Winterbourne Wind Farm

Amended Biodiversity Development Assessment Report

PREPARED FOR

WinterbourneWind Pty Ltd

DATE
20 September 2024

REFERENCE
0526676



DOCUMENT DETAILS

DOCUMENT TITLE	Winterbourne Wind Farm
DOCUMENT SUBTITLE	Amended Biodiversity Development Assessment Report
PROJECT NUMBER	0526676
Date	20 September 2024
Version	01
Authors	Mark Aitkens (Lead) Freya Robinson (Junior)
Client name	WinterbourneWind Pty Ltd

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	COMMENTS
Working Draft	0.1	F. Robinson	M. Aitkens	M. Davey	13.09.2024	Certified by Accredited Assessor
Final	01	-	-	M. Davey	19.09.2024	Final

SIGNATURE PAGE

Winterbourne Wind Farm

Amended Biodiversity Development Assessment Report

0526676



Freya Robinson
Ecologist



Mark Aitkens
Principal Ecologist / BAM Accredited Assessor



Simon Bennett
Project Manager



Dr Mark Davey
Partner

Environmental Resources Management
Australia Pty Ltd
Level 14, 207 Kent Street
Sydney NSW 2000
T +61 2 8584 8888

© Copyright 2024 by The ERM International Group Limited and/or its affiliates ('ERM'). All Rights Reserved.
No part of this work may be reproduced or transmitted in any form or by any means, without prior written permission of ERM.

CONTENTS

DECLARATIONS 1

EXECUTIVE SUMMARY 9

OVERVIEW 9

THE PROJECT 9

AREA SUBJECT TO ASSESSMENT 9

METHODS 11

BIODIVERSITY VALUES OF THE SUBJECT LAND 12

PRESCRIBED IMPACTS 19

CUMULATIVE IMPACTS 19

AVOID, MINIMISE AND MITIGATE 20

SERIOUS AND IRREVERSIBLE IMPACTS (SAII) 21

RESIDUAL IMPACTS AND BIODIVERSITY OFFSET LIABILITY 22

OFFSET STRATEGY 25

PREFACE 26

1. ASSESSMENT OVERVIEW 26

1.1 RELEVANT LEGISLATION AND POLICIES 26

1.1.1 Assessment Framework 27
1.1.2 Need for a BDAR 27
1.1.3 Application of the BAM 27
1.1.4 Matters of National Environmental Significance 28

1.2 BIODIVERSITY CREDITS AND CLASSES 29

1.3 ACCREDITED PERSON 30

1.4 DATA AND INFORMATION USED 30

1.5 BIODIVERSITY VALUES NOT ASSESSED 31

1.6 CATEGORY 1-EXEMPT LAND 32

1.7 STRUCTURE OF THE BDAR 34

1.8 BDAR VERSION HISTORY 34

STAGE 1: BIODIVERSITY ASSESSMENT 36

2. INTRODUCTION 36

2.1 PROPOSED DEVELOPMENT 36

2.1.1 Location 36
2.1.2 Development Description 43

2.2 METHODOLOGY 50

2.2.1 Site Context 50
2.2.2 Native Vegetation, Threatened Ecological Communities and Vegetation integrity 51

2.2.3 Threatened Flora Survey Methods 59
2.2.4 Threatened Fauna Survey Methods 66
2.2.5 Weather conditions 81
2.2.6 Limitations 86
2.2.7 Licencing 87

3. SITE CONTEXT 88
3.1 LANDSCAPE FEATURES 88
3.1.1 Aquatic Habitat 90
3.2 NATIVE VEGETATION COVER AND PATCH SIZE 91
3.2.1 Percent native vegetation cover in the landscape 91
3.2.2 Patch Size 93

4. NATIVE VEGETATION, THREATENED ECOLOGICAL COMMUNITIES AND VEGETATION INTEGRITY 95
4.1 NATIVE VEGETATION EXTENT 95
4.1.1 Mapped Native Vegetation 95
4.1.2 Areas that are Not Native Vegetation 95
4.2 IDENTIFY AND MAP PCTS 96
4.2.1 Classification 96
4.2.2 Floristic Composition 97
4.2.3 Plant Community Types 103
4.2.4 Vegetation Zones 136
4.2.5 Vegetation Integrity Scores 145
4.2.6 Threatened Ecological Communities 147
4.3 BIRD COMMUNITY COMPOSITION 154
4.3.1 Habitat 154
4.4 BAT COMMUNITY COMPOSITION 157

5. HABITAT SUITABILITY FOR THREATENED SPECIES 159
5.1 HABITAT SUITABILITY 159
5.1.1 Ecosystem Credit Species 159
5.1.2 Species Credit Species 162
5.1.3 Excluded Threatened Species 166
5.2 HABITAT SURVEYS - CANDIDATE SPECIES CREDIT SPECIES 168
5.2.1 Candidate Species Occurrence 168
5.3 SUPPLEMENTARY SEARS REQUIREMENTS 188

6. IDENTIFYING PRESCRIBED IMPACTS 191

STAGE 2: IMPACT ASSESSMENT (BIODIVERSITY VALUES AND PRESCRIBED IMPACTS) 193

7. AVOID AND MINIMISE IMPACTS 193
7.1 AVOID AND MINIMISE DIRECT AND INDIRECT IMPACTS 194
7.1.1 Avoid and Minimise Framework 195
7.1.2 Project Location and Design 198
7.1.3 Alternative Haul Routes 202
7.1.4 Further Measures to Avoid and Minimise Impacts 202
7.2 AVOID AND MINIMISE PRESCRIBED IMPACTS 204
7.2.1 Habitat Connectivity 204
7.2.2 Wind Turbine Strikes 204
7.2.3 Vehicle Strikes 205

7.3 BIRD AND BAT ADAPTIVE MANAGEMENT PLAN FRAMEWORK 205
7.3.1 Objectives and policy 205
7.3.2 Bird and Bat Survey Methods 207
7.3.3 Preliminary Turbine Risk Assessment 211
7.3.4 Heat Mapping 237
7.4 MATHEMATICAL COLLISION RISK MODELLING 241
7.4.1 Bird Utilisation Survey Guidelines 241
7.4.2 Assumed Bird Flight Activity 242
7.4.3 Species Morphometrics 242
7.4.4 Collision Risk Model Inclusion Criteria 242
7.4.5 Windfarm and WTG Parameters 243
7.4.6 Bird Species Parameters 244
7.4.7 Collision Risk Modelling Results 245
7.4.8 Collision Risk Model Peer Review Recommendations 245
7.4.9 Collision Risk Model Literature Review 247
7.4.10 Cumulative Collision Risk Assessment Framework 251
7.4.11 Assessment of Species Sensitivity 255
7.4.12 Cumulative Collision Risk Modelling 257
7.4.13 Ecologically Significant Mortality Thresholds 259
7.4.14 Identifying Joint Mitigation and Monitoring Actions 259
7.4.15 Monitoring Program 260
7.4.16 Handling Protocol and Training: Injured and Deceased Species 266
7.4.17 Trigger Action Response Plan 267
7.4.18 Mitigation Measures 271
7.4.19 Turbine Strike Notification 277
8. IMPACT ASSESSMENT 282
8.1 DIRECT IMPACTS 282
8.1.1 Change in Vegetation Integrity Score 285
8.2 INDIRECT IMPACTS 289
8.3 PRESCRIBED IMPACTS 294
8.3.1 Habitat Connectivity 294
8.3.2 Wind Turbine Strikes 294
8.3.3 Vehicle Strikes 294
8.4 CUMULATIVE IMPACTS 294
8.5 MITIGATING RESIDUAL IMPACTS – MANAGEMENT MEASURES AND IMPLEMENTATION 299
9. ASSESSING AND OFFSETTING IMPACTS 304
9.1 SERIOUS AND IRRIVERSIBLE IMPACTS 304
9.1.1 Assessment for Serious and Irreversible Impacts on Biodiversity Values 304
9.1.2 Additional Impact Assessment Provisions for TECs at Risk of an SAII 305
9.1.3 Proposed Additional Measures 314
9.1.4 SAII Impact Conclusion 314
9.2 IMPACT SUMMARY 314
9.2.1 Impacts that Require an Offset 314
9.2.2 Impacts that do not Require Further Assessment 314
10. APPLYING THE NO NET LOSS STANDARD 317
10.1 OFFSET REQUIREMENTS FOR DIRECT IMPACTS 317
10.1.1 Ecosystem Credits 317
10.1.2 Species Credits 322
10.2 OFFSET STRATEGY 322
11. CONCLUSION 323

11.1 BIODIVERSITY MATTERS REQUIRING ASSESSMENT 323
11.2 AVOID, MINIMISE AND MITIGATE 324
11.3 DIRECT IMPACTS ON ASSESSABLE BIODIVERSITY MATTERS 324
11.4 INDIRECT IMPACTS ON ASSESSABLE BIODIVERSITY MATTERS 325

12. REFERENCES 326

APPENDIX A NGH TECHNICAL MEMOS
APPENDIX B BAM FLORISTIC DATA
APPENDIX C BAM PLOT DATA
APPENDIX D BAT CALL ANALYSIS REPORTS
APPENDIX E EXPERT REPORT FOR *LITORIA CASTANEA*
APPENDIX F BIRD UTILISATION AND RAPTOR SURVEYS 2020 – 2022 (NATURE ADVISORY, 2022)
APPENDIX G BIODIVERSITY CREDIT REPORT

LIST OF TABLES

TABLE E-1 SUMMARY OF LANDCOVERS IN THE DISTURBANCE AREA 9
TABLE E-2 SUMMARY OF SURVEY EVENTS 11
TABLE E-3 BROAD CHARACTERISATION OF NATIVE VEGETATION COVER 12
TABLE E-4 PLANT COMMUNITY TYPES IN THE SUBJECT LAND 13
TABLE E-5 TECS WITHIN THE SUBLECT LAND 14
TABLE E-6 VEGETATION ZONES IN THE SUBJECT LAND 15
TABLE E-7 KEY DIFFERENCES BETWEEN LOW AND MODERATE CONDITION GRASSLANDS 17
TABLE E-8 SPECIES CREDIT SPECIES POLYGON EXTENT 17
TABLE E-9 UNAVOIDABLE IMPACTS ON TECS BY LAND TENURE (VIS >15) 21
TABLE E-10 SAII ENTITIES RELEVANT TO THE PROJECT 22
TABLE E-11 IMPACTS THAT REQUIRE OFFSET - ECOSYSTEM CREDITS 23
TABLE E-12 IMPACTS THAT REQUIRE OFFSET - SPECIES CREDITS 25
TABLE 1-1 REQUIREMENTS OF SUPPLEMENTARY SEARS 29
TABLE 2-1 SUBJECT LAND LOT AND DP DETAILS 38
TABLE 2-2 PROJECT COMPONENTS 43
TABLE 2-3 VEGETATION ZONE PLOT REQUIREMENTS 55
TABLE 2-4 THREATENED FLORA SURVEY SUMMARY 61
TABLE 2-5 FAUNA FIELD SURVEY EFFORT SUMMARY 68
TABLE 2-6 WEATHER CONDITIONS DURING THE PROJECT SURVEY PERIODS 81
TABLE 3-1 SUBJECT LAND LANDSCAPE FEATURES 88
TABLE 3-2 NATIVE VEGETATION COVER IN THE ASSESSMENT AREA 91
TABLE 4-1 SIMPER ANALYSIS OF CLUSTER GROUPS 97

TABLE 4-2	PCTS IDENTIFIED WITHIN THE SUBJECT LAND	103
TABLE 4-3	PCT 501 DESCRIPTION	107
TABLE 4-4	PCT 510 DESCRIPTION	109
TABLE 4-5	PCT 533 DESCRIPTION	112
TABLE 4-6	PCT 534 DESCRIPTION	114
TABLE 4-7	PCT 565 DESCRIPTION	117
TABLE 4-8	PCT 567 DESCRIPTION	119
TABLE 4-9	PCT 568 DESCRIPTION	121
TABLE 4-10	PCT 571 DESCRIPTION	123
TABLE 4-11	PCT 766 DESCRIPTION	125
TABLE 4-12	PCT 965 DESCRIPTION	127
TABLE 4-13	PCT 970 DESCRIPTION	129
TABLE 4-14	PCT 1192 DESCRIPTION	132
TABLE 4-15	PCT 1194 DESCRIPTION	134
TABLE 4-16	KEY DIFFERENCES BETWEEN LOW AND MODERATE CONDITION GRASSLANDS	136
TABLE 4-17	VEGETATION ZONES AND PATCH SIZES	137
TABLE 4-18	VEGETATION INTEGRITY SCORES	145
TABLE 4-19	THREATENED ECOLOGICAL COMMUNITIES INVESTIGATION	147
TABLE 4-20	EPBC ACT KEY DIAGNOSTIC CHARACTERISTICS AND CONDITIONS THRESHOLDS FOR NEW ENGLAND PEPPERMINT GRASSY WOODLAND TEC	149
TABLE 4-21	BC ACT KEY DIAGNOSTIC CHARACTERISTICS FOR THE ASSESSMENT OF NEW ENGLAND PEPPERMINT GRASSY WOODLAND TEC	150
TABLE 4-22	EPBC ACT KEY DIAGNOSTIC CHARACTERISTICS FOR THE ASSESSMENT OF BOX-GUM GRASSY WOODLAND TEC	151
TABLE 4-23	BC ACT KEY DIAGNOSTIC CHARACTERISTICS FOR THE ASSESSMENT OF BOX-GUM GRASSY WOODLAND TEC	152
TABLE 4-24	THREATENED BIRD SPECIES OBSERVED	155
TABLE 4-25	BAT CALL ANALYSIS RESULTS	157
TABLE 5-1	PREDICTED ECOSYSTEM CREDIT SPECIES	160
TABLE 5-2	FLORA CANDIDATE SPECIES	162
TABLE 5-3	FAUNA CANDIDATE SPECIES	164
TABLE 5-4	JUSTIFICATION FOR EXCLUSION	166
TABLE 5-5	THREATENED SPECIES EFFORT	169
TABLE 5-6	CANDIDATE SPECIES IDENTIFIED BY TARGETED SURVEY	175
TABLE 5-7	SUPPLEMENTARY SEARS OUTCOMES	189
TABLE 6-1	ASSESSMENT OF PRESCRIBED IMPACTS	191
TABLE 7-1	BIODIVERISTY FACTORS CONSIDERED IN PROJECT REDESIGN	195
TABLE 7-2	SITE SELECTION JUSTIFICATION CRITERIA	198

TABLE 7-3	PROJECT AMENDMENTS	200
TABLE 7-4	PROJECTS IMAPCT ON TECS WITH VIS >15	201
TABLE 7-5	TURBINE PRELIMINARY RISK MATRIX	211
TABLE 7-6	TURBINE PRELIMINARY RISK RATING	213
TABLE 7-7	CONSEQUENCES OF TURBINE STRIKE CRITERIA	216
TABLE 7-8	LIKELIHOOD OF TURBINE STRIKE CRITERIA	217
TABLE 7-9	RISK MATRIX OF RISK LEVEL BASED ON LIKELIHOOD AND CONSEQUENCE	218
TABLE 7-10	RISK ASSESSMENT SPECIFIC CRITERIA	218
TABLE 7-11	COLLISION RISK ASSESSMENT OF LISTED PRIORITY SPECIES	220
TABLE 7-12	COLLISION RISK MODEL INCLUSIVE CRITERIA	243
TABLE 7-13	WTG PARAMETERS FOR THE PROPOSED DEVELOPMENT	244
TABLE 7-14	SPECIES OBSERVED WITHIN THE RSA	244
TABLE 7-15	MODEL CRM ESTIMATED COLLISION NUMBERS PER ANNUM	245
TABLE 7-16	CRM PEER REVIEW RECOMMENDATIONS AND IMPLIMENTATION	246
TABLE 7-17	COMPARISON OF COLLISION RISK MODELS	249
TABLE 7-18	IDENTIFIED AT RISK SPECIES	253
TABLE 7-19	SPECIES SENSITIVE TO CUMULATIVE IMPACTS BASED ON FUNCTIONAL GROUPS	256
TABLE 7-20	NUMBER OF REPLICATES OF BIRD AND BAT CARCASSES FOR DETECTABILITY TRIALS	264
TABLE 7-21	PROPOSED MITIGATION MEASURES, TIMING, PERFORMANCE CRITERIA AND CORRECTIVE ACTIONS	273
TABLE 7-22	SPECIES INDICATIVE SIGNIFICANT IMPACT THRESHOLD	277
TABLE 7-23	MANAGEMENT ACTIONS	279
TABLE 8-1	SUMMARY OF IMPACTS TO NATIVE VEGETATION	282
TABLE 8-2	SUMMARY OF RESIDUAL IMPACTS TO THREATENED SPECIES AND THREATENED SPECIES HABITAT	284
TABLE 8-3	IMPACTS TO VEGETATION INTEGRITY	285
TABLE 8-4	SUMMARY OF RESIDUAL INDIRECT IMPACTS	290
TABLE 8-5	POTENTIAL CUMULATIVE IMPACTS	296
TABLE 8-6	SUMMARY OF PROPOSED MITIGATION AND MANAGEMENT MEASURES FOR RESIDUAL IMPACTS (DIRECT, INDIRECT AND PRESCRIBED)	300
TABLE 10-1	IMPACTS THAT REQUIRE AN OFFSET – ECOSYSTEM CREDITS	317
TABLE 10-2	ECOSYSTEM CREDIT CLASS AND MATCHING CREDIT PROFILE	320
TABLE 10-3	IMPACTS THAT REQUIRE AN OFFSET – SPECIES CREDITS	322
TABLE 11-1	SUMMARY OF LAND COVERS IN THE SUBJECT LAND	323

LIST OF FIGURES

FIGURE 1-1	DRAFT LAND CATEGORISATION OF THE SUBJECT LAND	33
FIGURE 2-1	LOCATION MAP	37
FIGURE 2-2	THE SUBJECT LAND	42
FIGURE 2-3	PROPOSED PROJECT LAYOUT	45
FIGURE 2-4	PORT OF NEWCASTLE TO WALCHA HAUL ROUTES	48
FIGURE 2-5	WALCHA TO THE PROJECT AREA HAUL ROUTES	49
FIGURE 2-6	VEGETATION SURVEY LOCATIONS	58
FIGURE 2-7	TARGETED THREATENED FLORA SURVEY EFFORT 2020 – 2021	64
FIGURE 2-8	TARGETED THREATENED FLORA SURVEY EFFORT 2023 – 2024	65
FIGURE 2-9	TARGETED THREATENED AMPHIBIAN SURVEY EFFORT	73
FIGURE 2-10	TARGETED THREATENED RAPTOR SURVEY EFFORT	74
FIGURE 2-11	TARGETED THREATENED DIURNAL BIRD SURVEY EFFORT	75
FIGURE 2-12	TARGETED THREATENED NOCTURNAL BIRD SURVEY EFFORT	76
FIGURE 2-13	TARGETED THREATENED BAT SURVEY EFFORT	77
FIGURE 2-14	TARGETED THREATENED TERRESTRIAL MAMMAL SURVEY EFFORT	78
FIGURE 2-15	TARGETED THREATENED ARBOREAL MAMMAL SURVEY EFFORT	79
FIGURE 2-16	TARGETED THREATENED REPTILE SURVEY EFFORT	80
FIGURE 3-1	NSW HYDROGRAPHY MAPPING	92
FIGURE 3-2	NATIVE VEGETATION COVER OF THE ASSESSMENT AREA	94
FIGURE 4-1	PLANT COMMUNITY TYPES	106
FIGURE 4-2	VEGETATION ZONES WITHIN THE SUBJECT LAND	144
FIGURE 4-3	THREATENED ECOLOGICAL COMMUNITIES WITHIN THE SUBJECT LAND	153
FIGURE 4-4	STICK NESTS AND LISTED BIRD SIGHTINGS WITHIN THE PROJECT AREA	156
FIGURE 5-1	MPORTANT HABITAT MAPPING IN PROXIMITY TO THE SUBJECT LAND	167
FIGURE 5-2	SPECIES POLYGON FOR BARKING OWL (*NINOX CONNIVENS*)	179
FIGURE 5-3	SPECIES POLYGON FOR BLUEGRASS (*DICHANTHIUM SETOSUM*)	180
FIGURE 5-4	SPECIES POLYGON FOR KOALA (*PHASCOLARCTOS CINEREUS*)	181
FIGURE 5-5	SPECIES POLYGON FOR NARROW-LEAVED BLACK PEPPERMINT (*EUCALYPTUS NICHOLII*)	182
FIGURE 5-6	SPECIES POLYGON FOR SOUTH-EASTERN GLOSSY BLACK-COCKATOO (*CALYPTORHYNCHUS LATHAMI LATHAMI*)	183
FIGURE 5-7	SPECIES POLYGON FOR SOUTHERN GREATER GLIDER (PETAUROIDES VOLANS)	184
FIGURE 5-8	SPECIES POLYGON FOR SOUTHERN MYOTIS (*MYOTIS MACROPUS*)	185
FIGURE 5-9	SPECIES POLYGON FOR SQUIRREL GLIDER (*PETAURUS NORFOLCENSIS*)	186
FIGURE 5-10	SPECIES POLYGON FOR LEAFLESS TONGUE ORCHID (CRYPTOSTYLIS HUNTERIANA)	187
FIGURE 7-1	VIS BY BAM PLOT WITHIN THE PROJECT AREA	196

FIGURE 7-2	'LOW' AND 'MODERATE TO HIGH' CONSERVATION GRASSLANDS BY BAM PLOT	197
FIGURE 7-3	ORIGINAL AND CURRENT DEVELOPMENT FOOTPRINTS	203
FIGURE 7-4	LOCATIONS OF BIRD UTILISATION SURVEYS CONDUCTED	209
FIGURE 7-5	LOCATIONS OF ANABAT DETECTORS DEPLOYED	210
FIGURE 7-6	TURBINE PRELIMINARY RISK RATING	215
FIGURE 7-7	TOTAL BIRD SPECIES ABUNDANCE RECORDED AT BUS POINTS	238
FIGURE 7-8	SPECIES ABUNDANCE IN THE RSA BY DISTANCE FROM BUS LOCATION	240
FIGURE 9-1	IMPACTS REQUIRING OFFSET	315
FIGURE 9-2	IMPACTS NOT REQUIRING ASSESSMENT	316

ACRONYMS AND ABBREVIATIONS

Name	Description
ALA	Atlas of Living Australia
ANOSIM	Analysis of Similarity
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BBAMP	Bird and Bat Adaptive Management Plan
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BCS	Biodiversity Conservation Science Directorate (NSW)
BC Regulation	*Biodiversity Conservation Regulation 2017* (NSW)
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
CRM	Collision Risk Modelling
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cwlth)
DECCW	Department of Environment, Climate Change and Water (NSW)
DP	Deposited Plan
DPE	Department of Planning and Environment (NSW)
DPI	Department of Primary Industries (NSW)
DPHI	Department of Planning Housing and Infrastructure
EEC	Endangered Ecological Community
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometres
kV	Kilovolts
LGA	Local Government Area
m	Metres
MW	Megawatts
MWh	Megawatt-hours
MNES	Matters of National Environmental Significance
NA	Nature Advisory Pty Ltd
NEM	National Electricity Market
NGH	NGH Environmental Pty Ltd

Name	Description
nMDS	Non-metric Multidimensional Scaling
NP	National Park
NSW	New South Wales
O&M	Operations and Maintenance
OEH	Office of Environment and Heritage (NSW)
OSOM	Oversized and Overmass
PCT	Plant Community Type
PMST	Protected Matters Search Tool
PP	Pinch Point
REZ	Renewable Energy Zone
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SVTM	State Vegetation Type Map
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VIS	Vegetation Integrity Score
VMP	Vegetation Management Plan
VZ	Vegetation Zone
WTG	Wind Turbine Generator

DECLARATIONS

Certification under clause 6.15 Biodiversity Conservation Act 2016

I, Mark Aitkens, certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the ***Biodiversity Conservation Act 2016*** (BC Act).

Signature:	
Date:	13 September 2024

BAM Assessor Accreditation Number: BAAS17034

Details and experience of contributors to the preparation of the BDAR

AUTHORS AND CONTRIBUTORS

Name	BAM Assessor Accreditation no.	Position/Role	Tasks performed	Relevant qualifications
Environmental Resources Management Pty Ltd (ERM)				
Mark Aitkens	BAAS17034	ERM – Principal Ecologist/Technical Lead	• Lead author • Technical Review	• BAM Accredited Assessor • Bachelor of Science (Environmental Biology)
Matt Davis	BAAS18090	ERM – Principal Ecologist	• Technical Review	• BAM Accredited Assessor • Master of Environmental Management, Conservation Biology • Bachelor of Science Ecology and Conservation Biology
Lorena Boyle	BAAS23027	ERM – Senior Ecologist	• Targeted threatened fauna surveys • Bird Utilisation Surveys	• BAM Accredited Assessor • Bachelor of Zoology
Dr Mark Davey	-	ERM – Project Director	• Quality Assessment Review	• PhD Marine Ecology • Graduate Certificate Marine Science • Bachelor of Applied Science (Aquatic Ecology)
Simon Bennett	-	ERM - Project Manager	• Quality Assessment Review	• Registered Environmental Assessment Practitioner • Bachelor of Science (Applied Geography) • Master of Project Management • Master of Urban Design
Timothy Callaghan	-	ERM - Senior Ecologist	• Targeted threatened flora surveys • BAM Plots	• Bachelor of Environmental Science & Management

Name	BAM Assessor Accreditation no.	Position/Role	Tasks performed	Relevant qualifications
Freya Robinson	-	ERM – Ecologist	• Junior author • Bird Utilisation Surveys	• Bachelor of Biological Science (Ecology and Botany) • Graduate Certificate of Agriculture & Environment
Robert Ashworth	-	ERM - Ecologist	• Junior author (collision risk assessment) • Bird Utilisation Surveys	• Bachelor of Science (Ecology and Conservation Biology) • Masters of Environment, restoration and Conservation
Michael Thompson	-	ERM – Ecologist	• Bird Utilisation Surveys	• Bachelor of Science (Zoology) • Graduate Certificate of Environmental Management
Shenna van Mellick	-	ERM – Ecologist	• Bird Utilisation Surveys	• Bachelor of Animal Ecology
Kelsie Youman	-	ERM – Ecologist	• Bird Utilisation Surveys	• Bachelor of Science (Hons) (Ecology and Conservation Biology)
Laura Steineger	-	ERM – Ecologist	• Bird Utilisation Surveys	• Bachelor of Wildlife Science
Kai Henderson	-	ERM – Ecologist	• Targeted threatened flora surveys • Bird Utilisation Surveys	• Bachelor of Environmental Management
Samantha Maher	-	ERM – Ecologist	• Targeted threatened fauna surveys	• Bachelor of Environmental Science and Management (Honours)
Sebastian Madden	-	ERM – Ecologist	• Bird Utilisation Surveys • Targeted threatened fauna surveys • Targeted threatened flora surveys	• Master of Conservation Biology
Viet Nguyen	-	ERM – Geographic Information System (GIS) Consultant	• GIS mapping and calculations • Figure preparation	• Master of Environmental Management

Name	BAM Assessor Accreditation no.	Position/Role	Tasks performed	Relevant qualifications
Nature Advisory Pty Ltd (NA)				
Candice Larkin	-	NA – Ecologist	• Bird Utilisation Surveys	-
Dr Ahmad Barati	-	NA – Ecologist	• Bird Utilisation Surveys	-
Peter Lansley	-	NA – Ecologist	• Bird Utilisation Surveys	-
NGH Environmental Pty Ltd (NGH)				
Beth Noel	BAAS19015	NGH – Senior Ecologist	• Technical Review	• BAM Accredited Assessor • Master of Wildlife Management • Bachelor of Applied Science (Honours, Geology)
Daniel Perkovic	BAAS21013	NGH – Senior Ecologist	• BAM plots	• BAM Accredited Assessor • Bachelor of Arts (LLB) • Certificate III in Conservation Land Management • Diploma of Conservation Land Management
Elijah Elias	BAAS21012	NGH – Senior Ecologist	• BAM plots	• BAM Accredited Assessor • Bachelor of Biodiversity Conservation
Mitch Palmer	BAAS17051	NGH – Senior Ecologist	• Field survey planning	• BAM Accredited Assessor • Bachelor of Science • Member of the Environmental Institute of Australia and New Zealand (MEIANZ)
Aleksei Atkin	BAAS17093	NGH – Senior Ecologist	• Field survey planning	• BAM Accredited Assessor • Master of Wildlife Management • Bachelor of Natural Science
Gillian Young	BAAS17086	NGH – Senior Ecologist	• BAM Plots • Targeted threatened flora surveys	• BAM Accredited Assessor • Bachelor of Natural Resources (Honours)

Name	BAM Assessor Accreditation no.	Position/Role	Tasks performed	Relevant qualifications
Elise Keane	BAAS23013	NGH – Senior Ecologist	• BAM Plots • Targeted threatened fauna surveys • Targeted threatened flora surveys	• Master of Environmental Management and Sustainability • Bachelor of Environmental Science (Wildlife and Conservation Biology)
Giorginna Xu	-	NGH – Ecologist	• Targeted threatened fauna surveys • Targeted threatened flora surveys	• Bachelor of Environmental Science
Rachel Buzio	-	NGH – Ecologist	• Targeted threatened fauna surveys	• Bachelor of Marine Science • Member of Australian Association of Bush Regenerators (AABR)
Teah Wills	-	NGH – Ecologist	• Targeted threatened fauna surveys	• Graduate Diploma Environmental Management • Bachelor of Environmental Biology
Nick Weigner	-	NGH – Ecologist	• Targeted threatened fauna surveys	• Bachelor of Science (Honours, Zoology and Ecology)
Isaac Higgs	-	NGH – Technical Assistant	• Targeted threatened fauna surveys	-
Jacob White	-	NGH – Technical Assistant	• Targeted threatened fauna surveys • Targeted threatened flora surveys	-
Noah Bruce-Allen	-	NGH – Technical Assistant	• Targeted threatened fauna surveys • Targeted threatened flora surveys	-
James Mitchell Wiliams	-	NGH – Technical Assistant	• Targeted threatened flora surveys	-
James Hagan	-	NGH – Ecologist	• Targeted threatened fauna surveys • Targeted threatened flora surveys	-

Name	BAM Assessor Accreditation no.	Position/Role	Tasks performed	Relevant qualifications
Stella O'Dwyer	-	NGH – Ecologist	• Targeted threatened fauna surveys • Targeted threatened flora surveys	-
Tom Fletcher	-	NGH – Ecologist	• Targeted threatened fauna surveys • Targeted threatened flora surveys	-
Ben Sloggett	-	NGH – Ecologist	• Targeted threatened fauna surveys • Targeted threatened flora surveys	-
Specialist Consultants/Subcontractors				
Greg Ford	-	Balance! Environmental - Director and Principal Consultant	• Bat call analysis	• Bachelor of Applied Science (Biology) (Zoology and Botany)
Lachlan McRae	-	Lachlan McRae Fauna Services	• Bat call analysis	• Bachelor of Environmental Science and Management (first class Honours)
Kelly Matthews	-	GreenTape Solutions – Principal Ecologist	• Bat call analysis	-
Georgeanna Story	-	ScatsAbout – Environmental Consultant	• Hair sample analysis	-
Dr David Dique	-	ERM – Lead Partner	• Koala scat analysis	• Doctor of Philosophy (PhD) (Zoology/Animal Biology) • Bachelor of Natural Resources (Honours, Ecology)
Barbara Triggs	-	Author of Tracks Scats and other traces	• Koala scat analysis	-
Ben Nottidge	-	GreenLeaf Ecology – Ecologist	• Targeted threatened fauna surveys • Targeted threatened flora surveys	-

Name	BAM Assessor Accreditation no.	Position/Role	Tasks performed	Relevant qualifications
Dr John Hunter	-	JHT – Ecologist	• BAM Plots • Targeted threatened fauna surveys • Targeted threatened flora surveys	• Doctor of Philosophy (PhD, Biogeography) • Bachelor of Science (First Class Honours, Botany, Zoology and Plant Systematics)
Wendy Hawes	-	JHT – Ecologist	• Targeted threatened fauna surveys	-
Vanessa Hunter	-	JHT – Ecologist	• Targeted threatened flora surveys	-
Cal Hunter	-	JHT – Ecologist	• Targeted threatened flora surveys	-
Dr Frank Lemckert	-	Eco Logical – Principal Ecologist	• Targeted threatened fauna surveys	• Doctor of Philosophy (PhD, Ecology, Evolution, Systematics, and Population Biology and Conservation Biology) • Master of Science (Ecology)
David Carr	BAAS18049	Stringy Bark Ecology – Ecologist	• BAM Plots	• BAM Accredited Assessor
Wendy Chapel	-	Stringy Bark Ecology – Ecologist	• BAM Plots	-
Dr Damian Licari	BAAS18006	Ascent Ecology – Principal Ecologist	• BAM Plots • Targeted threatened fauna surveys • Targeted threatened flora surveys	• Doctor of Philosophy (PhD) (Ecology) • Bachelor of Science (Honours) (Applied Geography)
Kaelen Were	-	Ascent Ecology – Ecologist	• BAM Plots • Targeted threatened fauna surveys • Targeted threatened flora surveys	-

Conflict of Interest

I, Mark Aitkens, declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interest of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature:	
Date:	13 September 2024

BAM Assessor Accreditation Number: BAAS17034

EXECUTIVE SUMMARY

OVERVIEW

Winterbourne Wind Pty Ltd (the Applicant) proposes to construct, operate, maintain, and decommission the Winterbourne Wind Farm (the Project) within the rural locality of Walcha, New South Wales (NSW). The Applicant seeks development approval under Part 4 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) as a State Significant Development (SSD) requiring preparation of a Biodiversity Development Assessment Report (BDAR) as the Project has a significant impact on biodiversity values (s7.14 of the *Biodiversity Conservation Act 2016* (BC Act)).

This amended BDAR has been prepared to assess impacts relating to the amended Project and to address matters raised in public and agency submissions, particularly agency advice provided by the Biodiversity Conservation and Science (BCS) Directorate.

THE PROJECT

The Project involves the construction, operation, maintenance and decommissioning of:

- Up to 118 Wind Turbine Generators (WTG) with a hub height of 149 metres (m) and maximum height tip height of 230 m (vertical tip);
- A Battery Energy Storage System (BESS) of up to 100 MW/200 MWh capacity;
- Two 33/330 kV electrical substations, including control room, transformers, circuit breakers, switches, and other ancillary equipment; and
- Ancillary infrastructure including (but not limited to) internal access tracks, road upgrades, meteorological masts (met masts), and an operation and maintenance (O&M) facility.

AREA SUBJECT TO ASSESSMENT

The Project is a linear development comprising impacts on vegetated and unvegetated surfaces. For the purposes of this BDAR, the Subject Land is defined as the area of direct impact on native vegetation outlined in Table E-1, which comprises an area of 853.98 ha.

TABLE E-1 SUMMARY OF LANDCOVERS IN THE DISTURBANCE AREA

Disturbance	Landcover Class	Landcover Character	Tenure	Draft NVM Land Category	Area (ha)
Surface	Vegetated	Native	Freehold	Category 1 Category 2	382.39 368.95
			Road reserve	Category 1 Category 2 N/A	17.52 76.30 0.48
		Cleared for grazing	Freehold	Category 1	38.75
		Exotic	Freehold	Category 1	0.10

Disturbance	Landcover Class	Landcover Character	Tenure	Draft NVM Land Category	Area (ha)
				Category 2	0.16
			Road reserve	Category 2 N/A	0.01 0.91
	Unvegetated	Water Roads	Freehold Road reserve	Category 1 Category 1	0.23 15.49
Transmission Line	Tree Canopy	Native	Freehold	Category 2	8.83
		Exotic	Freehold	Category 1 Category 2	0.14 0.06

The assessment excludes the evaluation of direct impacts on non-native vegetation within the Subject Land (i.e., 56.34 ha) as identified in Table E-1 and listed below:

- Roads and tracks;
- Cleared for grazing (i.e., mostly exotic with limited native vegetation cover);
- Exotic (i.e., tree plantings such as pine trees); and
- Open water.

Large areas of the Subject Land comprise low condition grassland that could be excluded from the assessment but have been retained due to the small presence of common resilient native grasses and herbs. An example of the commonly encountered degraded 'low condition grassland' is as follows.

PLATE A LOW CONDITION GRASSLAND



Impacts on biodiversity that do not involve the clearing of native vegetation (i.e., prescribed impacts) are also evaluated in the BDAR. Lands with native vegetation impacted by the Project along the haul route to the Project Area from the Port of Newcastle are included in the Subject Land assessed in the BDAR. The remaining area need not form part of this assessment.

METHODS

Impacts to biodiversity values have been assessed in accordance with the Biodiversity Assessment Method 2020 (BAM) (DPIE 2020).

The mapping of native vegetation at a high resolution (i.e., capture scale of 1:1,000 or better (Section 4.1 of the BAM)) has substantially assisted the identification of impact avoidance outcomes during the design process. The mapping of woody vegetation and its separation from areas of treeless grasslands used for agricultural purposes has resulted in the avoidance of high VIS vegetation cover; this being a core BAM principle for demonstrating impact avoidance (Section 7.1 of the BAM). By directing impacts away from woody vegetation, the high-resolution vegetation mapping used in this assessment has encouraged the Applicants design team to preferentially utilise low condition grasslands and, where unavoidable, use moderate condition grasslands. Courser vegetation mapping such as the State Vegetation Type Map is captured at a broader scale (e.g., 5m pixel scale for woody vegetation) and is unsuitable for such purposes as it generally overestimates the extent of woody vegetation cover. Such mapping is informative at a landscape scale but lacks the detail necessary to encourage the application of sensitive design principles. The Project design has incorporated considerable impact avoidance measures, which reflects in the residual impact calculated for the Project.

Field surveys were undertaken over more than 25 events, by three consulting companies, as summarised in Table E-2.

TABLE E-2 SUMMARY OF SURVEY EVENTS

Season	Dates	Survey Methods
Environmental Resources Management Australia Pty Ltd (ERM)		
Spring 2019	8-21 November 2019	BAM plots to measure vegetation integrity scores (VIS), Habitat Quality Assessments, Bird Utilisation Surveys (BUS), targeted threatened fauna surveys
Summer 2020	13-26 February 2020	BAM plots to measure VIS, Habitat Quality Assessments, Rapid Vegetation Assessments, targeted threatened fauna surveys
Autumn 2022	14-16 March 2022	BUS
Autumn 2023	22-25 May 2023	Anabat deployment
Winter 2023	13-19 August 2023	BUS
Spring 2023	25 September 2023	Anabat deployment
	6-10 November 2023	BUS
Summer 2023/24	7 December 2023	Habitat Quality Assessments
Winter 2024	28-30 June; 23 July; August 2024	BAM plots to measure VIS

Season	Dates	Survey Methods
Nature Advisory Pty Ltd		
Spring 2020	5-16 October 2020	BUS, Anabat deployment
Autumn 2021	8 March - 22 April 2021	BUS, Anabat deployment
Summer 2021/22	3-8 January 2022	BUS
NGH Environmental Pty Ltd		
Winter 2020	10-14 August 2020	Rapid Vegetation Assessments, targeted threatened fauna surveys
Spring 2020	28 September- 2 October and November 2020	BAM plots to measure VIS, targeted threatened flora surveys
Autumn 2021	8-12 March 2021	BAM plots to measure VIS, Rapid Vegetation Assessments, Targeted threatened fauna surveys, Targeted threatened flora surveys
	29 March – 1 April 2021	Targeted threatened fauna surveys, Targeted threatened flora surveys
Winter 2021	23-27 August 2021	Targeted threatened fauna surveys, Habitat Quality Assessments
Spring 2021	10-29 October 2021	Targeted threatened fauna surveys
	15-16 November 2021	Targeted threatened flora surveys, Rapid Vegetation Assessments
Summer 2021/22	6-17 December 2021	Targeted threatened fauna surveys, Targeted threatened flora surveys
Spring 2023	18-22 September 2023	Habitat Quality Assessments, Targeted threatened fauna surveys
	3-6 October 2023	Habitat Quality Assessments, Targeted threatened fauna surveys
	23-25 October 2023	Targeted threatened flora surveys
Summer 2023/24	4-7 December 2023	BAM plots to measure VIS, Rapid Vegetation Assessments, Targeted threatened flora surveys
	29 January - 3 February 2024	BAM plots to measure VIS, Habitat Quality Assessments, Targeted threatened flora surveys

BIODIVERSITY VALUES OF THE SUBJECT LAND

According to the rules specified in the BAM for mapping native vegetation, the Subject Land comprises 853.98 ha of native vegetation cover of varying plant community type (PCT) and condition. A broad summary of this native vegetation cover is provided in Table E-3.

TABLE E-3 BROAD CHARACTERISATION OF NATIVE VEGETATION COVER

Native vegetation cover	Description	Area
Woody vegetation cover	Landcover comprising plants of the tree or shrub lifeform	123.81

Native vegetation cover	Description	Area
Sedgeland	Naturally occurring non-woody vegetation	1.58
Moderate condition grassland	Landcover derived from a woody vegetation type not comprising plants from the tree or shrub lifeform. Moderate to high groundcover species richness and/or per cent cover	184.24
Low condition grassland	Landcover derived from a woody vegetation type not comprising plants from the tree or shrub lifeform. Low to moderate groundcover species richness and/or per cent cover	544.35

Field survey performed to aid aerial photography interpretation and vegetation mapping includes:

- At least 299 BAM plots;
- 220 roadside observation points;
- ~500 rapid data points; and
- ~ 50 point intercept/step point 100m transects.

Mapping was performed at a capture scale of 1:1,000 or less. Great care was taken to map woody vegetation separately to non-woody vegetation. The woody matrix was subsequently mapped to better approximate woody vegetation patches in a highly fragmented cleared landscape. Accurate vegetation mapping was an important input into the design process as it aided meaningful decisions in the avoidance/minimization of impacts on higher condition state native vegetation (i.e., intact woody patches with intact function attributes such as tree canopy and stems, hollows, fallen logs and leaf litter).

The BAM requires all lands comprising native vegetation to be included in the extent of native vegetation cover and accordingly assigned to a PCT. The above-described native vegetation cover was further classified into PCTs as detailed in Table E-4.

TABLE E-4 PLANT COMMUNITY TYPES IN THE SUBJECT LAND

PCT	PCT Name	Area (ha)
501	Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion	7.18
510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	68.53
533	New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	0.62
534	New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	96.88
565	Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	7.67
567	Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	126.37
568	Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	214.56

PCT	PCT Name	Area (ha)
571	Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England	45.46
766	Carex sedgeland of the slopes and tablelands Bioregion and NSW North Coast Bioregion	1.58
965	Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	133.02
970	Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	130.25
1192	Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland	17.34
1194	Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	4.50
Total		**853.98**

Four threatened ecological communities (TECs) in varying condition states have been mapped within the Subject Land. The total area of these TECs agnostic to condition state is listed in Table E-5.

TABLE E-5 TECS WITHIN THE SUBLECT LAND

TEC	PCTs	Structure	Area (ha)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	510	Woody	4.61
		Non-woody	63.93
New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion	533, 534	Woody	6.43
		Non-woody	90.39
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	766	Wetland	1.58
Ribbon gum - mountain gum - snow gum grassy forest/woodland of the New England Tableland Bioregion	1192, 1194	Woody	3.42

Multiple vegetation zones (VZs) for each PCT were established following the granular examination of vegetation cover to represent the varying condition states occurring within the Subject Land. Land tenure was also considered in determining VZ (i.e., freehold land and crown land in road reserves). A total of 62 VZs were identified and mapped using vegetation structure as the main discriminator (e.g., grasslands, open woodlands, woodlands and open forest). The VZs of the Subject Land are listed in Table E-6 together with the VIS calculated from associated BAM plots. VZs emphasized in bold represent those with a low biodiversity value.

TABLE E-6 VEGETATION ZONES IN THE SUBJECT LAND

VZ	PCT	Condition/vegetation zone name	Area (ha)	VIS
1	510	DC_woodland	1.48	67.6
2	510	DC_openwoodland	0.49	50.9
3	510	DC_mod_grassland	13.22	28.1
4	510	LRC_mod_grassland	5.47	31.4
5	510	LRC_openwoodland	1.35	49.9
6	510	TL_canopy	1.29	62.5
7	533	DC_openwoodland	0.06	48.1
8	533	DC_modgrassland	0.49	26
9	533	TL_canopy	0.08	51.1
10	534	DC_woodland	1.2	59.2
11	534	DC_openwoodland	0.59	25.1
12	534	DC_mod_grassland	13.7	29.9
13	**534**	**LRC_mod_grassland**	**12.37**	**14.9**
14	534	LRC_openwoodland	3.25	68.1
15	534	LRC_canopy	1.26	56.1
16	565	DC_woodland	2.22	50.5
17	**565**	**DC_openwoodland**	**0.12**	**15.3**
18	**565**	**DC_mod_grassland**	**3.27**	**9.3**
19	567	DC_woodland	12.95	78.3
20	567	DC_openwoodland	0.71	19.3
21	567	DC_mod_grassland	21.65	35.3
22	567	LRC_woodland	0.77	86.4
23	567	LRC_mod_grassland	3.26	24.4
24	567	TL_canopy	1.49	70.3
25	568	DC_openforest	6.27	64.7
26	568	DC_woodland	30.47	61.5
27	568	DC_openwoodland	1.66	21.5
28	568	DC_mod_grassland	60.95	25.3
29	568	TL_canopy	2.57	55.5
30	571	DC_openwoodland	10.47	60.7
31	**571**	**DC_mod_grassland**	**16.07**	**14.7**
32	766	DC_sedgeland	1.18	62.8
33	**766**	**LRC_sedgeland**	**0.4**	**2.2**
34	965	DC_openforest	2.18	56.5

VZ	PCT	Condition/vegetation zone name	Area (ha)	VIS
35	965	DC_woodland	12.82	29.5
36	**965**	**DC_shrubland**	**0.95**	**7.4**
37	**965**	**DC_mod_grassland**	**4.29**	**8.6**
38	965	LRC_openforest	0.84	75.7
39	**965**	**LRC_mod_grassland**	**0.27**	**1**
40	965	TL_canopy	1.26	41.9
41	970	DC_openforest	4.86	74.6
42	970	DC_openwoodland	11.19	51
43	**970**	**DC_mod_grassland**	**24.29**	**13.3**
44	970	LRC_openwoodland	0.4	38.8
45	970	LRC_openforest	0.86	74.3
46	**970**	**LRC_mod_grassland**	**1.12**	**12.7**
47	970	TL_canopy	0.88	75.2
48	1192	DC_woodland	2.45	30.3
49	1192	LRC_woodland	0.82	34.6
50	1194	DC_openwoodland	0.93	48.2
51	**1194**	**DC_low_grassland**	**3.58**	**4.5**
52	501	DC_woodland	2.65	75
53	501	DC_mod_grassland	4.53	24.6
54	**510**	**low_grassland**	**45.22**	**9.5**
55	**534**	**low_grassland**	**64.51**	**11.4**
56	**565**	**low_grassland**	**2.06**	**10.5**
57	**567**	**low_grassland**	**85.54**	**11.6**
58	**568**	**low_grassland**	**112.65**	**10.8**
59	**571**	**low_grassland**	**18.92**	**10.9**
60	**965**	**low_grassland**	**110.41**	**3.2**
61	**970**	**low_grassland**	**86.65**	**7.4**
62	1192	low_grassland	14.07	19.4

The mapping of low and moderate condition grasslands was initially delineated by land categorization as published Draft Native Vegetation Regulatory map. Non-woody vegetation cover aligning with Category 1 exempt lands were generally assigned 'low condition grasslands' unless otherwise modified by available site data. On this basis, an estimated 352.18 ha of Category 1 exempt lands occur within the Subject Land, although this estimate has not been verified using *Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme* (DPE 2023). A greater extent of Category 1 exempt lands is likely as the zoned rural lands have been extensively used for agriculture for over a century.

Non-woody vegetation aligned to Category 2 lands were identified as 'moderate grassland' unless otherwise modified by available data. Where uncertainty exists (i.e., insufficient evidentiary data), non-woody grasslands were assigned to a 'moderate condition' state.

This approach to mapping low condition grasslands was verified by key metrics extracted from the BAM plot data (n=118 plots). Significant differences in exotic/native vegetation cover and plant species diversity were observed between plots sampling low and moderate condition grasslands. A summary of key differences is outlined in demonstrated in Table E-7.

TABLE E-7 KEY DIFFERENCES BETWEEN LOW AND MODERATE CONDITION GRASSLANDS

Grassland Type	Plots (count)	Average Exotic cover (%)	Average high threat weed cover (%)	Average native cover (%)	Average Shannon-Weiner Diversity	Average Evenness
low condition grassland	40	70.68	42.18	25.17	1.05	0.43
moderate condition grassland	78	23.45	13.14	82.25	1.37	0.56

The assignment of non-woody vegetation to a low condition grassland state is supported by the BAM Plot data. A mean VIS of 10.4±4.3 calculated from BAM plot data located in low condition grasslands verifies this condition state assignment (i.e., VIS, which is <15). Low condition grasslands typically have high exotic plant species richness/cover and low native plant species richness/cover. These factors in combination are indicative of low average diversity measures. These grasslands are heavily modified and are, by definition, sufficiently degraded to not support habitat constraints or microhabitats for species credit species.

A mean VIS of 19.4±10.4 for moderate condition grasslands is higher than that calculated for low condition grasslands, thus generally verifying this condition state assignment. However, the relatively higher variance (twice that for low condition grasslands) reflects the uncertainty in correctly assigning condition state to some VZ (i.e., where doubt existed, the condition state of the grassland was assigned to a moderate class). As shown in Table E-7, some the moderate condition grassland VZs had a VIS consistent with that calculated for low condition grasslands.

Species polygons were established for threatened species classed as 'species credit species' in the Threatened Biodiversity Database Collection (TBDC) where occurring or assumed to occur within the Subject Land. A species polygon was developed for eight species credit species with extent reflective of the VZ condition state or extent of occurrence as outline in Table E-8.

TABLE E-8 SPECIES CREDIT SPECIES POLYGON EXTENT

Species credit species	Polygon extent
Barking Owl (*Ninox connivens*)	800 m radius from suitable hollow-bearing tree intersecting with woody PCTs. Excludes grasslands.
Bluegrass (*Dichanthium setosum*)	Polygon comprising occurrence.
Leafless Tongue Orchid (*Cryptostylis hunteriana*)	Assumed presence. Extent of associated PCTs 533 and 1192 in a woody state (i.e., not grasslands).

Species credit species	Polygon extent
Koala (*Phascolarctos cinereus*)	Suitable PCTs with preferred feed trees. Excludes grasslands. VZs 1, 2, 5, 6, 7, 9, 10, 11, 14, 15, 16, 19, 20, 22, 24, 25, 26, 27, 29, 30, 34, 35, 38, 40, 41, 42, 44, 45, 47, 48, 49, 50 and 52.
Narrow-leaved Black Peppermint (*Eucalyptus nicholii*)	Count of individuals that will or may be adversely impacted. Conservative estimate for known locations of this species.
South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*)	200 m radius from suitable hollow-bearing tree intersecting with woody PCTs. Excludes grasslands. Conservative estimate of impacts as polygon includes PCTs that do not contain *Allocasuarina* spp..
Southern Greater Glider (*Petauroides volans*)	Suitable PCTs with preferred feed trees. Excludes grasslands. VZs 1, 2, 5, 6, 19, 20, 22, 24, 25, 26, 27, 29, 34, 35, 38, 40, 41, 42, 44, 45, 47, 48, 49 and 50.
Southern Myotis (*Myotis macropus*)	Woody vegetation within 200 m of a waterbody irrespective of hollow presence or not (assumed). Conservative estimate of impacts.
Squirrel Glider (*Petaurus norfolcensis*)	Suitable PCTs with preferred feed trees. Excludes grasslands. VZs 1, 2, 5, 6, 7, 9, 10, 11, 14, 15, 16, 17, 19, 20, 22, 24, 25, 26, 27, 29, 34, 35, 38, 40, and 50. Conservative estimate of impacts as species has only been found in a few locations.

Seventeen ecosystem credit species have been recorded within the Subject Land:

- Black Falcon (*Falco subniger*);
- Blue-billed Duck (*Oxyura australis*);
- Diamond Firetail (*Stagonopleura guttata*);
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*);
- Flame Robin (*Petroica phoenica*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Little Eagle (*Hieraaetus morphnoides*) (foraging);
- Scarlet Robin (*Petroica boodang*);
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*) (foraging);
- Speckled Warbler (*Chthonicola sagittata*);
- Spotted-tailed Quoll (*Dasyurus maculatus*);
- Varied Sittella (*Daphoenositta chrysoptera*);
- White-throated Needletail (*Hirundapus caudacutus*); and
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*).

It is noteworthy to point out for the South-eastern Glossy Black-Cockatoo that foraging resources for the species (i.e. *Allocasuarina* spp.) are almost entirely restricted to the eastern third of the Subject Land. PCTs west from the intersection of Bark Hut Road and Winterbourne Road generally do not contain *Allocasuarina* spp., with the eastern occurrence of potential foraging habitat generally aligning with Project Area observations of this threatened species.

Several named waterways, as listed below, are situated within the Subject Land with many of these mapped as Key Fish Habitat under the NSW Department of Primary Industries' mapping:

- Boundary Creek;
- Brookmount Creek;
- Cook Station Creek;
- Dog Trap Creek;
- Draytons Creek;
- Graveyard Creek;
- Grose Creek;
- Jacks Creek;
- Lambing Flat Creek;
- Mihi Creek;
- Salisbury Waters;
- Snake Creek;
- Stockyard Creek; and
- Winterbourne Creek.

Impacts on these waterways has been minimised by limiting the number of crossings and utilising existing crossings. Limited impacts on these waterways are anticipated with no loss of fish passage anticipated.

PRESCRIBED IMPACTS

The Project is anticipated to have prescribed impacts as outlined below:

- Impacts to habitat connectivity;
- Wind turbine strikes; and
- Vehicle strikes.

Measures to mitigate these impacts will be implemented through the following management plans:

- Construction Traffic Management Plan (CTMP);
- Soil and Water Management Plan (SWMP);
- Construction Environmental Management Plan (CEMP);
- Pest Management Control Programs;
- Biodiversity Management Plan; and
- Bird and Bat Adaptive Management Plan (BBAMP).

The framework for the BBAMP is provided in this BDAR.

CUMULATIVE IMPACTS

The assessment provided in this BDAR is in accordance with the BAM involving application of the Mitigation Hierarchy (avoid, minimise, mitigate) and calculation of residual impacts. Entities at risk of serious and irreversible impact have also been assessment. The cumulative impacts of the Project are addressed through this assessment.

AVOID, MINIMISE AND MITIGATE

The Applicant has amended the Project to reduce impacts on biodiversity values identified and quantified through surveys and assessment performed in accordance with the BAM. The total loss of native vegetation (853.98 ha) comprises:

- PCT mapped in a woody condition state: 123.81 ha;
- PCT mapped in a wetland state: 1.58 ha;
- PCT mapped in a moderate condition grassland state: 184.24 ha; and
- PCT mapped in a low condition grassland state: 544.35 ha.

By area, 592.69 ha or 69.4% of the Subject Land is of a landcover type with low biodiversity value (i.e., no calculable residual impact as VIS <15 for TECs and VIS <17 for non-TECs); an outcome attained through considerable effort in design that utilised the datasets obtained by applying the BAM. The balance (261.29 ha) comprises native vegetation with a VIS exceeding the specified BAM threshold for calculating residual impacts. It is the latter that has been used to determine the residual impacts of the Project.

Through design refinements, the Project preferentially aligns with area of low biodiversity value. Over 69% or 592.69 ha of the Subject Land comprises low condition native vegetation, an area representing lands historically cleared and managed for ongoing agriculture use (i.e., livestock grazing and/or cropping). These permitted agricultural land uses have substantially modified the natural biodiversity values resulting in low native plant species richness and high exotic plant species cover cultivated for agricultural benefit. Most of these lands no longer comprise functional habitat features such as trees and hollow-bearing trees with low fallen log length and compromised leaf litter cover.

The low VIS calculated for low condition native grasslands (i.e., average VIS: 10.4±4.6) generally does not exceed the associated BAM specified offset thresholds for PCTs requiring an offset. That is, most of these low condition grasslands comprise insufficient biodiversity value to warrant inclusion in the calculation of residual impacts (i.e., no requirement for a biodiversity offset). The alignment of the Project footprint to low condition grasslands demonstrates a significant impact avoidance outcome for locally occurring biodiversity values.

The remaining 261.29 ha of native vegetation proposed to be removed by the Project is unavoidable for various reasons (e.g., topography, land tenure). These lands comprise a mix of native vegetation landcover including native woody vegetation (123.81 ha) and most is moderate condition grasslands (145.48 ha). Notwithstanding these residual impacts, the principles of avoid and minimise were applied by preferentially aligning the Project to areas of least biodiversity value (e.g., use of moderate condition grassland and avoidance, where possible, of larger woody vegetation patches).

For transmission lines, impact minimisation involves the clearing of the tree canopy only, with retention of the groundcover and sparse shrub layer (where present). This consideration affords the retention of native vegetation cover in a modified state rather than a total loss outcome.

Unavoidable impacts on PCTs in a woody condition state have an average VIS of 52.4±19.7, which is significantly greater than the VIS calculated for moderate condition grasslands (i.e., 19.4±10.4).

Refinement of the Project layout and design has significantly reduced impacts on local biodiversity values including, but not restricted to, species reliant on native vegetation with functional habitat character such as trees (e.g., avoidance of preferred Koala habitat) and remnant vegetation comprising hollow-bearing trees (e.g., habitat for Barking Owl, Greater Glider, Squirrel Glider and several ecosystem predicted species).

Impacts to native vegetation cover within the local road reserve network (i.e., crown lands) was largely unavoidable. Impacts have been minimised where possible by utilising the roadside environment immediately adjacent to the sealed/unsealed road surface. For this reason, impacts on TECs are greatest in the road reserve. Project impacts on TECs by land tenure excluding those in a low biodiversity condition state (i.e., VIS <15) is outlined in Table E-9.

TABLE E-9 UNAVOIDABLE IMPACTS ON TECS BY LAND TENURE (VIS >15)

TEC	PCTs	Tenure	Condition	Area (ha)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	510	Freehold	Woody	3.26
			Non-woody	13.22
		Crown (road reserve)	Woody	1.35
			Non-woody	5.47
New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion	533, 534	Freehold	Woody	2.68
			Non-woody	13.70
		Crown (road reserve)	Woody	3.75
			Non-woody	0.00
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	766	Freehold	N/A	0.00
Ribbon gum - mountain gum - snow gum grassy forest/woodland of the New England Tableland Bioregion	1192, 1194	Freehold	Woody	3.42

Direct and indirect impacts will be mitigated by measures designed to protect retained and adjacent vegetation and habitat during construction, operation and decommissioning phases. A Biodiversity Management Plan (BMP) will be prepared to the satisfaction of the Environment Agency Head for implementation prior to/during construction and through the operational period. Other plans implemented in conjunction with the BMP include a Bird and Bat Adaptive Management Plan (BBAMP), Construction Traffic Management Plan (CTMP), Soil and Water Management Plan (SWMP) and Construction Environmental Management Plan (CEMP).

SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

The Project will have an impact on two Serious and Irreversible Impact (SAII) entities as outlined in Table E-10.

TABLE E-10 SAII ENTITIES RELEVANT TO THE PROJECT

SAII Entity	Principles	Comment
New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion	1[1] and 2[2]	The Project will reduce the BC Act listed extent of this TEC locally by 97.50 ha, comprising: • 20.62 ha with VIS >15 (i.e., offsetable); and • 76.88.65 ha with VIS <15 (i.e., not offsetable). The Project has preferentially avoided woody patches (i.e., woodlands, open woodlands and scattered trees) wherever possible with the impact on this condition state limited to: • 2.68 ha on freehold land; and • 3.75 ha on crown land (i.e., road reserve). Impacts on freehold land have been deferred to moderate condition derived grasslands wherever possible (i.e., 14.19 ha). Impacts on this TEC within the road reserve are largely unavoidable as these impacts are associated with the widening of existing infrastructure.
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland	1 and 2	The Project will reduce the BC Act listed extent of this TEC locally by 68.53 ha, comprising: • 23.31 ha with VIS >15 (i.e., offsetable); and • 45.22 ha with VIS <15 (i.e., not offsetable). The Project has preferentially avoided woody patches (i.e., woodlands, open woodlands and scattered trees) wherever possible with the impact on this condition state limited to: • 3.26 ha on freehold land; and • 1.35 ha on crown land (i.e., road reserve). Impacts on freehold land have been deferred to moderate condition derived grasslands wherever possible (i.e., 13.22 ha). Impacts on this TEC within the road reserve are largely unavoidable as these impacts are associated with the widening of existing infrastructure.

Additional measures are proposed to address the localized loss of SAII entities. The Applicant proposes to revegetate up to 15 ha of existing non-woody/cleared lands within 25 km of the Project Area to re-establish up to 7.5 ha of each SAII entity. This outcome, which aims to generate a local no net loss of TEC in a woody condition state, may be achieved by:

- Committing to an active restoration program in a local biodiversity stewardship site; and/or
- Revegetation of temporary impact areas.

The additional measures will seek to improve local patch size and connectivity.

RESIDUAL IMPACTS AND BIODIVERSITY OFFSET LIABILITY

The VIS of each VZ was calculated using the Biodiversity Assessment Method Calculator (BAM-C) and BAM Plot data obtained from these VZs. The Projects direct impact on biodiversity values by PCT as outlined in Table E-11, noting those in bold do not attract an offset liability (i.e., VIS is below the BAM specified threshold).

[1] The impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline
[2] The impact will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size

TABLE E-11 IMPACTS THAT REQUIRE OFFSET - ECOSYSTEM CREDITS

Vegetation Zone	PCT	Condition/vegetation zone name	TEC (BC Act)	Impact area (ha)	Ecosystem credits required
1	510	DC_woodland	Yes	1.48	63
2	510	DC_openwoodland	Yes	0.49	16
3	510	DC_mod_grassland	Yes	13.22	232
4	510	LRC_mod_grassland	Yes	5.47	107
5	510	LRC_openwoodland	Yes	1.35	42
6	510	TL_canopy	Yes	1.29	16
7	533	DC_openwoodland	Yes	0.06	2
8	533	DC_modgrassland	Yes	0.49	8
9	533	TL_canopy	Yes	0.08	1
10	534	DC_woodland	Yes	1.2	44
11	534	DC_openwoodland	Yes	0.59	9
12	534	DC_mod_grassland	Yes	13.7	256
13	**534**	**LRC_mod_grassland**	**Yes**	**12.37**	**0**
14	534	LRC_openwoodland	Yes	3.25	138
15	534	LRC_canopy	Yes	1.26	18
16	565	DC_woodland	No	2.22	42
17	**565**	**DC_openwoodland**	**No**	**0.12**	**0**
18	**565**	**DC_mod_grassland**	**No**	**3.27**	**0**
19	567	DC_woodland	No	12.95	444
20	567	DC_openwoodland	No	0.71	6
21	567	DC_mod_grassland	No	21.65	334
22	567	LRC_woodland	No	0.77	29
23	567	LRC_mod_grassland	No	3.26	35
24	567	TL_canopy	No	1.49	18
25	568	DC_openforest	No	6.27	178
26	568	DC_woodland	No	30.47	819
27	568	DC_openwoodland	No	1.66	16
28	568	DC_mod_grassland	No	60.95	675
29	568	TL_canopy	No	2.57	33
30	571	DC_openwoodland	No	10.47	318
31	**571**	**DC_mod_grassland**	**No**	**16.07**	**0**
32	766	DC_sedgeland	Yes	1.18	37
33	**766**	**LRC_sedgeland**	**Yes**	**0.4**	**0**

Vegetation Zone	PCT	Condition/vegetation zone name	TEC (BC Act)	Impact area (ha)	Ecosystem credits required
34	965	DC_openforest	No	2.18	62
35	965	DC_woodland	No	12.82	189
36	**965**	**DC_shrubland**	**No**	**0.95**	**0**
37	**965**	**DC_mod_grassland**	**No**	**4.29**	**0**
38	965	LRC_openforest	No	0.84	32
39	**965**	**LRC_mod_grassland**	**No**	**0.27**	**0**
40	965	TL_canopy	No	1.26	12
41	970	DC_openforest	No	4.86	159
42	970	DC_openwoodland	No	11.19	249
43	**970**	**DC_mod_grassland**	**No**	**24.29**	**0**
44	970	LRC_openwoodland	No	0.4	7
45	970	LRC_openforest	No	0.86	28
46	**970**	**LRC_mod_grassland**	**No**	**1.12**	**0**
47	970	TL_canopy	No	0.88	18
48	1192	DC_woodland	Yes	2.45	37
49	1192	LRC_woodland	Yes	0.82	14
50	1194	DC_openwoodland	Yes	0.93	22
51	**1194**	**DC_low_grassland**	**Yes**	**3.58**	**0**
52	501	DC_woodland	No	2.65	99
53	501	DC_mod_grassland	No	4.53	56
54	**510**	**low_grassland**	**No**	**45.22**	**0**
55	**534**	**low_grassland**	**No**	**64.51**	**0**
56	**565**	**low_grassland**	**No**	**2.06**	**0**
57	**567**	**low_grassland**	**No**	**85.54**	**0**
58	**568**	**low_grassland**	**No**	**112.65**	**0**
59	**571**	**low_grassland**	**No**	**18.92**	**0**
60	**965**	**low_grassland**	**No**	**110.41**	**0**
61	**970**	**low_grassland**	**No**	**86.65**	**0**
62	1192	low_grassland	No	14.07	136

The residual impact calculated for species credit species is the extent of known or assumed presence following consideration of survey results, impact avoidance and application of species credit polygon rules. The residual impact for species credit species is tabulated in Table E-12.

TABLE E-12 IMPACTS THAT REQUIRE OFFSET - SPECIES CREDITS

Common Name	Scientific Name	Loss of habitat (ha) or individuals	Number of species credits required
Barking Owl	*Ninox connivens*	25.8	818
Bluegrass	*Dichanthium setosum*	0.78	4
Leafless Tongue Orchid	*Cryptostylis hunteriana*	0.99	18
Koala	*Phascolarctos cinereus*	122.9	3,550
Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	59 individuals	118
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	7.8	256
Southern Greater Glider	*Petauroides volans*	101	2,884
Southern Myotis	*Myotis macropus*	9.6	277
Squirrel Glider	*Petaurus norfolcensis*	106.5	3,082

OFFSET STRATEGY

The Applicant is developing a biodiversity offset strategy in parallel with the BDAR. This strategy will detail the offset approach to be undertaken to retire credit obligations and will be achieved by:

- Retiring 'like for like' credits as specified in Tables 11 and 12 to the amount and from the regions indicated; and/or
- Funding a biodiversity conservation action instead of, or in combination with, the retirement of species credits; and/or
- In part or full payment into the Biodiversity Conservation Trust (BCT) in lieu of satisfying the offset liability specified in Tables 11 and 12.

PREFACE

1. ASSESSMENT OVERVIEW

Environmental Resources Management Australia Pty Ltd (ERM) has prepared this Amended Biodiversity Development Assessment Report (Amended BDAR) for the Winterbourne Wind Farm (the Project) on behalf of Winterbourne Wind Pty Ltd (the Applicant).

The Project is to be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as State Significant Development (SSD). This Amended BDAR is prepared in accordance with the Biodiversity Assessment Method 2020 (BAM), with consideration of the Draft BBAMP Framework and BBUS Guidelines 2023, as the Biodiversity Offset Scheme (BOS) applies to the Project. It also addresses the:

- Planning Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Industry and Environment (DPIE); now Department of Planning, Housing and Environment (DPHI) (SSD-10471, dated 17 September 2020);
- Supplementary SEARS received from the NSW Biodiversity and Conservation Division (BCD); and
- Supplementary SEARs received form the Commonwealth Department of Agriculture, Water and the Environment (DAWE); now the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

In support of the SSD application (SSD-10471), an Environmental Impact Statement (EIS) was prepared for the Project (ERM, 2022). The EIS was publicly exhibited between 18 November 2022 and 23 January 2023 by the (then) NSW Department of Planning and Environment (DPE) (now NSW Department of Planning, Housing and Infrastructure (DPHI)).

This Amended BDAR has address project amendments and relevant issues raised in public and agency submissions. The Amended BDAR will be submitted with the Submission Report and Amendment Report prepared as part of the SSD application.

1.1 RELEVANT LEGISLATION AND POLICIES

This BDAR addresses Stage 1 (Biodiversity Assessment) and Stage 2 (Impact Assessment) of the BAM and omits Stage 3 (Improving Biodiversity Values) as this is only required for Biodiversity Stewardship Site Assessment Reports. The BDAR also addresses the assessment requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and relevant State Environmental Planning Policies (SEPPs).

1.1.1 ASSESSMENT FRAMEWORK

The Project requires approval under Part 4 of the EP&A Act. Section 1.7 of the EP&A Act specifies that the Act has effect subject to the provisions of Part 7 of *Biodiversity Conservation Act 2016* (BC Act). Part 7 of the BC Act mandates the application of the BAM (DPIE 2020a) where the Project exceeds a biodiversity offsets scheme threshold (i.e., Section 7.2 of the BC Act) and/or is "likely to significantly affect threatened species" upon application of the test (Section 7.3 of the BC Act). In this case, these thresholds do not apply as the Project is declared SSD thus mandating the preparation of a BDAR (s7.14) in the absence of a successful BDAR waiver. The Minister for Planning must consider impacts on SAIIs and determine if any additional measures are required to minimise impacts to those entities (s7.16(3)).

1.1.2 NEED FOR A BDAR

The BOS applies to the Project as it has been declared SSD (s7.14 of the BC Act). The Applicant has engaged an independent accredited assessor without any conflicts of interest to apply the BAM to assess the impacts of the Project on biodiversity values.

1.1.3 APPLICATION OF THE BAM

1.1.3.1 CONTENT

This BDAR has been prepared in accordance with the relevant parts of the BAM, as required under the BC Act for development identified as "likely to significantly affect threatened species". No streamline modules were applied in preparing this BDAR. The minimum information supplied in this BDAR is in accordance with the relevant details specified in Table 24 of Appendix K of the BAM.

1.1.3.2 CERTIFICATION

The BDAR is certified by the accredited assessor indicated on Page (viii) of this document as of the date corresponding with the signature. The Biodiversity Assessment Method Calculator (BAM-C) report associated with this BDAR was finalised within 14 days of the date of submission of this BDAR.

1.1.3.3 CHANGES TO THE BAM

Clause 6.31 of the *Biodiversity Conservation Regulation 2017* outlines how an accredited assessor can address changes to the BAM that occur whilst preparing a BDAR for a Project. This clause is reproduced below for clarity:

6.31 Changes in biodiversity assessment method

(1) If the biodiversity method is changed, a biodiversity assessment report may, during the designated period after the method is changed, be prepared on the basis of the method in force before the change, but only if the report states that it has been prepared on that basis.

(2) For the purposes of this clause, the designated period is—

(a) except as provided by this subclause—6 months, or

(b) in the case of a biodiversity development assessment report in respect of State significant development or State significant infrastructure—12 months, or

(c) in the case of a biodiversity certification assessment report for an application that is not a strategic biodiversity certification application—12 months, or

(d) in the case of a biodiversity certification assessment report for a strategic biodiversity certification application—12 months or such longer period as the Minister approves in a particular case.

The BAM refers to the Threatened Biodiversity Data Collection (TBDC) and NSW BioNet Atlas as published databases that *must* be used in preparing a BDAR (see Section 1.4 of the BAM). Under this section, a change in these published databases has the effect of changing the BAM. Thus, such changes during the preparation of a BDAR for this Project may be interpreted as a change to the BAM. On this basis, and with reference to the specified designated periods above, the accredited assessor may prepare the BDAR based on the methods in force before the change and in so doing will state this as the case in the BDAR.

This BDAR contains site-based information capable of determining the plant community types (PCTs) present within the Project Area, thus provides a sound basis for the generation of the Candidate Species applicable to the Project. Changes in the Candidate Species list after the publishing of this BDAR may represent a change in the BAM and, for this reason, these additional species may be excluded from the assessment. The BDAR will state this if the circumstance arises.

A change to survey methods for Candidate Species specified in the TBDC during the preparation of the BDAR is also interpreted as a change to the BAM. The accredited assessor may choose to apply the survey methods in force before the change and, if so, the decision to do so will be stated in the BDAR.

1.1.4 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places – defined as Matters of National Environmental Significance (MNES).

A referral was submitted by the Applicant to the Commonwealth Department of Agriculture, Water and the Environment (EPBC 2020/8734). The referral identified potential for significant impacts to EPBC Act listed MNES, which are likely to occur or use habitat within the Project Area and be impacted by the Project.

A delegate of the Minister for the Environment determined that the Project is likely to have a significant impact on MNES and therefore is a 'controlled action' under Section 75 of the EPBC Act. Consequently, the Project will be assessed under an Assessment Bilateral Agreement, allowing a single environmental impact assessment process for both the Commonwealth and NSW government. Supplementary SEARs have been provided where the Commonwealth has identified additional matters for consideration, the EPBC Act controlling provisions for the proposed action included:

- Listed threatened species and communities.
- World Heritage properties and National Heritage places; and
- Listed migratory species.

The assessment requirements include (but are not limited to) the EIS identifying each EPBC Act listed threatened species and community and migratory species likely to be impacted by the action. This must include a description of the impacts, habitat, survey methodologies and avoidance, mitigation and offset measures as well as impacts to the biodiversity within the adjacent World Heritage Property. The threatened species and communities identified in the supplementary SEARs are provided in Table 1-1.

TABLE 1-1 REQUIREMENTS OF SUPPLEMENTARY SEARS

MNES	EPBC Act Listing	Section Addressed
Listed Threatened Species and Communities		
New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands ecological community	Critically Endangered	Section 4.2.6
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community (Haul Route)	Critically Endangered	Section 4.2.6
Spotted-tailed Quoll (SE mainland population) (*Dasyurus maculatus maculatus*)	Endangered	Section 5.1.1
Koala (combined populations of QLD, NSW and ACT) (*Phascolarctos cinereus*)	Endangered	Section 5.1.2
Narrow-leaved Black Peppermint (*Eucalyptus nicholii*)	Vulnerable	Section 5.1.2
Greater Glider (*Petauroides volans*)	Endangered	Section 5.1.2
Beadle's Grevillea (*Grevillea beadleana*)	Endangered	Section 5.3
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	Vulnerable	Section 5.1.2
Narrow-leaved Bertya (*Bertya ingramii*)	Endangered	Section 5.1.2
Austral Toadflax (*Thesium australe*) (Haul Route)	Vulnerable	Section 5.1.2
World Heritage properties and National Heritage places		
Gondwana Rainforests of Australia World Heritage Property and National Heritage Place	N/A	Section 5.3
Listed Migratory Species		
White-throated Needletail (*Hirundapus caudacutus*)	Vulnerable, Migratory	Section 5.1.1
Fork-tailed Swift (*Apus pacificus*)	Migratory	Section 5.3

1.2 BIODIVERSITY CREDITS AND CLASSES

The BAM uses biodiversity credits to measure:

- The residual impacts of a Project on biodiversity values; or
- Gains in biodiversity values at biodiversity stewardship sites.

In this application, the BDAR is measuring the direct impacts of the Project on biodiversity values using two kinds of credits, being 'ecosystem credits' and 'species credits'.

Each ecosystem credit is assigned up to seven attributes that are used to distinguish the type of biodiversity values represented by the credit and to determine whether a credit within a class is 'like' another credit.

Each species credit is assigned four attributes. Matching of attributes is used to apply the 'like-for-like' rules and variation rules as set out in the BC Regulation.

1.3 ACCREDITED PERSON

A BDAR, which documents the assessment and 'No Net Loss' outcomes, must be prepared by a person accredited under Section 6.10 of the BC Act. An accredited person is referred to as an assessor.

This BDAR was authored by Mark Aitkens (lead) and Freya Robinson (junior) with contributions from Robert Ashworth and Hannah Centra. The BDAR was reviewed and certified by Mark Aitkens (Accredited BAM Assessor – BAAS17034) on 13 September 2024.

The assessment provided in the report is based on the BAM-C (version 1.4.0.00) with BAM data last updated on 14/03/2024 and linked to a Development Assessment Case created in the BAM-C. The BAM-C was finalized on 13 September 2024 as part of certifying this BDAR.

1.4 DATA AND INFORMATION USED

The full list of information sources referred to in this report is provided in Section 12. Digital shapefiles for all maps and spatial data have been submitted with this report. Information sources included (but were not necessarily limited to) the following:

- Proposal layers and concept designs provided by the Applicant;
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) EPBC Protected Matters Search Tool (PMST) (http://www.environment.gov.au/epbc/protectedmatters- search-tool);
- DCCEEW Species Profiles and Threats (SPRAT) database (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl);
- DCCEEW Directory of Important Wetlands in Australia (https://www.dcceew.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands);
- Interim Biogeographical Regionalisation for Australia (IBRA) and IBRA sub-regions v7 (http://www.environment.gov.au/land/nrs/science/ibra);
- NSW Department of Planning, Industry and Environment (DPIE) Threatened Species Database Collection (http://www.environment.nsw.gov.au/threatenedspeciesapp/);
- DPIE Guidance to assist a decision-maker to determine a serious and irreversible impact;
- NSW Biodiversity Values Map (https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap);
- NSW Department of Primary Industries (DPI) Key Fish Habitat mapping;
- NSW Department of Planning and Environment (DPE) Guidance for the Biodiversity Development Assessment Report Template;
- DPE State Vegetation Type Mapping Version C2.0M2.0 (https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map);
- DPE BioNet Atlas of NSW database;
- DPE Threatened Biodiversity Data Collection (TBDC) database;
- DPE BioNet Vegetation Classification database;

- NSW Office of Environment and Heritage (OEH) BAM Calculator (BAM-C) (https://www.lmbc.nsw.gov.au/bamcalc);
- Biodiversity Assessment Method (BAM) 2020 (DPIE, 2020);
- NSW Mitchell Landscapes map and descriptions (NPWS, 2003);
- Groundwater Dependent Ecosystem Atlas (BoM, 2023);
- Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH, 2018);
- Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (NSW DPIE, 2020);
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Department of Environment and Conservation (DEC), 2004);
- Survey Guidelines for Australia's Threatened Mammals (Department of Sustainability, Environment, Water, Population & Communities (DSWP&C), 2011);
- NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE, 2020a);
- Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide (DPE, 2022);
- Draft Wind Farms – turbine strike assessment & adaptive impact management – Biodiversity Assessment Method Guide – February 2024 (DCCEEW, 2024);
- Biodiversity Development Assessment Report – Winterbourne Wind Farm (NGH, 2022);
- Winterbourne Wind Farm Scoping Report (ERM, 2020);
- Winterbourne Wind Farm EIS (ERM, 2022); and
- Winterbourne Wind Farm - Land Category Assessment Report (NGH, 2023).

1.5 BIODIVERSITY VALUES NOT ASSESSED

The BAM does not assess biodiversity values for:

- Marine mammals;
- Wandering seabirds;
- Biodiversity that is endemic to Lord Howe Island; and/or
- Native vegetation and loss of habitat on category 1-exempt land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act)), other than the additional biodiversity impacts under clause 6.1 of the BC Regulation (referred to as prescribed impacts in the BAM).

This BDAR does not include an assessment of these matters. The extent of Category 1-Exempt Land is outlined in the following section.

1.6 CATEGORY 1-EXEMPT LAND

The Subject Land comprises rural zoned land and is thus regulated under the LLS Act. Under the LLS Act, three land categories are defined relating to vegetation clearing:

- Category 1 – 'Exempt land', land not subject to clearing approval;
- Category 2 – 'Regulated Land', land on which clearing of native vegetation may be carried out with or without approval in accordance with an 'allowable activity' or 'code' under the LLS Act; and
- 'Excluded Land' – Land not categorised in the Regulatory Maps and to which the LLS Act does not apply.

The Draft Native Vegetation Regulatory (NVR) Map identifies the Subject Land as containing Category 1 (exempt land) and Category 2 (regulated land). The mapped extent of the land categories as defined by the Draft NVR Map is shown in Figure 1-1.

The extent of proposed land categorisation has been considered in this BDAR by way of mapping condition states among non-woody vegetation cover (e.g., grasslands) to produce 'vegetation zones' generally distinguishing between grasslands likely to be in a moderate condition (i.e., Category 2) or low condition (i.e., Category 1) state. Vegetation integrity scores (VIS) have been calculated for each vegetation zone to evaluate any requirement to offset (i.e., residual impacts on native vegetation and habitat).



Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road
- Category 1
- Category 2
- Sensitive

Coordinate System:
GDA 1994 MGA Zone 56

Date: 09/09/2024
Created By: VN
Drawing Size: A3

0 500 1,000 1,500m

1:56,000

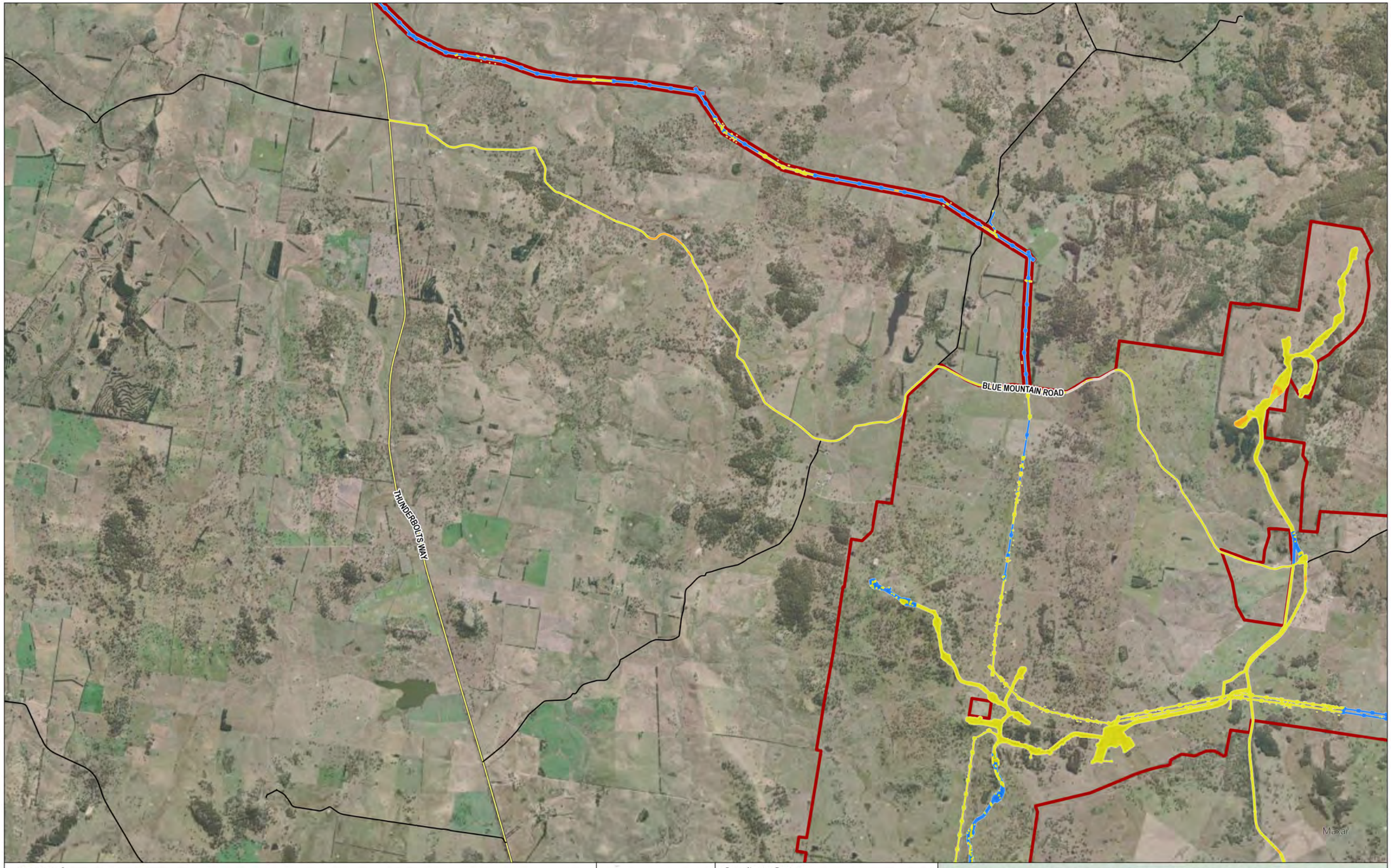
1-1 Draft Land Categorisation of the Subject Land

Map 1 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road
- Category 1
- Category 2
- Sensitive
- Vulnerable

Coordinate System:
GDA 1994 MGA Zone 56

Date: 09/09/2024
Created By: VN
Drawing Size: A3

0 500 1,000 1,500m

1:56,000

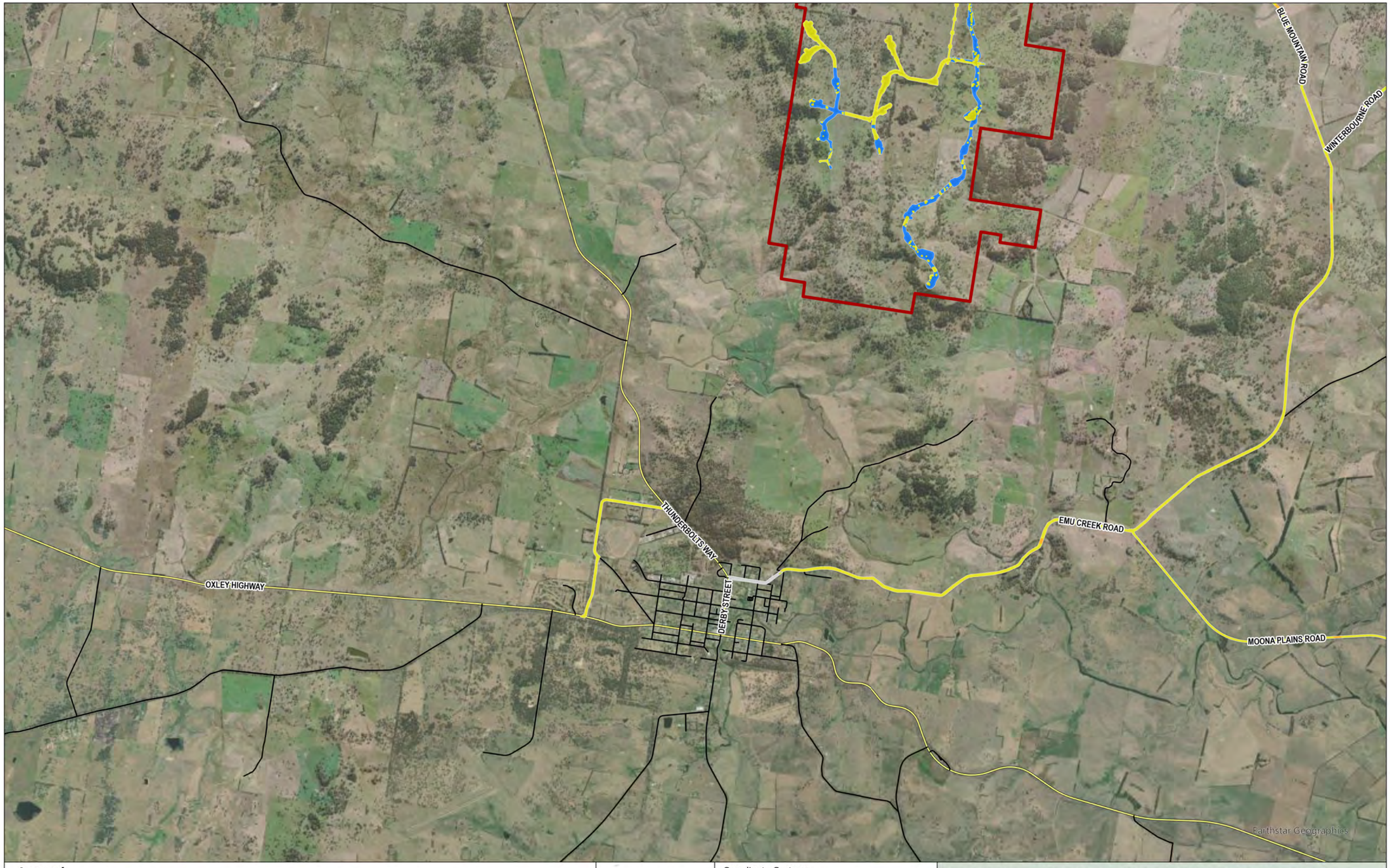
1-1 Draft Land Categorisation of the Subject Land

Map 2 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road
- Category 1
- Category 2
- Sensitive
- N/A

Coordinate System:
GDA 1994 MGA Zone 56

Date: 09/09/2024

Created By: VN

Drawing Size: A3

0 500 1,000 1,500m

1:56,000

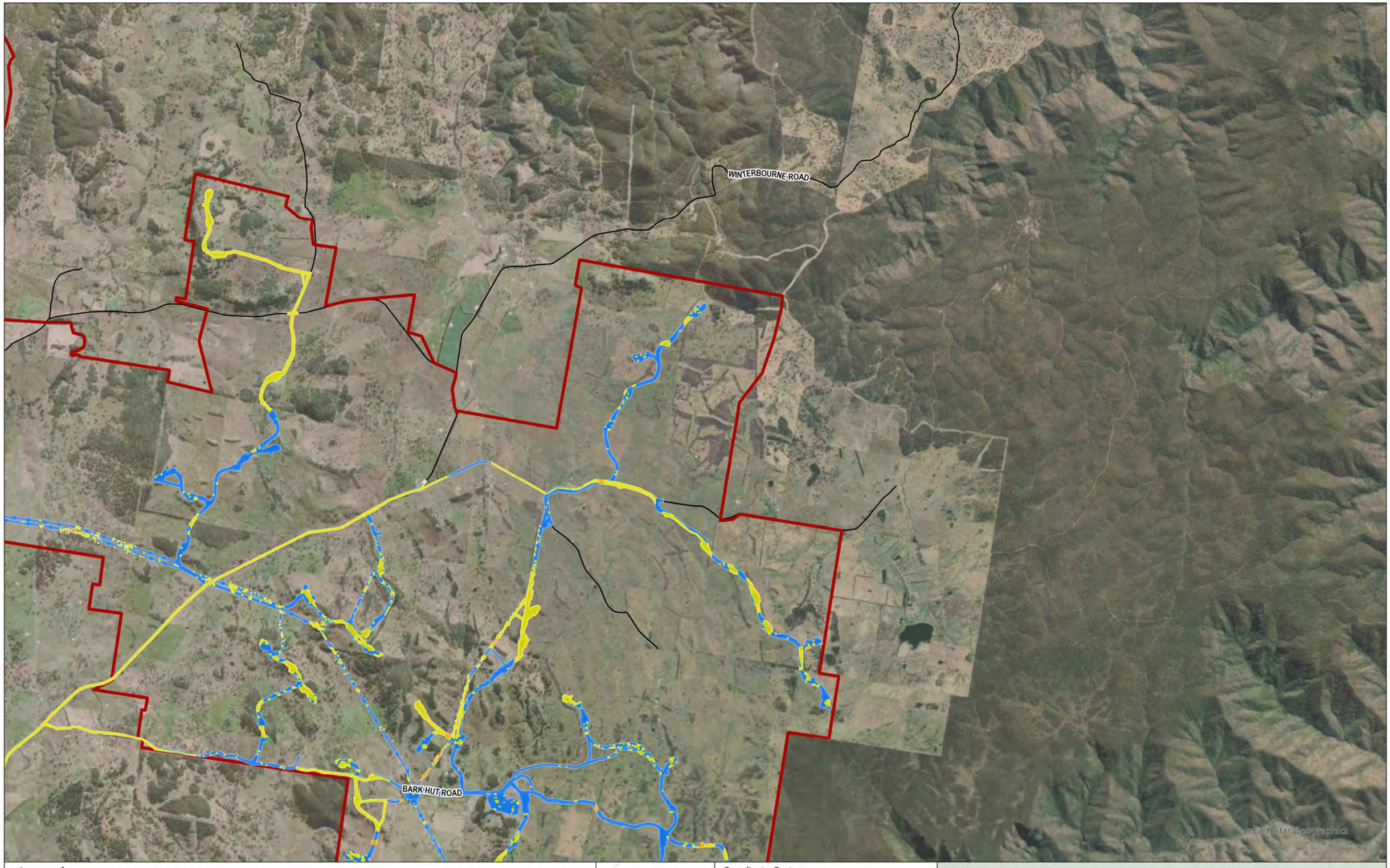
1-1 Draft Land Categorisation of the Subject Land

Map 3 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road
- Category 1
- Category 2
- Sensitive
- Vulnerable

Coordinate System:
GDA 1994 MGA Zone 56

Date: 09/09/2024
Created By: VN
Drawing Size: A3

0 500 1,000 1,500m

1:56,000

1-1 Draft Land Categorisation of the Subject Land

Map 4 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

OXLEY HIGHWAY

Earthstar Geographics

Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road
- Category 1
- Category 2
- Sensitive



Coordinate System:
GDA 1994 MGA Zone 56
Date: 09/09/2024
Created By: VN
Drawing Size: A3
0 500 1,000 1,500m

1:56,000

1-1 Draft Land Categorisation of the Subject Land

Map 5 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

1.7 STRUCTURE OF THE BDAR

A BDAR requires completion of Stages 1 and 2 of the BAM (DPIE 2020a). These stages include:

- Stage 1 establishes a consistent approach to assessing the biodiversity values of land; and
- Stage 2 outlines the guidance and requirements to apply the hierarchy of avoid, minimise and offset for assessing direct, indirect or prescribed impacts on biodiversity values arising from the proposed development, activity, clearing or biodiversity certification. Stage 2 also provides guidance on the use of mitigation measures where there is uncertainty on the timing or extent of impacts.

The structure of BDAR follows the corresponding BAM sections to assist readability for compliance with the BAM. Thus, in omitting the Stage 3 assessment, the BDAR section structuring ends with the last section in Stage 2 (Section 10 Applying the no net loss standard).

Documents appended to this BDAR include:

- APPENDIX A NGH TECHNICAL MEMOS
- APPENDIX B BAM FLORISTIC DATA
- APPENDIX C BAM PLOT DATA
- APPENDIX D BAT CALL ANALYSIS REPORTS
- APPENDIX E EXPERT REPORT FOR LITORIA CASTANEA
- APPENDIX F BIRD UTILISATION AND RAPTOR SURVEYS 2020 – 2022 (NATURE ADVISORY, 2022)
- APPENDIX G BIODIVERSITY CREDIT REPORT.

1.8 BDAR VERSION HISTORY

This BDAR has been prepared in accordance with the BAM 2020 through contributions made by accredited and non-accredited persons since 2019. Contributors to the preparation of the BDAR are listed on Page 2 of this BDAR.

A BDAR previously prepared for the Project by NGH in 2022 (NGH 2022) has been used to inform most threatened species survey methods and results discussed within this BDAR. Since the publishing of NGH (2022), the Project has seen several revisions to the footprint, additional surveys, collision risk modelling for bird and bat strike, and refinement of vegetation mapping.

This Amended BDAR was prepared to address the impacts of the Amended Project and the issues raised in government agency and public submissions on the EIS.

This Amended BDAR (current version) assesses the impact of the Project by way of:

- Proposal design: The Project involves the construction, operation, maintenance and decommissioning of a wind farm, with up to 118 WTGs, together with associated ancillary infrastructure. This BDAR additionally assesses 44 km of transmission line to connect the Project to the existing electrical network; and

- Mitigation: Mitigation measures proposed to be undertaken as part of the Project include a:
  - Bird and Bat Adaptive Management Plan (BBAMP);
  - Construction Traffic Management Plan (CTMP);
  - Soil and Water Management Plan (SWMP);
  - Construction Environmental Management Plan (CEMP); and
  - Pest Management Control Programs.

The BBAMP will intend to enable the implementation of a long-term approach to the mitigation and management of potential impacts on listed threatened and migratory species because of turbine strike. Monitoring will also be incorporated into the BBAMP to identify any potential changes to the species' utilisation of the Subject Land and the surrounding landscape.

The CTMP will detail mitigation and management measures which aim to minimise the impact of construction traffic by suitable signage and driving protocols as means of reducing risk of vehicle strike. The SWMP will mitigate impacts to soil and water resources through the implementation of specific mitigation and management measures.

The CEMP will address the management and mitigation of offsite dust emissions. The Pest Management Control Programs will be developed and implemented to minimise the impacts of introduced predators on existing native fauna.

Amendments to Version 1 of this BDAR have potential to affect the offset liability generated.

STAGE 1: BIODIVERSITY ASSESSMENT

2. INTRODUCTION

The Project is situated 6.5 kilometres (km) north-east of Walcha, 35 km south of Armidale, and 75 km north-east of Tamworth, in the New England Tablelands region of NSW. The Project Area occurs across two Local Government Areas (LGA), the Walcha LGA and the Uralla Shire LGA and is within the New England Renewable Energy Zone (REZ).

The Project Area is on land predominately used for sheep and cattle grazing where the groundcover has been improved for pasture by the introduction of exotic species. The topography is undulating and areas of steeper incline are present, most of the woody vegetation across the Subject Land is isolated to the tops of these rises. The Project Area extends over an area of approximately 21,844 hectares (ha) across 315 freehold land parcels.

The Project Area includes the main wind farm area and a transmission line area which extends northwest from the wind farm for approximately 44 km. The transmission line area comprises a 60 m easement corridor extending from the wind farm and crossing the Salisbury Plains. Upgrades to the public road network are located outside the Project Area.

Major transport corridors in proximity to the Project include:

- The New England Highway (A15) which connects Newcastle to Brisbane via Tamworth;
- The Oxley Highway (B56) which connects Walcha to Port Macquarie; and
- Waterfall Way (B78) which connects Uralla to Raleigh via Armidale.

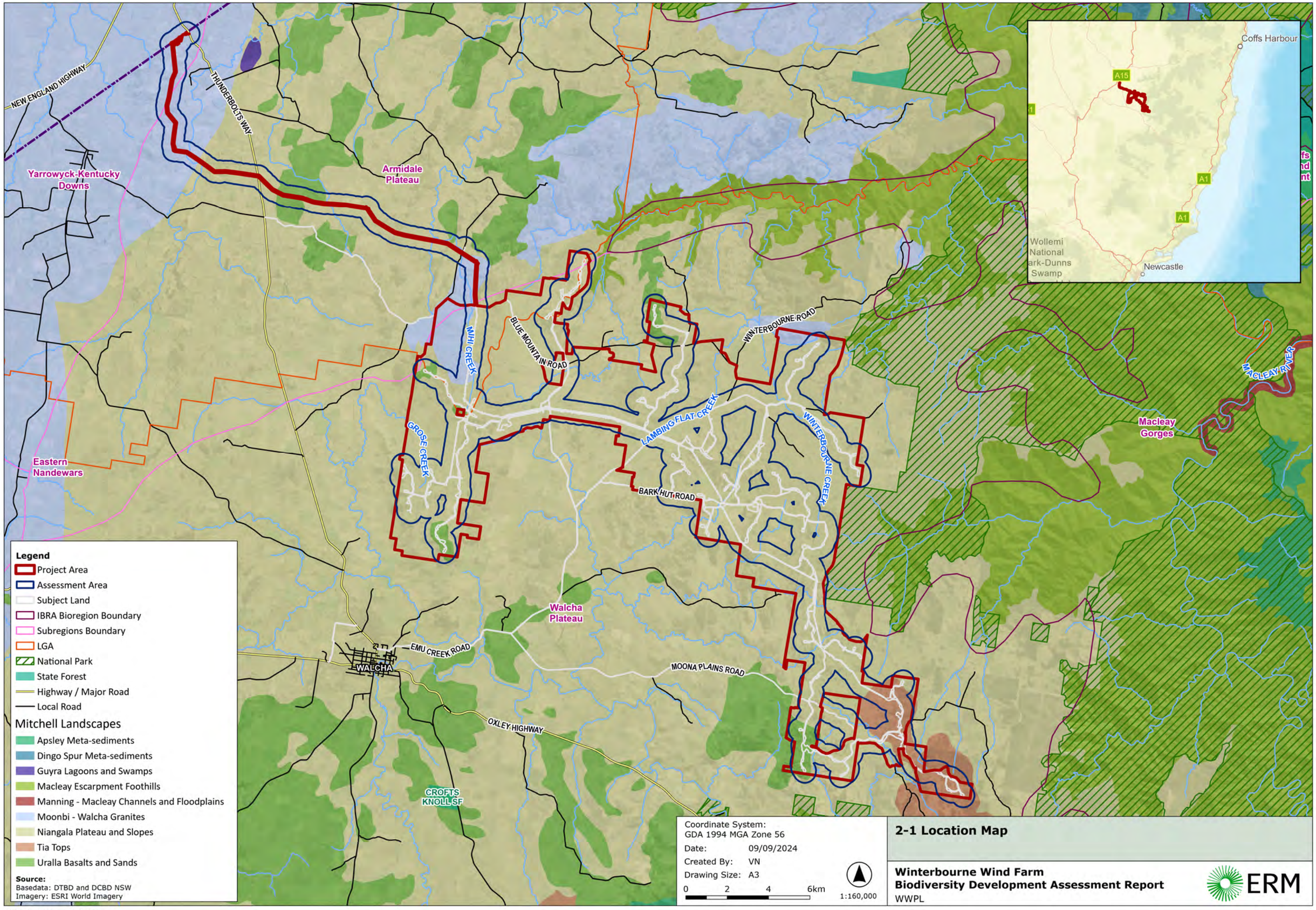
The Project location is shown in Figure 2-1 .

2.1 PROPOSED DEVELOPMENT

2.1.1 LOCATION

The Project is located within the New England REZ, which is centered around Armidale. The Project Area is accessed via Winterbourne Road which runs east-west through the Project Area and connects with the New England Highway via Winterbourne Road, Emu Creek Road or Jamieson Street. The Project Area is currently used for agricultural purposes such as livestock grazing and cropping and is characterised by large areas of grassland and pastures with isolated remnant patches of forest and woodland vegetation.

The Project Area is bounded by Thunderbolts Way to the west, the Oxley Highway to the south, the Oxley Wild Rivers National Park (NP) to the east, and the Salisbury Plains to the north. Thunderbolts Way is a regional road, which extends south from Gwydir Highway, travelling through Uralla and Walcha and terminates at Scone Road in Barrington. Oxley Highway is a State Road, which runs in a general east-west alignment linking Port Macquarie and the Pacific Highway to the New England Highway near Bendemeer.



2-1 Location Map

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

2.1.1.1 DEVELOPMENT FOOTPRINT

For the purposes of the BDAR, the term 'Development Footprint' is used hereafter to refer to the area to be directly impacted during the construction and operational phases of the Project. This term is interchangeable with 'Subject Land'. The Development Footprint covers an area of 913.60 ha and is inclusive of the wind farm components, transmission line and haul route.

2.1.1.2 PROPERTIES

The properties included in the Project Area are listed in Table 2-1. Additional areas of impacts assessed in this BDAR includes access roads to the transmission line and switching station and roads requiring upgrade along the proposed haul route.

TABLE 2-1 SUBJECT LAND LOT AND DP DETAILS

Landowner Group	Lot	DP	Title
Project Area			
Landowner Group 1	5	866652	Freehold
Landowner Group 2	98, 99, 100	1128816	Freehold
	48	756473	Freehold
Landowner Group 3	89	756474	Freehold
Landowner Group 4	80, 105	756504	Freehold
Landowner Group 5	1	1154216	Freehold
	91, 92, 93, 94, 96	755820	Freehold
	1, 2	207146	Freehold
Landowner Group 6	95, 96, 97	1128816	Freehold
Landowner Group 7	1	590453	Freehold
	2	710615	Freehold
	3	1221142	Freehold
	50, 58, 81, 95, 117, 118	756477	Freehold
Landowner Group 8	2	529780	Freehold
	47, 95	756504	Freehold
	351	873508	Freehold
	1, 2, 3, 4	1090942	Freehold
Landowner Group 9	1	120126	Freehold
	70	661944	Freehold
	37, 38, 39, 44, 45, 46, 67, 68, 112, 113, 123	765477	Freehold
	3	1111348	Freehold
	1	1221141	Freehold

Landowner Group	Lot	DP	Title
Landowner Group 10	1	131437	Freehold
	2	247741	Freehold
	6, 7, 24, 29, 68, 69, 70, 71, 72, 77, 83, 89	756504	Freehold
	1	1175912	Freehold
Landowner Group 11	34, 51, 52	756476	Freehold
	352	873508	Freehold
	123	1062583	Freehold
Landowner Group 12	81	756504	Freehold
	1	1210945	Freehold
Landowner Group 13	1	127753	Freehold
	2	211479	Freehold
	26, 28, 38	756473	Freehold
	103, 109	756474	Freehold
	53, 84, 85, 86, 87	756477	Freehold
	8	1144370	Freehold
	2	1192373	Freehold
	11	1199615	Freehold
	120	804549	Freehold
Landowner Group 14	131, 132	756477	Freehold
	3	1238969	Freehold
	6	1147105	Freehold
Landowner Group 15	1	1069933	Freehold
Landowner Group 16	29, 32, 33, 36, 37	756473	Freehold
Landowner Group 17	46	756473	Freehold
	1	595834	Freehold
	2	1234912	Freehold
	51	1126596	Freehold
Landowner Group 18	1, 2	360166	Freehold
	20	756504	Freehold
	3	234456	Freehold

Landowner Group	Lot	DP	Title
Landowner Group 19	99	756504	Freehold
	4	234456	Freehold
	1	576324	Freehold
	1	211106	Freehold
	1, 2	810885	Freehold
	3	618977	Freehold
	7	866652	Freehold
	1	529780	Freehold
Landowner Group 20	55, 101, 102	756504	Freehold
Landowner Group 21	65, 104, 106, 107, 108, 119, 120, 140, 141,462	756492	Freehold
	53	756476	Freehold
	1	344471	Freehold
	5, 12, 13, 17, 18, 19, 60, 68, 69, 70, 72, 73, 74, 75, 76, 77, 101, 121	755820	Freehold
	2	344472	Freehold
Landowner Group 22	1	512960	Freehold
Landowner Group 23	2	512960	Freehold
	117	756492	Freehold
	33, 50	756476	Freehold
Landowner Group 24	B	381236	Freehold
	335, 336, 337, 364, 366, 369, 399	756502	Freehold
Landowner Group 25	1	1221143	Freehold
Landowner Group 26	10	1204696	Freehold
Landowner Group 27	2	595834	Freehold
Transmission Line and Switching Station			
Landowner Group 28	92, 115, 116, 117, 129, 146, 180, 183, 189, 198, 199, 302, 303	755836	Freehold
	1	184356	Freehold
	1	126202	Freehold
	9	1237026	Freehold
	127	755829	Freehold
	2	1243987	Freehold
Landowner Group 29	114	755829	Freehold
	205, 206	755846	Freehold
Landowner Group 30	14, 33, 34, 39, 40, 42, 78, 87	755820	Freehold

Landowner Group	Lot	DP	Title
Landowner Group 31	45, 154, 155	755820	Freehold
Landowner Group 32	1	172254	Freehold
	1	1241971	Freehold
Landowner Group 33	B	372668	Freehold
Relevant Transport Route Road Upgrades			
N/A	7010	1058937	Crown Land
N/A	7031	1058953	Crown Land
N/A	5A	38704	Freehold
N/A	1	835733	Freehold
N/A	7016	94120	Crown Land
N/A	1	529780	Freehold
N/A	39	756504	Freehold
N/A	1	784322	Freehold
N/A	52	517948	Freehold

2.1.1.3 SUBJECT LAND

The term 'Subject Land' is land to which the BAM is applied and includes the area of direct impacts and is therefore synonymous with the term 'Development Footprint'. The extent of the Subject Land is shown in Figure 2-2.

2.1.1.4 ASSESSMENT AREA

The Assessment Area for a linear development, such as the wind farm, is all lands within a 500 m radius of the Subject Land boundary shown in Figure 2-2. The Assessment Area comprises areas of agricultural RU1 land and Oxley Wild Rivers National Park to the east and south-east is zoned as E1 National Parks and National Reserves. Existing electrical network infrastructure intersects the Assessment Area of the Project's transmission line, the Assessment Area does not extend into residential or commercial areas.

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
MILL CREEK
WINTERBOURNE ROAD
GROSE CREEK
LAMBING FLAT CREEK
WINTERBOURNE CREEK
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY
CROFTS KNOLL SF
OXLEY WILD RIVERS National Park
OXLEY WILD RIVERS National Park
OXLEY WILD RIVERS National Park
MACLEAY RIVER

Legend

- Project Area
- Subject Land
- National Parks
- State Forest
- Existing 330kV Transmission Line
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

Coordinate System:
GDA 1994 MGA Zone 56
Date: 09/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

2-2 The Subject Land

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

2.1.2 DEVELOPMENT DESCRIPTION

The Project layout for which approval is sought is shown in Figure 2-3 with components further discussed in Table 2-2.

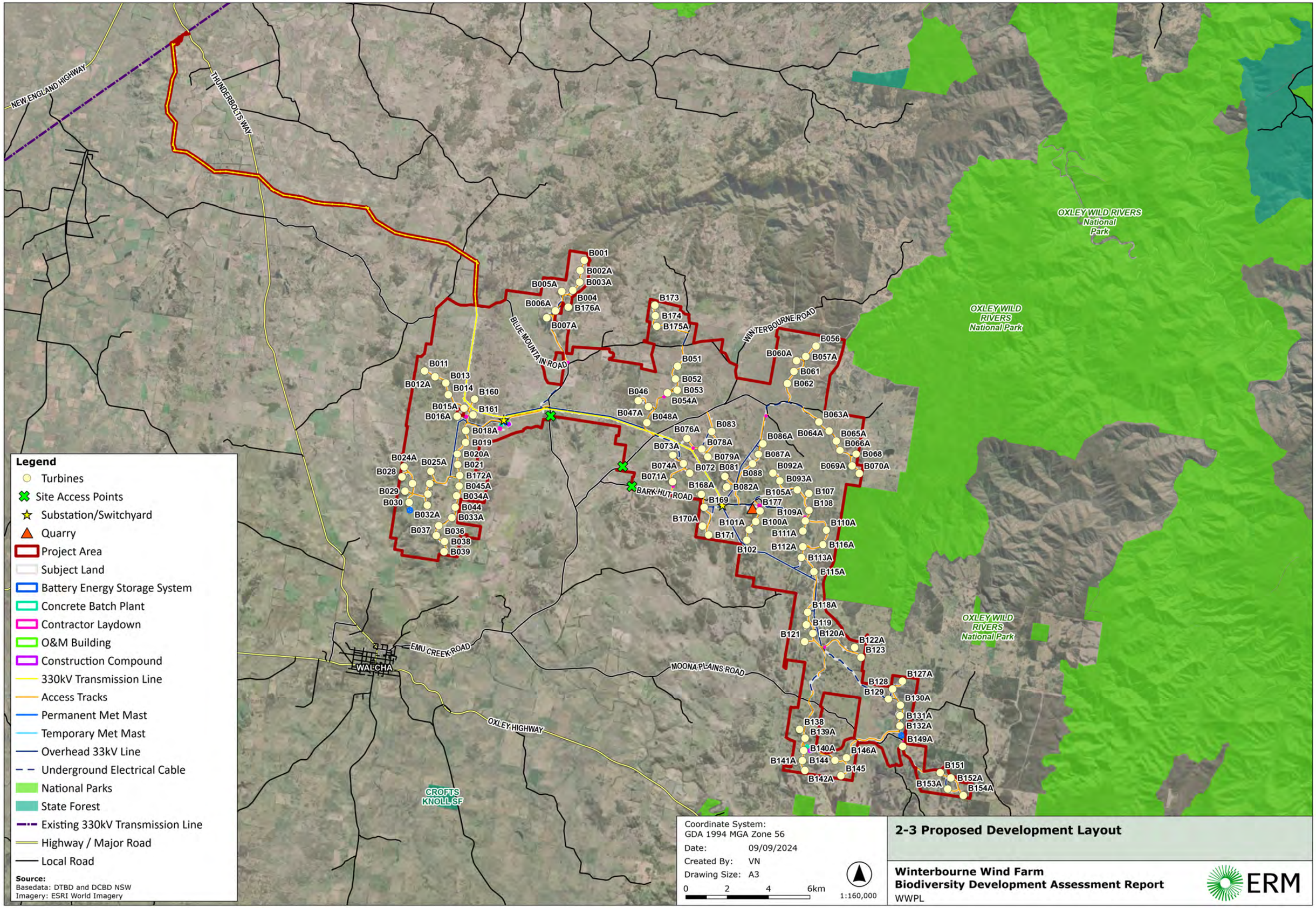
TABLE 2-2 PROJECT COMPONENTS

Project Component	Description	Quantity
Project Footprint		
Project Area	Total area to which the Application applies	21,844 ha
Development Footprint	The area of land that is directly impacted by the Project including all temporary and permanent disturbance areas; and all areas where vegetation may be removed during project construction and operation. The Development Footprint is inclusive of the wind farm components, transmission line and haul route.	913.6 ha
Permanent Development Footprint	The area of land that will be subject to permanent alteration because of the Project's infrastructure until decommissioning. This is generally associated with areas for the WTG hardstands, meteorological masts, BESS, O&M facilities, substations, communication tower, switchyard and internal roads. These areas will not be suitable for agricultural use.	216.6 ha
WTGs		
Model	Vestas V162-6.2 MW Other models are under consideration and will depend on a range of outcomes	118 WTGs
Rotor diameter	162 m	
Blade length	81 m	
Uppermost blade tip	230 m	
Tower (hub) height	149 m	
WTG hardstand	During construction approximately 2.3 ha (temporary) and after rehabilitation this area will be reduced to approx. 0.8 ha (permanent).	
Ancillary Infrastructure		
High Voltage Transmission Line	330 kV single or double circuit twin conductor overhead transmission line	44 km
Medium Voltage Reticulation	Aboveground and underground 33 kV electrical reticulation and fibre optic cabling connecting the WTGs to the onsite substations (generally following site access tracks)	210.5 km
33/330 kV Substation	100 x 100 m (approx. 1 ha) containing transformers, switchgear, communication towers, control and protection equipment and drainage and oil containment systems with security fencing	2
Switchyard	160 x 120 m (approx. 2 ha) and 20 m asset protection zone	1
100 MW/200 MWh BESS	100 x 100 m (approx. 1 ha) and 20 m asset protection zone including a cooling system and automated control system	1

Project Component	Description	Quantity
Internal Access Tracks	Access tracks within the Project Area connecting to existing Council roads providing access to WTGs, ancillary infrastructure and transmission line, 5.5 m wide roadway on straights plus shoulders and drainage as required	115.3km
Permanent O&M Facility	50 x 40 m containing the control room, switch room, storage shed and workshops with water supply, waste facilities, car parking, electricity and Wi-Fi	1
Meteorological Monitoring Masts	Maximum height of 149 m, built on a concrete base supported by guy wires	Up to 4 temporary Up to 2 permanent
Other Project elements		
Duration and start of construction phase	Construction over a period of 52 months	
Construction workforce	Up to 390 FTE	
Duration of operation phase	30 years	
Operational workforce	Approximately 33-39 long-term service and maintenance jobs	

The following temporary elements will be required during the construction phase of the Project:

- Site buildings and facilities for construction contractors / equipment, including site offices, car parking and amenities for the construction workforce;
- Mobile concrete batching plant/s to supply concrete for WTG footings and substation construction works;
- Earthworks for access tracks, WTG platforms and foundations, potentially including controlled blasting in certain areas;
- Rock crushing facilities for the generation of suitable aggregates for concrete batching and/or for access track and hardstand construction;
- Hardstand laydown areas for the storage of construction materials, plant, and equipment;
- Up to four temporary meteorological monitoring masts. The temporary monitoring masts will be located close to a WTG location with a maximum height of 149 m AGL;
- Groundwater supply, subject to appropriate licencing, and storage for concrete batching and construction activities;
- The transport, storage and handling of fuels, oils and other hazardous materials for construction and operation of wind farm infrastructure;
- Beneficial reuse of materials won from within the development footprint during cut and fill and WTG foundation excavation works for use in access track, hardstands and foundation material; and
- Addition of an onsite quarry, to supply raw construction materials for the Project. The quarry operations will be confined to Lot 95 DP 1128816 and have an annual extraction limit of up to 500,000 tonnes.



2-3 Proposed Development Layout

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

2.1.2.1 HAUL ROUTE

The Port of Newcastle will likely be utilised for import and unloading of WTG components. Due to the size of the WTG components and some substation components, restricted access vehicles (RAVs) will be required for transportation from the Port of Newcastle to the Project Area. RAVs deliveries are oversized and overmass (OSOM) and require permits that specify the designated route for travel, the number of escorts required and the time in which the RAVs can travel through certain road zones.

The proposed OSOM delivery route from the Port of Newcastle to the Project Area has been separated into five routes:

1. Components over 5.2 m including blades, towers and nacelle between Port of Newcastle and Walcha;
2. Components under 5.2 m including powertrain, hub and small components between Port of Newcastle and Walcha;
3. Alternative route through Tamworth for blades;
4. Walcha to northern site entries for all components; and
5. Walcha to eastern site entries including Bark Hut Road for all components.

RJA (2024) completed a route survey along the transportation routes for the Project and have identified several road upgrades to facilitate the proposed OSOM movements. The route study has been reviewed in ERM (2024) to determine the extent of impacts requiring assessment in this BDAR. Removal of native vegetation is required in some sections of the haul routes, and these impacts are to be assessed under the BOS and reported within this BDAR.

Routes 1, 2 and 3 are displayed in Figure 2-4 and Routes A and B are displayed in Figure 2-5.

Details of each route and their corresponding works required are as follows:

- Route 1 allows for >5.2 m overall height and has 14 locations where modification is required. Route 1 can accommodate for the transportation of the blades, towers and nacelles. The route is 448 km long and travels via Selwyn Street, George Street, Industrial Drive, Maitland Road, New England Highway, John Renshaw Drive, Hunter Expressway, New England Highway, Golden Highway, Putty Road, Jerrys Plains Road, Golden Highway, Denman Road, Bengalla Road, Wybong Road, Kayuga Road, Invermein Street, Stair Street, Dartbrook Mine access Road, New England Highway, (Tamworth bypass via Scott Street, Marius Street), New England Highway, Staces Road, Thunderbolts Way and Jamieson Street;
- Route 2 allows for <5.2 m overall height and has no modifications required. Route 2 can accommodate for the transportation of the powertrain, hub and other small components. The route is 406 km long and travels via Selwyn Street, George Street, Industrial Drive, Maitland Road, New England Highway, John Renshaw Drive, Hunter Expressway, New England Highway, Bell St, Victoria St, Bridge St, New England Highway, (Tamworth bypass via Scott Street, Marius Street), New England Highway, Staces Road, Thunderbolts Way and Jamieson Street; and

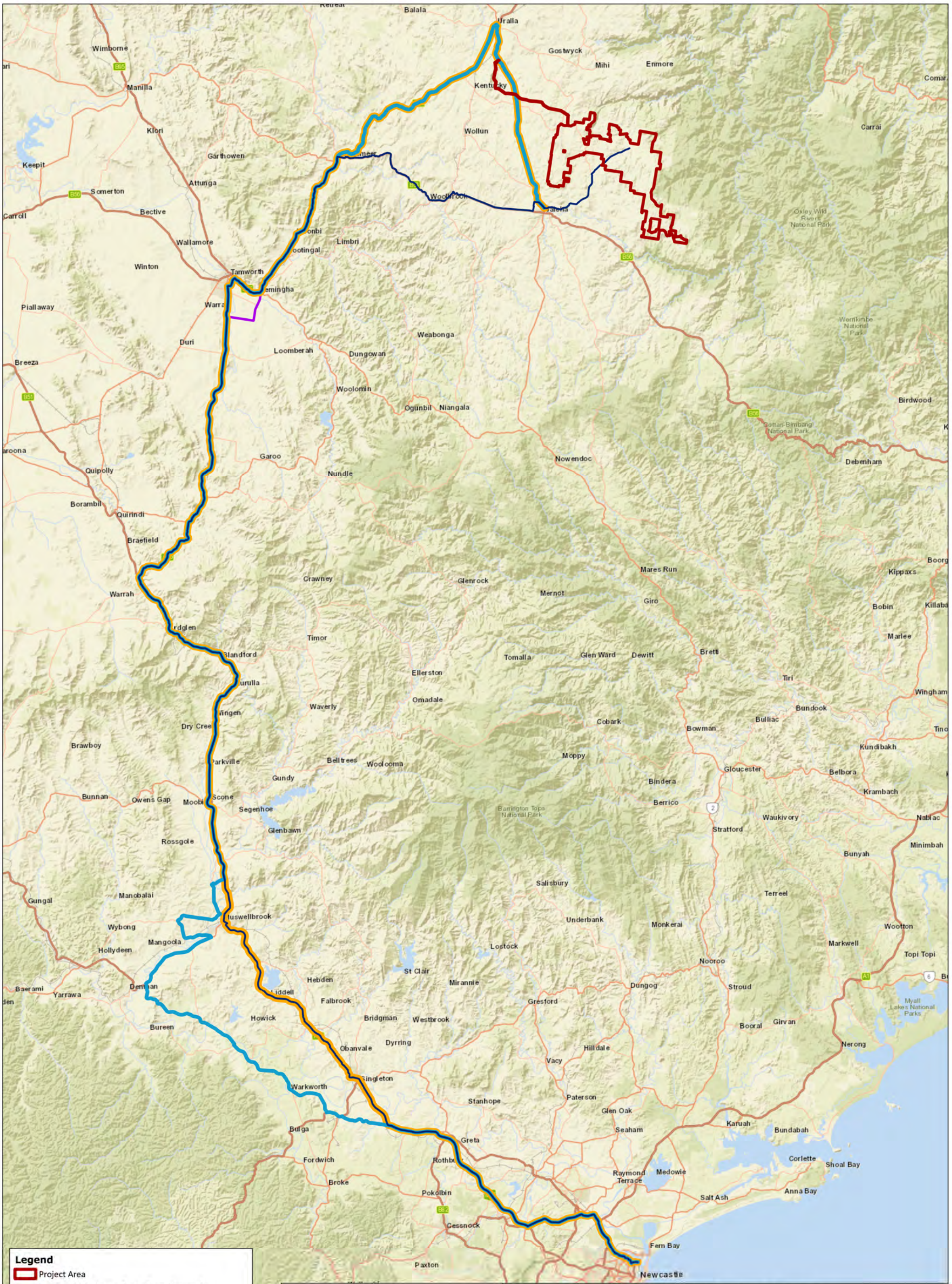
- Route 3 is an alternative route through Tamworth that could accommodate transportation of the blades. The route is limited to 25 tonnes and is subject to flooding and would require traffic control procedures to implemented either side of the Tamworth township. The route is 11.2km long and would require modifications at 4 location. The route travels via Whitehouse Lane, Marsden Park Road, O'Briens Lane and Nundle Road and bypasses areas of Tamworth that would otherwise require modifications as detailed in Route 1.

Two routes are proposed from Walcha to various site entry points:

- Route A encompasses transport from Walcha to the northern site entries, travelling for 22 km via Jamieson Street, Emu Creek Road, Winterbourne Road and Blue Mountain Road and requires modifications at 3 locations; and
- Route B encompasses transport from Walcha to the eastern site entries, travelling for 28 km via Jamieson Street, Emu Creek Road, Winterbourne Road and Table Top Road and requires modifications at an additional 3 locations (1 location as per Route A).

The ERM (2024) due diligence assessment comprised of a desktop and field survey, was conducted to identify which locations subject to modification contain biodiversity values that could be impacted by the required works. The due diligence report concluded that the removal of native vegetation requiring to be assessed under the BOS and reported within this BDAR occurs at several locations of the haul route. These assessable impacts are restricted to local roads generally east of Walcha (i.e., routes A and B) and, for this reason, these affected lands have been included in the Subject Land.

The Applicant has assumed that the transport route between the Port of Newcastle and the intersection of Denman Road and Bengalla Road will be upgraded as required by the NSW Government prior to commencement of the Project, per media statement released on 18 June 2024. The Applicant has also assumed that upgrades through Muswellbrook LGA will be undertaken prior to commencement of the Project as part of EnergyCo/Transport for NSW road upgrades, an/or upgrades undertaken by other developers that have secured development consent (e.g., Hills of Gold Winf Farm, Thunderbolt Wind Farm).



Legend

- Project Area
- Heavy Vehicle Access Route From Newcastle
- OSOM Route 1 - Newcastle Port to Walcha over 5.2m
- OSOM Route 2 - Newcastle Port to Walcha under 5.2m
- OSOM Route 3 - Alternative Route through Tamworth

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Street Map

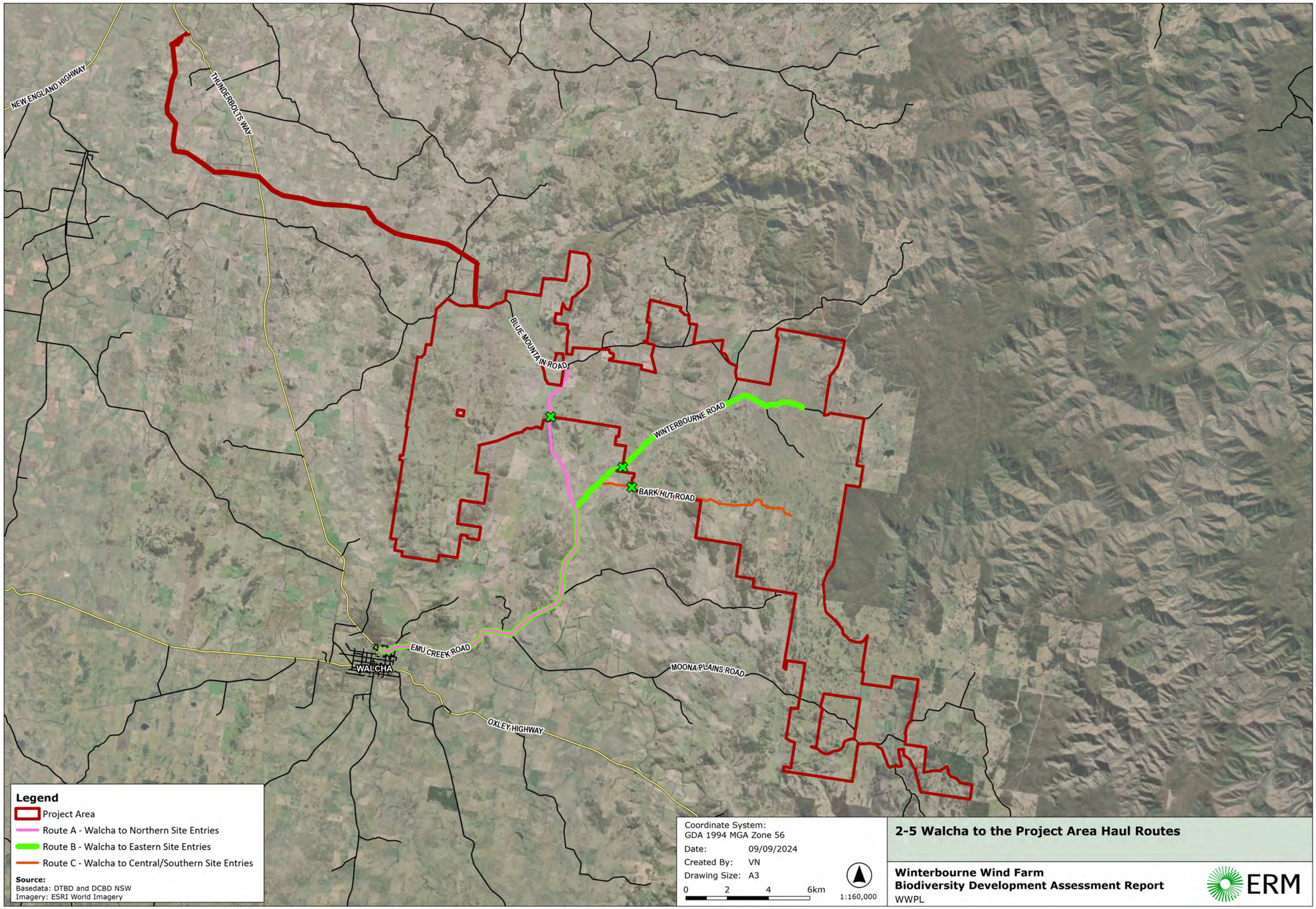
Coordinate System:
GDA 1994 MGA Zone 56
Date: 09/09/2024
Created By: ABC
Drawing Size: VN
0 5 10 15km
1:700,000

2-4 Port of Newcastle to Walcha Haul Routes

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



2-5 Walcha to the Project Area Haul Routes

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

2.2 METHODOLOGY

2.2.1 SITE CONTEXT

2.2.1.1 LANDSCAPE FEATURES

Landscape features requiring consideration were initially determined via desktop assessment. Field surveys undertaken between November 2019 and July 2024 sought to verify the following landscape features (in accordance with Sections 4.2 and 4.3 of the BAM):

- IBRA bioregions and subregions, NSW landscape region and area (ha);
- Native vegetation extent and cleared areas within the buffer area;
- Rivers and streams (classified according to stream order);
- Wetlands within, adjacent to and downstream of the site;
- Connectivity features;
- Areas of geological significance and soil hazard features;
- Site context components, including:
  - Identification of method applied (i.e. linear or site-based); and
  - Percent native vegetation cover in the landscape (development site and biodiversity stewardship site).

2.2.1.2 NATIVE VEGETATION COVER

A desktop assessment was initially conducted to determine the extent (ha) of vegetation cover on the Subject Land and Assessment Area (500 m buffer of Subject Land). The following resources were used:

- Historic aerial imagery (State of NSW and Spatial Services);
- Transitional NVR Map (NSW Department of Climate Change, Energy, the Environment and Water);
- NSW Landuse 2017 v1.2 (NSW Department of Climate Change, Energy, the Environment and Water);
- NSW Environmental Planning Instrument - Land Zoning (NSW Department of Planning, Housing and Infrastructure);
- NSW Woody Vegetation Extent & FPC 2011 (NSW Department of Climate Change, Energy, the Environment and Water); and
- NSW State Vegetation Type Map (NSW Department of Climate Change, Energy, the Environment and Water).

Desktop and field surveys conducted between 2019 and 2024 confirmed the extent and condition of native vegetation cover on the Subject Land.

Native vegetation in the Assessment Area situated outside of the Subject Land were not ground-truthed in their entirety and in some areas relies on state vegetation mapping that may be outdated and/or inaccurate. Consequently, there may be some minor additions or omissions to the actual extent of native vegetation as defined in the BAM.

2.2.2 NATIVE VEGETATION, THREATENED ECOLOGICAL COMMUNITIES AND VEGETATION INTEGRITY

Sections of the BAM relevant to vegetation mapping are:

- Section 4.1 Map native vegetation extent on subject land;
- Section 4.2 Identify and map plant community types and ecological communities; and
- Section 4.3 Map vegetation zones and assessment vegetation integrity (vegetation condition).

The State Vegetation Type Map (SVTM) (DPE, 2024a) and BioNet Vegetation Classification (BioNet VIS) system were used to identify candidate PCTs and threatened ecological communities (TECs) that may be present within the Subject Land, and across the haul route. This was used as the basis for survey design as part of preparing a site-specific vegetation map identifying PCTs and condition states (i.e., vegetation zones).

Recent high-resolution imagery (ESRI basemaps) was used in ArcMap at a scale of 1:1,000 to generate vector data (i.e., polygons) to describe variation in vegetation structure, character and condition. Field based data was obtained to assign vegetation classification and calculate condition states.

The following sections outline the approach taken in generating the vegetation map for the Subject land.

2.2.2.1 MAPPING NATIVE VEGETATION EXTENT

Section 4.1 of the BAM requires the extent of native vegetation to be mapped across the Subject Land. The definition of native vegetation in the BAM is reproduced below:

> **Native vegetation:** has the same meaning as in section 1.6 of the BC Act and section 60B of the LLS Act, repeated here:
>
> (1) For the purposes of this Part, **native vegetation** means any of the following types of plants native to New South Wales:
>
> a. trees (including any sapling or shrub or any scrub),
>
> b. understorey plants,
>
> c. groundcover (being any type of herbaceous vegetation),
>
> d. plants occurring in a wetland.
>
> (2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorize conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.
>
> (3) For the purposes of this Part, native vegetation extends to a plant that is dead or that is not native to New South Wales if:
>
> a. the plant is situated on land that is shown on the native vegetation regulatory map as category 2-velunerbale regulated land, and

b. it would be native vegetation for the purposes of this Part if it were native to New South Wales.

(4) For the purposes of this Part, native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). A declaration under Section 14.7 of the BC Act that specified vegetation is or is not marine vegetation also has the effect for the purposes of this Part.

The mapping of native vegetation extent involved the use of aerial photography, existing maps of native vegetation in the area (i.e., SVTM) and field verification surveys from 2019 to 2024.

This mapping first focused on delineating the extent of woody vegetation (i.e., tree canopy cover in Section 4.1(1) of the BAM), which was performed at a capture scale of 1:1,000 or finer (Section 4.1(2) of the BAM). The latest available ArcGIS basemap imagery (May 2023) using the following stepwise approach:

- Cognitively mapping the boundary of the tree canopy cover to map the extent of woody vegetation (i.e., woody vegetation extent layer);
- Use of a 15 m buffer to the woody vegetation extent layer and 'minimum bounding polygon' tool in ArcGIS (Convex Hull) to map woody matrix layer;
- Aggregation of woody extent and woody matrix layers to produce woody vegetation patch layer; and
- Cognitive mapping to join closely adjoining woody vegetation patches.

A structural classification was assigned to woody patches to aid future vegetation zone delineation (i.e., Section 4.3 of the BAM). Woody structural classifications adopted were:

- Open forest: Tree canopy separation less than 6 m;
- Woodland: Tree canopy separation 6 – 25 m;
- Open Woodland: Tree canopy separation of 26 – 49 m;
- Scattered: Tree canopy separation of 50 – 100 m; and
- Disconnected: Tree canopy separation of greater than 100 m.

The residual area, which comprises non-woody vegetation, required further analysis to distinguish between lands comprising native ground cover vegetation and areas that are not native vegetation (i.e., Section 4.1.2 of the BAM). Cognitive analysis of recent aerial imagery was initially used to map these lands (i.e., lands covered by water, human infrastructure [e.g., roads, buildings] and naturally unvegetated surfaces [e.g. rocks]). These areas are not native vegetation and are excluded and thus do not require any further assessment in Section 4 of the BAM (i.e., Section 4.1.2(1)). These lands were assigned the classification PCT = 0.

The residual land area comprising vegetation cover was provisionally assigned as 'groundcover vegetation' (i.e., lands not comprising woody vegetation or lands not already assigned PCT = 0). Further analysis was undertaken to differentiate this land area into native vegetation (e.g., secondary or derived grasslands) and areas that are not native vegetation (e.g., lands taken to be cleared). This involved desktop interpretation and field surveys of the Subject Lands over several seasons and years.

Lands taken to be cleared, herein referred to as areas that are not native vegetation (Section 4.1.2 of the BAM), are those that meet Section 60F(3) of the *Local Land Services Act 2013* (LLS Act). Prior to the finalization of the Draft NVR Map, which is referred to as the transitional period in Section 60F(1) of the LLS Act, an area is taken to be low conservation value grasslands if it comprises only groundcover whose clearing was permitted by Section 20 of the *Native Vegetation Act 2003*, as in force immediately before the repeal of that Act (i.e., Section 60F(3) of the LLS Act). Section 60F of the LLS Act applies to the Subject Land as it is a rural zoned area as defined in Section 60A of the LLS Act.

According to Section 20 of the *Native Vegetation Act 2003*, the clearing of native vegetation that comprises only groundcover is permitted if:

6. the vegetation comprises less than 50% of indigenous species of vegetation; and
    a. not less than 10% of the area is covered with vegetation (whether dead or alive); and
7. those percentages are calculated in accordance with the regulations.

In relation to Section 20(c) above, Clause 62(1) of the Native Vegetation Regulation 2013 states that the percentages are to be calculated by the landholder in a scientific and objective manner that is appropriate to the area proposed to be cleared and the species of vegetation that are present. This calculation can only be made at the time of year when the proportion of the amount of indigenous vegetation in the area to the amount of non-indigenous vegetation in the area is likely to be at its maximum.

The following desktop resources were used to identify candidate lands that may be classified as areas that are not native vegetation (i.e., taken to be cleared):

- The extent of Category 1 exempt lands as shown in the Draft NVR Map (April 2023);
- The extent of lands mapped as PCT = 0 in the SVTM (i.e., Section 4.1(3) of the BAM); and
- Aerial photography interpretation (i.e., classify areas based on colour/texture).

Field surveys used to field verify desktop mapping including one or both of the following scientific and objective survey methods:

- Plot-based vegetation integrity surveys (BAM Plots) including full floristic plots (see Section 2.2.2.4); and
- Point intercept transects (see Section 2.2.2.6).

These vegetation surveys were performed during the following dates:

- Spring 2019 – 8th to 21st November 2019;
- Summer 2020 – 13th to 26th February 2020;
- Winter 2020 – 10th to 14th August 2020;
- Spring 2020 – 28th September to 2nd October 2020;
- Autumn 2021 – 8th March to 1st April 2021;
- Spring 2021 – 10th October to 16th November 2021;
- Summer 2023 – 4th to 7th December 2023;
- Summer 2024 – 29th January to 3rd February 2024; and
- Winter 2024 – June - August 2024.

The extent of native vegetation includes lands identified as forming part of the woody patch layer and native groundcovers that are not taken to be cleared. These lands are subject to classification into PCTs.

2.2.2.2 IDENTIFYING PLANT COMMUNITY TYPES AND ECOLOGICAL COMMUNITIES

The Bray-Curtis similarity (dissimilarity) index (Bray-Curtis Index) was used to quantitatively assess the floristic plot data (samples) obtained from the Subject Land into groups (i.e., classify), thus aid the identification of PCTs. This analysis used the percent cover values for each species in each BAM plot to generate a pairwise resemblance matrix. The Bray-Curtis Index value generated is bounded between 0 and 1. Full floristic plots obtained from woody patches were used in the analysis. Full floristic plots associated with derived grasslands were excluded from this analysis as these areas were substantially degraded by agricultural activity.

A Bray-Curtis Index value of 0 assigned to a plot pair means the two samples have the same species composition (i.e. they are similar or the same), whereas a value of 1 means the pairwise comparison indicates no similarity. The pairwise Bray-Curtis index matrix was generated from PRIMER Version 7 with PERMANOVA Version 1.0.3 (Plymouth Marine Laboratory, Plymouth United Kingdom, Clarke and Gorley 2006). A dummy variable was added (value 0.1) following a square root transformation of percent cover values.

An agglomerative hierarchical clustering analysis (CLUSTER analysis). A SIMPER analysis was performed to characterize species composition of each *a priori* group (i.e. PCT assignments to BAM plots). Characteristic species were reported for each group and used to describe the PCT. A non-metric multidimensional scaling (nMDS) plot was produced to geographically represent plot data.

PCT mapping was facilitated by the CLUSTER analysis result and extrapolated by other factors such as terrain, aspect, topographic relief (e.g., areas of cold air drainage), aerial photographic interpretation and data obtained from rapid vegetation points. PCT mapping extended beyond the Subject land to the extent of a 100 m buffer.

2.2.2.3 VEGETATION ZONES AND VEGETATION INTEGRITY

A vegetation zone (VZ) is an area of native vegetation comprising a PCT in a similar (homogeneous) condition state. The VZs were defined during from the PCT map and observable condition states from Subject Land investigations and desktop mapping.

Subject Land vegetation surveys were performed during the following dates:

- Spring 2019 – 8th to 21st November 2019;
- Summer 2020 – 13th to 26th February 2020;
- Winter 2020 – 10th to 14th August 2020;
- Spring 2020 – 28th September to 2nd October 2020;
- Autumn 2021 – 8th March to 1st April 2021;
- Spring 2021 – 10th October to 16th November 2021;
- Summer 2023 – 4th to 7th December 2023;
- Summer 2024 – 29th January to 3rd February 2024; and
- Winter 2024 – June - August 2024.

Table 2-3 summarises the vegetation zones and associated minimum BAM plot requirements.

TABLE 2-3 VEGETATION ZONE PLOT REQUIREMENTS

Vegetation Zone	PCT	Condition	Area (ha)	Minimum Plots Required	Plots Used in Assessment
1	510	DC_woodland	1.48	1	2
2	510	DC_openwoodland	0.49	1	3
3	510	DC_mod_grassland	13.22	3	3
4	510	LRC_mod_grassland	5.47	3	3
5	510	LRC_openwoodland	1.35	1	2
6	510	TL_canopy	1.29	1	5
7	533	DC_openwoodland	0.06	1	1
8	533	DC_modgrassland	0.49	1	1
9	533	TL_canopy	0.08	1	1
10	534	DC_woodland	1.2	1	4
11	534	DC_openwoodland	0.59	1	2
12	534	DC_mod_grassland	13.7	3	3
13	534	LRC_mod_grassland	12.37	3	4
14	534	LRC_openwoodland	3.25	2	3
15	534	LRC_canopy	1.26	1	3
16	565	DC_woodland	2.22	2	2
17	565	DC_openwoodland	0.12	1	1
18	565	DC_mod_grassland	3.27	2	2
19	567	DC_woodland	12.95	3	3
20	567	DC_openwoodland	0.71	1	1
21	567	DC_mod_grassland	21.65	4	4
22	567	LRC_woodland	0.77	1	1
23	567	LRC_mod_grassland	3.26	2	2
24	567	TL_canopy	1.49	1	3
25	568	DC_openforest	6.27	3	5
26	568	DC_woodland	30.47	4	11
27	568	DC_openwoodland	1.66	1	2
28	568	DC_mod_grassland	60.95	5	5
29	568	TL_canopy	2.57	2	2
30	571	DC_openwoodland	10.47	3	5
31	571	DC_mod_grassland	16.07	3	4
32	766	DC_sedgeland	1.18	1	2

Vegetation Zone	PCT	Condition	Area (ha)	Minimum Plots Required	Plots Used in Assessment
33	766	LRC_sedgeland	0.4	1	1
34	965	DC_openforest	2.18	2	2
35	965	DC_woodland	12.82	3	3
36	965	DC_shrubland	0.95	1	1
37	965	DC_mod_grassland	4.29	2	2
38	965	LRC_openforest	0.84	1	2
39	965	LRC_mod_grassland	0.27	1	1
40	965	TL_canopy	1.26	1	1
41	970	DC_openforest	4.86	2	3
42	970	DC_openwoodland	11.19	3	6
43	970	DC_mod_grassland	24.29	4	4
44	970	LRC_openwoodland	0.4	1	1
45	970	LRC_openforest	0.86	1	1
46	970	LRC_mod_grassland	1.12	1	1
47	970	TL_canopy	0.88	1	1
48	1192	DC_woodland	2.45	2	2
49	1192	LRC_woodland	0.82	1	3
50	1194	DC_openwoodland	0.93	1	3
51	1194	DC_low_grassland	3.58	2	2
52	501	DC_woodland	2.65	2	4
53	501	DC_mod_grassland	4.53	2	2
54	510	low_grassland	45.22	4	10
55	534	low_grassland	64.51	5	5
56	565	low_grassland	2.06	2	2
57	567	low_grassland	85.54	5	5
58	568	low_grassland	112.65	6	6
59	571	low_grassland	18.92	3	5
60	965	low_grassland	110.41	6	6
61	970	low_grassland	86.65	5	5
62	1192	low_grassland	14.07	3	3

BAM plots used to assess VIS were located within the Development Footprint, where practicable, with some proximal BAM plot located outside the Subject Land (due to refinements of the Project layout) also used where reasonable. Where BAM plots were not located within the Development Footprint, they were located within a contiguous/representative patch of vegetation suitable for collection of data commensurate with the impacted vegetation zones. This allows for the vegetation integrity scores to be included in the BAM-C to provide consistency with the area impacted in the Development Footprint. The location of BAM Plots conducted are shown in Figure 2-6 .

2.2.2.4 PLOT-BASED VEGETATION SURVEY

The vegetation integrity score (VIS) for a vegetation zone was calculated from BAM Plots performed in accordance with s.4.2.1 of the BAM. BAM plots were established by walking a random distance into the vegetation zone and establishing the plot on a random bearing. Each BAM Plot was established around a central 50 m transect and each included:

- A 20 m x 20 m plot sampled for the presence of flora species. The plots were carefully examined to identify all flora species present. This search continued until it was confident that all flora species within the plot were detected. Data collected for each species included:
  - Stratum and layers in which each species occurs;
  - Growth form for each species;
  - Scientific and common name for each species;
  - Percentage foliage cover (PFC) across the plot, of each species rooted in or overhanging the plot;
- Abundance rating for each species;
- One 1000 m² (20 m x 50 m) plot to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs; and
- Five 1 m² sub-plots to assess average litter cover (and other groundcover components).

BAM Plot locations and other survey methods such as rapid vegetation assessments that informed the ground-truthed PCT mapping are shown in Figure 2-6 .

2.2.2.5 RAPID DATA POINTS

Rapid vegetation assessments were conducted to supplement BAM plots when determining PCT occurrence. Rapid vegetation assessments recorded the dominant canopy, mid stratum and ground stratum species present while also noting aspects of the landscape such as slope, nearby water sources, soil qualities and signs of disturbance. Rapid vegetation assessments conducted across the Subject Land are shown in Figure 2-6 .

2.2.2.6 POINT INTERCEPT TRANSECTS

Transects of 100 m length were performed to evaluate the percent native and exotic vegetation cover for degraded lands that may not constitute native vegetation. Treeless lands with groundcover vegetation cover comprising less than 50% native vegetation cover in rural zoned land is taken to be cleared (Section 60F(3) of the *Local Land Services Act 2013*).

NEW ENGLAND HIGHWAY

THUNDERBOLTS WAY

Maxar

Legend

- Vegetation Survey
- Project Area
- Subject Land



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 500 1,000 1,500m

1:56,000

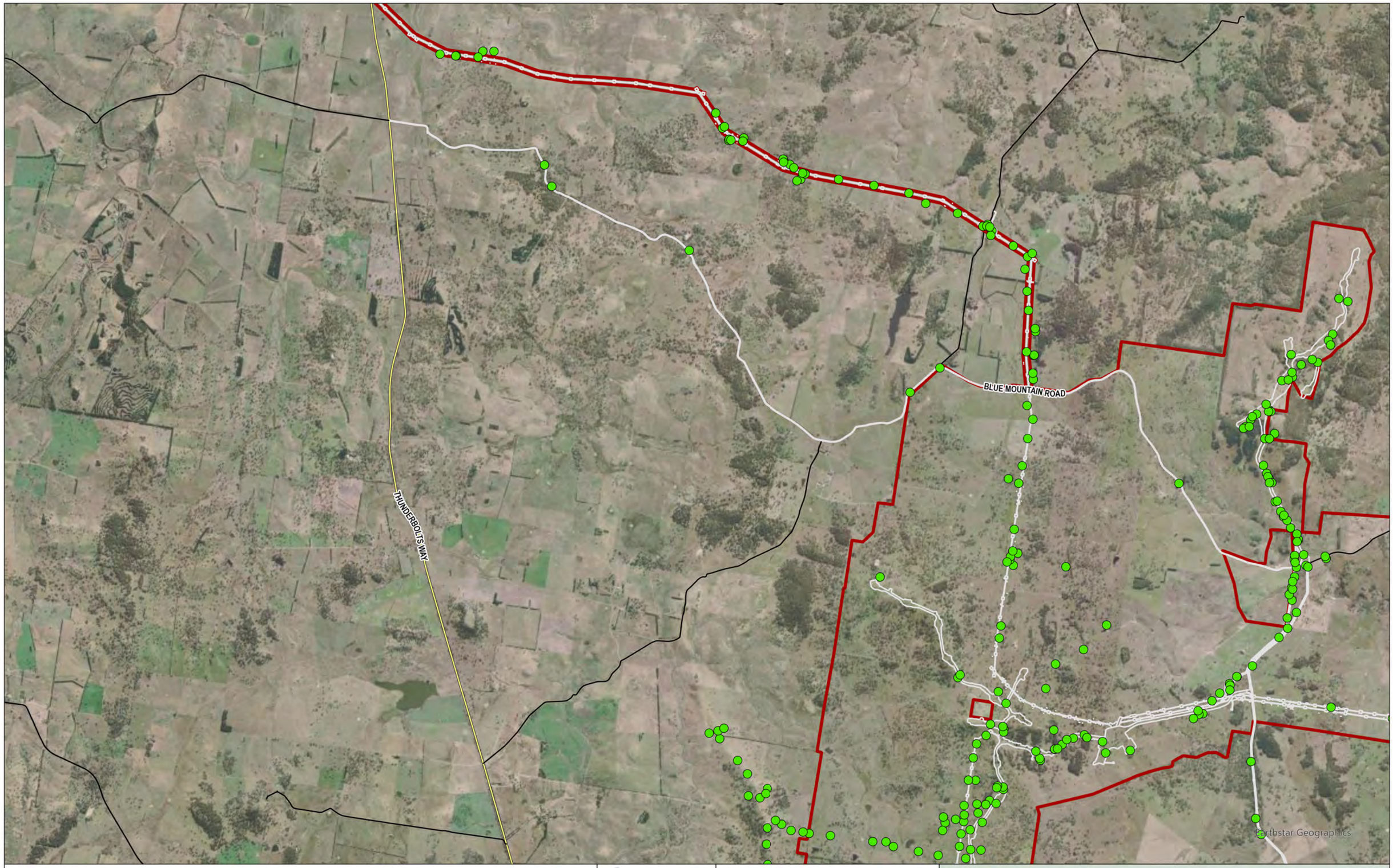
2-6 Vegetation Survey Locations

Map 1 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Vegetation Survey
- Project Area
- Subject Land



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 500 1,000 1,500m

1:56,000

2-6 Vegetation Survey Locations

Map 2 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
THUNDERBOLTS WAY
DERBY STREET
EMU CREEK ROAD
OXLEY HIGHWAY
MOONA PLAINS ROAD
Maxar

Legend

- Vegetation Survey
- Project Area
- Subject Land

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 500 1,000 1,500m
1:56,000

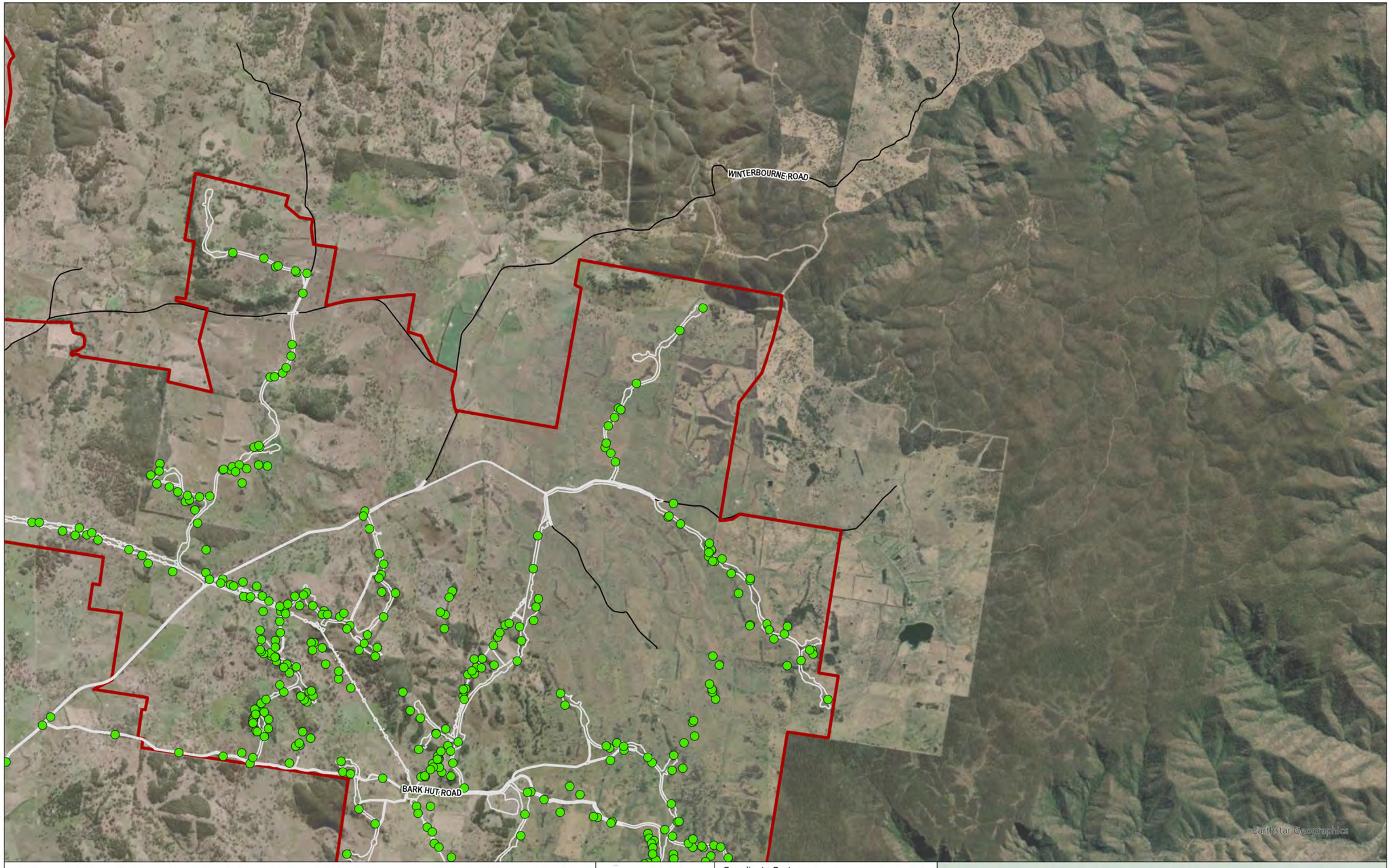
2-6 Vegetation Survey Locations

Map 3 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

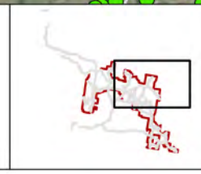
ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Vegetation Survey
- Project Area
- Subject Land



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 500 1,000 1,500m

1:56,000

2-6 Vegetation Survey Locations

Map 4 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

OXLEY HIGHWAY

Earthstar Geographics

Legend

- Vegetation Survey
- Project Area
- Subject Land



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 500 1,000 1,500m

1:56,000

2-6 Vegetation Survey Locations

Map 5 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

2.2.3 THREATENED FLORA SURVEY METHODS

2.2.3.1 REVIEW OF EXISTING INFORMATION

The BAM-C, BioNet Atlas Database and Atlas of Living Australia (ALA) were reviewed prior to the flora surveys conducted for this BDAR. Threatened flora sightings recorded within the Subject Land were further investigated and considered throughout this BDAR. Desktop review and field surveys within the Subject Land included the assessment of habitat constraints and microhabitats and their suitability for predicted species credit flora species.

2.2.3.2 HABITAT CONSTRAINTS ASSESSMENT

Desktop review and field surveys within the Subject Land included the assessment of habitat constraints and microhabitats and their suitability for predicted species credit flora species.

2.2.3.3 FIELD SURVEYS

The BAM-C identifies candidate species that require seasonal targeted searches to be undertaken across the Subject Land in accordance with the BAM and relevant guidelines. Targeted field surveys were undertaken in habitat throughout the broader Project Area prior to refinement of the current Subject Land. The Project Area includes the Subject Land. Threatened flora survey effort is shown in Figure 2-7 and Figure 2-8.

The following targeted flora survey events were completed across the Project Area and Subject Land:

- Spring 2020: 28th September to 2nd October and November 2020;
- Autumn 2021: 8th to 12th March and 29th March to 1st April 2021;
- Spring 2021: 10th to 29th October and 15th to 16th November 2021;
- Summer 2021: 6th to 17th December 2021;
- Spring 2023: 23rd to 25th October 2023;
- Summer 2023: 4th to 7th December 2023; and
- Summer 2024: 29th January to 3rd February 2024.

Targeted flora survey methods conducted by NGH were described in and retrieved from the following documents:

- Biodiversity Development Assessment Report – Winterbourne Wind Farm (NGH, 2022);
- Field Survey Technical Memo 3 – Winterbourne Wind Farm (NGH, 2023);
- Field Survey Technical Memo 4 – Winterbourne Wind Farm (NGH, 2023); and
- Survey Technical Memo – Winterbourne Target Flora & BAM Plots Jan/Feb 2024 (NGH, 2024).

The technical memos are provided in Appendix A.

2.2.3.4 2020 – 2021 SURVEY METHODOLOGY

The following methodology was taken from the Biodiversity Development Report – Winterbourne Wind Farm, prepared by NGH in 2022. NSW Government DPIE *Surveying threatened plants and their habitats* (DPIE, 2020) was used to establish the most effective survey methodology across the development site. A two-phase grid-based survey approach was adopted to maximise the likelihood of detection of targeted plants and apply survey techniques that aim to cover a large proportion of suitable habitat in a large site.

The targeted flora surveys were applied to land within the Development Footprint, a grid spaced at 100 m^2 was overlayed onto the development site using a geographic information system (GIS). Surveys were proposed where the 100 m^2 intersected with suitable habitat for targeted flora species, suitable habitat was considered to include all native vegetation zones. Any areas of exotic vegetation or areas categorised as Category 1 land were not surveyed for threatened flora. A total of 3,030 grid points were within the development site, and 382 grid points intersected the Development Footprint, excluding Category 1 land. The grid points that were situated within the Development Footprint were then adjusted to target turbine locations and ensure coverage across the vegetation zones. At the time of the flora surveys additional assessment of exotic land was being undertaken.

The 328 grid points were targeted for threatened flora surveys. At each survey location point, a 40 m diameter area (1,256 m^2 circular area) was systematically surveyed for the target species by conducting parallel field traverses across the area with transects four metres apart (open vegetation) for all threatened flora species except for *Eucalyptus* species. All trees within the 40 m diameter area were inspected and identified to determine if they were the target species. Surveys for threatened eucalypts were only conducted in woodland vegetation zones. Any threatened flora detected were recorded and a photo of the threatened species and other descriptive notes were also recorded with each sighting.

A matrix of the threatened flora species credit species was prepared from the BAM Candidate Species Report. This detailed the survey window for each species and was used to establish the optimum time of year for detecting the most threatened flora species. This was determined to be November with 15 of the 23 species able to be surveyed within November. Most surveys were carried out in November 2021, with additional flora surveys carried out in October and December 2021 and March 2022 to meet the requirements of the remaining species.

A total of 518 survey points were undertaken within the Subject Land as shown in Figure 2-7 with any threatened flora detected recorded as a point datum. Some of the 518 survey points were duplicates as they were visited several times due to the different seasonal survey requirements of the threatened flora species. These 518 survey points resulted in a total of 65 hectares of potential threatened flora habitat inspected across the Subject Land and represent approximately 670 survey hours.

Threatened flora survey effort conducted between 2020 and 2021 is displayed in Figure 2-7.

2.2.3.5 2023 – 2024 SURVEY METHODOLOGY

Additional targeted flora surveys were completed in 2023 and 2024, after consultation with BCD regarding survey effort requirements and methodology. As described by the Survey Technical Memo - Winterbourne Targeted Flora & BAM Plots Jan/Feb 2024 issued by NGH (2024) the following survey methods were conducted. "In alignment with the Threatened Flora Survey Guidelines (2020), there were two survey methods used for targeted flora surveys. The grid point method was used in PCTs that occurred over more than 50 ha of the Subject Land. Walking transects were undertaken in PCTs that occurred over less than 50 ha of the Subject Land.

Using QGIS, grid points were overlayed on the project area in a 100 x 100 m grid pattern. These grid points were clipped to the relevant PCTs to which the threatened flora were associated. Each grid point was buffered by 20 m creating a 40 m diameter circle (n=204), which was used as the survey area. Surveys were completed in pairs, where parallel traverses were conducted within this circle at a separation distance of 10 m, at the recommendation of the BCS.

Within MerginMaps, completion of grid points was recorded with "Flora Fauna Survey Locations" point. Presence of a targeted threatened species was recorded depending on whether it was an area or count species (three count species & five area species were surveyed for). Area species were mapped to their full extent with "Threatened Flora Fauna Incidental Sightings Polygon", and count species were recorded with "Threatened Flora Fauna Incidental Sightings" points.

Parallel transects were used in places 10 m apart, totalling 854 m of walking transects. In a team of two, one transect line was walked once by each person at the recommendation of the BCD described in Section 1.2.3" (NGH, 2024).

Table 2-4 provides a summary of the flora species credit species surveyed for within the Subject Land. Threatened flora survey effort conducted between 2023 and 2024 is displayed in Figure 2-8.

TABLE 2-4 THREATENED FLORA SURVEY SUMMARY

Scientific Name	Common name	Associated PCT	Recommended Survey Period	Survey Method
Bertya ingramii	Narrow-leaved Bertya		All year	Two-phase grid-based survey approach
Boronia granitica	Granite Boronia		All year	Two-phase grid-based survey approach
Callitris oblonga	Pygmy Cypress Pine	766,	All year	Two-phase grid-based survey approach, grid point method
Chiloglottis anaticeps	Bird Orchid		December – March	Two-phase grid-based survey approach
Chiloglottis platyptera	Barrington Tops Ant Orchid		October	Two-phase grid-based survey approach
Cryptostylis hunteriana	Leafless Tongue Orchid		November – January	Two-phase grid-based survey approach

Scientific Name	Common name	Associated PCT	Recommended Survey Period	Survey Method
Dichanthium setosum	Bluegrass	501, 565, 568, 766, 970	November - May	Two-phase grid-based survey approach, grid point method
Diuris pedunculata	Small Snake Orchid		September – October	Two-phase grid-based survey approach
Eucalyptus magnificata	Northern Blue Box		All year	Two-phase grid-based survey approach
Eucalyptus nicholii	Narrow-leaved Black Peppermint	766, 970	All year	Two-phase grid-based survey approach, grid point method
Eucalyptus oresbia	Small-fruited Mountain Gum	501	All year	Walking transect method
Euphrasia arguta	-	565, 568, 766, 970	November – March	Two-phase grid-based survey approach, grid point method
Euphrasia ciliolata	Polblue Eyebright		December – May	Two-phase grid-based survey approach
Grevillea beadleana	Beadle's Grevillea		All year	Two-phase grid-based survey approach
Haloragis exalata subsp. *velutina*	Tall Velvet Sea-berry		All year	Two-phase grid-based survey approach
Picris evae	Hawkweed		November – February	Two-phase grid-based survey approach
Prostanthera cineolifera	Singleton Mint Bush		September – October	Two-phase grid-based survey approach
Pterostylis elegans	Elegant Greenhood		February – April	Two-phase grid-based survey approach
Pterostylis riparia	-		November - December	Two-phase grid-based survey approach
Styphelia perileuca	Montane Green Five-corners		All year	Two-phase grid-based survey approach
Swainsona sericea	Silky Swainson-pea		September - November	Two-phase grid-based survey approach
Tasmannia glaucifolia	Fragrant Pepperbush		All year	Two-phase grid-based survey approach
Tasmannia purpurascens	Broad-leaved Pepperbush		All year	Two-phase grid-based survey approach
Thesium australe	Austral Toadflax	565, 568, 766, 970	November - February	Two-phase grid-based survey approach, grid point method

2.2.3.6 SURVEY ADEQUACY

Project Area

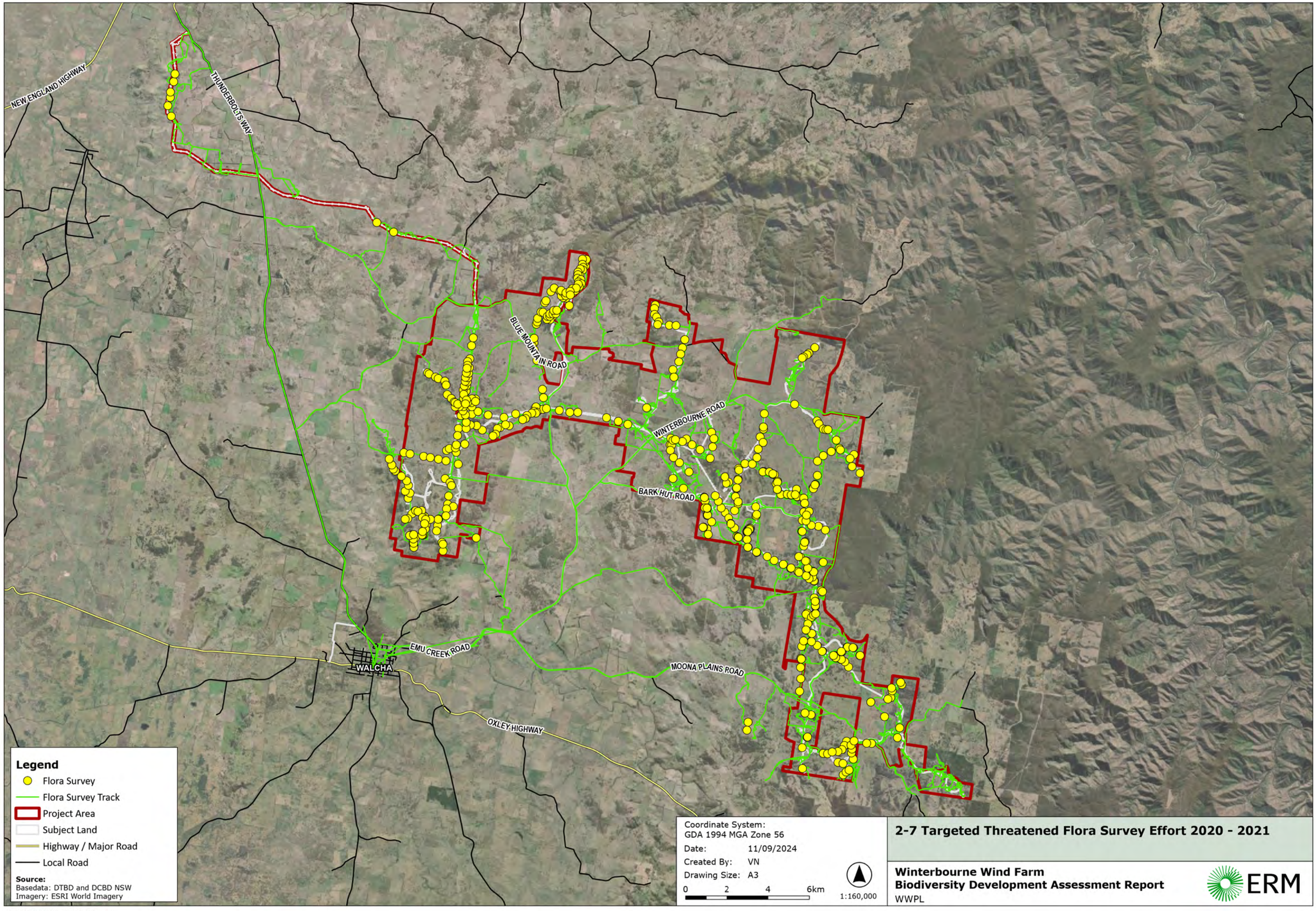
This survey is considered suitable for all threatened flora species credit species listed above. A total of 328 flora survey points were required within the Subject Land. A total of 518 flora survey points were conducted in the Subject land, with 258 conducted within the Development Footprint; some survey locations were visited more than once due to varied survey windows. This survey effort is considered sufficient due to the extensive survey hours applied across the Subject Land and all survey effort outside of the Development Footprint are representative of the surrounding vegetation. Survey points conducted outside the Development Footprint were a result of changes in the Project layout between 2020 and 2024. Ecologists experienced in the identification of threatened species and trained in the survey methodology conducted the threatened flora searches. Weather conditions over 2020 and 2024 varied greatly, therefore it is possible that some of the threatened flora, although expected to flower within certain windows, may not have flowered and thus may have gone undetected.

Local Road Reserve Network

A review of the local public road network and its ability to accommodate haulage to the Project area identified a general need for roadside upgrade works for many public roads east of Walcha. A conservative design has been established for these local public roads with this impact area now included in the Subject Land.

It is anticipated that the local road reserve works will be mostly limited to the highly degraded roadside shoulder where the habitat values are sufficiently degraded to demonstrate absence. This BDAR reasonably assumes these roadside environments are degraded and are therefore not habitat for Candidate Species identified in this report. The BDAR has been finalized and certified on this basis.

A survey in October and December 2024 of these lands is to be performed to verify that the affected lands are sufficiently degraded and/or relevant Candidate species are absent on this basis.



2-7 Targeted Threatened Flora Survey Effort 2020 - 2021

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend
- Flora Survey
- Project Area
- Subject Land
- Flora Survey Track
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

Coordinate System:
GDA 1994 MGA Zone 56
Date: 19/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

2-8 Targeted Threatened Flora Survey Effort 2023 - 2024

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R4.aprx

2.2.4 THREATENED FAUNA SURVEY METHODS

2.2.4.1 REVIEW OF EXISTING INFORMATION

The BAM-C, BioNet Atlas Database and Atlas of Living Australia (ALA) were reviewed prior to the fauna surveys conducted for this BDAR. All threatened fauna sightings recorded over the Subject Land were further investigated and considered throughout this BDAR.

2.2.4.2 HABITAT CONSTRAINTS ASSESSMENT

Desktop assessments and field surveys within the Subject Land included assessment of habitat constraints and microhabitats and their suitability for predicted species credit fauna species. This included desktop assessment of the Assessment Area for features such as caves and waterways and field inspection of microhabitats including leaf litter, stick nests and hollow-bearing trees within the Subject Land. Threatened fauna species excluded from assessment because of habitat constraints are identified and justified.

2.2.4.3 FIELD SURVEYS

Targeted field surveys were undertaken in habitat throughout the broader Project Area prior to refinement of the current Subject Land. The Project Area includes the Subject Land.

The following targeted fauna survey events were completed across the broader Project Area and Subject Land:

- Spring 2019: 8th to 21st November 2019;
- Summer 2020: 13th to 26th February 2020;
- Winter 2020: 10th to 14th August 2020;
- Spring 2020: 5th to 16th October 2020;
- Autumn 2021: 8th March to 22nd April 2021;
- Winter 2021: 23rd August to 27th August 2021;
- Spring 2021: 10th to 29th October 2021 and 15th and 16th November 2021;
- Summer 2021: 6th to 17th December 2021;
- Summer 2022: 3rd to 8th January 2022;
- Autumn 2022: 14th to 16th March 2022;
- Autumn 2023: 22nd to 25th May 2023;
- Winter 2023: 13th to 19th August 2023;
- Spring 2023: 18th to 25th September, 3rd to 6th October and 6th to 10th November 2023;
- Summer 2023: 7th December 2023; and
- Summer 2024: 29th January to 3rd February 2024.

Requirements for targeted surveys include the survey months specified in the BAM-C, as well as the survey effort and methods described in the TBDC and other relevant survey guidelines. Relevant survey guidelines considered include the following:

- Biodiversity Assessment Method 2020 (DPIE, 2020a);
- 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH, 2018);

- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Department of Environment and Conservation (DEC), 2004);
- Survey Guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2010);
- Survey Guidelines for Australia's Threatened Mammals (Department of Sustainability, Environment, Water, Population & Communities (DSEWPC), 2011);
- Survey Guidelines for Australia's Threatened Reptiles (DSEWPC, 2011);
- NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE, 2020b);
- The Spot Assessment Technique: A tool for determining localised levels of habitat use by Koalas *Phascolarctos cinereus* (Phillips & Callaghan, 2011);
- Threatened reptiles Biodiversity Assessment Method survey guide (DPE, 2022); and
- Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method survey guide (DPE 2022b).

Survey effort across the Subject Land and areas of the Project Area are detailed in Table 2-5 and shown in Figure 2-9 (amphibians), Figure 2-10 (raptors), Figure 2-11 (diurnal birds), Figure 2-12 (nocturnal birds), Figure 2-13 (bats), Figure 2-14 (terrestrial mammals), Figure 2-15 (arboreal mammals) and Figure 2-16 (reptiles).

Fauna survey methods conducted by NGH and Nature Advisory were described and retrieved from the following documents:

- NGH Consulting Glossy Black Cockatoo Diurnal Survey Summary (NGH, 2021);
- Biodiversity Development Assessment Report – Winterbourne Wind Farm (NGH, 2022);
- Bird utilisation and raptors surveys 2020-2022 (NATURE ADVISORY, 2022)
- Field Survey Technical Memo 1 – Winterbourne Wind Farm (NGH, 2023);
- Field Survey Technical Memo 2 – Winterbourne Wind Farm (NGH, 2023); and
- Field Survey Technical Memo 3 – Winterbourne Wind Farm (NGH, 2023).

TABLE 2-5 FAUNA FIELD SURVEY EFFORT SUMMARY

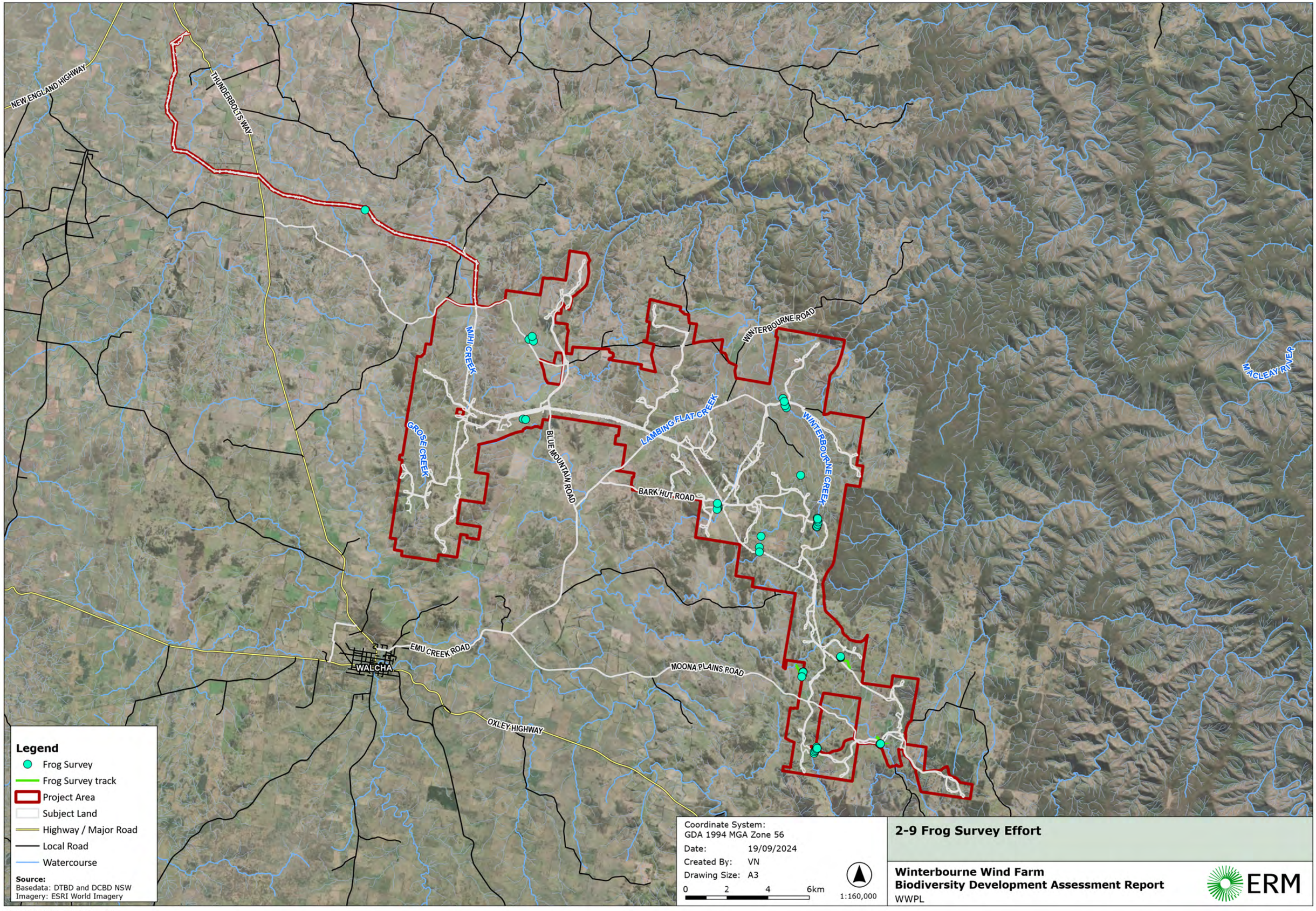
Target Species	Method	Survey Effort	Survey Adequacy
Amphibians • Booroolong Frog (*Litoria booroolongensis*) • Yellow-spotted Tree Frog (*Litoria castanea*) • Peppered Tree Frog (*Litoria piperata*) • Davies' Tree Frog (*Litoria daviesia*) • Glandular Frog (*Litoria subglandulosa*) • Tusked Frog (*Adelotis brevis*) • Sphagnum Frog (*Philoria sphagnicolus*)	• Nocturnal aural-visual surveys along a 500 m transect of suitable habitat (or pro-rata when less than 500 m of suitable habitat is present) commencing with a 5-minute listening period, 2-minute broadcast of target species calls, 2-minutes of listening for response, followed by a slow-paced walk visually scanning the area with a minimum 200-lumen torch to detect eyeshine walking 50 m over 5-minutes. Process repeated for the length of the transect. • Areas of breeding habitat were identified and targeted for tadpole searches, involving sweeping a net backwards and forwards through the water for 10-minutes per every 50m^2 surface area of water from at least 2 m from the bank. Tadpole species are contained for identification and returned to their source.	• Surveys were conducted from 6 to 14 December 2021 (nine nights) across 13 sites totaling 74 survey hours. • Weather conditions ranged from 0 mm to 49.4mm of rainfall. • No target species were detected, the surveys resulted in the observation of 10 non-threatened frog species. • 1-day assessment of suitable breeding habitat for the Sphagnum Frog conducted in February 2024 sufficient to exclude from further assessment. • Aural-visual surveys were undertaken in Spring 2023 looking for potential threatened target species and breeding habitat.	• This survey is considered suitable for the frog species targeted. Although some sites were not given four survey nights, they were sites with lower habitat quality where less frog call activity was observed. • Survey guidelines indicate that surveys should be conducted 2-3 hours after sunset, however some surveys were conducted late into the night to take advantage of personnel being onsite after dark. It was noted that calls started to reduce after about 10pm however the sites were visited in different order each survey night accounting for variation in call activity with time of evening. • 2021 surveys were not carried out 14 days apart, surveys were conducted over nine nights but significant variation in weather conditions was achieved. • Peppered Frog and Yellow Spotted Tree Frog did not have calls available to conduct call playback, however since all calls heard were identified this survey is considered suitable for ruling these species out. • The days leading up to and during the frog surveys in Spring 2023 were mostly dry which may have reduced the detectability of the frog species surveyed.
Raptors • White-bellied Sea-eagle (*Haliaeetus leucogaster*) • Little Eagle	• Opportunistic observations of stick nests of suitable size for breeding of these species were recorded.	• All survey events allowed for the opportunistic detection of stick nests of appropriate size for target species.	• Despite extensive opportunity for the detection of stick nests suitable for the target species, only one suitable nest (~60 cm) was observed and was

Target Species	Method	Survey Effort	Survey Adequacy
(*Hieraaetus morphnoides*) • Square-tailed Kite (*Lophoictinia isura*)	• Bird Utilisation Surveys (BUS) were conducted using the fixed-point bird count method for between 15 and 30-minutes. • Midday vantage point surveys	• 4 midday vantage point surveys were undertaken in October 2023 • 15 BUS locations were repeatedly surveyed (up to eight times per season) across four survey periods between 2020 and 2022 (1x Summer, 1x, Autumn, 1x Winter, 1x Spring). • 14 BUS locations were repeatedly surveyed (up to six times per season) across two survey periods in 2023 (1x Autumn, 1x Spring)	located outside of the Subject Land prior to the 2023 surveys. • BUS survey effort is considered suitable for detection of threatened raptors Further discussion regarding the methodology of BUS conducted can be found in Section 7.3 . • 13 stick nests were recorded in Spring 2023 which are considered to be suitable nest trees for Little Eagle, however the nests had no signs of use (such as whitewash, debris at the base of the tree, or animals within or nearby the nest). • As a result of no detection, species presence could not be utilised to prioritise habitat areas to survey. Due to the large area to cover, greater survey effort was undertaken within areas containing patches of large trees.
Diurnal Birds • Glossy Black-Cockatoo (*Calyptorhynchus lathami*)	• Habitat transects were undertaken to record habitat trees and search for individuals and breeding pairs in areas that meet the requirement for breeding habitat as defined by the TBDC. • Targeted area surveys were conducted in areas of identified foraging habitat for the species. Sites of 2 ha in size were selected for targeted surveys of the species for assessment of species presence, breeding habitat and foraging habitat. • BUS were conducted using the fixed-point bird count method for between 15 and 30-minutes.	• All survey events allowed for opportunistic detection of suitable breeding habitat for the species, surveys in Spring 2023 specifically targeted areas of identified potentially suitable habitat. • 14 sites were selected for bird census surveys between 23rd – 27th August 2021, equating to 79.5 hours of survey effort for the species. • 15 BUS locations were repeatedly surveyed (up to eight times per season) across four survey periods between 2020 and 2022 (1x Summer,	• One site believed to contain suitable habitat for the species was unable to be accessed due to flooding. Additionally, breeding habitat was unable to be confirmed absent and therefore presence is assumed in both instances. • BUS survey effort is considered suitable for detection of threatened raptors. Further discussion regarding the methodology of BUS conducted can be found in Section 7. • 21 suitable hollow bearing trees for Glossy Black-Cockatoo were recorded in Spring 2023, however none of these hollows showed signs of use (such as whitewash, debris including *Allocasuarina* seeds at the base of the

Target Species	Method	Survey Effort	Survey Adequacy
		1x, Autumn, 1x Winter, 1x Spring). • 14 BUS locations were repeatedly surveyed (up to six times per season) across two survey periods in 2023 (1x Autumn, 1x Spring)	tree, or animals coming in or out of the hollow). • As a result of no detection, species presence could not be utilised to prioritise habitat areas to survey. Due to the large area to cover, greater survey effort was undertaken within areas containing patches of large trees.
Nocturnal Birds • Bush Stone-curlew (*Burhinus grallarius*) • Barking Owl (*Ninox connivens*) • Powerful Owl (*Ninox strenua*) • Masked Owl (*Tyto novaehollandiae*) • Sooty Owl (*Tyto tenebricosa*)	• Spotlighting conducted from dusk (6:30pm onwards) using high wattage spotlights in areas of suitable habitat combined with call playback. Target species call was broadcast using an MP3 player and megaphone, followed by a period of listening for a response in 20-minute blocks with spotlighting of the area conducted before and after.	• 4 nights of spotlighting and call playback surveys were conducted in August 2020 and 8 nights in August 2021. • 44 sites were surveyed for a total of 23 hours of effort.	• Sites targeted for spotlighting and call playback were mostly restricted to roadsides as a result of flooding occurring across the Subject Land causing areas to be inaccessible. These roadside habitats may be subject to edge effects and potentially resulted in false negative results. • With consideration to the extensive time spent on site allowing for opportunistic detection of these species, detectability of target species is believed to be >90% confidence.
Bats • Grey-headed Flying-fox (*Pteropus poliocephalus*) • Southern Myotis (*Myotis macropus*) • Large Bent-winged Bat (*Miniopterus orianae oceanensis*) • Little Bent-winged Bat (*Miniopterus australis*) • Eastern Cave Bat (*Vespadelus troughtoni*)	• Echolocation detection equipment was deployed in areas of suitable habitat for the target species. Bat calls recorded by the devices were analysed for species identification by suitably qualified and experienced personnel. • Detectors were secured to trees or fence posts approximately 1.5 – 2 m above ground level and recorded from 30-minutes before dusk to 30-minutes after dawn. • Detectors secured to met masts had three microphones connected, recording at 20, 40 and 70 m above ground.	• 8 devices were deployed in Spring 2020 recording for up to 55 nights. • 8 devices were deployed in Spring 2021 in the same locations as Spring 2020, recording for up to 44 nights. • 11 devices were deployed in Autumn 2023 in new locations, recording for up to 14 nights. • 9 devices were deployed to met masts (3 met masts) recording at 3 different heights (2 m, 30 m and 70 m) in Spring 2023 recording for up to 45 nights.	• Total of survey nights far exceeds the minimum survey requirements for native vegetation present within the Subject Land. • Surveys were conducted in appropriate seasons and site selection is representative of all suitable habitat available for the species. • BCD were consulted prior to the 2023 surveys to inform the additional requirements for survey at the time, including deployment of devices to met masts at heights. • Further discussion regarding the methodology and results of the bat

Target Species	Method	Survey Effort	Survey Adequacy
			surveys conducted can be found in Section 7.3.2.
Terrestrial Mammals • Parma Wallaby (*Macropus parma*) • Brush-tailed Rock-wallaby (*Petrogale penicillata*) • Rufous Bettong (*Aepyprymnus rufescens*) • Spotted-tailed Quoll (*Dasyurus maculatus*)	• Diurnal targeted searches were undertaken in areas of suitable habitat (rocky escarpments, eucalypt forest) searching for individuals, scats, tracks and fur. • Camera traps deployed in areas of suitable habitat by attaching the devices to trees and a bait canister placed 2 m from the camera in frame. Bait mixture made of either sardines and chicken necks or honey, oats, peanut butter and truffle oil mixture with the canister sprayed in honey water. • Hair tubes deployed in areas of suitable habitat using PVC pipe of varying sizes (90, 45 and 32 mm) with a bait canister planted at one end and double-sided tape at the other. Hair samples obtained were analysed by a specialist.	• 3 camera traps deployed in November 2019 recording for 6 days and 6 nights. • 6 camera traps deployed, using 2 cameras per trap, in conjunction with 105 hair tubes deployed across 4 sites, between 6th and 14th December 2021 (7 days and 7 nights effort per site). • Spotlighting conducted as described for the nocturnal bird species also allowed for the detection of these species, equating to 23 hours of effort. • 35 cameras were deployed for 34 days and 34 nights between September and October 2023 in areas of suitable habitat.	• The survey coverage across the Subject Land, while not extensive in terms of number of sites surveyed, targeted high-quality habitat which should maximise detection of the threatened terrestrial mammals. • Only 10 hair samples were retrieved from the hair tubes, indicating they may not have been deployed long enough or that the high rainfall that occurred on 8-10 December 2021 affected the activity and hence the detection rate. • The guidelines recommendation of 10 cameras per hectare was not considered practical for the extent of the Subject Land. Consultation with BCS resulted in a reduced survey effort of 21 days of camera trapping in conjunction with the other survey methods, this was not achieved.
Arboreal Mammals • Eastern Pygmy-possum (*Cercartetus nanus*) • Squirrel Glider (*Petaurus norfolcensis*) • Greater Glider (*Petauroides volans*) • Koala (*Phascolarctos cinereus*)	• Camera traps were deployed in areas of suitable habitat by attaching the devices to trees and a bait canister placed 2 m from the camera in frame. Bait mixture made of either sardines and chicken necks or honey, oats, peanut butter, and truffle oil mixture with the canister sprayed in honey water. • Hair tubes were deployed in areas of suitable habitat using PVC pipe of varying sizes (90, 45 and 32 mm) with a bait canister planted	• 3 camera traps deployed in November 2019 recording for 6 days and 6 nights. • 6 camera traps deployed, using 2 cameras per trap, in conjunction with 105 hair tubes deployed across 4 sites, between 6th and 14th December 2021 (7 days and 7 nights effort per site). • Eight of the camera traps deployed in December 2021 were at heights suitable for detection of arboreal species.	• All target species except the Eastern Pygmy Possum were detected and therefore the effort is considered sufficient. The habitat within the Development Footprint does not contain significant resources for the Eastern Pygmy Possum with fragmented habitat composed of insufficient nectar producing plants. • Only 10 hair samples were retrieved from the hair tubes, indicating they may not have been deployed long enough or that the high rainfall that occurred on 8-10 December 2021

Target Species	Method	Survey Effort	Survey Adequacy
	at one end and double-sided tape at the other. Hair samples obtained were sent to a specialist for analysis. • Opportunistic scat searches were undertaken on site targeting large hollow bearing trees and Koala food trees to detect Koala scats and individuals.	• Spotlighting conducted as described for the nocturnal bird species also allowed for the detection of these species, equating to 23 hours of effort. • 20 cameras deployed in October 2023 at three locations of suitable habitat recording for 21 days and nights.	affected the activity and hence the detection rate. • The guidelines recommendation of 10 cameras per hectare was not considered practical for the extent of the Subject Land. Consultation with BCS resulted in a reduced survey effort of 21 days of camera trapping in conjunction with the other survey methods, this was not achieved.
Reptiles • Pale-headed Snake (*Hoplocephalus bitorquatus*) • Border Thick-tailed Gecko (*Uvidicolus sphyrurus*) • Stephens Banded Snake (*Hoplocephalus stephensii*)	• Timed nocturnal transect searches were conducted in areas of suitable habitat for 1 person-hour using standard spotlighting techniques with a focus placed on the tree trunks and other habitat likely to be used by the Pale-headed snake. • Diurnal surveys were undertaken for Border Thick-tailed Gecko involving turning over partially embedded or surface rock to detect reptiles sheltering during the day.	• Surveys were conducted between 13th and 16th December 2021. • 12 timed nocturnal transect search sites, repeated across two nights. • 30-minutes of rock turning conducted at 2 sites. • 1-day assessment of suitable breeding habitat for Stephens Banded Snake conducted in February 2024 sufficient to exclude from further assessment.	• The weather conditions were suitable and survey effort was targeted to suitable habitat with diurnal and nocturnal searches conducted at the right time of year. This survey is considered suitable for the purposes of this assessment. Humidity ranged between 44 and 83% and rainfall had occurred between 8 to 12 December 2021 resulting in suitable conditions.

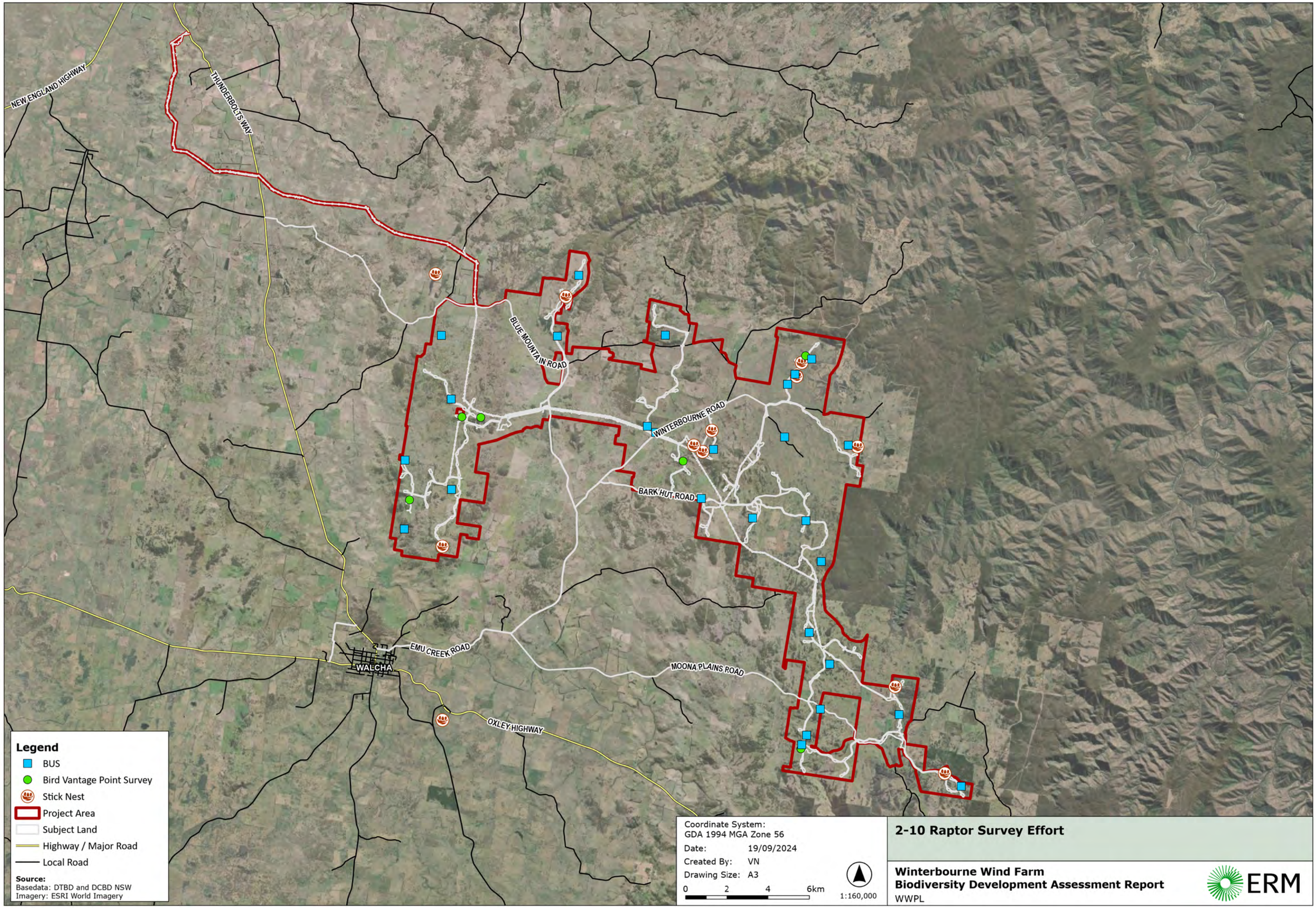


2-9 Frog Survey Effort

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R4.aprx



2-10 Raptor Survey Effort

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R4.aprx

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend
- BUS
- GBC Habitat Assessment
- Hollow Bearing Trees
- Project Area
- Subject Land
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

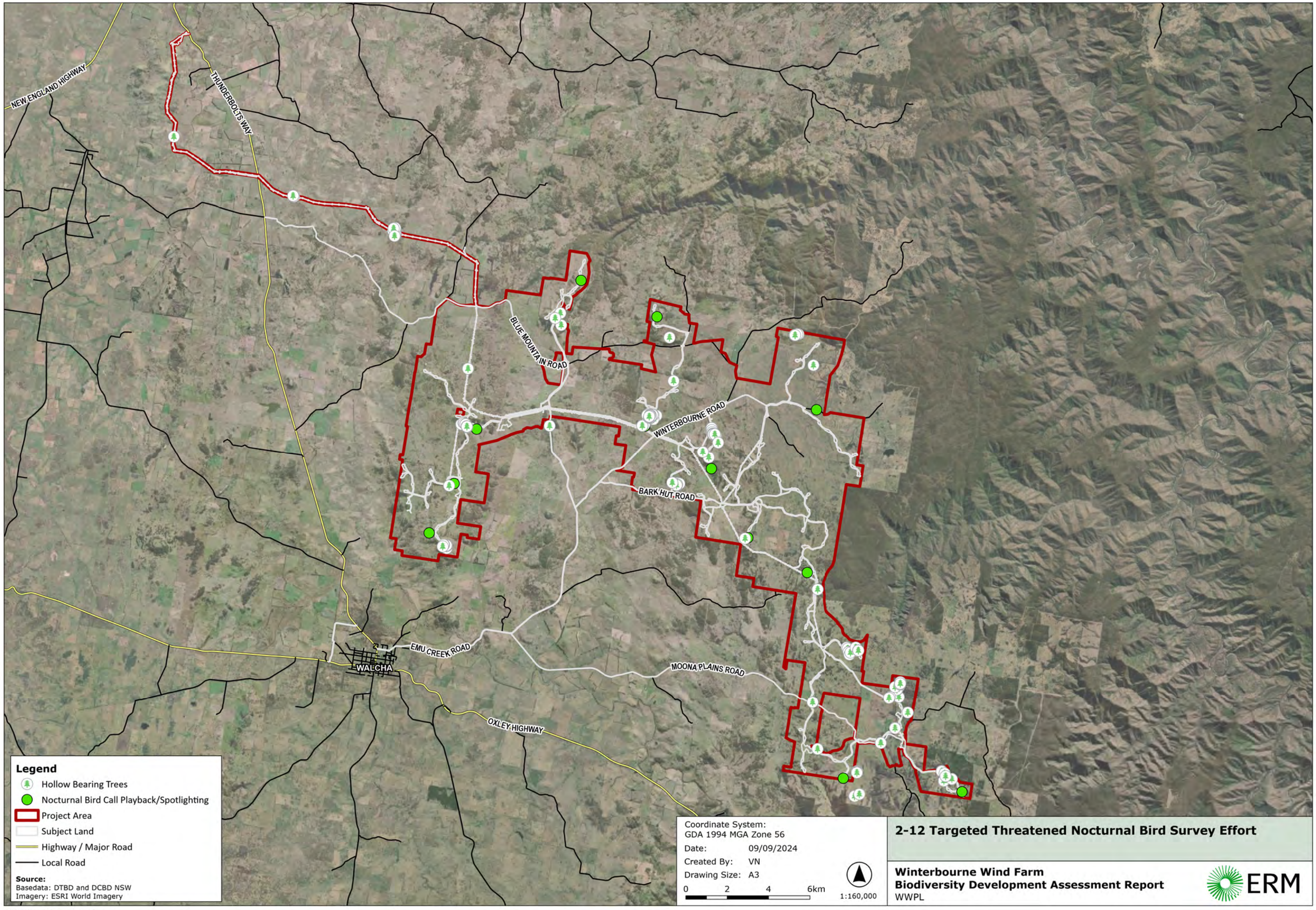
Coordinate System:
GDA 1994 MGA Zone 56
Date: 09/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

2-11 Targeted Threatened Diurnal Bird Survey Effort

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



2-12 Targeted Threatened Nocturnal Bird Survey Effort

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend
- Anabat Location
- Project Area
- Subject Land
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

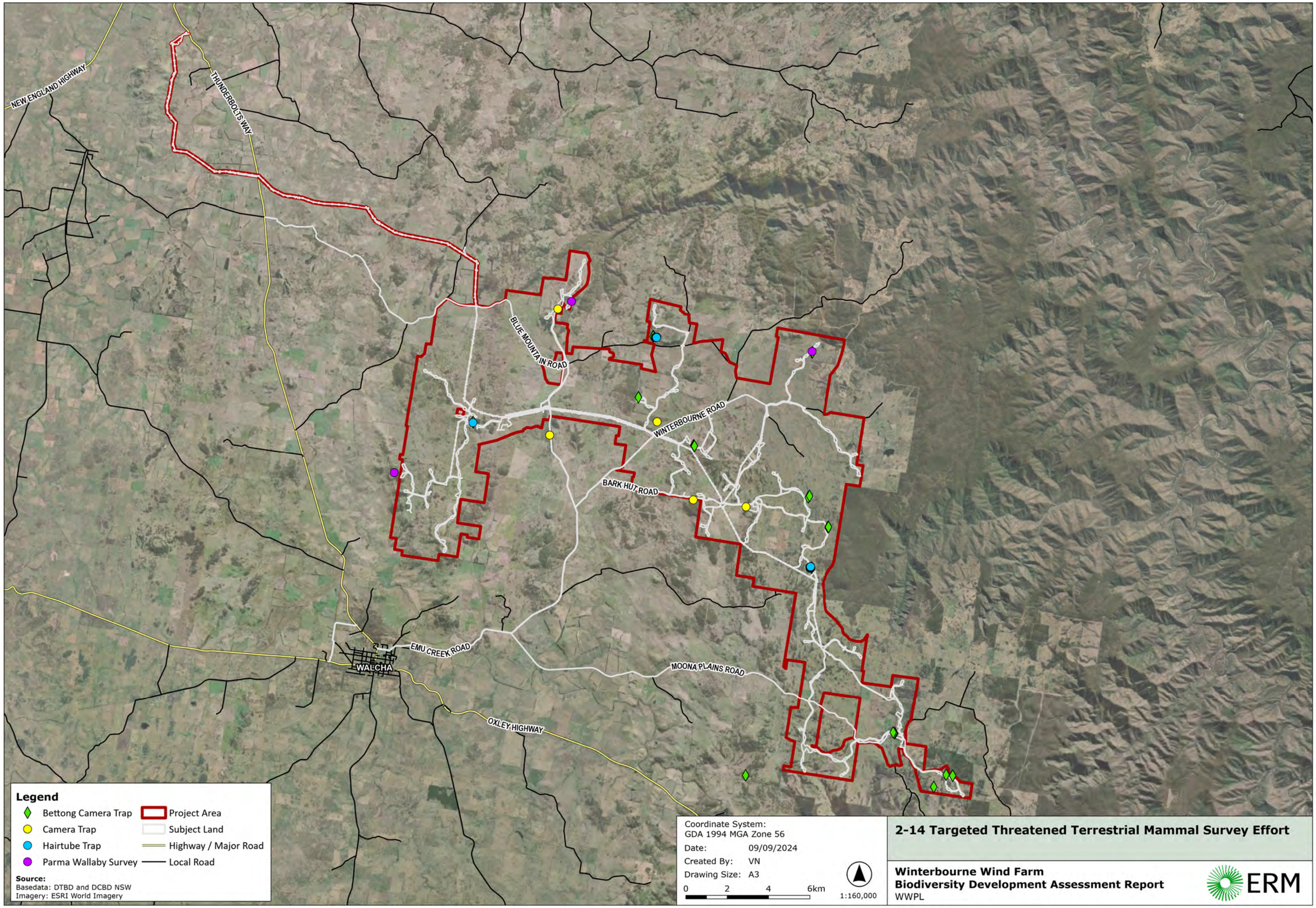
Coordinate System:
GDA 1994 MGA Zone 56
Date: 09/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

2-13 Targeted Threatened Bat Survey Effort

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



2-14 Targeted Threatened Terrestrial Mammal Survey Effort

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend

- Hairtube Trap
- Koala - Scat
- Greater Glider - Scat
- Pygmy Possum Camera Trap
- Hollow Bearing Trees
- Project Area
- Subject Land
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

Coordinate System:
GDA 1994 MGA Zone 56
Date: 09/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

2-15 Targeted Threatened Arboreal Mammal Survey Effort

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend

- Frog Survey
- Pale Headed Snake Survey
- Survey Track
- Project Area
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

Coordinate System:
GDA 1994 MGA Zone 56
Date: 10/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

2-16 Targeted Threatened Reptile Survey Effort

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

2.2.5 WEATHER CONDITIONS

The weather conditions during the survey events were appropriate for the survey of a variety of flora and fauna species. Daily weather observations from nearby Woolbrook (Woolbrook Road) weather station (Station No. 055136) are presented in Table 2-6.

TABLE 2-6 WEATHER CONDITIONS DURING THE PROJECT SURVEY PERIODS

Date	Min Temperature (°C)	Max Temperature (°C)	Rainfall (mm)
Spring 2019			
8/11/2019	9.2	26.3	0
9/11/2019	8.5	17.5	0
10/11/2019	4.2	21.6	0
11/11/2019	10.4	25.0	0
12/11/2019	7.0	28.0	0
13/11/2019	12.5	22.8	0
14/11/2019	7.5	24.5	0
15/11/2019	2.7	27.5	0
16/11/2019	5.6	28.0	0
17/11/2019	7.6	25.7	0
18/11/2019	13.6	25.2	0
19/11/2019	12.3	29.7	0
20/11/2019	8.2	33.0	0
21/11/2019	13.0	32.0	0
Summer 2020			
13/2/2020	17.6	20.7	35.4
14/2/2020	14.4	25.0	11.0
15/2/2020	12.5	28.0	0.2
16/2/2020	17.0	29.3	0
17/2/2020	11.0	25.5	10.6
18/2/2020	13.2	28.0	8.4
19/2/2020	16.2	24.0	14.4
20/2/2020	8.7	22.7	0.2
21/2/2020	13.5	25.2	0
22/2/2020	15.7	21.0	0
23/2/2020	14.9	21.0	0
24/2/2020	15.0	20.0	2.4
25/2/2020	14.5	25.0	0

Date	Min Temperature (°C)	Max Temperature (°C)	Rainfall (mm)
26/2/2020	15.5	26.7	0
Winter 2020			
10/8/2020	1.5	9.0	9.9
11/8/2020	0.8	18.2	0
12/8/2020	3.5	16.6	0
13/8/2020	7.8	18.2	0
14/8/2020	1.0	16.0	0
Spring 2020			
28/9/2020	0.5	16.7	0
29/9/2020	3.8	17.8	0
30/9/2020	5.5	16.0	0
1/10/2020	10.5	18.0	4.8
2/10/2020	1.4	23.0	0.2
Autumn 2021			
8/3/2021	12.7	22.3	0
9/3/2021	10.5	25.2	12.0
10/3/2021	10.6	26.6	0
11/3/2021	16.4	24.0	1.0
12/3/2021	14.6	23.8	9.2
29/3/2021	8.2	22.5	0
30/3/2021	11.0	22.5	0
31/3/2021	6.5	20.2	0
1/4/2021	5.0	22.0	0
2/4/2021	7.0	23.7	0
6/4/2021	13.5	20.2	0
8/4/2021	11.8	20.4	0
20/4/2021	-0.7	19.0	0
22/4/2021	-3.6	15.2	0
Winter 2021			
23/8/2021	9.7	19.0	9.0
24/8/2021	4.6	6.6	23.6
25/8/2021	2.8	10.3	9.0
26/8/2021	-3.6	12.0	0.2
27/8/2021	-1.6	11.0	0

Date	Min Temperature (°C)	Max Temperature (°C)	Rainfall (mm)
28/8/2021	-3.7	-3.0	12.7
29/8/2021	-4.0	19.5	0
30/8/2021	-2.5	-1.8	16.0
31/8/2021	-1.0	19.7	0
1/9/2021	0.2	23.0	0
Spring 2021			
10/10/2021	7.4	25.0	0
11/10/2021	7.5	16.0	29.2
12/10/2021	8.5	16.0	12.0
13/10/2021	9.0	19.7	4.0
14/10/2021	13.8	22.5	1.0
15/10/2021	11.5	16.6	7.4
16/10/2021	5.0	14.3	3.8
17/10/2021	0.2	18.6	0
18/10/2021	2.8	20.7	0
19/10/2021	2.2	22.0	0
20/10/2021	4.3	19.5	0.6
21/10/2021	7.0	21.0	0
22/10/2021	11.8	24.0	0
23/10/2021	9.0	28.2	0
24/10/2021	16.0	21.0	0.4
25/10/2021	6.0	19.6	0
26/10/2021	1.0	20.3	0
27/10/2021	6.5	24.2	0
28/10/2021	5.5	27.0	0
29/10/2021	11.8	22.5	11.8
15/11/2021	5.2	18.0	0
16/11/2021	1.2	18.0	0
Summer 2021			
6/12/2021	10.5	21.6	0
7/12/2021	14.3	23.5	9.2
8/12/2021	11.0	25.2	49.4
9/12/2021	11.3	23.0	23.2
10/12/2021	5.8	19.0	17.0

Date	Min Temperature (°C)	Max Temperature (°C)	Rainfall (mm)
11/12/2021	6.2	22.0	0
12/12/2021	10.0	23.0	0
13/12/2021	9.5	24.0	0
14/12/2021	10.5	25.5	0
15/12/2021	6.7	29.0	0
16/12/2021	12.4	24.5	0
17/12/2021	14.5	28.0	0
Summer 2022			
3/1/2022	9.0	26.0	0
4/1/2022	16.2	27.0	0
5/1/2022	17.7	22.5	0
6/1/2022	19.4	27.2	0
7/1/2022	17.7	28.5	0
8/1/2022	20.0	30.0	0
Autumn 2022			
14/3/2022	9.2	25.0	0
15/3/2022	9.5	23.5	0
16/3/2022	12.5	25.0	0
Autumn 2023			
22/5/2023	-5.5	16.0	0
23/5/2023	-5.0	18.5	0
24/5/2023	-4.5	18.5	0
25/5/2023	-6.5	19.5	0
Winter 2023			
13/8/2023	-1.5	19.0	0
14/8/2023	4.0	19.0	0
15/8/2023	6.0	16.5	0
16/8/2023	-1.5	17.0	0
17/8/2023	0.0	17.5	0.2
18/8/2023	7.0	13.0	13.2
19/8/2023	0.5	11.0	0.2
Spring 2023			
18/9/2023	3.0	28.0	0
19/9/2023	3.0	26.0	0

Date	Min Temperature (°C)	Max Temperature (°C)	Rainfall (mm)
20/9/2023	1.0	26.0	0
21/9/2023	3.0	24.0	0
22/9/2023	6.0	19.0	0
3/10/2023	6.5	29.0	0
4/10/2023	11.0	23.5	0
5/10/2023	5.0	16.0	13.0
6/10/2023	-2.5	20.5	0
23/10/2023	1.5	26.5	0
24/10/2023	2.0	31.0	0
25/10/2023	-	31.0	0
6/11/2023	10.0	22.5	5.4
7/11/2023	7.0	23.0	1.0
8/11/2023	9.5	24.0	0
9/11/2023	12.0	24.5	4.6
10/11/2023	9.0	24.5	43.0
Summer 2023			
4/12/2023	11.0	26.5	0
5/12/2023	10.5	29.0	0
6/12/2023	11.5	32.0	0
7/12/2023	14.0	33.5	0
Summer 2024			
29/1/2024	18.5	30	0
30/1/2024	20.5	31.0	0
31/1/2024	15.5	29.0	45.2
1/2/2024	14.0	30.5	4
2/2/2024	14.5	33.0	0
3/2/2024	17.5	35.0	0

Source: Daily Rainfall - 055136 - Bureau of Meteorology (bom.gov.au)

2.2.6 LIMITATIONS

The field and desktop assessments undertaken to inform this report provide a detailed overview of the biodiversity values of the Subject Land; however, results are limited by the state and condition of native vegetation communities investigated at the time of survey.

Variation in flora composition and structure has been observed during survey events, likely due to natural seasonal variation, severe weather/climatic events (e.g., drought, floods and fire), land use history, pest vertebrate/invertebrate impacts and any other associated interaction effects. However, observer differences are also likely noting the involvement of several observers over the course of all investigations (i.e., ecologists employed at Nature Advisory, NGH and ERM). All efforts have been made to minimise the effect of these factors on the assessment.

2.2.6.1 FALSE NEGATIVES

Fauna and flora diversity within the Subject Land should not be seen to be comprehensive, but rather a finding from sampling design and effort at the time of survey events. The potential for false negatives (i.e., not seeing a species that is present), was limited by use of industry published guidelines applicable to the assessment. The inclusion of seasonal and multiple year sampling has reduced the likelihood of not detecting species relevant to this assessment. Section 8.4 discusses findings of similar developments in the area to provide insight into false negatives.

2.2.6.2 VEGETATION CLASSIFICATION

The classification of native vegetation within the Subject Land has been assigned the best fit PCT by using a quantitative analysis of BAM plot data and corresponding comparative analysis with the BioNet Vegetation Classification database by an experienced practitioner. This process involved the consideration of BAM plot data obtained from several seasons, years and by several observers. The influence of broad ecotones generated from several environmental and anthropogenic influences has also been considered in this analysis. The corresponding PCT mapping has been guided by the quantitative analysis of floristic survey data, field observations and analysis of aerial imagery.

2.2.6.3 TARGETED SURRVEYS

Targeted field surveys for threatened flora and fauna have been conducted in habitat throughout the Project Area. The Project Area includes the Subject Land. A period of several seasons or years is often needed to identify all the species present in an area, especially as some species are only apparent at certain times of the year (orchids or migratory birds) and require specific weather conditions for optimal detection.

These potential limitations have been addressed by adopting a cautionary approach (assumed presence), applied where habitat was identified, or species were predicted to utilise habitat components at some stage during their life cycle.

2.2.6.4 DEGRADED LANDS

The Subject Land comprises large areas of low condition grassland and roadside vegetation that is in a heavily degraded state. Reasonable assumption has been made with respect to the suitability of these lands for Candidate species occurrence. Efforts have been made to verify these assumptions, noting limitations in season and knowledge of impacts arising from the iterative design process.

2.2.7 LICENCING

Regarding the flora and fauna surveys conducted in this BDAR, ERM operated under the Scientific License of SL100196 and Animal Ethics Accreditation number 53055.

3. SITE CONTEXT

3.1 LANDSCAPE FEATURES

The following site context features discussed in Table 3-1, have been identified from an inspection of the Subject Land along with GIS assessment of available relevant digital mapping layers and aerial imagery.

TABLE 3-1 SUBJECT LAND LANDSCAPE FEATURES

Landscape feature	Description
IBRA Bioregions and Subregions	The Subject Land and Assessment Area occur within the New England Tablelands Bioregion and across three subregions: • Armidale Plateau • Walcha Plateau • Yarrowyck – Kentucky Downs The Walcha Plateau covers a large majority of the Subject Land and was therefore used in the BAM-C.
NSW Landscape Regions (Mitchell)	The Subject Land is situated across four NSW Mitchell Landscapes: • Moonbi – Walcha Granites • Niangala Plateau and Slopes • Tia Tops • Uralla Basalts and Sands • The Niangala Plateau and Slopes landscape description has been selected for the Subject Land as it has the largest occurrence across the Subject Land. It is described as "Woodland of snow gum (*Eucalyptus pauciflora*) and black sallee (*Eucalyptus stellulata*) on western ridges, with manna gum (*Eucalyptus viminalis*) and mountain gum (*Eucalyptus dalrympleana*) on mid-slopes and New England peppermint (*Eucalyptus cinerea*) in the valleys on cold sites. Open forest of broad-leaved stringybark (*Eucalyptus caliginosa*), yellow box (*Eucalyptus melliodora*), narrow-leaved peppermint (*Eucalyptus radiata*), and narrow-leaved black peppermint (*Eucalyptus nicholii*) on better soils. Tall open forest of; New England blackbutt (*Eucalyptus andrewsii* ssp*. campanulata*), silver-top stringybark (*Eucalyptus laevopinea*), diehard stringybark (*Eucalyptus cameronii*), narrow-leaved peppermint, on moist margins of the plateau and grey box (*Eucalyptus molucanna*), yellow box (*Eucalyptus melliodora*), Youman's stringybark (*Eucalyptus youmanii*) on dry margins. Silvertop stringybark and lightwood (*Acacia implexa*) with white box (*Eucalyptus albens*) on northern slopes" (NPWS, 2003).
Rivers, streams, estuaries and wetlands	The Subject Land is located north-east of the Apsley River, west of the Macleay River and north-east of Ohio Creek. NSW Hydrography mapping (Figure 3-1) shows that 14 named creeks intersect the Subject Land as well as several unnamed ephemeral tributaries. Aquatic habitat associated with these creeks and tributaries and their associated canals/drains are assessed in Section 3.1.1. There are no Ramsar Wetlands or Important Wetlands as listed in the Directory of Important Wetlands of Australia located within the Subject Land. Farm dams and drainage channels occur throughout the Subject Land. These artificial features possess relatively low-quality habitat with limited emergent, floating or submerged vegetation, however, still provide a valuable resource for fauna as a water source.

Landscape feature	Description
Habitat connectivity	The Subject Land has been historically cleared and altered for agricultural use however some vegetation has been retained and serves as habitat corridors and connectivity to nearby National Parks. The eastern portion of the Project Area has the highest concentration of remnant vegetation and connects with Oxley Wild Rivers National Park. The value of this connectivity is reduced because of fencing, overgrazing and land management practices occurring within the Subject Land. There is little connectivity between the eastern and western sides of the Project Area and the land beyond the western extent of the Project Area is consistent with the cleared, agricultural landscape seen within this portion of the Subject Land. Figure 3-2 displays the extent of native vegetation within the Subject Land and the surrounding areas to demonstrate the habitat connectivity features present.
Karst, caves, crevices, cliffs, rocks or other geological features of significance	The presence of habitat features including karst, caves, crevices and cliffs or other areas of geological significance were assessed throughout the Subject Land during detailed field surveys. There are no karsts, caves, crevices, cliffs or other geological features of significance within the Subject Land.
Soil hazard features	The soil erosion hazard for the majority of the Subject Land has been determined to be moderate and the nearby sensitive soils of the Oxley Wild Rivers National Park should not be impacted by the Project (ERM, 2022). A search of the ASC Soil Type Map reveals that the Kurosol soil type dominates the Subject Land. Kurosols have strong texture contrast between A horizons and strongly acidic B horizons, and with low water holding capacity Kurosols are often sodic. They tend to have low fertility and land use is generally restricted to grazing pastures (ERM, 2022). A search of the NSW Environment Protection Authority Contaminated Sites Register returned no results for the Walcha Council LGA for current or former Declarations of Significantly Contaminated Land. The Uralla Shire Council returned one result for the Former Koppers Timber Treatment Plant which was repealed in 2012.
Areas of outstanding biodiversity value	The Subject Land is not identified as an area of outstanding biodiversity value, as defined under the BC Act.
Additional landscape features identified in SEARs	SEARs identified Gondwana Rainforests of Australia World Heritage Property and National Heritage Place as an additional landscape feature as the Oxley Wild Rivers National Park forms part of the World Heritage-listed Gondwana Rainforest. Indirect impacts to the Oxley Wild Rivers National Park are discussed in Section 8.2

3.1.1 AQUATIC HABITAT

The Subject Land is located north-east of the Apsley River, west of the Macleay River and north-east of Ohio Creek. NSW Hydrography mapping (Figure 3-1) shows that 14 named creeks intersect the Subject Land as well as several unnamed ephemeral tributaries. The named creeks that occur within the Subject Land include:

- Boundary Creek;
- Brookmount Creek;
- Cook Station Creek;
- Dog Trap Creek;
- Draytons Creek;
- Graveyard Creek;
- Grose Creek;
- Jacks Creek;
- Lambing Flat Creek;
- Mihi Creek;
- Salisbury Waters;
- Snake Creek;
- Stockyard Creek; and
- Winterbourne Creek.

The NSW DPI Fisheries Spatial Data Portal was reviewed to determine aquatic values and potential presence of threatened species in the Subject Land listed under the EPBC Act, BC Act as well as the NSW *Fisheries Management Act 1994* (FM Act). No freshwater fish communities or threatened species are mapped within the Subject Land however many of the creek lines within the Subject Land are mapped as key fish habitat. Mitigation measures to prevent impact to these areas of key fish habitat are discussed in Section 8.5.

Other aquatic habitats present within the Subject Land include unnamed first and second Strahler stream order tributaries that occur as ephemeral gullies and have been observed to only hold water immediately after rainfall events, providing little habitat potential.

Farm dams and other artificial aquatic systems present have been subject to habitat quality assessments and targeted fauna surveys for amphibian species where suitable habitat was observed.

No mapped wetlands occur within the Subject Land, nor are there any aquatic endangered ecological communities that would be affected by the Subject Land.

3.2 NATIVE VEGETATION COVER AND PATCH SIZE

The assessment of site context involved the application of the site-based method. The following landscape attributes were assessed in the following sections:

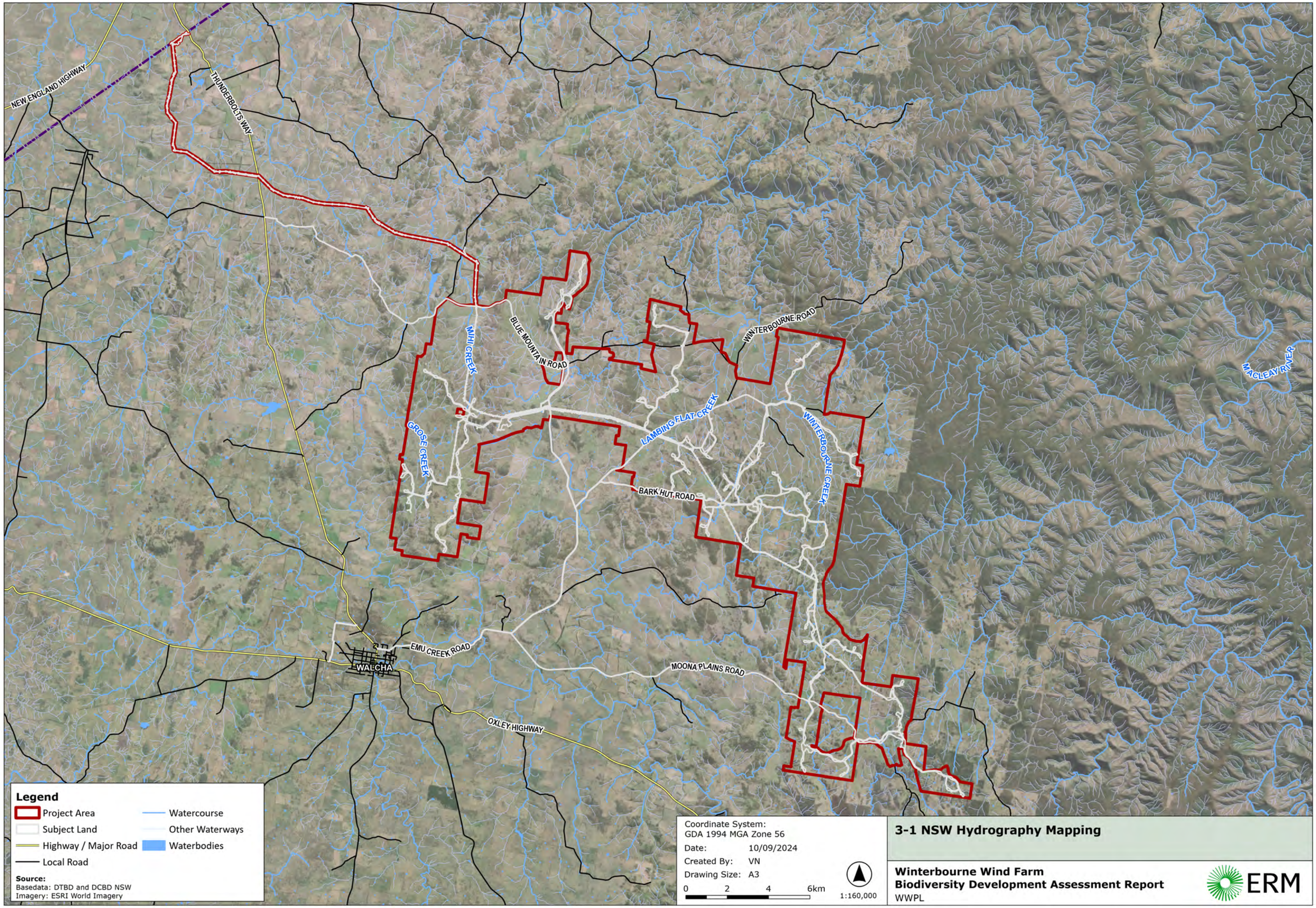
- Percent native vegetation cover in the landscape; and
- Patch size.

3.2.1 PERCENT NATIVE VEGETATION COVER IN THE LANDSCAPE

The extent of native vegetation across the Assessment Area is shown in Figure 3-2 and summarised in Table 3-2 , which includes the parameters used in the BAM-C for percentage of native vegetation cover and the cover class which was found to be >30-70%. Assessment of native vegetation cover in the Assessment Area relies upon the State Vegetation Type Mapping (SVTM) and does not consider any amendments made to the vegetation mapping within the Subject Land as a result of ground truthing as discussed in Section 4.

TABLE 3-2 NATIVE VEGETATION COVER IN THE ASSESSMENT AREA

Description	Value
Assessment Area	19,964.27 ha
Total area of native vegetation cover	7,982.40 ha
Percentage of native vegetation cover	39.98%
Class (0-10, >10-30, >30-70 or >70%)	>30-70%



3-1 NSW Hydrography Mapping

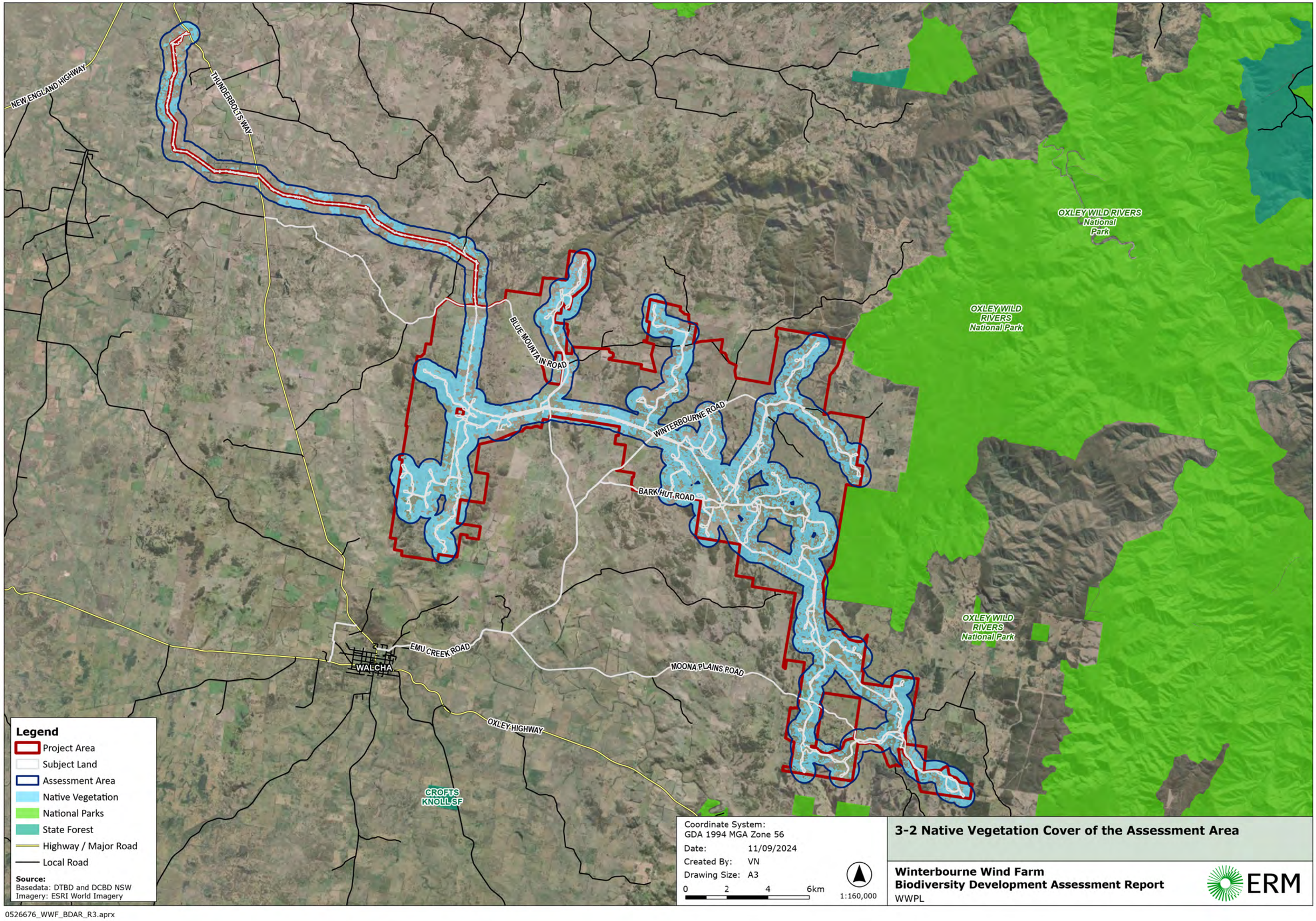
Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

3.2.2 PATCH SIZE

Patch size is defined in the BAM as an area of intact native vegetation that occurs on the development site and includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤ 30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site. The patch size for each vegetation zone within the Subject Land has been calculated as > 100 ha.



3-2 Native Vegetation Cover of the Assessment Area

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

4. NATIVE VEGETATION, THREATENED ECOLOGICAL COMMUNITIES AND VEGETATION INTEGRITY

4.1 NATIVE VEGETATION EXTENT

This section of the BDAR identifies native vegetation occurring on the Subject Land (Figure 3-2) in accordance with the requirements of Section 5 of the BAM. This section describes PCTs on the Subject Land, including:

- Vegetation formation and class;
- Area (ha) for each vegetation type (PCT);
- Species relied upon for identification of vegetation type;
- Justification of evidence used to identify a PCT (as outlined in Paragraph 5.2.1.12 of the BAM);
- TEC status (as outlined in Paragraphs 5.2.1.14 – 5.2.1.15 of the BAM); and
- Estimate of percent cleared value of PCT (as outlined in Paragraph 5.2.1.16 of the BAM).

This section also includes the results of vegetation integrity assessments completed on the Subject Land, including:

- Mapping vegetation zones (in accordance with Subsection 5.3.1 of the BAM);
- Patch size;
- Assessing vegetation integrity using benchmark data (in accordance with Subsection 5.3.3 of the BAM);
- Survey effort (as described in Subsection 5.3.4 of the BAM);
- Determining the current vegetation integrity score (in accordance with Appendix 6 of the BAM) including:
    - Composition condition score.
    - Structure condition score.
    - Function condition score; and
    - VI score.

4.1.1 MAPPED NATIVE VEGETATION

Ground-verified vegetation mapping was conducted over the Subject Land and for most of the Assessment Area. Changes were made to the SVTM (DPE, 2022a), including the reassignment and reshaping of polygons, and was performed to better describe the spatial occurrence of PCTs across the Subject Land.

4.1.2 AREAS THAT ARE NOT NATIVE VEGETATION

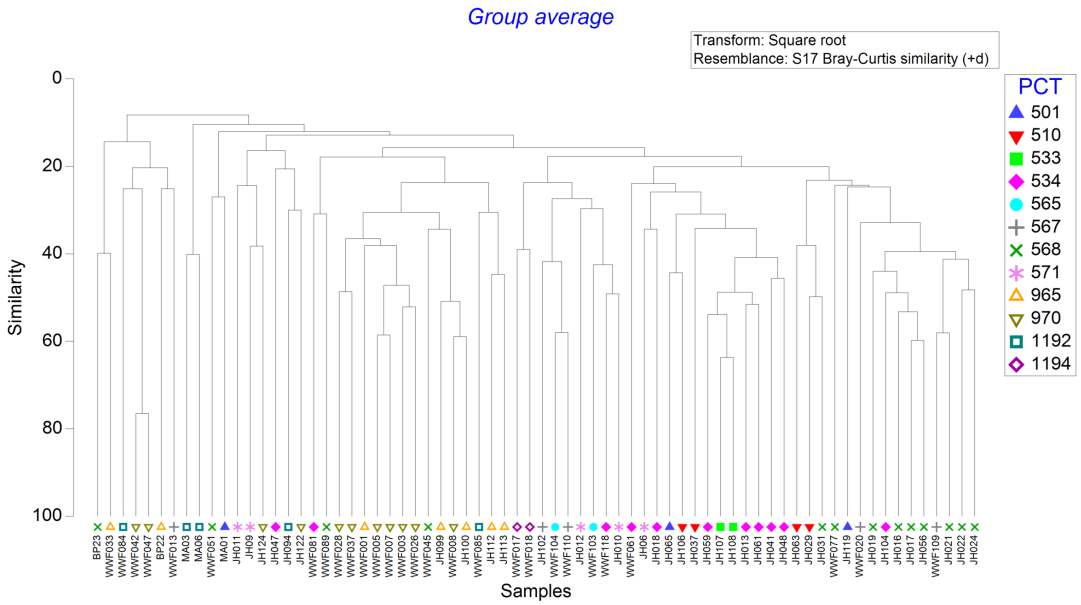
A Land Category Assessment (LCA) Report has not been completed for this assessment. Instead, the published Draft Native Vegetation Regulatory Map has been used to aid in vegetation cover condition classification (see Section 1.6). This was used to differentiate between ‘low’ and ‘moderate’ condition grasslands where the vegetation structure did not comprise woody species.

4.2 IDENTIFY AND MAP PCTS

4.2.1 CLASSIFICATION

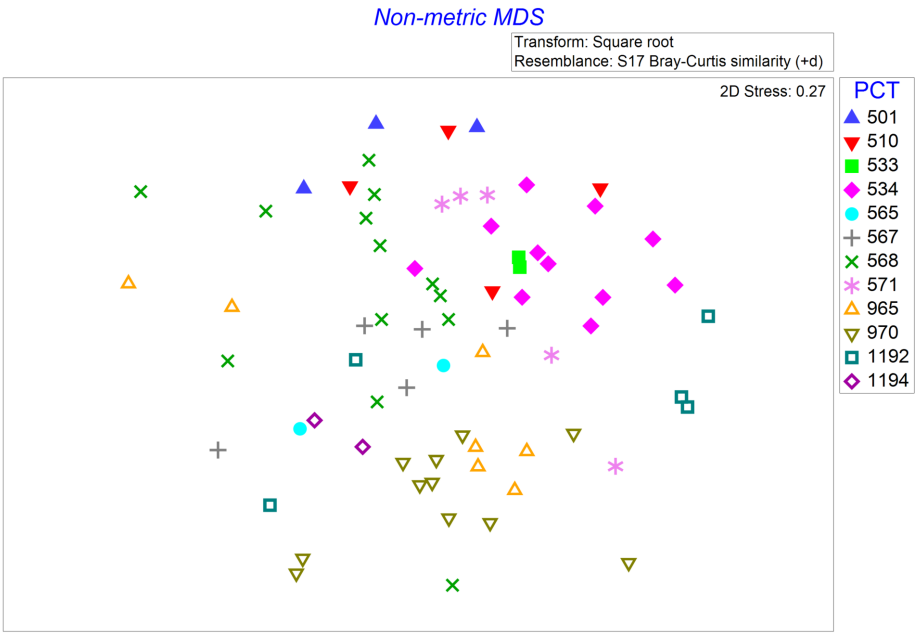
Seventy (70) BAM plots were used in this assessment to classify PCTs (i.e., full floristic plots performed in woody vegetation). BAM plots located in non-woody vegetation were excluded as these are heavily modified and would confound the analysis. Analysis involved use of the Bray-Curtis similarity index to produce a resemblance matrix. The dendrogram produced from the CLUSTER analysis is shown in Chart 4-1 .

CHART 4-1 DENDROGRAM OF THE BAM PLOT DATA BY PCT



The nMDS plot showing the PCT groups is displayed in Chart 4-2.

CHART 4-2 NMDS PLOT OF BAM PLOTS BY SIMPROF GROUPS



The high stress (i.e., 0.27), reflects the considerable variation in samples inherent in the dataset (e.g., disturbance, year, season and observer).

Notwithstanding, the ANOSIM indicates meaningful structure in the *a priori* assignment of BAM plots to PCT groups (i.e., Global Sample Statistic (R) of 0.363 ($p < 0.1$)). However, as the Global R value was not >0.50, it is not indicative of a strong classification.

A strong classification with clear compositional difference is not likely to be readily produced from vegetation data obtained within the Subject Land. Several anthropogenic factors limit the prospect of an optimal classification. These factors include:

- The degradation effect of past and ongoing disturbance on floristic integrity in naturally occurring PCTs (e.g., loss of indicator species and increased influence from non-indicator disturbance tolerant and exotic species);
- Spatial limitations on collecting representative floristic samples (e.g., BAM plot sampling was restricted to available vegetation within the Subject Land often in circumstances contrary to sound sampling principles (e.g., samples taken from small patches); and
- The influence of edges on vegetation cover, which introduces 'noise' into the analysis.

These limitations are likely amplified by natural sources of floristic variation that operate across the Subject Land such as:

- Natural ecotones;
- Altitudinal variation;
- Topographic variation from west to east;
- Varying influence of cold air drainage from west to east; and
- Decreasing rainfall gradient from east to west.

Also noteworthy is the limited availability of reference plot data from this area and the role of such data in defining PCTs across the IBRA region (i.e., largely unsampled freehold land in an over-cleared landscape). In this regard, it is possible that the Subject Land comprises relict examples of under sampled and/or undescribed PCTs that have been substantially and irreparably altered following European settlement (e.g., natural grasslands).

4.2.2 FLORISTIC COMPOSITION

The SIMPER output for each PCT group is provided in Table 4-1, this representing the diagnostic species of these groups. A full list of species by BAM plot is provided in Appendix B.

TABLE 4-1 SIMPER ANALYSIS OF CLUSTER GROUPS

Species	Average Abundance	Average Similarity	Sim/SD	Contribution %	Cumulative %
PCT 501: Average similarity 18.58					
Eucalyptus melliodora	1.56	4.25	0.58	22.86	22.86
Eucalyptus malacoxylon	2.04	2.91	0.58	15.69	38.55
Geranium solanderi	0.4	1.68	4.25	9.04	47.58

Species	Average Abundance	Average Similarity	Sim/SD	Contribution %	Cumulative %
Juncus australis	0.32	1.48	5.13	7.99	55.57
Sporobolus creber	2.16	1.3	0.58	7.02	62.59
Carex inversa	0.52	0.71	0.58	3.84	66.43
Rumex brownii	0.33	0.67	0.58	3.58	70.02
Solanum vicinum	0.3	0.67	0.58	3.58	73.6
Amyema pendula	0.21	0.6	0.58	3.23	76.83
Poa sieberiana	0.25	0.6	0.58	3.23	80.07
Schoenus apogon	0.62	0.58	0.58	3.14	83.2
Dichondra repens	0.21	0.47	0.58	2.53	85.74
Echinopogon caespitosus	0.44	0.47	0.58	2.53	88.27
Hydrocotyle laxiflora	0.25	0.47	0.58	2.53	90.81
Group 510: Average similarity 24.33					
Eucalyptus melliodora	2.32	5.15	0.91	21.17	21.17
Sporobolus creber	2.14	4.87	0.91	20.02	41.19
Schoenus apogon	1.06	2.2	1.12	9.05	50.24
Eucalyptus nova-anglica	2.16	2.09	0.41	8.6	58.84
Cynodon dactylon	1.53	1.62	0.41	6.66	65.5
Cotula australis	1.3	1.15	0.68	4.71	70.21
Carex inversa	0.76	1.06	0.75	4.36	74.56
Cymbonotus lawsonianus	0.34	0.92	0.91	3.78	78.34
Amyema pendula	0.72	0.65	0.91	2.67	81.01
Juncus australis	0.41	0.65	0.91	2.67	83.68
Euchiton sphaericus	0.5	0.6	0.41	2.46	86.15
Poa sieberiana	1.37	0.56	0.41	2.28	88.43
Oxalis perennans	0.24	0.54	0.91	2.22	90.64
Group 533: Average similarity 63.82					
Eucalyptus nova-anglica	3.52	14.38	SD=0!	22.53	22.53
Sporobolus creber	3.82	14.38	SD=0!	22.53	45.05
Poa sieberiana	2.65	12.03	SD=0!	18.85	63.9
Schoenus apogon	2.12	9.09	SD=0!	14.25	78.15
Asperula conferta	0.85	3.21	SD=0!	5.04	83.19

Species	Average Abundance	Average Similarity	Sim/SD	Contribution %	Cumulative %
Euchiton sphaericus	1.14	2.49	SD=0!	3.9	87.09
Geranium solanderi	0.77	2.49	SD=0!	3.9	90.99
Group 534: Average similarity 25.76					
Eucalyptus nova-anglica	3.07	6.96	0.99	27.01	27.01
Poa sieberiana	2.76	4.95	1.04	19.22	46.23
Sporobolus creber	1.39	2.29	0.69	8.9	55.13
Carex inversa	0.84	1.42	0.74	5.51	60.65
Asperula conferta	0.8	1.2	0.67	4.66	65.31
Hydrocotyle laxiflora	0.8	1.06	0.99	4.1	69.41
Schoenus apogon	0.69	0.96	0.59	3.73	73.14
Geranium solanderi	0.44	0.94	1.02	3.65	76.79
Lissanthe strigosa	0.5	0.67	0.65	2.59	79.39
Haloragis heterophylla	0.62	0.64	0.51	2.5	81.89
Austrostipa rudis	0.77	0.59	0.48	2.28	84.17
Eragrostis leptostachya	0.9	0.44	0.23	1.72	85.88
Euchiton sphaericus	0.43	0.43	0.54	1.69	87.57
Paspalum dilatatum	0.65	0.4	0.34	1.55	89.12
Hypericum gramineum	0.25	0.3	0.6	1.18	90.3
Group 565: Average similarity 42.53					
Eucalyptus laevopinea	4.83	17.43	-	40.99	40.99
Pteridium esculentum	1.83	6.59	-	15.49	56.48
Austrostipa verticillata	1.62	4.66	-	10.96	67.44
Geranium solanderi	1.5	4.66	-	10.96	78.4
Acacia dealbata	1.35	3.29	-!	7.75	86.14
Hydrocotyle laxiflora	0.82	2.95	-	6.93	93.07
Group 567: Average similarity 22.35					
Poa sieberiana	4.14	8.22	1	36.8	36.8
Geranium solanderi	1.09	2.97	2.05	13.27	50.07
Eucalyptus caliginosa	2.31	1.91	0.32	8.54	58.61
Oxalis perennans	0.67	1.58	1.41	7.08	65.69

Species	Average Abundance	Average Similarity	Sim/SD	Contribution %	Cumulative %
Eucalyptus blakelyi	1.59	1.06	0.32	4.75	70.44
Eucalyptus melliodora	1.48	0.97	0.32	4.33	74.77
Hydrocotyle laxiflora	0.52	0.76	1.11	3.4	78.17
Soliva sessilis	0.73	0.67	0.32	2.99	81.16
Pteridium esculentum	0.26	0.51	0.62	2.26	83.43
Cymbonotus lawsonianus	0.33	0.38	0.62	1.7	85.13
Gamochaeta spp.	0.33	0.38	0.62	1.7	86.83
Sporobolus creber	0.33	0.35	0.61	1.59	88.42
Dichondra repens	0.29	0.33	0.62	1.49	89.9
Panicum effusum	0.34	0.29	0.32	1.28	91.18
Group 568: Average similarity 21.95					
Eucalyptus caliginosa	2.72	5.97	0.85	27.19	27.19
Poa sieberiana	2.24	3.97	0.74	18.08	45.27
Olearia viscidula	1.43	1.63	0.49	7.4	52.68
Austrostipa rudis	0.99	1.28	0.47	5.85	58.53
Cynodon dactylon	1.47	1.2	0.33	5.44	63.97
Eucalyptus melliodora	0.8	0.98	0.3	4.45	68.42
Geranium solanderi	0.34	0.76	0.77	3.44	71.86
Euchiton sphaericus	0.32	0.55	0.7	2.52	74.38
Dichondra repens	0.47	0.53	0.42	2.42	76.8
Lissanthe strigosa	0.32	0.42	0.56	1.9	78.7
Juncus australis	0.25	0.39	0.6	1.78	80.48
Rumex brownii	0.17	0.37	0.6	1.68	82.15
Crassula sieberiana	0.45	0.32	0.23	1.45	83.6
Bothriochloa decipiens	0.41	0.29	0.25	1.33	84.93
Paronychia brasiliana	0.35	0.29	0.33	1.32	86.25
Austrostipa scabra	0.47	0.23	0.18	1.06	87.31
Cymbonotus lawsonianus	0.27	0.21	0.32	0.97	88.27
Urtica incisa	0.29	0.2	0.2	0.89	89.16
Rytidosperma racemosum	0.22	0.19	0.26	0.85	90.01

Species	Average Abundance	Average Similarity	Sim/SD	Contribution %	Cumulative %
Group 571: Average similarity 21.91					
Eucalyptus laevopinea	1.63	3.65	0.74	16.65	16.65
Pteridium esculentum	1.08	2.42	0.62	11.05	27.69
Poa sieberiana	0.68	1.64	0.61	7.47	35.16
Hydrocotyle laxiflora	0.47	1.53	1.12	6.99	42.15
Austrostipa rudis	0.69	1.31	0.46	6	48.14
Dichondra repens	0.31	1.17	1.06	5.36	53.5
Eucalyptus viminalis	1.22	1.1	0.32	5.02	58.53
Euchiton sphaericus	0.28	1.06	1.13	4.86	63.39
Lissanthe strigosa	0.28	1.06	1.13	4.86	68.25
Bothriochloa decipiens	0.69	0.85	0.32	3.89	72.14
Schoenus apogon	0.31	0.77	0.58	3.51	75.65
Haloragis heterophylla	0.73	0.68	0.32	3.1	78.75
Vittadinia sulcata	0.19	0.53	0.61	2.41	81.16
Juncus australis	0.9	0.52	0.61	2.36	83.52
Geranium solanderi	0.27	0.5	0.61	2.27	85.8
Chrysocephalum semipapposum	0.13	0.22	0.32	1	86.8
Juncus remotiflorus	0.13	0.22	0.32	0.99	87.79
Carex inversa	0.23	0.21	0.32	0.98	88.77
Amyema pendula	0.13	0.21	0.32	0.94	89.72
Group 965: Average similarity 15.21					
Poa sieberiana	1.78	3.27	0.6	21.49	21.49
Eucalyptus radiata	2.37	2.43	0.38	16	37.49
Pteridium esculentum	0.88	2.01	0.89	13.21	50.7
Geranium solanderi	0.51	1.48	0.84	9.72	60.42
Eucalyptus stellulata	1.19	1.04	0.22	6.87	67.28
Acaena novae-zelandiae	0.28	0.76	0.89	5.03	72.31
Carex inversa	0.35	0.54	0.36	3.54	75.85
Eucalyptus dalrympleana	1.01	0.54	0.22	3.53	79.38
Cynodon dactylon	0.93	0.43	0.22	2.81	82.19

Species	Average Abundance	Average Similarity	Sim/SD	Contribution %	Cumulative %
Dichondra repens	0.33	0.42	0.33	2.77	84.96
Paspalum dilatatum	0.35	0.36	0.38	2.36	87.33
Rubus parvifolius	0.39	0.31	0.34	2.03	89.36
Sporobolus creber	0.46	0.27	0.22	1.77	91.13
Group 970: Average similarity 27.74					
Eucalyptus radiata	3.47	9.12	0.95	32.88	32.88
Poa sieberiana	3.35	7.28	0.9	26.25	59.14
Pteridium esculentum	1.14	2.06	0.75	7.44	66.58
Eucalyptus obliqua	1.57	1.57	0.42	5.66	72.25
Geranium solanderi	0.72	1.41	0.7	5.1	77.35
Acaena novae-zelandiae	0.53	0.89	0.65	3.21	80.56
Eucalyptus nobilis	1.09	0.88	0.23	3.17	83.73
Eucalyptus acaciiformis	0.93	0.65	0.24	2.34	86.07
Dichondra repens	0.31	0.53	0.75	1.92	87.99
Urtica incisa	0.53	0.5	0.26	1.8	89.79
Grona varians	0.17	0.35	0.6	1.27	91.06
Group 1192: Average similarity 12.80					
Eucalyptus dalrympleana	2.77	7.68	0.58	60	60
Poa sieberiana	1	1.4	0.54	10.91	70.91
Eucalyptus stellulata	0.79	0.73	0.32	5.66	76.58
Asperula conferta	0.19	0.69	0.62	5.4	81.98
Acaena novae-zelandiae	0.22	0.45	0.62	3.53	85.51
Oxalis perennans	0.24	0.45	0.62	3.53	89.04
Paspalum dilatatum	0.29	0.33	0.32	2.6	91.63
Group 1194: Average similarity 37.95					
Poa sieberiana	1.83	5.92	SD=0!	15.59	15.59
Geranium solanderi	1.5	4.18	SD=0!	11.02	26.61
Viburnum tinus	1.21	4.18	SD=0!	11.02	37.63
Cynoglossum australe	0.92	3.5	SD=0!	9.22	46.86
Wahlenbergia communis	0.83	3.24	SD=0!	8.54	55.39

Species	Average Abundance	Average Similarity	Sim/SD	Contribution %	Cumulative %
Amyema pendulum	1.06	2.96	SD=0!	7.79	63.19
Paronychia brasiliana	0.63	2.65	SD=0!	6.97	70.16
Hydrocotyle laxiflora	0.63	2.29	SD=0!	6.04	76.2
Lepidium spp.	0.58	1.87	SD=0!	4.93	81.13
Rubus parvifolius	0.72	1.87	SD=0!	4.93	86.06
Carduus nutans	0.38	1.32	SD=0!	3.49	89.54
Galium binifolium	0.66	1.32	SD=0!	3.49	93.03

4.2.3 PLANT COMMUNITY TYPES

Table 4-2 identifies the PCTs present within the Subject Land with the mapped extent shown in Figure 4-1. A description of each PCT is provided in Table 4-3 to Table 4-15 .

TABLE 4-2 PCTS IDENTIFIED WITHIN THE SUBJECT LAND

PCT ID	PCT name	Subject Land (ha)
501	Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion	7.18
510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	68.53
533	New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	0.62
534	New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	96.88
565	Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	7.67
567	Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	126.37
568	Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	214.56
571	Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	45.46
766	Carex sedgeland of the slopes and tablelands	1.58
965	Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	133.02
967	Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	130.25
1192	Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	17.34
1194	Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	4.52

Lands mapped as PCT 0 represent lands that are either not covered by vegetation or comprise 'exotic' vegetation, although the latter can comprise a small amount of native vegetation as defined by the LLS Act, albeit never abundant or characteristic. The latter is often associated with exotic trees (e.g., pine trees) or groundcovers that are typical of cropped lands or improved pastures (e.g., *Dactylis glomerata*). Examples of these circumstances are provided in Plate 1 and 2.

PLATE 1 LOW CONDITION GRASSLAND (PCT 1192)

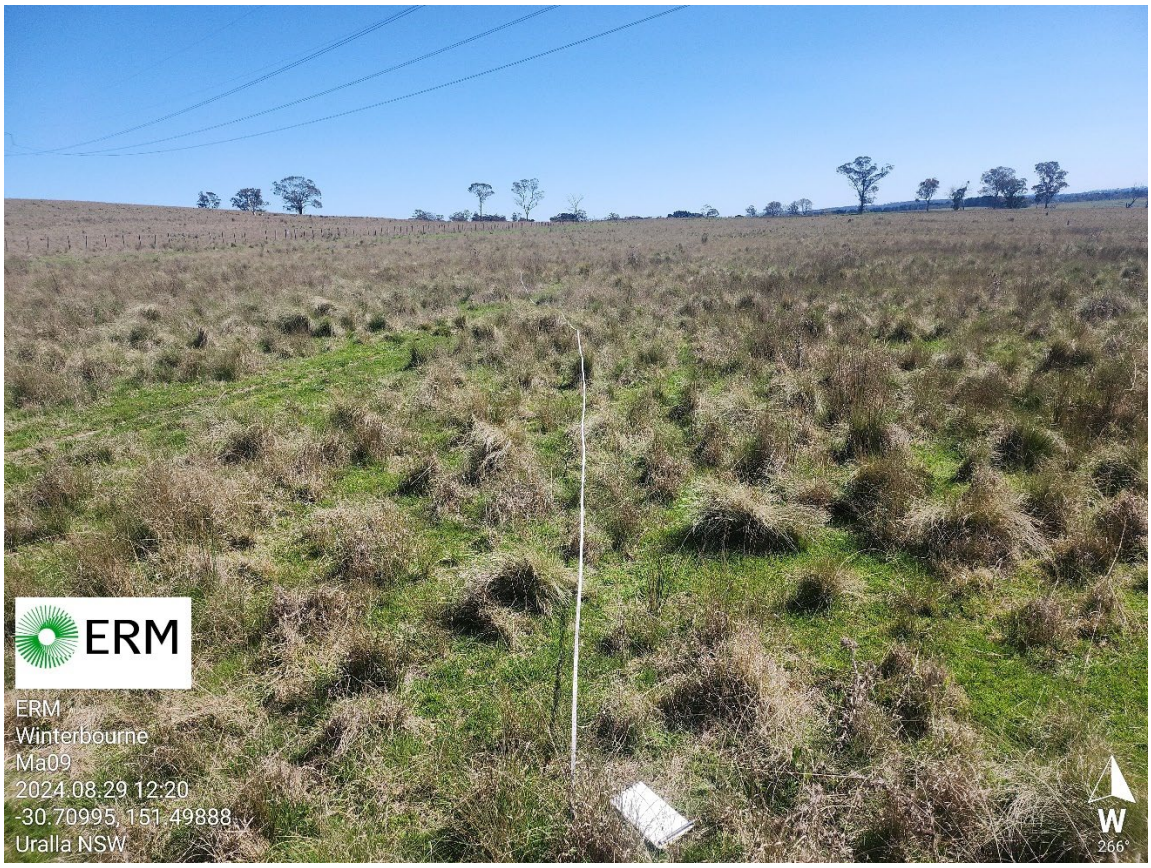
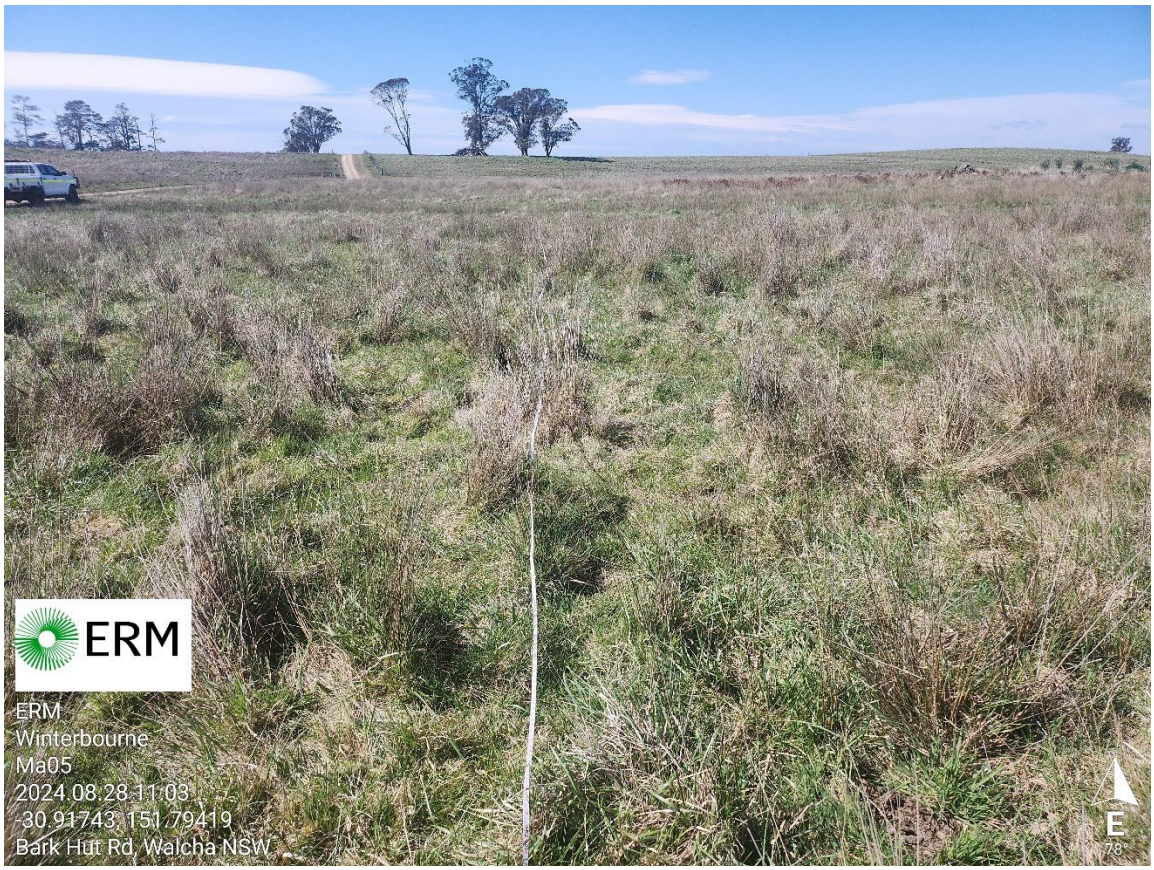


PLATE 2 LOW CONDITION GRASSLAND - ROADSIDE





Legend

Project Area

Subject Land

534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

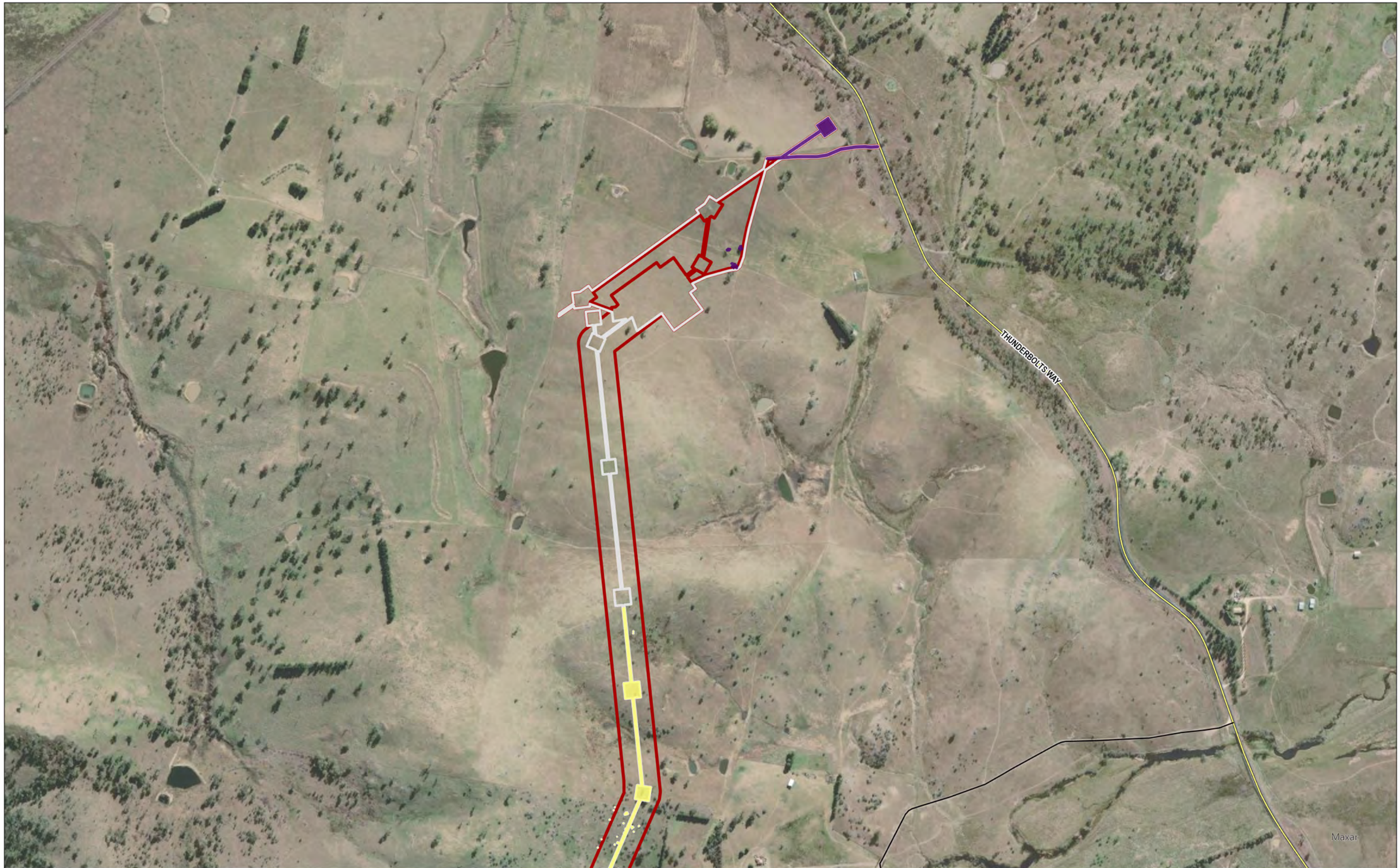
4-1 Plant Community Types

Map 1 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area

Subject Land

510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion

1192,Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 2 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area

Subject Land

510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 3 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

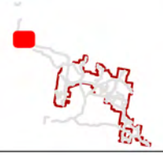
Legend

Project Area

Subject Land

510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion

534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 4 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area
Subject Land
510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 5 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area
Subject Land
510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 6 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

Maxar

Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 7 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

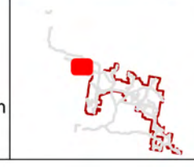


Legend

Project Area

Subject Land

510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 8 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

Project Area
Subject Land
510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 9 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

Legend

Project Area

Subject Land

510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion

534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

766,Carex sedgeland of the slopes and tablelands



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 10 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 1192,Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 11 of 50

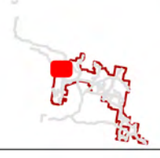
Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 533,New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 12 of 50

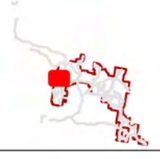
Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Legend

- Project Area
- Subject Land
- 533,New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 13 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Legend

Project Area

Subject Land

510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion

567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion

568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

571,Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 14 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 565,Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- 571,Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 15 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area

568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Subject Land



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 16 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area

568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Subject Land



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 17 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- 1192,Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 18 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 19 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

BLUE MOUNTAIN ROAD

Maxar

Legend

Project Area
Subject Land
534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

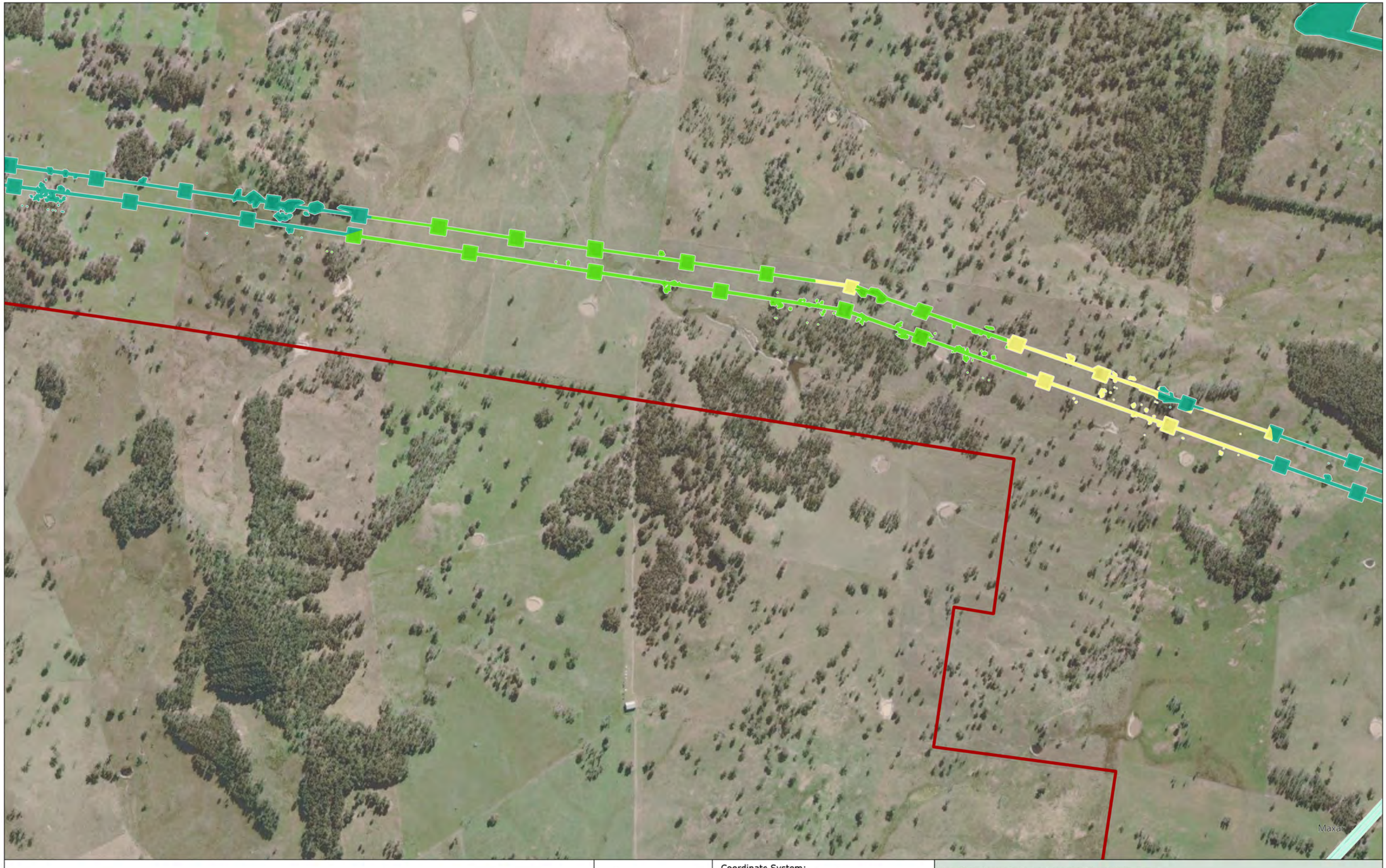
4-1 Plant Community Types

Map 20 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

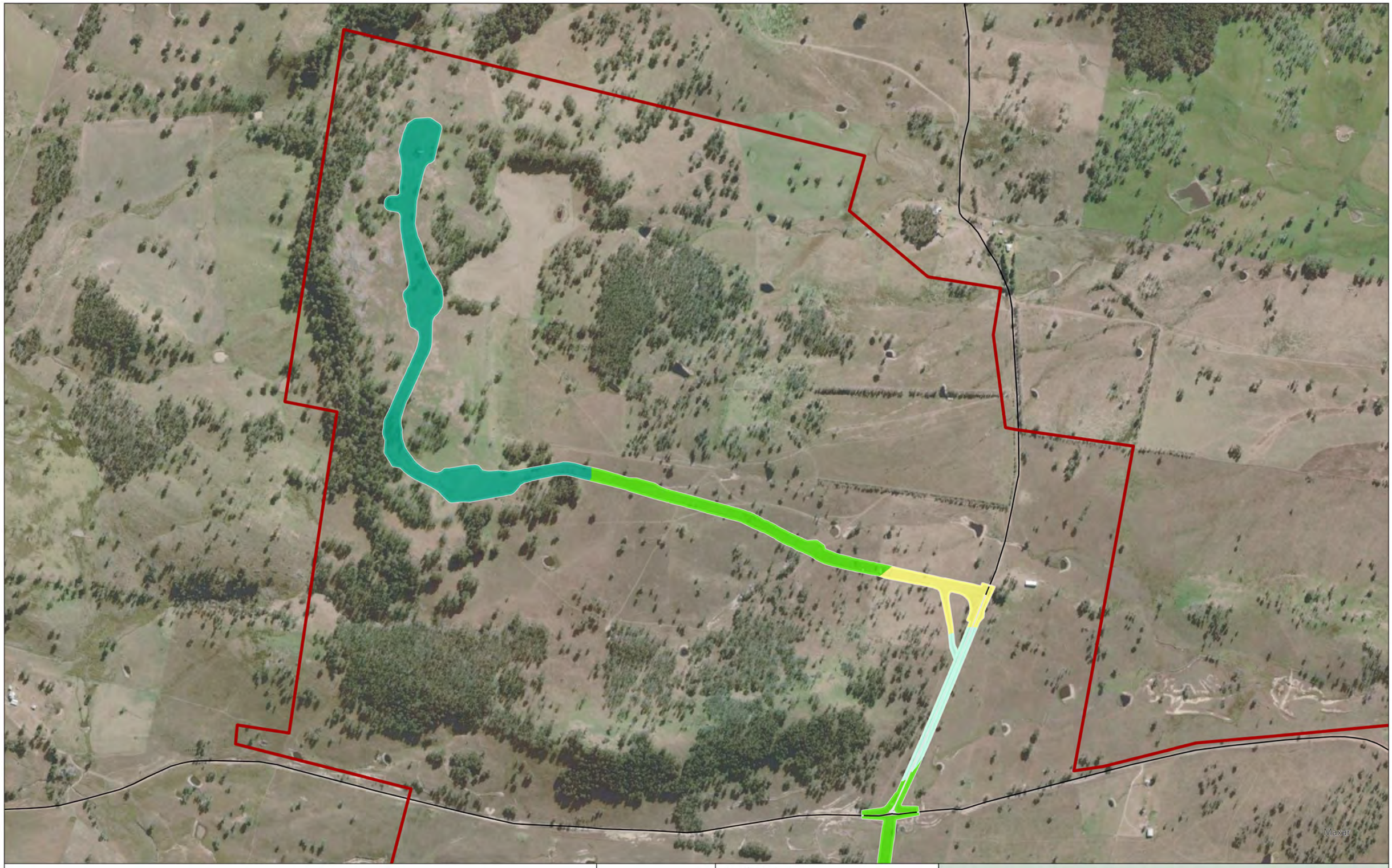
1:10,000

4-1 Plant Community Types

Map 21 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 22 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

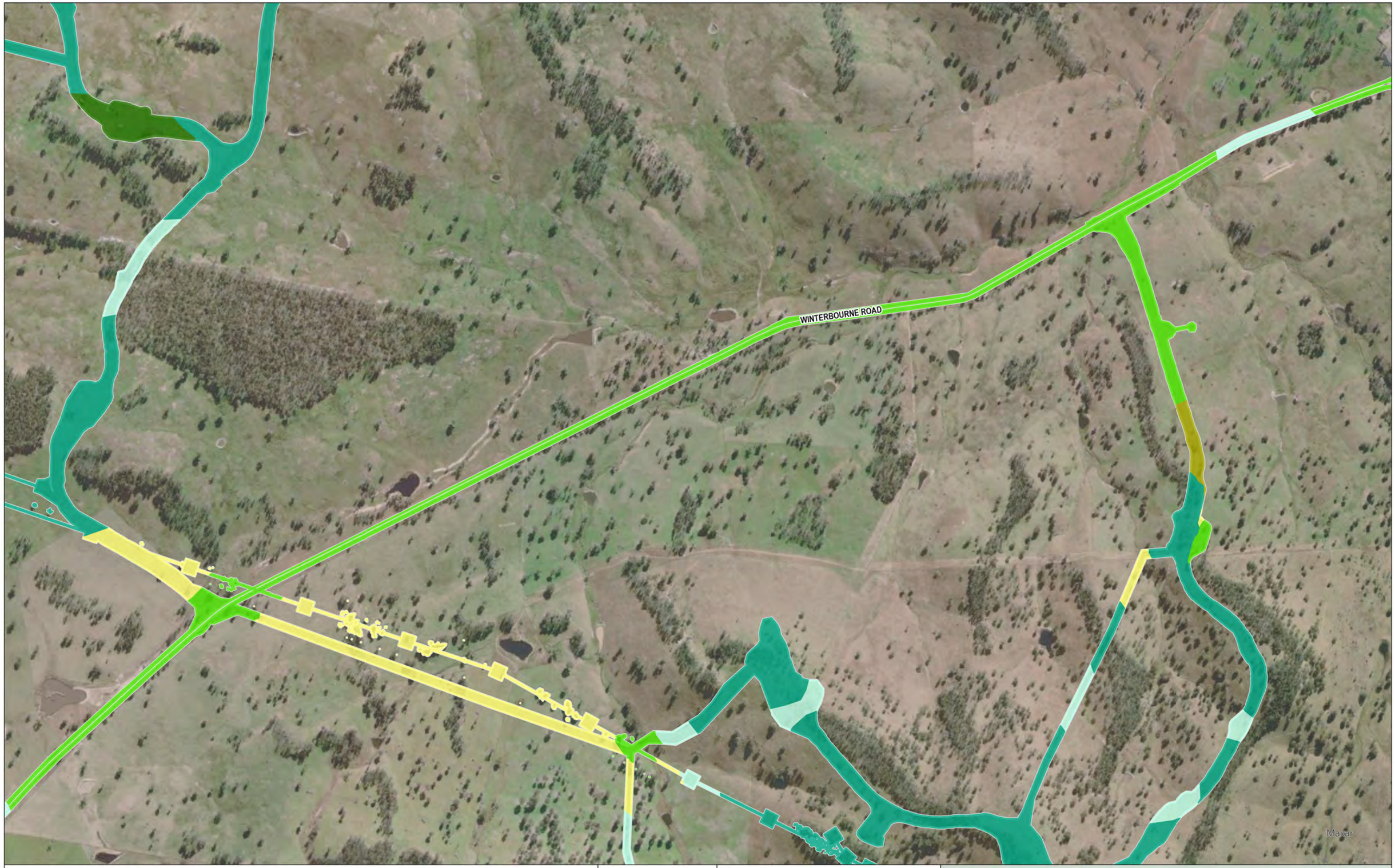
4-1 Plant Community Types

Map 23 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 501,Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 565,Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 24 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

WINTERBOURNE ROAD

BARK HUT ROAD

Maxar

Legend

- Project Area
- Subject Land
- 501,Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- 970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 25 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- 766,Carex sedgeland of the slopes and tablelands



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 26 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area

568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Subject Land



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 27 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 501,Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 28 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- 965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 29 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

BARK HUT ROAD

Maxar

Legend

- Project Area
- Subject Land
- 501,Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- 766,Carex sedgeland of the slopes and tablelands
- 970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 30 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Legend

Project Area

Subject Land

965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion

970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

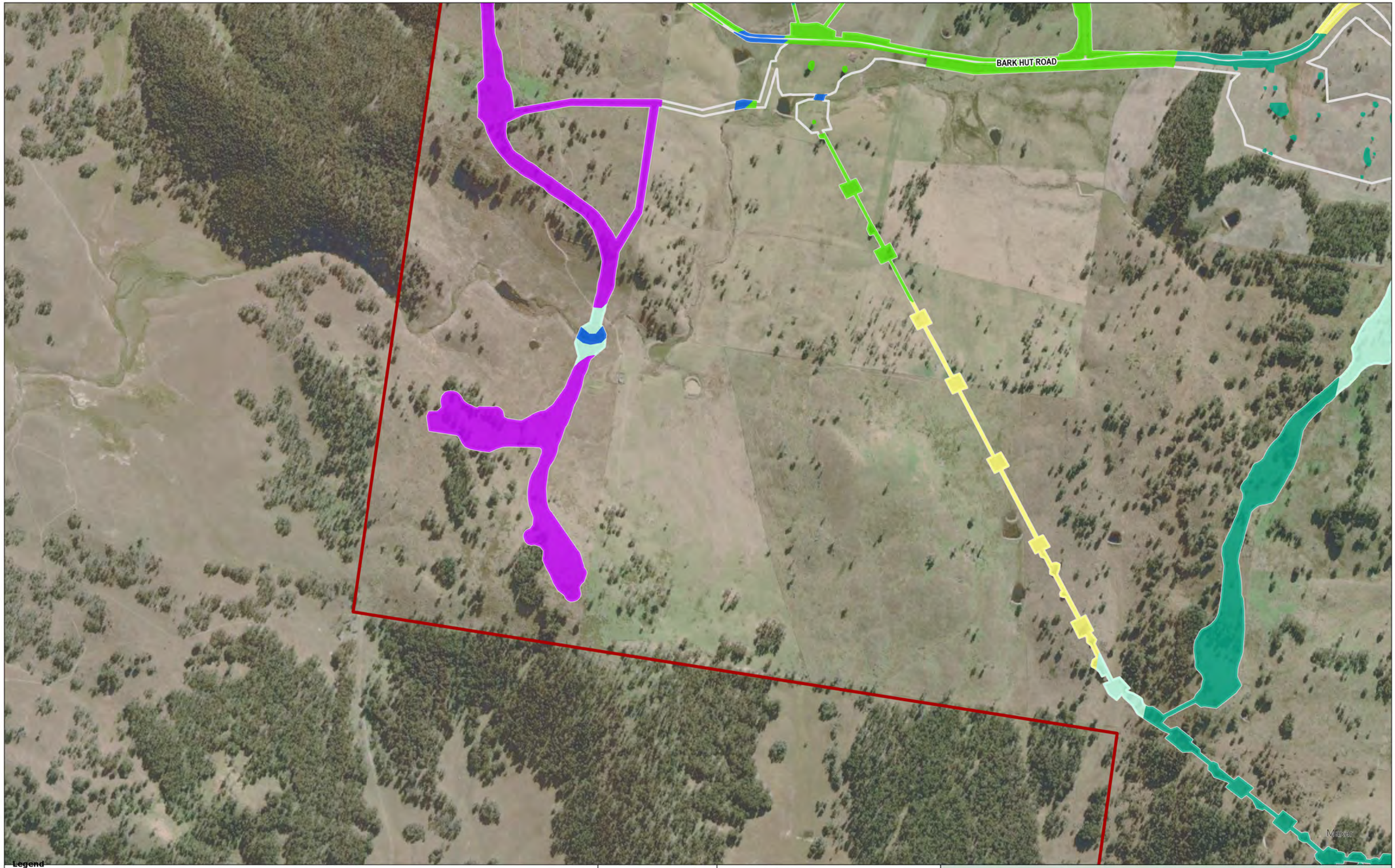
4-1 Plant Community Types

Map 31 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- 965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
- 970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 33 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- 568,Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- 965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
- 970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 34 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Legend

Project Area

Subject Land

965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 35 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

Maxar

Legend

- Project Area
- Subject Land
- 766,Carex sedgeland of the slopes and tablelands
- 965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
- 970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 36 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

Maxar

Legend

Project Area

Subject Land

766,Carex sedgeland of the slopes and tablelands

970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 37 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
- 970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 38 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

Legend

Project Area
Subject Land
965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 39 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
- 970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
- 1194,Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

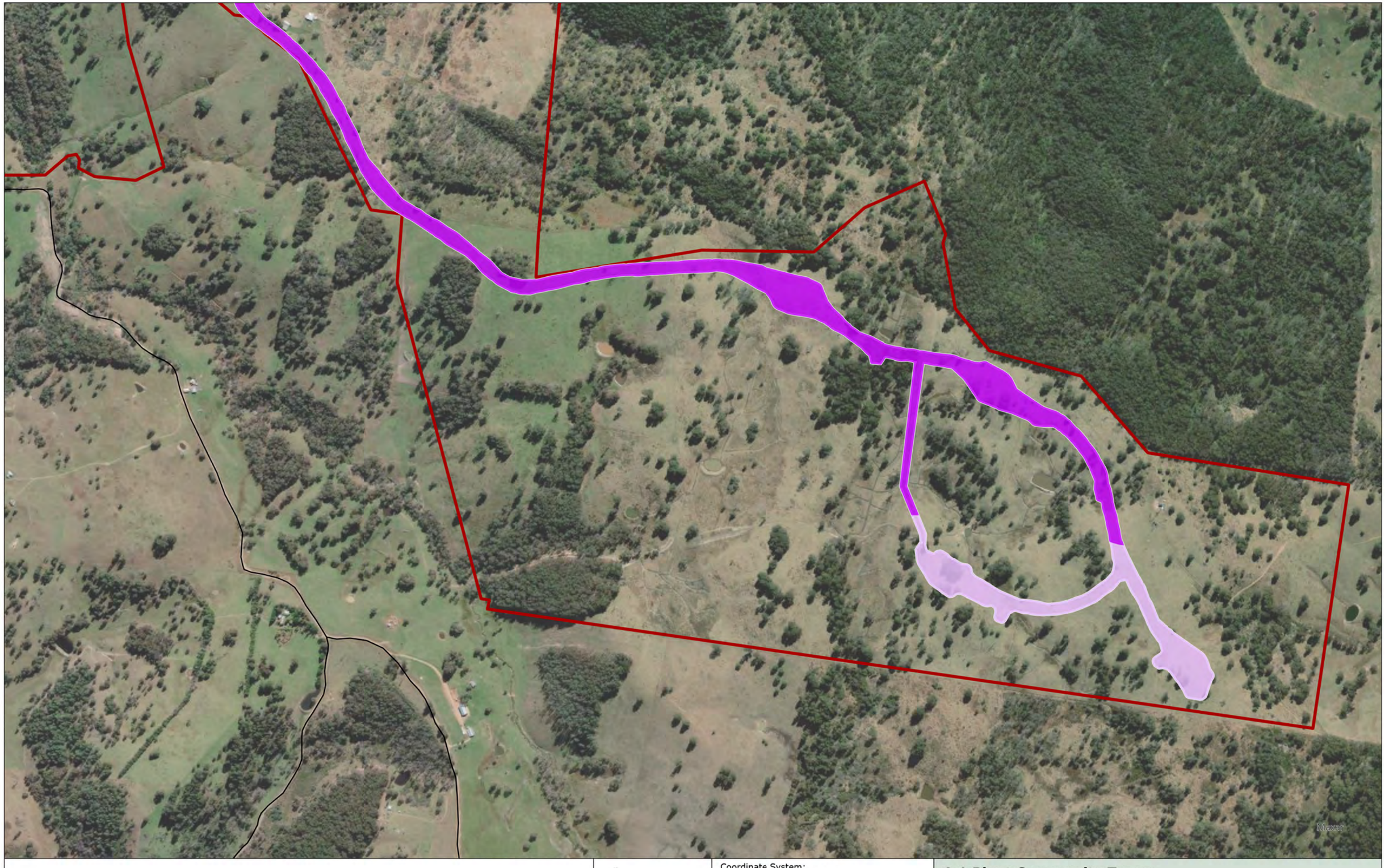
4-1 Plant Community Types

Map 40 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area
Subject Land
965,Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 41 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

THUNDERBOLTS WAY
URALLA ROAD
EMU CREEK ROAD
DERBY STREET
OXLEY HIGHWAY
WALCHA

Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 1192,Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 42 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

EMU CREEK ROAD

OXLEY HIGHWAY

Maxar

Legend

Project Area

Subject Land

534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

1192,Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 43 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 1192,Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 44 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

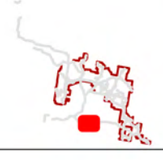


Legend

Project Area

534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

Subject Land



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 45 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area
Subject Land
510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

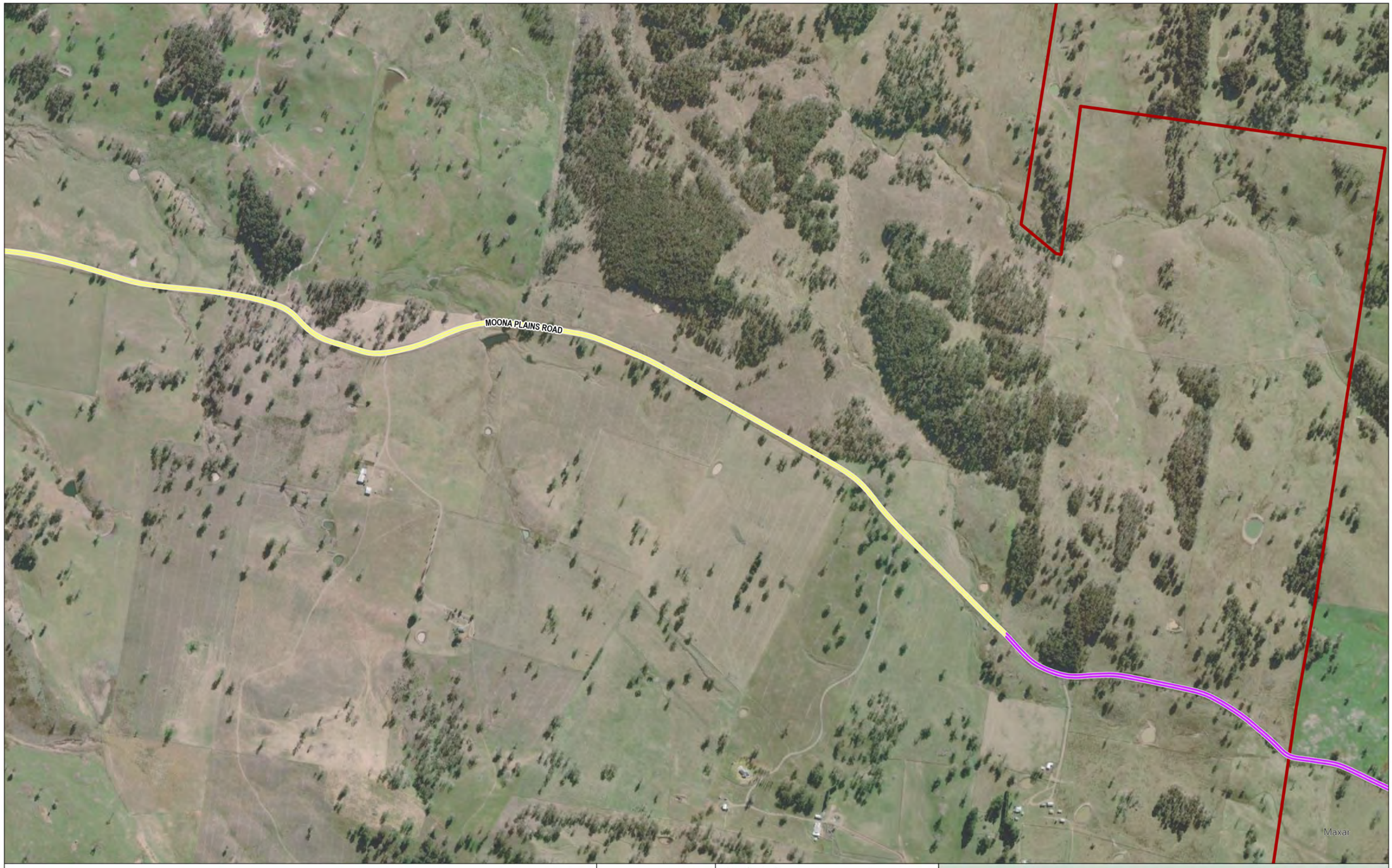
4-1 Plant Community Types

Map 46 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area
Subject Land
510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
970,Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:10,000

4-1 Plant Community Types

Map 47 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 1192,Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 48 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

WINTERBOURNE ROAD

Maxar

Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 766,Carex sedgeland of the slopes and tablelands

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 49 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- 510,Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- 534,New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- 567,Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- 766,Carex sedgeland of the slopes and tablelands



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:10,000

4-1 Plant Community Types

Map 50 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

TABLE 4-3 PCT 501 DESCRIPTION

PCT 501 Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion	
PCT ID	501
PCT name	Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	New England Grassy Woodlands
Associated TECs	PCT 501 is not associated with any TEC
Percent cleared value	83.00%
BioNet VIS PCT Description	Tall to mid-high open forest to woodland generally between 15-20 m high dominated by Bendemeer White Gum (*Eucalyptus elliptica*) with stringybark eucalypts including Silvertop Stringybark (*Eucalyptus laevopinea*) along with Rough-barked Apple (*Angophora floribunda*), Ribbon Gum (*Eucalyptus viminalis*) and often boxes such as Moonbi Apple Box (*Eucalyptus malacox*ylon), Apple Box (*Eucalyptus bridgesiana*) or Nortons Box (*Eucalyptus nortonii*). The shrub layer is sparse or very sparse and includes *Olearia viscidula*, *Melichrus urceolatus*, *Lissanthe strigosa* subsp. *subulata*, *Bursaria spinosa*, *Rubus parvifolius*, *Pimelea curviflora* var. *curviflora*, *Melicytus dentatus*, *Pultenaea microphylla* and *Daviesia genistifolia*. The ground layer is a mix of grasses and forbs. Grasses include Snow Grass (*Poa sieberiana* or *Poa labillardierei*), *Echinopogon ovatus*, *Austrodanthonia racemosa* var. *racemosa*, *Bothriochloa macra* and *Themeda australis*. Forbs include *Acaena novae-zelandiae*, *Ranunculus lappaceus*, *Rumex brownii*, *Geranium solanderi* var. *solanderi*, *Asperula conferta*, *Hydrocotyle laxiflora*, *Hypericum gramineum*, *Swainsona galegifolia*, *Euchiton gymnocephalus*, *Mentha satureioides*, *Pratia purpurascens*, *Plantago debilis*, *Viola betonicifolia* and *Galium migrans*. Scrambers include *Desmodium varians*, *Desmodium gunni* and *Glycine clandestina*. This community is distinguished by the occurrence of two restricted eucalypt species, the Bendemeer White Gum and Moonbi Apple Box. Occurs on cream to yellow clay to loam soils derived from a range of substrates on hillslopes and hillcrests in hilly to undulating terrain at mid to high elevation in the south-eastern part of the Nandewar and southern New England Tablelands Bioregions. It is estimated that about 80% of the pre-European extent of this community has been cleared, with the majority of remaining occurrences of this community on private land or in Travelling Stock Routes or road reserves.
Description within Subject Land	This PCT occurs in the eastern third of the Subject Land and is at the eastern known limit of distribution. It occurs on dry north facing slopes, with rocky surfaces on metasediments. Moonbi Apple Box is frequently observed due to the shallow rocky substrate this PCT is found on. Bendemeer White Gum (*Eucalyptus elliptica*) is irregularly observed but found nowhere else within the locality. Presence of Yellow Box at associate level (i.e., never dominating). Groundcovers are highly variable due to the extensive grazing activity. Weeping grass (*Microlaeana stipoides*) is common

PCT 501 Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion



PHOTOGRAPH 1 PCT 501

TABLE 4-4 PCT 510 DESCRIPTION

PCT 510 Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	
PCT ID	510
PCT name	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	New England Grassy Woodlands
Associated TECs	PCT 510 is associated with: • White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverine Bioregions – Critically Endangered (BC Act) (part) • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered (EPBC Act) (part)
Percent cleared value	79.00%
BioNet VIS PCT Description	Tall open forest or woodland that occurs on undulating areas at intermediate to high altitudes, with local stands in the Horton area east of Mount Kaputar. Similar to ID599 Yellow Box - Blakelys Red Gum grassy woodland of Brigalow Belt South and Nandewar Bioregions, it occupies deep, relatively fertile soils on a number of different geologies, but mainly sedimentary rocks and basalt. Dominated by Rough-barked Apple (*Angophora floribunda*), Yellow Box (*Eucalyptus melliodora*) and/or Blakelys Red Gum (*Eucalyptus blakelyi*). Ribbon Gum (*Eucalyptus viminalis*), Apple Box (*Eucalyptus bridgesiana*) and Broad-leaved Stringybark (*Eucalyptus caliginosa*) are sometimes present, and the vulnerable *Eucalyptus rubida* subsp. *barbigerorum* can occur within this unit east of Inverell. The shrub layer is either sparse or absent, with typical species including *Acacia implexa, Acacia fimbriata, Cassinia quinquefaria* or *Olearia elliptica* subsp. *elliptica*. The ground layer is well developed with dominant species including Kangaroo Grass (*Themeda australis*), Snow Grass (*Poa sieberiana*), *Cymbopogon refractus* and *Lespedeza juncea* subsp. *sericea*. Less frequent groundcover species include *Aristida ramosa, Sorghum leiocladum, Dianella revoluta* var. *revoluta, Microlaena stipoides* var. *stipoides, Desmodium brachypodum, Viola betonicifolia, Chrysocephalum apiculatum, Glycine tabacina, Lomandra longifolia, Bothriochloa macra* and *Carex breviculmis*.
Description within Subject Land	This PCT occurs mainly in the central and western parts of the Subject Land where annual rainfall is less than the eastern parts. A grassy vegetation type generally dominated by Yellow Box with Blakely's Redgum occurring less commonly, although commonly occurring with New England Peppermint which is dominates in downslope areas. Typically found on the lower slopes adjacent to and upslope of New England Peppermint woodlands in areas of cold air drainage and below stringybark communities typically dominated by Broad-leaved Stringybark. The understory is highly variable owing to land use and typically grassy with shrubs being absent. Present as small patches and isolated trees in an overcleared landscape used for livestock grazing. Species richness is compromised by land use, with large areas now charactersied by low condition grasslands.

PCT 510 Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	
	Mapping uncertainties associated with undefined ecotonal areas that exist between adjoining PCTs were resolved by assigning midslope vegetation to this PCT rather than the adjoining stringybark PCTs. Distinctions between PCTs 533 and 534 are less easily discerned.



PHOTOGRAPH 2 PCT 510

PCT 510 Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion



PHOTOGRAPH 3 PCT 510 LOW CONDITION GRASSLAND

TABLE 4-5 PCT 533 DESCRIPTION

PCT 533 New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	
PCT ID	533
PCT name	New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	New England Grassy Woodlands
Associated TECs	PCT 533 is associated with: • New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion – Critically Endangered (BC Act) (Equivalent) • New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands – Critically Endangered (EPBC Act) (Part)
Percent cleared value	70.00%
BioNet VIS PCT Description	Mid-high to tall woodland or open forest which occupies flats and lower slopes subject to cold air drainage, on coarse sandy soils overlying granite and leucogranite substrates. It is dominated in the overstorey by *Eucalyptus nova-anglica* usually with *Eucalyptus pauciflora* as a co-dominant or associate species. Other occasional overstorey species include *Eucalyptus stellulata, Eucalyptus radiata* subsp. *sejuncta* and *Eucalyptus dalrympleana* subsp. *heptantha*. The shrub layer is sparse to mid-dense, with *Brachyloma daphnoides* subsp. *glabrum, Monotoca scoparia, Bursaria spinosa* subsp. *spinosa* and *Leucopogon fraseri* the most frequent species. Other shrub species recorded include *Mirbelia confertiflora, Hovea heterophylla, Dillwynia sieberi, Bossiaea neo-anglica, Petrophile canescens, Persoonia procumbens, Bursaria spinosa* subsp. *spinosa, Leptospermum polygalifolium* subsp. *transmontanum, Aotus subglauca* var. *subglauca, Grevillea scortechinii* subsp. *sarmentosa, Logania albiflora, Hibbertia riparia, Grevillea juniperina* subsp. *allojohnsonii, Dodonaea viscosa, Choretrum pauciflorum, Bossiaea scortechinii* and *Baeckea omissa*. Climbers and twiners include *Rubus parvifolius, Glycine tabacina* and *Glycine clandestina*. Ground cover is mid-dense to dense and dominated by *Themeda australis, Pteridium esculentum, Lomandra longifolia, Poa sieberiana, Scleranthus biflorus, Imperata cylindrica* var. *major, Acaena novae-zelandiae* and *Poa labillardierei* var. *labillardierei*. Other groundcover species recorded include *Brachyscome nova-anglica, Dichelachne micrantha, Stylidium graminifolium, Dichelachne inaequiglumis, Hypericum gramineum, Lomandra multiflora, Microlaena stipoides* var. *stipoides, Goodenia hederacea, Austrodanthonia racemosa* var. *racemosa, Adiantum aethiopicum, Wahlenbergia communis, Sorghum leiocladum, Poranthera microphylla, Helichrysum scorpioides, Aristida ramosa, Trachymene incisa, Stackhousia viminea, Opercularia diphylla, Gonocarpus tetragynus, Entolasia stricta, Echinopogon caespitosus, Dichondra repens, Dichelachne crinita, Veronica arcuata, Calandrinia* sp. A and *Austrostipa rudis* subsp. *nervosa*. The groundcover of this community often supports weed species including *Hypochaeris radicata, Trifolium repens, Holcus lanatus* and *Acetosella vulgaris*. This community has been mostly cleared, and the remaining remnants have been severely degraded by dieback, weed invasion, and continued clearing, grazing and burning.

PCT 533 New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	
Description within Subject Land	This PCT is restricted to a small occurrence in the central west of the Subject Land where outcropping granite occurs in areas of cold area drainage. Dominated by New England Peppermint with snowgrass (*Poa sieberiana*) and *Sporobolus creber.* Similar but differs to PCT 534 by the absence of species such as Yellow Box, Blakely's Redgum, Ribbon Gum *Austrostipa verticillata*, and higher relative abundance of *Sporobolus creber*, *Schoenus apogon* and *Juncus australis*. Occurs as a moderately disturbed patch in grazed lands.



PHOTOGRAPH 4 PCT 533

TABLE 4-6 PCT 534 DESCRIPTION

PCT 534 New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	
PCT ID	534
PCT name	New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Tableland Clay Grassy Woodlands
Associated TECs	PCT 534 is associated with: • New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion – Critically Endangered (BC Act) (Equivalent)
Percent cleared value	90.00%
BioNet VIS PCT Description	Mid-high open forest or woodland that occurs at high elevations on valley flats and depressions on plateaus that are subject to cold air drainage on poorly drained loam-clay soils derived from basalt, fine-grained sedimentary and acid volcanic substrates. Usually, 10 to 20m tall and dominated by *Eucalyptus nova-anglica*, occasionally in association with other tree species including *Eucalyptus pauciflora, Eucalyptus dalrympleana* subsp. *heptantha, Eucalyptus blakelyi* and *Eucalyptus radiata* subsp. *sejuncta*. The shrub layer is either sparse or absent. When present, species such as *Leucopogon fraseri, Leucopogon lanceolatus* var. *lanceolatus, Dillwynia sieberi, Melichrus urceolatus, Pimelea curviflora* var. *divergens, Pimelea glauca, Olearia viscidula, Lissanthe strigosa, Melicytus dentatus* or *Pultenaea microphylla* may occur at low frequency. There is a dense ground layer of various grasses and herbs including *Poa sieberiana, Asperula conferta, Themeda australis, Juncus filicaulis, Dichondra repens, Veronica calycina, Carex inversa, Acaena novae-zelandiae, Rumex brownii, Acaena ovina, Desmodium varians, Geranium solanderi* var. *solanderi, Poa labillardierei* var. *labillardierei, Cymbonotus lawsonianus, Lespedeza juncea* subsp. *sericea, Viola betonicifolia, Gonocarpus tetragynus, Chrysocephalum apiculatum, Echinopogon ovatus, Microlaena stipoides* var. *stipoides, Haloragis heterophylla, Austrodanthonia racemosa* var. *racemosa, Echinopogon caespitosus, Sorghum leiocladum, Austrodanthonia pilosa, Hardenbergia violacea, Hypericum gramineum, Lomandra multiflora* subsp. *multiflora, Luzula densiflora, Mentha satureioides, Wahlenbergia communis, Wahlenbergia planiflora* var. *longipila* and *Wahlenbergia planiflora* var. *planiflora*. An endangered community with an estimated 10% of its pre-European extent remaining. Most remnants are regrowth, heavily disturbed and threatened by weed invasion, grazing by stock, continued clearing and dieback.

PCT 534 New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	
Description within Subject Land	This PCT is widespread throughout the central and western parts of the Subject Land in areas of cold air drainage. It is almost solely dominated by New England Peppermint, although other associated level species may be observed such as Yellow Box (where adjoining PCT 510) and Snow Gum (*Eucalyptus pauciflora*) where it grades into upslope patches of PCT 1192. The understory is typically shrub less with a grassy herbaceous groundcover. Groundcover differences between adjoining grassy woodland formations are subtle, which is likely due to the extensive livestock related disturbance history associated with this overcleared part of the landscape. Typically occurs as scattered trees in an open woodland or even sparser canopy cover, with most of the PCT represented by derived grasslands in low a condition state.



PHOTOGRAPH 5 PCT 534 OPEN WOODLAND

PCT 534 New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion



PHOTOGRAPH 6 PCT 534 LOW CONDITION GRASSLAND

TABLE 4-7 PCT 565 DESCRIPTION

PCT 565 Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	
PCT ID	565
PCT name	Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	New England Dry Sclerophyll Forest
Associated TECs	PCT 565 has no associated TECs
Percent cleared value	44.00%
BioNet VIS PCT Description	Tall open forest that occurs on steeper slopes on rich to relatively fertile, fine-grained soils derived from basalt, granite or acid volcanic rocks. Overstorey dominated by *Eucalyptus laevopinea* and *Eucalyptus dalrympleana* subsp. *heptantha* with common associate species including *Eucalyptus bridgesiana, Eucalyptus melliodora, Angophora floribunda* and *Eucalyptus caliginosa*. There is usually a sparse to mid-dense shrub/small tree layer with *Acacia dealbata, Bursaria spinosa* subsp. *spinosa, Lissanthe strigosa* subsp. *strigosa, Hibbertia linearis* and *Olearia viscidula*. The groundcover is a mid-dense to dense mixture of grasses, forbs and herbs with *Poa sieberiana, Dichondra repens, Microlaena stipoides* var. *stipoides, Hydrocotyle laxiflora, Glycine clandestina, Viola betonicifolia, Veronica calycina, Desmodium varians, Geranium solanderi* var. *solanderi, Acaena novae-zelandiae* and *Elymus scaber* var. *scaber*.
Description within Subject Land	This PCT is restricted to the western parts of the Subject Land. It comprises vegetation dominated by Silvertop Stringybark with *Acacia dealbata* and *Olearia viscidula* in the midstory and grassy understory dominated by Snowgrass (*Poa sieberiana*) and Weeping grass (*Microlaena stipoides*). Yellow Box occurs as an associated tree canopy species. A suite of herbs is present in the groundcover layer occurring in low densities, with Kidneyweed (Dichondra repens) being common.

PCT 565 Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion



PHOTOGRAPH 7 PCT 565

TABLE 4-8 PCT 567 DESCRIPTION

PCT 567 Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	
PCT ID	567
PCT name	Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	New England Grassy Woodlands
Associated TECs	PCT 567 is associated with: • White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverine Bioregions – Critically Endangered (BC Act) (part) • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered (EPBC Act) (part)
Percent cleared value	62.00%
BioNet VIS PCT Description	Very tall woodland or tall open forest, widespread on tablelands low hills on a variety of substrates. Can be either shrubby (e.g. *Daviesia latifolia*) or grassy. Occupies the mid slope between stringybark communities on ridges and grassy box-gum woodlands on flats and lower slopes. Overstorey dominated by *Eucalyptus caliginosa* with common associates including *Eucalyptus melliodora, Eucalyptus bridgesiana, Eucalyptus blakelyi, Angophora floribunda, Eucalyptus laevopinea* and *Eucalyptus dalrympleana* subsp. *heptantha*. Sparse to sometimes mid-dense shrub layer with *Lissanthe strigosa* subsp. *subulata, Daviesia latifolia, Melichrus urceolatus, Jacksonia scoparia, Acacia filicifolia, Acacia implexa, Cassinia quinquefaria, Bursaria spinosa* subsp. *spinosa* and *Olearia elliptica* subsp. *elliptica*. The groundcover is sparse to mid-dense and includes *Poa sieberiana, Dichondra repens, Scleranthus biflorus, Themeda australis, Aristida ramosa, Pteridium esculentum, Lomandra multiflora subsp. multiflora, Goodenia hederacea* subsp. *hederacea, Viola betonicifolia, Lagenifera stipitata, Glycine clandestina, Poranthera microphylla, Rumex brownii, Veronica calycina, Hypericum gramineum, Bothriochloa macra, Sporobolus creber* and *Chrysocephalum apiculatum*. A vulnerable community, with much of the remaining extent being regrowth from previous clearing, and in poor condition due to the effects of grazing of understorey by stock.

PCT 567 Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	
Description within Subject Land	Broad-leaved Stringybark and Yellow Box shrub/grass open forest occurs on midslopes in the Subject Land, between open forests dominated by Broad-leaved Stringybark and downlsope grassy woodlands dominated by Yellow Box, supporting the transitional nature of this vegetation at the landscape scale. Broad-leaved Stringybark dominates with occurrences of Yellow Box typically in an associated level status. Blakely's Redgum also infrequently occurs in low densities with other eucalypts including Mountain Gum (*Eucalytpus dalrympleana*), *Eucalyptus nicholii* and Silvertop Stringybark. Snowgrass dominates the groundcover stratum, with herbs such as Geranium solanderi, *Chrysocephalum apiculatum* and *Dichondra repens* also commonly observed. Vegetation with increasing abundance of Blakely's Redgum and/or Yellow Box in a grassy woodland formation have been mapped as part of PCT 510, with stands exhibiting increasing occurrence of *Olearia viscidula* included as part of PCT 568.



PHOTOGRAPH 8 PCT 567

TABLE 4-9 PCT 568 DESCRIPTION

PCT 568 Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	
PCT ID	568
PCT name	Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	New England Dry Sclerophyll Forests
Associated TECs	PCT 568 has no associated TECs
Percent cleared value	59.00%
BioNet VIS PCT Description	Tall to very tall open forest on upper slopes and ridges on sedimentary, granitic and acid volcanic substrates. Dominated by *Eucalyptus caliginosa* with *Eucalyptus dalrympleana* subsp. *heptantha* and less commonly *Eucalyptus bridgesiana, Eucalyptus viminalis, Eucalyptus elliptica* or *Eucalyptus youmanii*. A shrub and/or small tree layer may be present, with *Lissanthe strigosa* subsp. *subulata, Olearia viscidula, Rubus parvifolius, Melichrus urceolatus, Hibbertia riparia* and *Acacia implexa*. The sparse to dense groundcover supports *Poa sieberiana, Themeda australis, Veronica calycina, Pteridium esculentum, Lomandra multiflora* subsp. *multiflora, Aristida ramosa, Lomandra longifolia, Dianella revoluta* var. *revoluta, Carex breviculmis, Goodenia bellidifolia* subsp. *bellidifolia, Echinopogon caespitosus* var. *caespitosus, Microlaena stipoides* var. *stipoides, Luzula flaccida* form B, *Asperula conferta, Geranium solanderi* var. *solanderi, Haloragis heterophylla, Solenogyne bellioides* and *Wahlenbergia planiflora* subsp. *longipila*.
Description within Subject Land	Broad-leaved Stringybark forests and woodlands typically occur on ridges and upper slopes throughout the Subject Land. It differs to other vegetation on ridgetops by the absence of Silvertop Stringybark (PCT 565) and midslope vegetation by having low abundance of associated eucalypt species. The understory comprises a characteristic *Olearia viscidula* shrublayer. Black Sheoak (*Allocasuarina littoralis*) also occurs in low densities. The groundlayer is moderately grassy with Snowgrass, Weeping Grass, *Bothriochloa decipiens*, interspersed throughout a well-developed leaf litter layer. Herbs and forbs are also commonly observed but typically in low cover abundance.

PCT 568 Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion



PHOTOGRAPH 9 PCT 568

TABLE 4-10 PCT 571 DESCRIPTION

PCT 571 Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	
PCT ID	571
PCT name	Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	New England Grassy Woodlands
Associated TECs	PCT 571 is associated with: • White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverine Bioregions – Critically Endangered (BC Act) (part) • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered (EPBC Act) (part)
Percent cleared value	78.00%
BioNet VIS PCT Description	Very tall woodland or tall to very tall open forest occupying lower slopes, valley floors, gullies and drainage lines on deeper soils overlying basalts and metamorphosed sediments. Closely related to Ribbon Gum - Mountain Gum - Snow Gum grassy open forest or woodland (ID554) and Candlebark - Ribbon Gum grassy woodland (ID513) both of which occur at higher elevation on the New England Tablelands. Grades into Blakelys Red Gum - Yellow Box grassy woodlands (ID510) which is also floristically similar. Overstorey dominated by *Eucalyptus viminalis, Angophora floribunda* and *Eucalyptus melliodora*, with associate species such as *Eucalyptus blakelyi, Eucalyptus laevopinea* or *Eucalyptus moluccana* sometimes present. There is often a sparse small tree layer of scattered *Acacia filicifolia* or *A. implexa* over a sparse shrub stratum comprising species such as *Lissanthe strigosa, Cassinia quinquefaria, Pultenaea microphylla, Bursaria spinosa* subsp. *spinosa, Olearia elliptica, Hibbertia obtusifolia, Pimelea curviflora, Rubus parvifolius, Melichrus urceolatus* and *Brachyloma daphnoides*. The groundcover is usually well-developed with a diversity of grasses and forbs present, including *Poa sieberiana* subsp. *sieberiana, Poa labillardierei* var. *labillardierei, Themeda australis, Bothriochloa macra, Austrodanthonia racemosa* var. *racemosa, Sporobolus creber, Sorghum leiocladum, Geranium solanderi* var. *solanderi, Lespedeza juncea* subsp. *sericea, Lotus australis, Mentha satureioides, Elymus scaber, Scleranthus biflorus, Epilobium billardiereanum* subsp. *billardiereanum, Dichondra repens, Asperula conferta, Microlaena stipoides* var. *stipoides* and *Desmodium varians*. This community has been largely cleared for agriculture. Most of the remaining extent occurs on private land and is generally highly modified through clearing, grazing, pasture improvement and weed invasion.
Description within Subject Land	Ribbon Gum woodlands/ open forest occur in the central west of the Subject Land in elevated by gently undulating country. Ribbon Gum dominates with Silvertop Stringybark, with associate level occurrences of Blakely's Redgum and *Eucalyptus nicholii*. The sparse shrub

PCT 571 Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	
	layer comprises *Acacia deane*i and *Lissanthe strigosa*. The groundcover is species rich grassy herbaceous without any clear dominance by any species.



PHOTOGRAPH 10 PCT 571

TABLE 4-11 PCT 766 DESCRIPTION

PCT 766 Carex sedgeland of the slopes and tablelands	
PCT ID	766
PCT name	Carex sedgeland of the slopes and tablelands
Vegetation formation	Freshwater Wetlands
Vegetation class	Montage Bogs and Fens
Associated TECs	PCT 766 is associated with: • Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions – Endangered (BC Act) (Part) • Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps Bioregions – Endangered (BC Act) (Part) • Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion – Endangered (BC Act) (Part)
Percent cleared value	75.00%
BioNet VIS PCT Description	Mid stratum consists of *Leptospermum gregarium* and *Leptospermum polygalifolium*. Ground stratum comprised of *Carex appressa, C. gaudichaudiana*, *Poa labillardierei* var. *labillardierei* and *Scirpus polystachyus*. On valley floors and drainage lines with poor drainage.
Description within Subject Land	Carex sedgelands in the Subject Land are restricted to broad drainages. They are naturally treeless in the coldest part of the landscape. Patches occur with *Carex gaudichaudiana* and Carex appressa, with the latter more apparent doing to its resilience to grazing. Occurrences are now rare and limited due to the effects of livestock grazing.

PCT 766 Carex sedgeland of the slopes and tablelands



PHOTOGRAPH 10 PCT 766

TABLE 4-12 PCT 965 DESCRIPTION

PCT 965 Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	
PCT ID	965
PCT name	Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	New England Dry Sclerophyll Forest
Associated TECs	PCT 965 is associated with: • New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion – Critically Endangered (BC Act) (Part) • Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion – Endangered (BC Act) (Part)
Percent cleared value	75.00%
BioNet VIS PCT Description	Mid-high to very tall dry or moist grassy open forest at high altitudes on the eastern side of the tablelands. Upper stratum species include *Eucalyptus radiata* subsp. *radiata, E. nobilis, E. caliginosa, E, dalrympleana* subsp. *heptantha* and *E. laevopinea*. Middle stratum species include *Acacia filicifolia, Allocasuarina littoralis, Leucopogon lanceolatus, Lomatia silaifolia* and *Monotoca scoparia*. Ground stratum species include *Calochlaena dubia, Doodia caudata, Lomandra longifolia, Poa sieberiana* var. *sieberiana, Pteridium esculentum* and *Themeda australis.*
Description within Subject Land	PCT 965 is largely restricted to the wetter eastern parts of the Subject Land where it typically occurs in heavier wetter soils. Characterised by a dominance of Narrow-leaved Peppermint, this community also includes several other canopy species such as Mountain Ribbon Gum, Mountain Gum, Silvertopped Stringybark and Messmate. It differs to vegetation in the east by having no box species in the tree canopy and sparse shrubby understory comprising several species. The groundlayer comprises a few grass species notably Snowg Grass and Weeping Grass.

PCT 965 Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion



PHOTOGRAPH 12 PCT 965

TABLE 4-13 PCT 970 DESCRIPTION

PCT 970 Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	
PCT ID	970
PCT name	Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	New England Dry Sclerophyll Forest
Associated TECs	PCT 970 is associated with: • New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion – Critically Endangered (BC Act) (Part)
Percent cleared value	56.00%
BioNet VIS PCT Description	Mid-high to tall shrubby woodland and open forest, on the eastern side of the New England Tableland. Upper stratum species include *Eucalyptus radiata* subsp. *radiata, E. acaciiformis, E. campanulata, E. williamsiana, E. pauciflora* and *E. dalrympleana* subsp. *heptantha*. Middle stratum species include *Banksia spinulosa, Bossiaea scortechinii, Leucopogon lanceolatus, Monotoca scoparia* and *Petrophile canescens*. Ground stratum species include *Lomandra* spp., *Poa sieberiana* var. *sieberiana, Pteridium esculentum* and *Themeda australis*.
Description within Subject Land	PCT 970 is restricted to the wetter eastern parts of the Subject Land where it is generally found higher in the landscape with improved drainage and lighter soils. The vegetation is typically dominated by Narrow-leaved Peppermint with lesser occurrence of Wattle-leaved Peppermint and other eucalypts such as Messmate and Mountain Gum. In difference to other vegetation in the Subject Land, this PCT is characterised by a Bracken Fern (*Pteridium esculentum*) and Snowgrass. *Acacia melanoxylon*, *Acacia deanei* and *Exocarpos cuppressiformis* characterise the shrub layer, with the former two potentially reflective of the higher rainfall and grazed nature of this vegetation.

PCT 970 Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion



PHOTOGRAPH 10 PCT 970 WOODLAND

PCT 970 Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion



PHOTOGRAPH 10 PCT 970 GRASSLAND

TABLE 4-14 PCT 1192 DESCRIPTION

PCT 1192 Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	
PCT ID	1192
PCT name	Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Tableland Clay Grassy Woodlands
Associated TECs	PCT 1192 is associated with: • Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion – Endangered (BC Act) (Part)
Percent cleared value	75.00%
BioNet VIS PCT Description	Mid tall to tall open forest or woodland; Landscape Position: At higher altitudes on the eastern edge of the New England Tablelands with major occurrences on the Dorrigo Plateau.
Description within Subject Land	PCT 1192 is a dry grassy woodland located in the central western parts of the Subject Land. It typically occurs low in the landscape and upslope of New England Peppermint woodlands that often occupy the coldest parts. Occurrences in the Subject Land are limited to the local road reserve and Blue Mountain. It comprises several eucalypt species with Snow Gum and/or Mountain Gum being characteristic. Black Sally (*Eucalyptus stellulata*) and New England Peppermint occur in the lower ecotonal zones with adjoining lower slope vegetation. Almost shrubless, this PCT comprises a mix of grasses and herbs notably Snowgrass and Austrostipa spp. with a large contingent of exotic species owing to the influence of land use and livestock grazing.

PCT 1192 Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion



PHOTOGRAPH 14 PCT 1192

TABLE 4-15 PCT 1194 DESCRIPTION

PCT 1194 Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	
PCT ID	1194
PCT name	Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Vegetation formation	Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Tableland Wet Sclerophyll Forest
Associated TECs	PCT 1194 is associated with: • Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion – Endangered (BC Act) (Part)
Percent cleared value	80.00%
BioNet VIS PCT Description	Mid-high to very tall grassy or shrubby open forest, widespread at high altitudes on the escarpment ranges north from Barrington Tops and on the eastern side of the tablelands. Upper stratum species include *Eucalyptus pauciflora, E. dalrympleana* subsp. *heptantha, E. nobilis, E. radiata* subsp. *sejuncta, E. viminalis, E. fastigata, E. obliqua, E. laevopinea* and *E. stellulata*. Middle stratum species include *Acacia dealbata, Acacia melanoxylon, Dicksonia antarctica, Tasmannia purpurascens* and *Leucopogon hookeri*. Ground stratum species include *Blechnum nudum, Lomandra longifolia, Poa sieberiana* var. *sieberiana* and *Pteridium esculentum.*
Description within Subject Land	This vegetation is limited to the wetter east where it is characterised by Mountain Ribbon Gum and Silvertopped Stringybark. The groundstratum is grassy herbaceous with shrub overstory, owing to the heavily grazed condition of this vegetation. Herbs of drier conditions are evident due to the grazing history evident in this community with characteristic wet sclerophyll species accordingly occurring in lower abundance. Relict wet sclerophyll species observed include *Clematis aristata* and *Rubus parvifolius*, Rubus Weed species are common. The vegetation is heavily modified and occurs in a low condition state.

PCT 1194 Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion



PHOTOGRAPH 15 PCT 1194

4.2.3.1 HAUL ROUTE

The haul route, excluding local roads east from Walcha, was assessed for impacts on native vegetation. Areas where trimming or removal of vegetation is required that have been deemed planted vegetation do not require assessment under the BOS and BAM. Impacts on all routes outside the local road reserve network are limited to PCT – 0 (i.e., not native vegetation). A review of the haul route is proved in ERM (2024).

4.2.4 VEGETATION ZONES

Sixty-two (62) VZs were delineated to describe PCTs condition states (e.g., structural form such as open forest, woodland, open woodland, grassland), impact type (i.e., surface clearing and tree canopy only) and tenure (i.e., private lands and local road corridor). Details on vegetation zones and BAM plot requirements is provided in Table 4-17. The mapped extent of vegetation zones within the Subject Land is shown in Figure 4-2.

The mapping of VZs with low and moderate condition grassland classifications was initially delineated by land categorization as published Draft Native Vegetation Regulatory map (see Figure 1-1). Non-woody vegetation cover aligning with Category 1 exempt lands were generally assigned 'low condition grasslands' unless otherwise modified by available site data. An estimated 352.18 ha of Category 1 exempt lands occur within the Subject Land, although this estimate has not been verified using *Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme* (DPE 2023).

Conversely, non-woody vegetation aligned to Category 2 lands were typically identified as 'moderate grassland' unless otherwise modified by available data. Where uncertainty exists (i.e., insufficient evidentiary data), non-woody grasslands were assigned to a 'moderate condition' state.

This approach to mapping low condition grasslands was verified by key metrics extracted from the BAM plot data (n=118 plots). Significant differences in exotic/ native vegetation cover and plant species diversity were observed between low and moderate condition grasslands. A summary of key differences is outlined in demonstrated in Table 4-16.

TABLE 4-16 KEY DIFFERENCES BETWEEN LOW AND MODERATE CONDITION GRASSLANDS

Grassland Type	Plots (count)	Average Exotic cover (%)	Average high treat weed cover (%)	Average native cover (%)	Average Shannon-Weiner Diversity	Average Evenness
low condition grassland	40	70.68	42.18	25.17	1.05	0.43
moderate condition grassland	78	23.45	13.14	82.25	1.37	0.56

TABLE 4-17 VEGETATION ZONES AND PATCH SIZES

Vegetation zone ID	PCT ID	Condition/ other defining feature	Area (ha)	Patch size class	Impact type	No. BAM Plots used in assessment	BAM Plot names
1	510	DC_woodland	1.48	>100 ha	surface	2	WWF060 JH029
2	510	DC_openwoodland	0.49	>100 ha	surface	3	WWF136 WWF138 WWF139
3	510	DC_mod_grassland	13.22	>100 ha	surface	3	WWF131 WWF133 WWF135
4	510	LRC_mod_grassland	5.47	>100 ha	surface	3	JH042 JH050 JH121
5	510	LRC_openwoodland	1.35	>100 ha	surface	2	JH037 JH106
6	510	TL_canopy	1.29	>100 ha	tree canopy	5	WWF128 WWF129 WWF130 WWF132 JH063
7	533	DC_openwoodland	0.06	>100 ha	surface	1	JH108
8	533	DC_modgrassland	0.49	>100 ha	surface	1	WWF112
9	533	TL_canopy	0.08	>100 ha	tree canopy	1	JH107
10	534	DC_woodland	1.2	>100 ha	surface	4	JH013 JH018 JH059 JH061

Vegetation zone ID	PCT ID	Condition/ other defining feature	Area (ha)	Patch size class	Impact type	No. BAM Plots used in assessment	BAM Plot names
11	534	DC_openwoodland	0.59	>100 ha	surface	2	WWF090 JH047
12	534	DC_mod_grassland	13.7	>100 ha	surface	3	WWF115 WWF123 JH060
13	534	LRC_mod_grassland	**12.37**	>100 ha	surface	4	JH052 JH053 JH101 JH103
14	534	LRC_openwoodland	3.25	>100 ha	surface	3	JH041 JH048 JH104
15	534	LRC_canopy	1.26	>100 ha	tree canopy	3	WWF081 WWF117 WWF118
16	565	DC_woodland	2.22	>100 ha	surface	2	WWF103 WWF104
17	565	DC_openwoodland	0.12	>100 ha	surface	1	WWF076
18	565	DC_mod_grassland	3.27	>100 ha	surface	2	JH069 JH117
19	567	DC_woodland	12.95	>100 ha	surface	3	WWF020 WWF108 WWF109
20	567	DC_openwoodland	0.71	>100 ha	surface	1	WWF013
21	567	DC_mod_grassland	21.65	>100 ha	surface	4	WWF062 JH055 JH076 JH118
22	567	LRC_woodland	0.77	>100 ha	surface	1	JH102

Vegetation zone ID	PCT ID	Condition/ other defining feature	Area (ha)	Patch size class	Impact type	No. BAM Plots used in assessment	BAM Plot names
23	567	LRC_mod_grassland	3.26	>100 ha	surface	2	JH105 JH111
24	567	TL_canopy	1.49	>100 ha	tree canopy	3	WWF110 WWF122 WWF127
25	568	DC_openforest	6.27	>100 ha	surface	5	WWF069 WWF088 WWF092 JH016 JH056
26	568	DC_woodland	30.47	>100 ha	surface	11	WWF045 WWF052 WWF064 WWF073 WWF077 WWF089 BP23 JH017 JH021 JH022 JH031
27	568	DC_openwoodland	1.66	>100 ha	surface	2	WWF051 WWF075
28	568	DC_mod_grassland	60.95	>100 ha	surface	5	WWF059 JH030 JH067 JH075 JH032
29	568	TL_canopy	2.57	>100 ha	tree canopy	2	JH019 JH024

Vegetation zone ID	PCT ID	Condition/ other defining feature	Area (ha)	Patch size class	Impact type	No. BAM Plots used in assessment	BAM Plot names
30	571	DC_woodland	10.47	>100 ha	surface	5	JH06 JH09 JH010 JH011 JH012
31	571	DC_mod_grassland	16.07	>100 ha	surface	4	BAMPlot5 JH070 JH073 JH116
32	766	DC_sedgeland	1.18	>100 ha	surface	2	WWF120 WWF121
33	766	LRC_sedgeland	0.4	>100 ha	surface	1	WWF056
34	965	DC_openforest	2.18	>100 ha	surface	2	JH100 JH112
35	965	DC_woodland	12.82	>100 ha	surface	3	WWF001 WWF033 BP22
36	965	DC_shrubland	0.95	>100 ha	surface	1	WWF043
37	965	DC_mod_grassland	4.29	>100 ha	surface	2	WWF038 WWF034
38	965	LRC_openforest	0.84	>100 ha	surface	2	WWF010 JH099
39	965	LRC_mod_grassland	0.27	>100 ha	surface	1	JH098
40	965	TL_canopy	1.26	>100 ha	tree canopy	1	JH113
41	970	DC_openforest	4.86	>100 ha	surface	3	WWF005 WWF007 WWF008

Vegetation zone ID	PCT ID	Condition/ other defining feature	Area (ha)	Patch size class	Impact type	No. BAM Plots used in assessment	BAM Plot names
42	970	DC_openwoodland	11.19	>100 ha	surface	6	WWF003 WWF026 WWF042 BP27 WWF028 WWF047
43	970	DC_mod_grassland	24.29	>100 ha	surface	4	BP24 WWF027 WWF035 JH114
44	970	LRC_openwoodland	0.4	>100 ha	surface	1	JH124
45	970	LRC_openforest	0.86	>100 ha	surface	1	JH122
46	970	LRC_mod_grassland	1.12	>100 ha	surface	1	JH123
47	970	TL_canopy	0.88	>100 ha	tree canopy	1	WWF037
48	1192	DC_woodland	2.45	>100 ha	surface	2	WWF084 WWF085
49	1192	LRC_woodland	0.82	>100 ha	surface	3	MA03 MA06 JH094
50	1194	DC_openwoodland	0.93	>100 ha	surface	3	WWF015 WWF018 WWF017
51	1194	DC_low_grassland	3.58	>100 ha	surface	2	JH097 JH096
52	501	DC_woodland	2.65	>100 ha	surface	4	MA01 WWF087 JH065 JH119

Vegetation zone ID	PCT ID	Condition/ other defining feature	Area (ha)	Patch size class	Impact type	No. BAM Plots used in assessment	BAM Plot names
53	501	DC_mod_grassland	4.53	>100 ha	surface	2	WWF049 JH120
54	510	low_grassland	45.22	>100 ha	surface	10	WWF072 WWF074 JH044 JH051 JH091 JH026 JH027 JH077 JH082 JH083
55	534	low_grassland	64.51	>100 ha	surface	5	MA07 MA08 JH039 JH057 JH058
56	565	low_grassland	2.06	>100 ha	surface	2	JH089 JH090
57	567	low_grassland	85.54	>100 ha	surface	5	WWF082 WWF113 WWF125 BAMPlot4 BP11
58	568	low_grassland	112.65	>100 ha	surface	6	WWF058 WWF067 WWF086 BAMPlot3 JH092 BAMPlot19

Vegetation zone ID	PCT ID	Condition/ other defining feature	Area (ha)	Patch size class	Impact type	No. BAM Plots used in assessment	BAM Plot names
59	571	low_grassland	18.92	>100 ha	surface	5	WWF095 WWF096 BAMPlot20 JH054 JH074
60	965	low_grassland	110.41	>100 ha	surface	6	WWF044 BAMPlot16 BP09 BP15 BP21 JH098
61	970	low_grassland	86.65	>100 ha	surface	5	WWF002 WWF006 WWF023 WWF036 BP10
62	1192	low_grassland	14.07	>100 ha	surface	3	MA10 JH095 BAMPlot25

4.2.4.1 PATCH SIZE

Patch size of each vegetation zone was determined based on BAM Subsection 4.3.1. Patch sizes were assigned to vegetation zones within the Subject Land using ArcGIS to select boundaries depicted in the vegetation mapping for the Subject Land and aerial imagery. In accordance with the BAM, patch size area was assigned to each vegetation zone as a class, being < 5 ha, 5–24 ha, 25–100 ha or ≥ 100 ha. The patch size for all zones was ≥ 100 ha.

The patches extend onto adjoining land beyond the footprint of the Subject Land. Patch size of each vegetation zone was determined to be greater than 100 ha, the maximum patch size to be entered into the BAM-C.

DUKE STREET

THUNDERBOLTS WAY

NEW ENGLAND HIGHWAY

Maxar

Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road
- VZ10 (534 DC_woodland)
- VZ14 (534 LRC_openwoodland)
- VZ55 (534 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 1 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

THUNDERBOLTS WAY

Maxar

Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ6 (510 TL_canopy)
- VZ48 (1192 DC_woodland)
- VZ54 (510 low_grassland)
- VZ62 (1192 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 2 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ6 (510 TL_canopy)
- VZ54 (510 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 3 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Highway / Major Road
- VZ6 (510 TL_canopy)
- VZ12 (534 DC_mod_grassland)
- VZ15 (534 LRC_canopy)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 4 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

THUNDERBOLTS WAY

Maxar

Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road
- VZ02 (510 DC_open_woodland)
- VZ6 (510 TL_canopy)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 5 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road
- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ14 (534 LRC_openwoodland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 6 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ12 (534 DC_mod_grassland)
- VZ19 (567 DC_woodland)
- VZ20 (567 DC_openwoodland)
- VZ24 (567 TL_canopy)
- VZ54 (510 low_grassland)
- VZ57 (567 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 7 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road
- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ54 (510 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 8 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road
- VZ05 (510 LRC_openwoodland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 9 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ6 (510 TL_canopy)
- VZ10 (534 DC_woodland)
- VZ11 (534 DC_openwoodland)
- VZ15 (534 LRC_canopy)
- VZ32 (766 DC_sedgeland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 10 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

BLUE MOUNTAIN ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ13 (534 LRC_mod_grassland)
- VZ15 (534 LRC_canopy)
- VZ22 (567 LRC_woodland)
- VZ23 (567 LRC_mod_grassland)
- VZ49 (1192 LRC_woodland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)
- VZ62 (1192 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 11 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ07 (533 DC_woodland)
- VZ08 (533 DC_modgrassland)
- VZ09 (533 TL_canopy)
- VZ11 (534 DC_openwoodland)
- VZ12 (534 DC_mod_grassland)
- VZ15 (534 LRC_canopy)
- VZ19 (567 DC_woodland)
- VZ21 (567 DC_mod_grassland)
- VZ24 (567 TL_canopy)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 12 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

Project Area

Subject Land

- VZ07 (533 DC_woodland)
- VZ08 (533 DC_modgrassland)
- VZ09 (533 TL_canopy)
- VZ10 (534 DC_woodland)
- VZ12 (534 DC_mod_grassland)
- VZ19 (567 DC_woodland)
- VZ20 (567 DC_openwoodland)
- VZ21 (567 DC_mod_grassland)
- VZ24 (567 TL_canopy)
- VZ25 (568 DC_openforest)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_canopy)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 13 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ6 (510 TL_canopy)
- VZ10 (534 DC_woodland)
- VZ12 (534 DC_mod_grassland)
- VZ16 (565 DC_woodland)
- VZ18 (565 DC_mod_grassland)
- VZ19 (567 DC_woodland)
- VZ20 (567 DC_openwoodland)
- VZ21 (567 DC_mod_grassland)
- VZ25 (568 DC_openforest)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_cancpy)
- VZ30 (571 DC_openwoodland)
- VZ31 (571 DC_mod_grassland)
- VZ54 (510 low_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)
- VZ59 (571 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 14 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ16 (565 DC_woodland)
- VZ17 (565 DC_openwoodland)
- VZ18 (565 DC_mod_grassland)
- VZ19 (567 DC_woodland)
- VZ21 (567 DC_mod_grassland)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ30 (571 DC_openwoodland)
- VZ31 (571 DC_mod_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)
- VZ59 (571 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 15 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- VZ02 (510 DC_open_woodland)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ30 (571 DC_openwoodland)
- VZ58 (568 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 16 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- VZ25 (568 DC_openforest)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ58 (568 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 17 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ13 (534 LRC_mod_grassland)
- VZ22 (567 LRC_woodland)
- VZ23 (567 LRC_mod_grassland)
- VZ25 (568 DC_openforest)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ48 (1192 DC_woodland)
- VZ54 (510 low_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)
- VZ62 (1192 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 18 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ10 (534 DC_woodland)
- VZ11 (534 DC_openwoodland)
- VZ12 (534 DC_mod_grassland)
- VZ13 (534 LRC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ19 (567 DC_woodland)
- VZ20 (567 DC_openwoodland)
- VZ22 (567 LRC_woodland)
- VZ23 (567 LRC_mod_grassland)
- VZ26 (568 DC_woodland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 19 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

BLUE MOUNTAIN ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ10 (534 DC_woodland)
- VZ11 (534 DC_openwoodland)
- VZ12 (534 DC_mod_grassland)
- VZ13 (534 LRC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ15 (534 LRC_canopy)
- VZ19 (567 DC_woodland)
- VZ20 (567 DC_openwoodland)
- VZ21 (567 DC_mod_grassland)
- VZ22 (567 LRC_woodland)
- VZ23 (567 LRC_mod_grassland)
- VZ24 (567 TL_canopy)
- VZ25 (568 DC_openforest)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_canopy)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 20 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ03 (510 DC_modgrassland)
- VZ6 (510 TL_canopy)
- VZ10 (534 DC_woodland)
- VZ12 (534 DC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ15 (534 LRC_canopy)
- VZ22 (567 LRC_woodland)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_canopy)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ56 (565 low_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 21 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ05 (510 LRC_openwoodland)
- VZ11 (534 DC_openwoodland)
- VZ12 (534 DC_mod_grassland)
- VZ13 (534 LRC_mod_grassland)
- VZ19 (567 DC_woodland)
- VZ20 (567 DC_openwoodland)
- VZ21 (567 DC_mod_grassland)
- VZ22 (567 LRC_woodland)
- VZ23 (567 LRC_mod_grassland)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ58 (568 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 22 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ11 (534 DC_openwoodland)
- VZ12 (534 DC_mod_grassland)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ55 (534 low_grassland)
- VZ58 (568 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 23 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

WINTERBOURNE ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ6 (510 TL_canopy)
- VZ10 (534 DC_woodland)
- VZ11 (534 DC_openwoodland)
- VZ12 (534 DC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ15 (534 LRC_canopy)
- VZ16 (565 DC_woodland)
- VZ17 (565 DC_openwoodland)
- VZ19 (567 DC_woodland)
- VZ20 (567 DC_openwoodland)
- VZ21 (567 DC_mod_grassland)
- VZ22 (567 LRC_woodland)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_canopy)
- VZ52 (501 DC_woodland)
- VZ53 (501 DC_mod_grassland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ56 (565 low_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 24 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

VZ01 (510 DC_woodland)
VZ02 (510 DC_open_woodland)
VZ03 (510 DC_modgrassland)
VZ04 (510 LRC_mod_grassland)
VZ05 (510 LRC_openwoodland)
VZ6 (510 TL_canopy)
VZ13 (534 LRC_mod_grassland)
VZ14 (534 LRC_openwoodland)
VZ19 (567 DC_woodland)
VZ20 (567 DC_openwoodland)
VZ21 (567 DC_mod_grassland)
VZ22 (567 LRC_woodland)
VZ23 (567 LRC_mod_grassland)
VZ25 (568 DC_openforest)
VZ26 (568 DC_woodland)
VZ27 (568 DC_openwoodland)
VZ28 (568 DC_mod_grassland)
VZ29 (568 TL_canopy)
VZ33 (766 LRC_sedgeland)
VZ42 (970 DC_openwoodland)
VZ43 (970 DC_mod_grassland)
VZ44 (970 LRC_openwoodland)
VZ46 (970 LRC_mod_grassland)
VZ52 (501 DC_woodland)
VZ53 (501 DC_mod_grassland)
VZ54 (510 low_grassland)
VZ55 (534 low_grassland)
VZ57 (567 low_grassland)
VZ58 (568 low_grassland)
VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

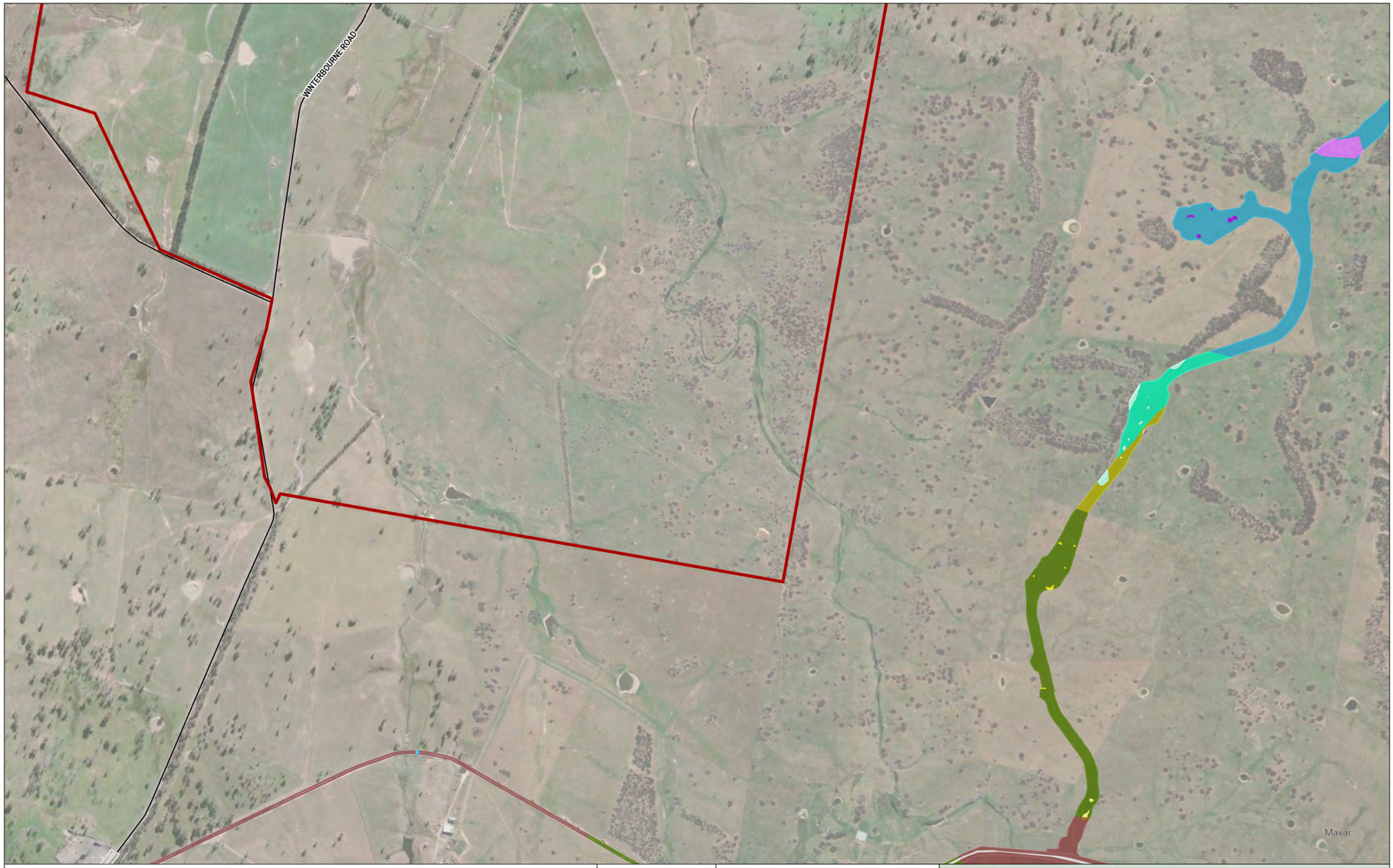
4-2 Vegetation Zones within the Subject Land

Map 25 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ05 (510 LRC_openwoodland)
- VZ10 (534 DC_woodland)
- VZ14 (534 LRC_openwoodland)
- VZ19 (567 DC_woodland)
- VZ21 (567 DC_mod_grassland)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ33 (766 LRC_sedgeland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ58 (568 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 26 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ58 (568 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 27 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

WINTERBOURNE ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ02 (510 DC_open_woodland)
- VZ03 (510 DC_modgrassland)
- VZ05 (510 LRC_openwoodland)
- VZ10 (534 DC_woodland)
- VZ14 (534 LRC_openwoodland)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_canopy)
- VZ52 (501 DC_woodland)
- VZ53 (501 DC_mod_grassland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ58 (568 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

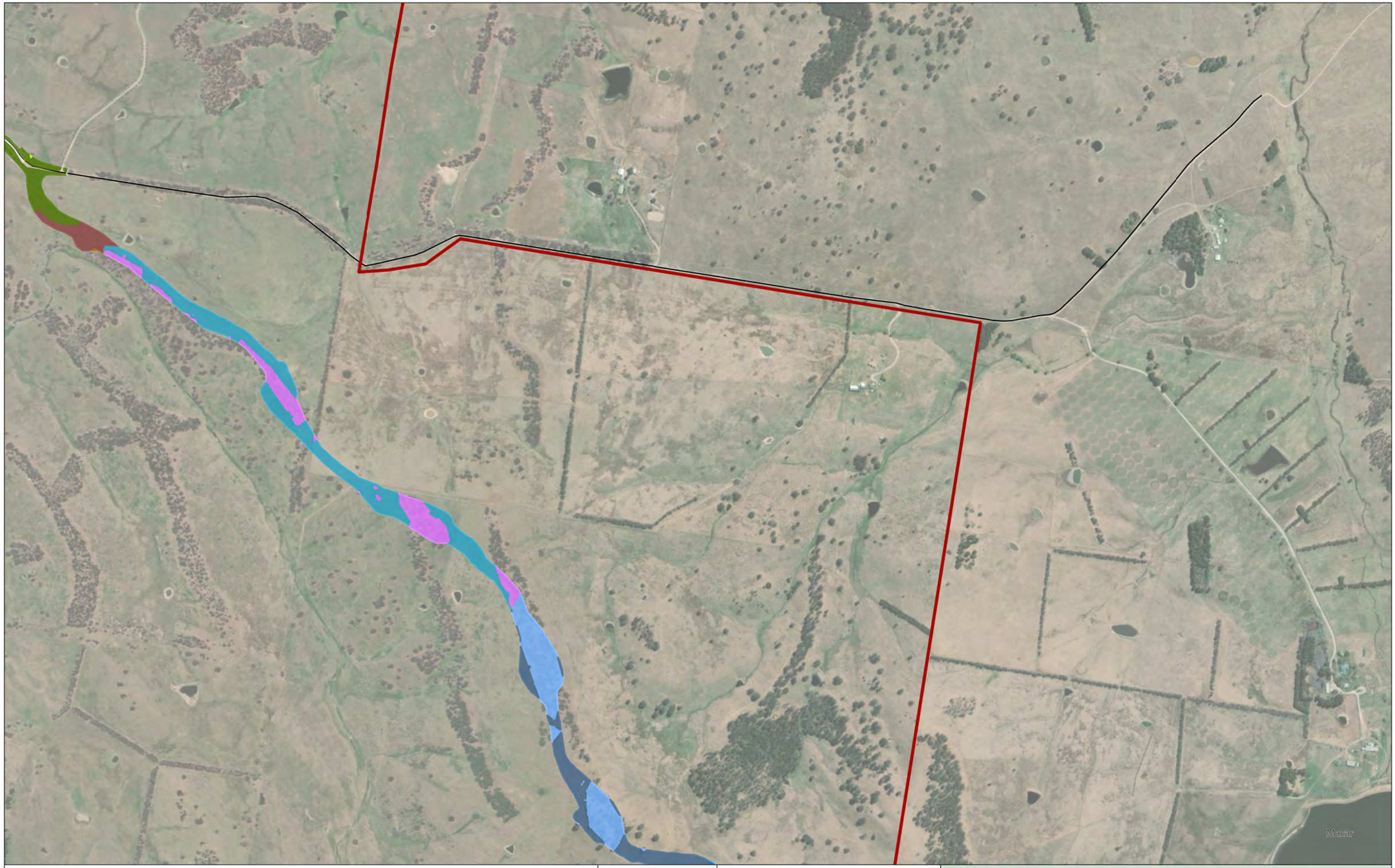
4-2 Vegetation Zones within the Subject Land

Map 28 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ05 (510 LRC_openwoodland)
- VZ10 (534 DC_woodland)
- VZ26 (568 DC_woodland)
- VZ35 (965 DC_woodland)
- VZ37 (965 DC_mod_grassland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ58 (568 low_grassland)
- VZ60 (965 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 29 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

BARK HUT ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ03 (510 DC_modgrassland)
- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ6 (510 TL_canopy)
- VZ10 (534 DC_woodland)
- VZ12 (534 DC_mod_grassland)
- VZ13 (534 LRC_mod_grassland)
- VZ15 (534 LRC_canopy)
- VZ25 (568 DC_openforest)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_cancpy)
- VZ32 (766 DC_sedgeland)
- VZ33 (766 LRC_sedgeland)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ53 (501 DC_mod_grassland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)
- VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 30 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ35 (965 DC_woodland)
- VZ36 (965 DC_shrubland)
- VZ37 (965 DC_mod_grassland)
- VZ42 (970 DC_openwoodland)
- VZ60 (965 low_grassland)
- VZ61 (970 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

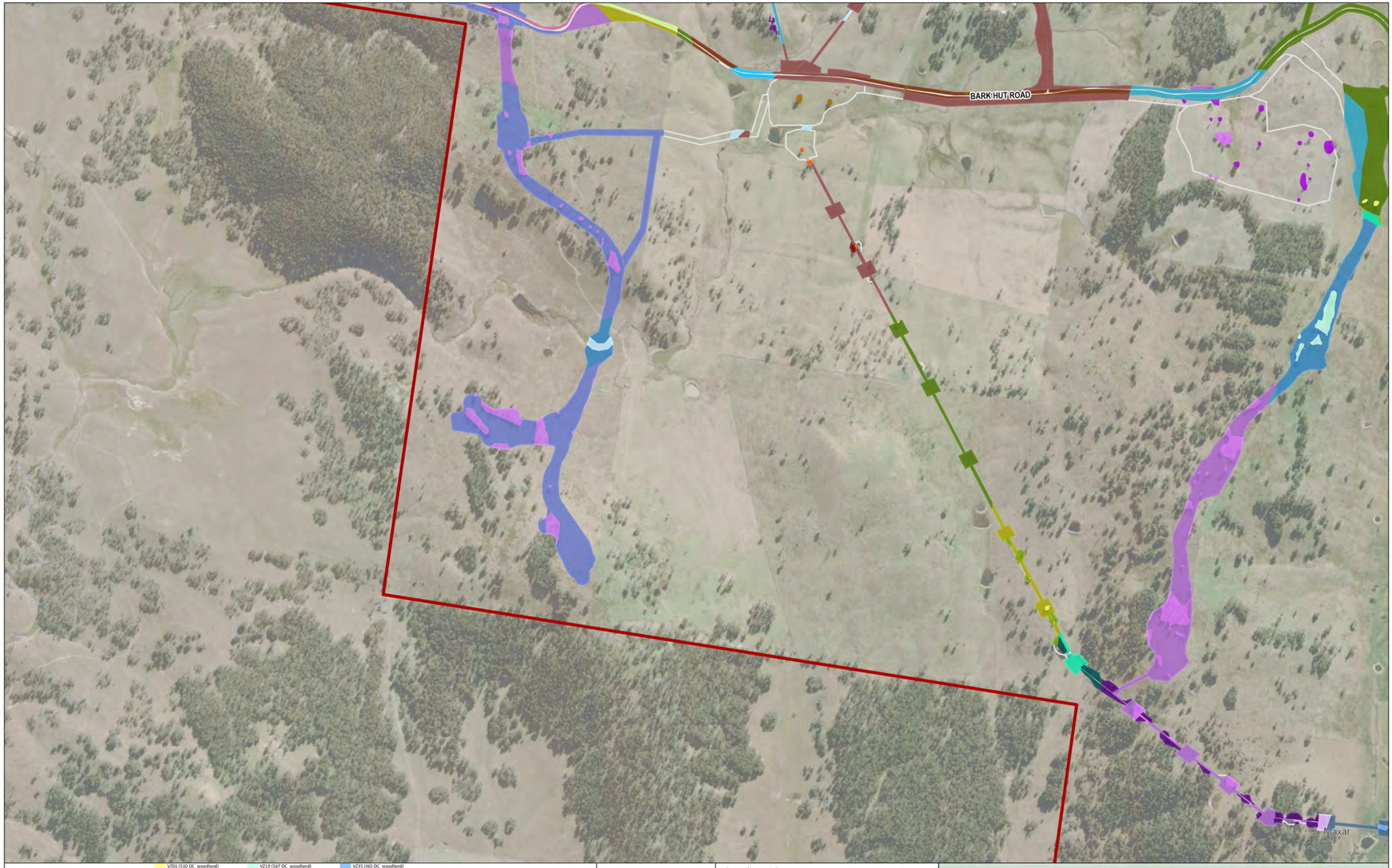
4-2 Vegetation Zones within the Subject Land

Map 31 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

VZ01 (510 DC_woodland)
VZ02 (510 DC_open_woodland)
VZ03 (510 DC_modgrassland)
VZ04 (510 LRC_mod_grassland)
VZ6 (510 TL_canopy)
VZ10 (534 DC_woodland)
VZ11 (534 DC_openwoodland)
VZ12 (534 DC_mod_grassland)
VZ13 (534 LRC_mod_grassland)
VZ14 (534 LRC_openwoodland)
VZ15 (534 LRC_canopy)
VZ19 (567 DC_woodland)
VZ21 (567 DC_mod_grassland)
VZ24 (567 TL_canopy)
VZ25 (568 DC_openforest)
VZ26 (568 DC_woodland)
VZ27 (568 DC_openwoodland)
VZ28 (568 DC_mod_grassland)
VZ29 (568 TL_canopy)
VZ32 (766 DC_sedgeland)
VZ33 (766 LRC_sedgeland)
VZ34 (965 DC_openforest)
VZ35 (965 DC_woodland)
VZ240 (965 TL_canopy)
VZ242 (970 DC_openwoodland)
VZ243 (970 DC_mod_grassland)
VZ244 (970 LRC_openwoodland)
VZ246 (970 LRC_mod_grassland)
VZ254 (510 low_grassland)
VZ255 (534 low_grassland)
VZ257 (567 low_grassland)
VZ258 (568 low_grassland)
VZ260 (965 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 32 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM



Legend

- Project Area
- Subject Land
- Local Road

- VZ01 (510 DC_woodland)
- VZ03 (510 DC_modgrassland)
- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ19 (567 DC_woodland)
- VZ21 (567 DC_mod_grassland)
- VZ25 (568 DC_openforest)
- VZ26 (568 DC_woodland)
- VZ27 (568 DC_openwoodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_cancpy)
- VZ34 (965 DC_openforest)
- VZ35 (965 DC_woodland)
- VZ38 (965 LRC_openforest)
- VZ40 (965 TL_cancpy)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ54 (510 low_grassland)
- VZ57 (567 low_grassland)
- VZ58 (568 low_grassland)
- VZ60 (965 low_grassland)
- VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 33 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ25 (568 DC_openforest)
- VZ26 (568 DC_woodland)
- VZ28 (568 DC_mod_grassland)
- VZ29 (568 TL_canopy)
- VZ34 (965 DC_openforest)
- VZ35 (965 DC_woodland)
- VZ37 (965 DC_mod_grassland)
- VZ40 (965 TL_canopy)
- VZ41 (970 DC_openforest)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ47 (970 TL_canopy)
- VZ58 (568 low_grassland)
- VZ60 (965 low_grassland)
- VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 34 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Maxar

Legend

- Project Area
- Subject Land
- VZ34 (965 DC_openforest)
- VZ35 (965 DC_woodland)
- VZ37 (965 DC_mod_grassland)
- VZ40 (965 TL_canopy)
- VZ60 (965 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 35 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ32 (766 DC_sedgeland)
- VZ34 (965 DC_openforest)
- VZ35 (965 DC_woodland)
- VZ37 (965 DC_mod_grassland)
- VZ39 (965 LRC_mod_grassland)
- VZ41 (970 DC_openforest)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ44 (970 LRC_openwoodland)
- VZ46 (970 LRC_mod_grassland)
- VZ60 (965 low_grassland)
- VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 36 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ32 (766 DC_sedgeland)
- VZ41 (970 DC_openforest)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024
Created By: VN
Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 37 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ14 (534 LRC_openwoodland)
- VZ19 (567 DC_woodland)
- VZ20 (567 DC_openwoodland)
- VZ34 (965 DC_openforest)
- VZ35 (965 DC_woodland)
- VZ38 (965 LRC_openforest)
- VZ39 (965 LRC_mod_grassland)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ44 (970 LRC_openwoodland)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)
- VZ60 (965 low_grassland)
- VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 38 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ34 (965 DC_openforest)
- VZ35 (965 DC_woodland)
- VZ38 (965 LRC_openforest)
- VZ39 (965 LRC_mod_grassland)
- VZ41 (970 DC_openforest)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ45 (970 LRC_openforest)
- VZ60 (965 low_grassland)
- VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 39 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land

- VZ35 (965 DC_woodland)
- VZ37 (965 DC_mod_grassland)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ50 (1194 DC_openwoodland)
- VZ51 (1192 DC_low_grassland)
- VZ57 (567 low_grassland)
- VZ60 (965 low_grassland)
- VZ61 (970 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:11,000

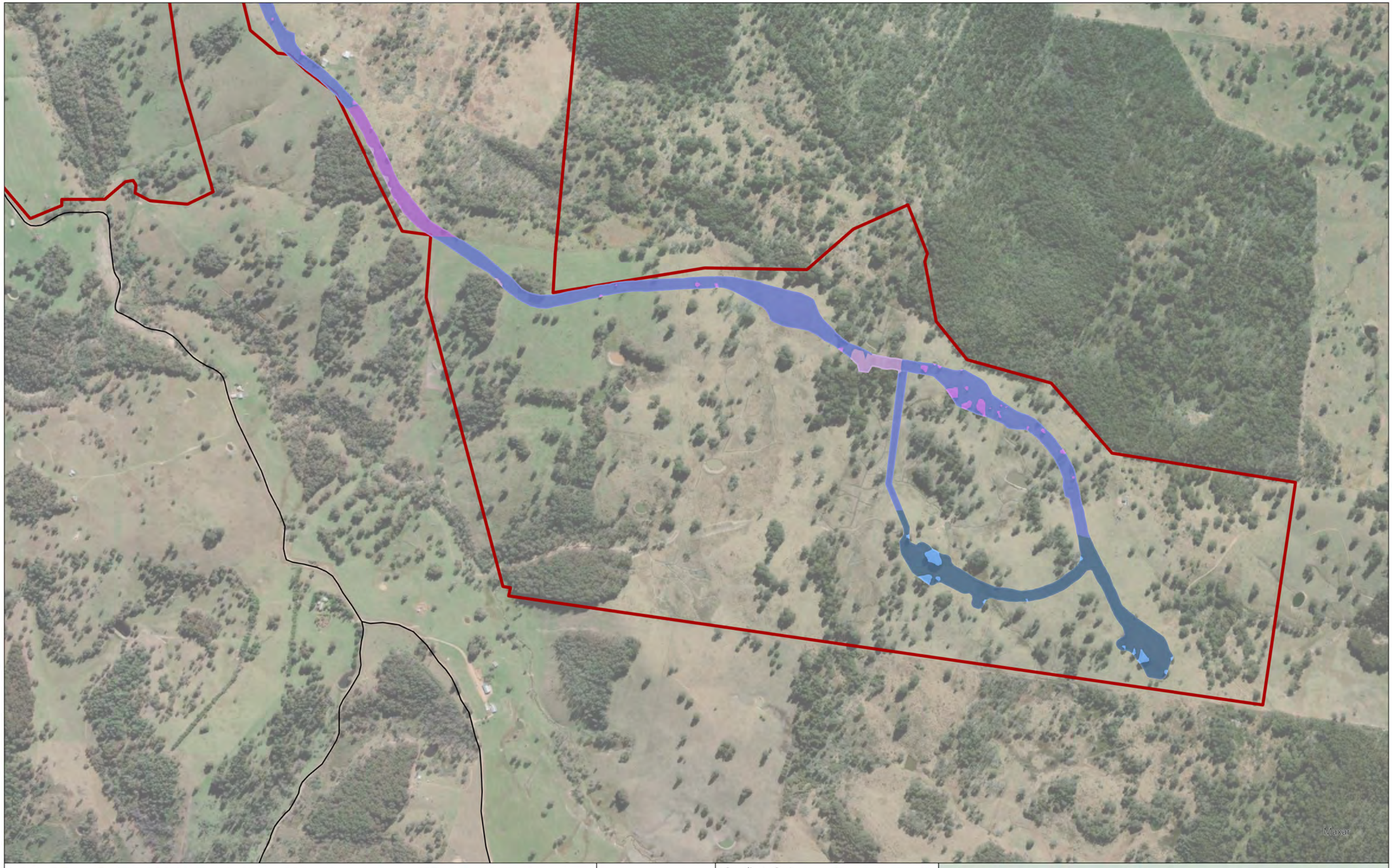
4-2 Vegetation Zones within the Subject Land

Map 40 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ35 (965 DC_woodland)
- VZ41 (970 DC_openforest)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ60 (965 low_grassland)
- VZ61 (970 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 41 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

THUNDERBOLTS WAY
URALLA ROAD
EMU CREEK ROAD
DERBY STREET
OXLEY HIGHWAY
WALCHA
Maxar

Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road

- VZ05 (510 LRC_openwoodland)
- VZ13 (534 LRC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ15 (534 LRC_canopy)
- VZ49 (1192 LRC_woodland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ62 (1192 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 42 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

EMU CREEK ROAD

OXLEY HIGHWAY

Maxar

Legend

- Project Area
- Subject Land
- Highway / Major Road
- Local Road
- VZ13 (534 LRC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ49 (1192 LRC_woodland)
- VZ55 (534 low_grassland)
- VZ62 (1192 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 43 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

EMU CREEK ROAD

MOONA PLAINS ROAD

Maxar

Legend

- Project Area
- Subject Land
- Local Road

- VZ13 (534 LRC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)
- VZ62 (1192 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 44 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road
- VZ14 (534 LRC_openwoodland)
- VZ55 (534 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56

Date: 11/09/2024

Created By: VN

Drawing Size: A3

0 100 200 300m

1:11,000

4-2 Vegetation Zones within the Subject Land

Map 45 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road
- VZ05 (510 LRC_openwoodland)
- VZ14 (534 LRC_openwoodland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 46 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

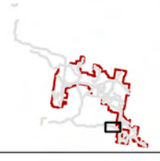
0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ05 (510 LRC_openwoodland)
- VZ42 (970 DC_openwoodland)
- VZ43 (970 DC_mod_grassland)
- VZ44 (970 LRC_openwoodland)
- VZ54 (510 low_grassland)
- VZ61 (970 low_grassland)



Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 47 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ14 (534 LRC_openwoodland)
- VZ49 (1192 LRC_woodland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ62 (1192 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 48 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ11 (534 DC_openwoodland)
- VZ13 (534 LRC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ33 (766 LRC_sedgeland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m

1:17,000

4-2 Vegetation Zones within the Subject Land

Map 49 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Local Road

- VZ04 (510 LRC_mod_grassland)
- VZ05 (510 LRC_openwoodland)
- VZ11 (534 DC_openwoodland)
- VZ13 (534 LRC_mod_grassland)
- VZ14 (534 LRC_openwoodland)
- VZ22 (567 LRC_woodland)
- VZ33 (766 LRC_sedgeland)
- VZ54 (510 low_grassland)
- VZ55 (534 low_grassland)
- VZ57 (567 low_grassland)

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 100 200 300m
1:11,000

4-2 Vegetation Zones within the Subject Land

Map 50 of 50

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

4.2.5 VEGETATION INTEGRITY SCORES

The vegetation integrity score (VIS) is calculated by inputting BAM plot data (i.e., composition, structure and function values – see Appendix C) into vegetation zones established in the online BAM Calculator (BAM-C). The BAM-C generated calculations are summarized in Table 4-18. Vegetation zones in bold place emphasis on those that have a VIS that is below the specified offsetable threshold.

TABLE 4-18 VEGETATION INTEGRITY SCORES

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score
1	74.1	69.2	60.2	67.6
2	47.5	50.8	54.6	50.9
3	28.6	51.6	15	28.1
4	44.1	55.3	12.7	31.4
5	67.9	84.5	21.6	49.9
6	51.2	68.6	69.4	62.5
7	55.5	67.6	29.7	48.1
8	42.7	51.7	7.9	26
9	49.1	58.6	46.4	51.1
10	72.6	48.5	59	59.2
11	24.9	25.1	25.4	25.1
12	34.9	67.1	11.4	29.9
13	**17.2**	**22.6**	**8.6**	**14.9**
14	73	67.3	64.2	68.1
15	61.2	62.4	46.2	56.1
16	47.4	73.3	37.1	50.5
17	**3.3**	**46.5**	**23.1**	**15.3**
18	**37.5**	**53.8**	**0.4**	**9.3**
19	54.6	92.1	95.4	78.3
20	33.9	8.8	24.2	19.3
21	35.3	60.6	20.5	35.3
22	85.2	83.9	90.4	86.4
23	45.7	65.1	4.9	24.4
24	68	70.3	72.9	70.3
25	79.2	41.2	83.1	64.7
26	51.6	57.2	78.7	61.5
27	9.8	35.6	28.7	21.5

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score
28	44	48.6	7.6	25.3
29	44.3	58.6	65.9	55.5
30	55.9	62	64.6	60.7
31	**41.8**	**58.7**	**1.3**	**14.7**
32	56.4	69.8	...	62.8
33	**48.2**	**0.1**	**...**	**2.2**
34	34.8	71.9	72.1	56.5
35	18.3	48.1	29	29.5
36	**15.5**	**25.7**	**0**	**7.4**
37	**10.7**	**24.3**	**2.4**	**8.6**
38	75	58.5	98.8	75.7
39	**15.1**	**0.3**	**0.2**	**1**
40	34.8	59.6	35.5	41.9
41	59.8	78.4	88.6	74.6
42	26.6	70.2	71	51
43	**55.6**	**52.8**	**0.8**	**13.3**
44	20.6	49.4	57.5	38.8
45	54.4	77.7	96.9	74.3
46	**26**	**34.1**	**2.3**	**12.7**
47	58	81.9	89.6	75.2
48	40.8	49.9	13.6	30.3
49	15.4	31	86.6	34.6
50	36.4	44.7	69	48.2
51	**29.9**	**24.6**	**0.1**	**4.5**
52	77.4	72.9	74.6	75
53	28.9	64.3	7.9	24.6
54	**24.3**	**49.2**	**0.7**	**9.5**
55	**23.3**	**17.5**	**3.7**	**11.4**
56	**20.2**	**16.8**	**3.4**	**10.5**
57	**19.9**	**20.9**	**3.7**	**11.6**
58	**42.8**	**47.9**	**0.6**	**10.8**
59	**30**	**22.7**	**1.9**	**10.9**
60	**17.5**	**14.8**	**0.1**	**3.2**
61	**32.5**	**44.2**	**0.3**	**7.4**

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score
62	30.9	50.5	4.7	19.4

Vegetation zones not having a VIS exceeding 15 for TECs or 17 for non-TECs amounts to an area of 592.57 ha, which represents 69.4% of native vegetated lands within the Subject Land.

4.2.6 THREATENED ECOLOGICAL COMMUNITIES

Four EPBC Act TECs were identified as part of the desktop assessment in the Protected Matters Search Tool as having the potential to occur within the Subject Land. Two of these TECs were also identified through PCT association, and have equivalent communities listed under the BC Act and an additional five TECs were identified through PCT association that were not identified by the PMST. Consideration of these TECs is provided in Table 4-19.

TABLE 4-19 THREATENED ECOLOGICAL COMMUNITIES INVESTIGATION

TEC	BC Act	EPBC Act	Associated PCT	Recorded within the Subject Land
New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands and BC Act equivalent	Critically Endangered	Critically Endangered	533, 534, 965, 970	Yes – limited to PCTs 533 and 534 where New England Peppermint is a characteristic canopy species
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland and BC Act equivalent	Critically Endangered	Critically Endangered	510, 567, 571	Yes – limited to PCT 510 where one or more of the characteristic canopy tree species are dominant
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	Endangered	-	766	Yes – limited to occurrences of PCT 766
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps Bioregions	Endangered	-	766	No – PCT 766 presents as a Carex Sedgeland and the community does not present as a Montane Peatland and Swamp.
Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion	Endangered	Endangered	766	No – PCT 766 presents as a Carex Sedgeland and the community does not present as a Wetland.
Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	Endangered	-	965, 1194	Yes – limited to occurrences of PCT 1194 where basalt occurs

TEC	BC Act	EPBC Act	Associated PCT	Recorded within the Subject Land
Natural Temperate Grassland of the South Eastern Highlands	-	Critically Endangered	766	No - PCT 766 presents as a Carex Sedgeland and the community does not present as a Grassland.
Lowland Rainforest of Subtropical Australia	Endangered	Critically Endangered	-	No – no rainforest communities occur in the Subject Land
Ben Halls Gap Sphagnum Moss Cool Temperate Rainforest	Endangered	Critically Endangered	-	No – no rainforest communities occur in the Subject Land

The mapping of woody TECs (i.e., excluding Carex sedgelands EEC), has generally considered the schematic transect of the landscapes present in the Guyra 1:100,000 map sheet (Benson and Ashby 2000) as reproduced below.

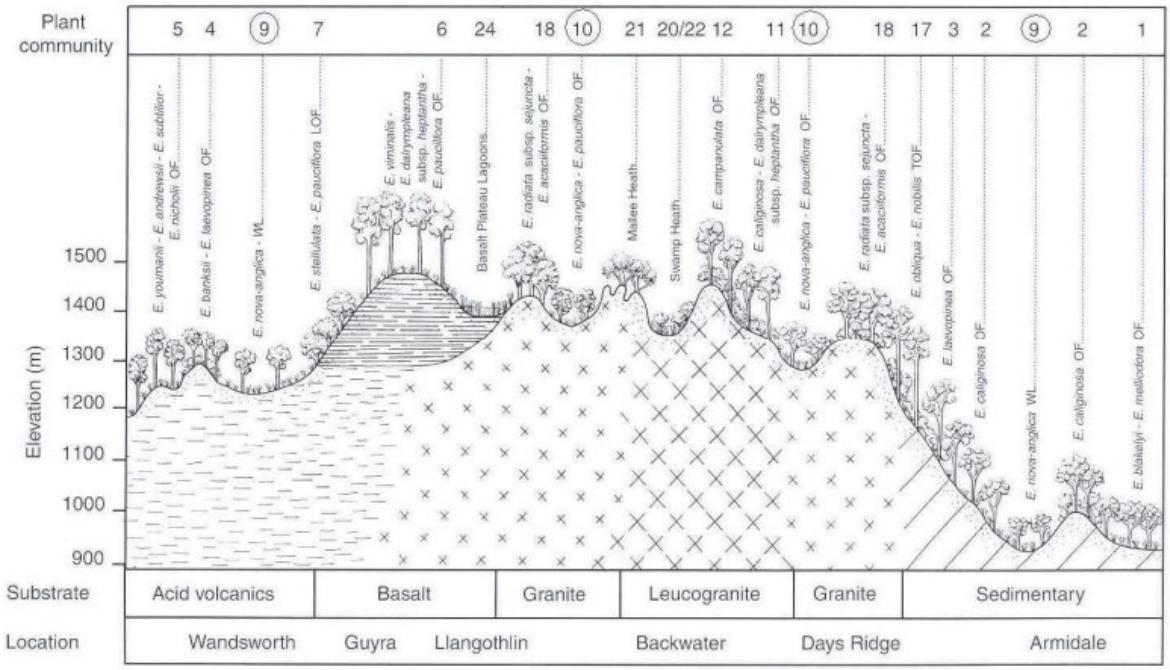


Fig. 1. Schematic transect of the landscapes present in the area covered by the Guyra 1: 100 000 map sheet showing the relationship between topographic position, elevation, substrate and plant communities. OF = Open-Forest, WL = Woodland, LOF = Low Open-Forest, TOF = Tall Open-Forest (after Walker and Hopkins (1990)). Reproduced with permission, from Benson and Ashby (2000). Plant communities 9 and 10, circled, are components of the national ecological community.

Characteristically, New England Peppermint Grassy Woodlands typically occur in areas of low relief where frost hollows are common. Occurrence of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland are generally upslope of the frost hollows on soils of medium fertility and gentle gradients. Combined, these lower parts of the landscape are arable and have been over-cleared typically for agricultural purposes.

Occurrences of Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion are limited to patches of 1194 coincident with basalt.

The following sections provide additional detail with respect to the TECs found within the Subject Land.

4.2.6.1 NEW ENGLAND PEPPERMINT (*EUCALYPTUS NOVA-ANGLICA*) GRASSY WOODLANDS

The New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion in NSW/New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands TEC is listed as Critically Endangered under both the BC Act and the EPBC Act respectively. Both these listed communities will here onward be referred to as 'New England Peppermint Grassy Woodland TEC'.

The community is described as a temperate grassy eucalypt woodland to open forest where *Eucalyptus nova-anglica* is dominant or co-dominant, generally occurring on valley flats and lower slopes. The canopy layer may occur as a pure stand of *Eucalyptus nova-anglica* or may include other eucalypt species such as *Eucalyptus pauciflora*, *E. stellulata*, *E. dalrympleana* subsp. *heptantha*, *E. blakelyi*, *E. radiata* subsp. *sejuncta* and *E. rubida*. The shrub layer is normally absent or sparse and may include *Leucopogon fraseri, Melichrus urceolatus, Lissanthe strigosa, Rubus parvifolius* and *Bursaria spinosa*. The ground layer typically consists of a dense, continuous cover of native grasses and herbs, commonly including *Poa sieberiana* and *Themeda triandra* (TSSC, 2011; NSW TSSC 2013).

To be considered part of the EPBC Act listed TEC patches must meet the key diagnostic characteristics and condition thresholds described in Table 4-20, as per TSSC, 2011.

TABLE 4-20 EPBC ACT KEY DIAGNOSTIC CHARACTERISTICS AND CONDITIONS THRESHOLDS FOR NEW ENGLAND PEPPERMINT GRASSY WOODLAND TEC

Key Diagnostic Characteristic	**Response**
Distribution limited to the tablelands and slopes of northeastern NSW, extending into southeastern Queensland	The Subject Land is within the New England Tablelands of northeastern NSW
An overstorey dominated, or co-dominated by *Eucalyptus nova-anglica* (New England Peppermint)	PCTs 533 and 534 mapped within the Subject Land have this characteristic
The shrub layer is typically sparse or absent	PCTs 533 and 534 mapped within the Subject Land have this characteristic
The ground layer vegetation is usually dominated by native grasses and herbs. Cover is typically dense, though this may vary in response to seasonal conditions and management history.	PCTs 533 and 534 mapped within the Subject Land generally have this characteristic. Management history has had a marked impact on floristic composition and structure.
Condition Thresholds	
Patch Size: The patch, excluding the buffer zone, is at least 0.5 ha in size	There are patches of PCT 533 and 534 mapped within the Subject Land that qualify under this threshold
Ground Cover: The perennial ground cover vegetation is dominated by native species AND the ground cover of the patch has EITHER: • At least 20 different native vascular plant species present in the patch. • At least 5 different grazing-sensitive (highly palatable) native species present in the patch.	All patches of PCT 533 and 534 that are greater than 0.5 ha qualify under this threshold

Key Diagnostic Characteristic	Response
Trees: The trees must have a density of EITHER: • At least 10 native trees per 0.5 ha, that are at least 10 cm in DBH. • At least 10 native tree stems per 0.5 ha that are at least 50 cm in height, as evidence of potential natural regeneration of native tree species.	All patches of PCT 533 and 534 that are greater than 0.5 ha qualify under this threshold
Outcome	**Patches of PCT 533 or 534 of greater than 0.5 ha in area form part of the Commonwealth listed community**

To be considered part of the BC Act listed TEC patches must meet the key characteristics described in Table 4-21, as per DECCW NSW, 2010.

TABLE 4-21 BC ACT KEY DIAGNOSTIC CHARACTERISTICS FOR THE ASSESSMENT OF NEW ENGLAND PEPPERMINT GRASSY WOODLAND TEC

Key Diagnostic Characteristic	Response
Is the site in the New England Tableland Bioregion?	Yes
Is the vegetation an open grassy forest or woodland with sparse or no shrubs?	PCTs 533 and 534 mapped within the Subject Land have this characteristic
Does the tree layer contain mainly New England Peppermint?	PCTs 533 and 534 mapped within the Subject Land have this characteristic
Outcome	**Patches of PCT 533 and 534 meet the key diagnostic criteria for inclusion within the threatened ecological community**

The extent of New England Peppermint TEC within the Subject Land is shown in Figure 4-3.

4.2.6.2 WHITE BOX – YELLOW BOX – BLAKELY'S RED GUM GRASSY WOODLAND AND DERIVED NATIVE GRASSLAND

The White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is listed as Critically Endangered under the EPBC Act and part of the national community is listed in NSW as the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions which is listed as Critically Endangered under the BC Act. The term 'Box-Gum Grassy Woodland TEC' is used here onward to describe both the EPBC Act and BC Act listed communities.

The community generally presents as an open woodland with a canopy foliage cover of less than 30% consisting of *Eucalyptus albens* (White Box), *Eucalyptus melliodora* (Yellow Box) and/or *Eucalyptus blakelyi* (Blakely's Red Gum) and in some cases the grey boxes *Eucalyptus microcarpa* and *E. moluccana* can occur as co-dominants. A shrub layer is generally absent but can include *Acacia, Bursaria, Cassinia, Hibbertia, Lissanthe* and *Templetonia* species (DCCEEW 2023; NSW TSSC, 2020).

The ground cover is dominated by tussock grasses, especially *Themeda triandra* (Kangaroo Grass) and *Poa sieberiana* (Snow Grass), along with species of *Austrostipa, Aristida, Chloris, Cymbopogon, Dichanthium, Microlaena* and *Rytidosperma*. Between the tussocks there may be bare ground or a range of forbs from genera such as *Bulbine, Chrysocephalum, Dianella, Geranium, Goodenia, Lomandra, Pimelea* and *Stackhousia* (DCCEEW 2023; NSW TSSC, 2020).

The EPBC Act and BC Act listed communities have been assessed against the mapped extent of PCT 510 within the Subject Land. To be considered part of the EPBC Act listed TEC patches must meet the key diagnostic characteristics described in Table 4-22, as per TSSC, 2011.

TABLE 4-22 EPBC ACT KEY DIAGNOSTIC CHARACTERISTICS FOR THE ASSESSMENT OF BOX-GUM GRASSY WOODLAND TEC

Question	Response
Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?	PCT 510 is characterised in this way (i.e., Yellow Box and Blakely's Redgum). BioNet describes the adjoining upslope vegetation on steeper slopes (i.e., PCT 567) as having Yellow Box and/or Blakely's Redgum as an associate species but not dominant. Ecotonal areas with the adjoining vegetation type have been included in the mapped occurrence of PCT 510 to conservatively account for the extent of this TEC.
Does the patch have a predominately native understorey?	Yes – PCT 510 is predominantly grassy.
Is the patch 0.1 ha or greater in size?	Yes
There are 12 or more native understorey species present (excluding grasses) from the provided list, with at least one important species (Species list attained from: https://www.dcceew.gov.au/sites/default/files/documents/box-gum-species.pdf)	Generally. There are occurrences of the PCT 510 that have low native plant species composition where this threshold would not be met.
Outcome	**Present. The extent of this TEC is reflected in the mapping of PCT 510. Condition based distinctions are noted (e.g. grasslands verse woody vegetation).**

To be considered part of the BC Act listed TEC patches must meet the key characteristics described in Table 4-23, as per DECCW NSW, 2010.

TABLE 4-23 BC ACT KEY DIAGNOSTIC CHARACTERISTICS FOR THE ASSESSMENT OF BOX-GUM GRASSY WOODLAND TEC

Question	Response
Is the site on the tablelands or western slopes of NSW?	Yes – the Subject Land is on the New England Tablelands
Does the site contain, or would the site have recently been likely to contain, White Box, Yellow Box or Blakely's Red Gum?	PCT 510 is characterised in this way (i.e., Yellow Box and Blakely's Redgum). BioNet describes the adjoining upslope vegetation on steeper slopes (i.e., PCT 567) as having Yellow Box and/or Blakely's Redgum as an associate species but not dominant. Ecotonal areas with the adjoining vegetation type have been included in the mapped occurrence of PCT 510 to conservatively account for the extent of this TEC.
Is the ground layer mainly grassy?	Yes – PCT 510 is predominantly grassy.
If the site has been degraded, is there potential for assisted natural regeneration of the tree layer or the understorey (e.g. by removing grazing, weeds, etc.)?	Generally. There are occurrences of the PCT 510 that have low native plant species composition where past and present land use has favoured exotic/cosmopolitan species and increase abundance of unpalatable grass species. The application of phosphorus and other soil ameliorants to improve pastures for livestock has likely altering the soil biome thus diminished the potential for assisted natural regeneration.
Determination of Presence	**Present. Occurrences of grassland vegetation in a low condition state are likely reflective of heavily modified environments where the potential for assisted natural regeneration is considered low.**

The extent of Box-Gum Grassy Woodland TEC within the Subject Land is shown in Figure 4-3.

4.2.6.3 CAREX SEDGELAND OF THE NEW ENGLAND TABLELAND, NANDEWAR, BRIGALOW BELT SOUTH AND NSW NORTH COAST BIOREGIONS

The Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions TEC is listed as Endangered under the BC Act. The term 'Carex Sedgeland TEC' is used here onward to describe the community.

The community generally presents as fens dominated by sedges, grasses and semi-aquatic herbs. Dominant species include *Carex appressa*, *Stellaria angustifolia*, *Scirpus polystachyus*, *Carex gaudichaudiana*, *Carex* sp. Bendemeer, *Carex tereticaulis* and *Isachne globosa*. Other common species include *Geranium solanderi* var. *solanderi*, *Haloragis heterophylla*, *Lythrum salicaria, Epilobium billardierianum* subsp. *hydrophilum* and *Persicaria hydropiper*. The community occurs at higher altitudes of the tablelands but in some cases extends onto the slopes, along drainage depressions in areas of altitude between 440 and 1,360 m (NSW TSSC, 2011).

The extent of Carex Sedgeland TEC within the Subject Land is presented in Figure 4-3.

NEW ENGLAND HIGHWAY

THUNDERBOLTS WAY

Maxar

Legend

- Project Area
- Subject Land
- New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion
- Ribbon gum - mountain gum - snow gum grassy forest/ woodland of the New England Tableland Bioregion
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern



Coordinate System:
GDA 1994 MGA Zone 56

Date: 10/09/2024

Created By: VN

Drawing Size: A3

0 500 1,000 1,500m

1:56,000

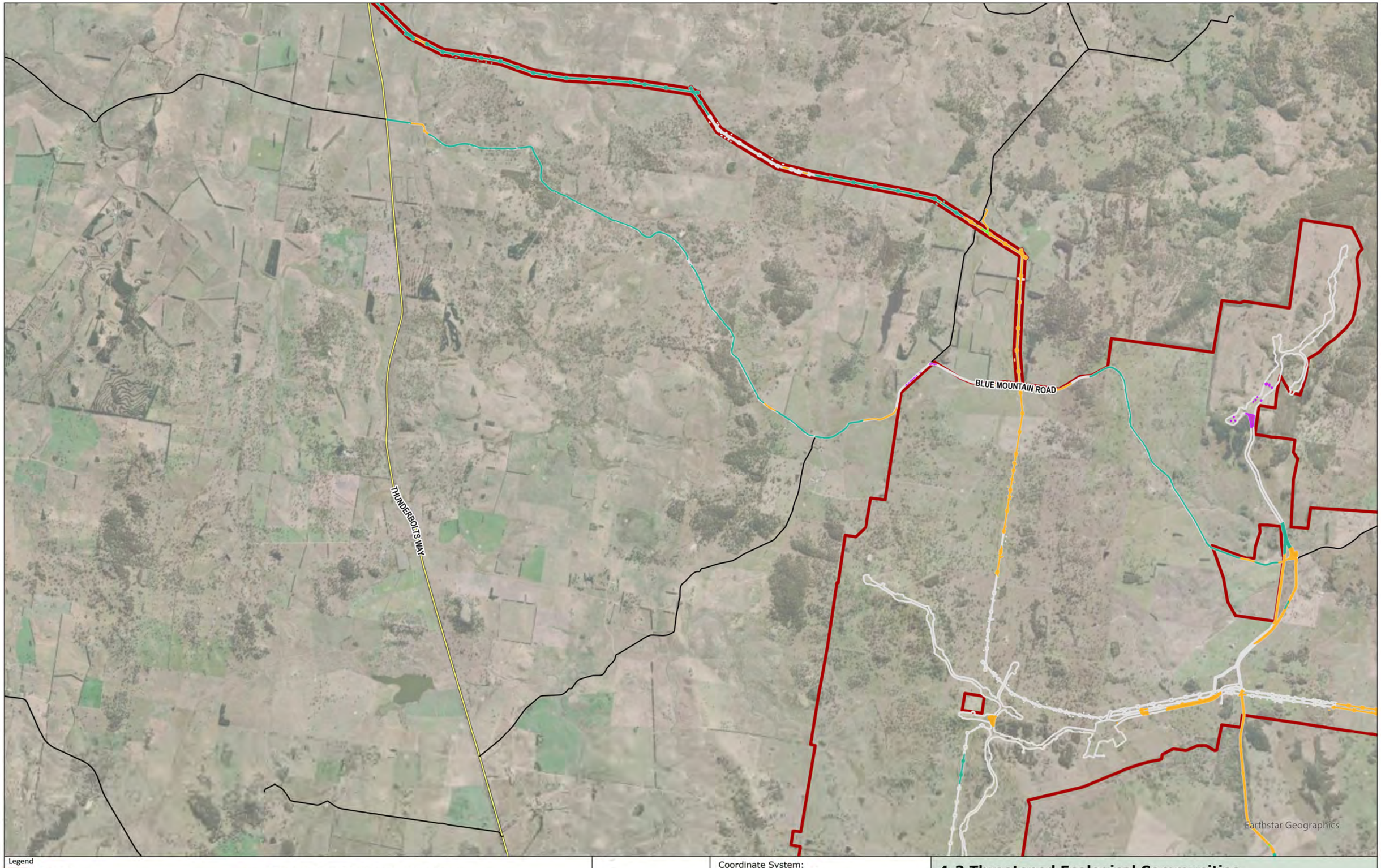
4-3 Threatened Ecological Communities

Map 1 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



Legend

- Project Area
- Subject Land
- Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions
- New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion
- Ribbon gum - mountain gum - snow gum grassy forest/ woodland of the New England Tableland Bioregion
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern

Coordinate System:
GDA 1994 MGA Zone 56

Date: 10/09/2024
Created By: VN
Drawing Size: A3

0 500 1,000 1,500m

1:56,000

4-3 Threatened Ecological Communities

Map 2 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
THUNDERBOLTS WAY
DERBY STREET
EMU CREEK ROAD
OXLEY HIGHWAY
MOONA PLAINS ROAD
Earthstar Geographics

Legend

- Project Area
- Subject Land
- Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions
- New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion
- Ribbon gum - mountain gum - snow gum grassy forest/ woodland of the New England Tableland Bioregion
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern

Coordinate System:
GDA 1994 MGA Zone 56
Date: 10/09/2024
Created By: VN
Drawing Size: A3
0 500 1,000 1,500m
1:56,000

4-3 Threatened Ecological Communities

Map 3 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

WINTERBOURNE ROAD

BARK HUT ROAD

Earthstar Geographics

Legend

- Project Area
- Subject Land
- Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions
- New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern



Coordinate System:
GDA 1994 MGA Zone 56

Date: 10/09/2024

Created By: VN

Drawing Size: A3

0 500 1,000 1,500m

1:56,000

4-3 Threatened Ecological Communities

Map 4 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

MOONA PLAINS ROAD

OXLEY HIGHWAY

Maxar

Legend

- Project Area
- Subject Land
- Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions
- New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion
- Ribbon gum - mountain gum - snow gum grassy forest/ woodland of the New England Tableland Bioregion
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern

Coordinate System:
GDA 1994 MGA Zone 56

Date: 10/09/2024

Created By: VN

Drawing Size: A3

0 500 1,000 1,500m

1:56,000

4-3 Threatened Ecological Communities

Map 5 of 5

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

4.3 BIRD COMMUNITY COMPOSITION

4.3.1 HABITAT

The relatively heterogenous landform character of the Subject Land and variegated patterning in woody vegetation cover, represent the main factors in defining bird habitat and associated composition. Dry sclerophyll woodlands and forests on ridgetops are separated from grassy woodlands in areas of lower relief by grasslands derived from past land clearing. Year-round water availability is widespread in the form of farms dams and semi-permanent creeks.

The sparse occurrence of woody vegetation in areas of low relief (i.e., trees and/or tall shrub canopy strata) means that many bird species reliant on hollows and/or tree canopies as part of their lifecycle are likely to have a patchy distribution and limited to areas of higher VIS. Water dependent species are likely to be rare to absent as the available water resources are typically small in area and highly degraded.

Non-passerine bird species (birds not within the order Passeriformes) are most likely to benefit from these habitat values. Species likely to be observed include raptors, quails and allies, pigeons and doves, cockatoos and parrots. If observed, non-passerine species reliant on microhabitat offered by areas of wetland or a tree canopy would likely be transient such as grebes, pelicans and allies, herons and allies, ducks and allies, waders and gulls, cuckoos and kingfishers. These would be observed as fly overs while moving between areas of interest.

Smaller and/or generalist passerine species most likely to be observed in the Subject Land include crows, ravens, magpies, wrens and pipits. The presence of anthropogenic features such as fence lines, posts and dams would provide localised favourable conditions for some smaller passerine species such as larks, robins, wagtails, thornbills and finches. Non-passerine granivores such as parrots would also benefit from the presence of closed depressions like farm dams.

4.3.1.1 RESIDENT RAPTOR HABITAT

As per Section 6.1.5 of the BAM, the likely habitat for resident raptor species has been determined. This aligns with broad habitat types identified across the landscape.

Several stick nests suitable for use by raptors were observed across the Subject Land, ranging between 40 cm to 1 m in width. No observations of raptors using these suitable nests were made throughout the field surveys. A White-bellied Sea-Eagle nest is known to occur in proximity to the Subject Land; however, no sightings of the species have been made within the Subject Land. Nests suitable for raptor use throughout the Subject Land are displayed in Figure 4-4.

4.3.1.2 LISTED BIRD SPECIES

Threatened and/or migratory avian species observed within and in proximity to the Subject Land are detailed in Table 4-24 and observation points are shown in Figure 4-4.

TABLE 4-24 THREATENED BIRD SPECIES OBSERVED

Common Name	Scientific Name	BC Act	EPBC Act	Number of Sightings
Barking Owl	*Ninox connivens*	V	-	One individual opportunistically observed outside of the breeding season.
Black Falcon	*Falco subniger*	V	-	One individual opportunistically observed perched.
Blue-billed Duck	*Oxyura australis*	V	-	Two to four males observed on a dam during surveys at BUS01 by ERM in Winter 2023.
Diamond Firetail	*Stagonopleura guttata*	V	V	Nine individuals were recorded by NA at BUS3 during the Summer 2022 survey.
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-	One to five individuals observed at multiple BUS locations over multiple seasons
Flame Robin	*Petroica phoenica*	V	-	One individual observed at BUS5 by ERM in Spring 2023
Little Eagle	*Hieraaetus morphnoides*	V	-	Two incidental observations made by NA, one within the Project Area and one in proximity to the Project Area.
Scarlet Robin	*Petroica boodang*	V	-	One to four individuals observed at multiple BUS locations and opportunistically over multiple surveys by ERM.
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	V	V	Opportunistically observed and two individuals detected by NA at BUS7 during Autumn 2021 surveys. Evidence of foraging observed in proximity to suitable breeding habitat.
Speckled Warbler	*Chthonicola sagittata*	V	-	Four individuals observed at BUS3 by NA in Autumn 2021.
Varied Sitella	*Daphoenositta chrysoptera*	V	-	Between 3 and 12 individuals were observed at multiple locations across multiple seasons.
White-throated Needletail	*Hirundapus caudacutus*	V	V, Mi	Nine individuals opportunistically observed flying between 40 and 60 m high in a south-easterly direction.

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend

- Barking Owl
- Black Falcon
- Diamond Firetail
- Dusky Woodswallow
- Glossy Black-Cockatoo
- Little Eagle
- Little Lorikeet
- Scarlet Robin
- Speckled Warbler
- Varied Sitella
- White-throated Needletail
- Stick Nest
- Subject Land
- Project Area
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

Coordinate System:
GDA 1994 MGA Zone 56
Date: 19/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

4-4 Listed Bird Sightings within the Project Area

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R4.aprx

4.4 BAT COMMUNITY COMPOSITION

Three survey events were undertaken that involved the deployment of ultrasonic records to detect bat calls. Data from devices deployed between September and October 2020 were analysed by Balance! Environmental, data from devices deployed between May and June 2023 were analysed by Green Tape Solutions and data from devices deployed between September and November 2023 were analysed by Lachlan McRae Fauna Services.

The three bat call analysis report are attached as Appendix D. Across the three survey events, a total of 21 species or species groups have been identified, with the identification confidence ranked as either 'definite', 'probable' or 'possible'. As a precautionary approach, all levels of identification confidence have been treated as confirmation of species presence (Table 4-25).

TABLE 4-25 BAT CALL ANALYSIS RESULTS

Scientific Name	Common Name	BC Act	EPBC Act	Confirmed Presence
Austronomus australis	White-striped Freetail Bat	-	-	Definite
Chalinolobus gouldii	Gould's Wattled Bat	-	-	Definite
Chalinolobus morio	Chocolate Wattled Bat	-	-	Definite
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Probable
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	-	Possible
Miniopterus australis	Little Bent-winged Bat	V	-	Possible
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Definite
Myotis macropus	Southern Myotis	V	-	Possible
Nyctophilus geoffroyi or *Nyctophilus gouldi*	Lesser Long-eared Bat or Goulds Long-eared Bat	-	-	Possible
Ozimops planiceps	South-eastern Freetail Bat	-	-	Possible
Ozimops ridei	Ride's Free-Tailed Bat	-	-	Possible
Rhinilophus megaphyllus	Smaller Horseshoe Bat	-	-	Definite
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Definite
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Probable
Scotorepens balstoni	Inland Broad-nosed Bat	-	-	Possible
Scotorepens orion	Eastern Broad-nosed Bat	-	-	Probable
Scotorepens spp.	-	-	-	Probable
Vespadelus darlingtoni	Large Forest Bat	-	-	Definite
Vespadelus regulus	Southern Forest Bat	-	-	Probable
Vespadelus troughtoni	Eastern Cave Bat	V	-	Probable
Vespadelus vulturnus	Little Forest Bat	-	-	Possible

Of the 21 species or species groups identified through the bat call analysis, eight species are listed as threatened species under the BC Act. None of the species are listed under the EPBC Act. Of the eight BC Act listed species, one is assessed as a species credit species (*Myotis macropus*) and a species polygon is required for the determination of impacts and offsets, three are ecosystem credit species, and four are additional species not detected by them BAM-C. These results provide a preliminary assessment of bat community composition across the broader Project Area. Further assessment will be undertaken pre-construction and potential impacts to bat community composition will be assessed further in the BBAMP.

5. HABITAT SUITABILITY FOR THREATENED SPECIES

5.1 HABITAT SUITABILITY

Ecosystem credit species are threatened species whose occurrence can generally be predicted by vegetation surrogates and/or landscape features, or that have a low probability of detection using targeted surveys. The TBDC identifies the threatened species assessed for ecosystem credits. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.

'Species credit species', also referred to as 'Candidate species', are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence. These species are identified in the TBDC. A targeted survey or an expert report is required to confirm the presence or absence of these species on the Subject Land. Alternatively, for a development, activity, clearing or biodiversity certification proposal only, the Applicant may elect to assume the species is present.

In some circumstances the TBDC may identify a threatened species that requires assessment for ecosystem credits and species credits (referred to as dual credit species). For dual credit species, part of the habitat is assessed as a species credit (e.g., breeding habitat or land mapped on an important habitat map for a species). The remaining habitat components for the species are assessed as an ecosystem credit (e.g., foraging habitat).

For a small number of threatened species, a habitat constraint may refer to a mapped location (Important Mapped Area) that identifies areas that are considered important for those species. Maps currently available relevant to the Subject Land include important areas for breeding of the Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*). These maps have been reviewed and it has been determined that the Subject Land does not form part of the important habitat mapping for these species.

The following sections identify the ecosystem credit species, species credit species and dual credit species relevant to this BDAR.

5.1.1 ECOSYSTEM CREDIT SPECIES

The ecosystem credit species predicted to occur on or use the Subject Land as advised by the BAM-C are listed in Table 5-1. No ecosystem credit species have been excluded from further assessment.

TABLE 5-1 PREDICTED ECOSYSTEM CREDIT SPECIES

Common name	Scientific name	Listing status		Species retained for further assessment	Associated PCT	Sensitivity to gain class
		BC Act	EPBC Act			
Barking Owl (Foraging)	*Ninox connivens*	V	-	Yes	510, 533, 534, 565, 567, 568, 571, 965, 970, 1194	High
Black-necked Stork	*Ephippiorhynchus asiaticus*	E	-	Yes	766	Moderate
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus picumnus*	V	V	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Diamond Firetail	*Stagonopleura guttata*	V	V	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	Moderate
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-	Yes	510, 533, 534, 565, 567, 568, 571, 766, 965, 970, 1194	Moderate
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Flame Robin	*Petroica phoenicea*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	Moderate
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Grey-headed Flying-fox (Foraging)	*Pteropus poliocephalus*	V	V	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Hastings River Mouse	*Pseudomys oralis*	E	E	Yes	965, 970	High
Large Bent-winged Bat (Foraging)	*Miniopterus orianae oceanensis*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Little Eagle (Foraging)	*Hieraaetus morphnoides*	V	-	Yes	510, 533, 534, 565, 567, 568, 766, 965, 970, 1194	Moderate
Little Lorikeet	*Glossopsitta pusilla*	V	-	Yes	510, 533, 534, 567, 571, 965, 970, 1194	High
Masked Owl (Foraging)	*Tyto novaehollandiae*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High

Common name	Scientific name	Listing status		Species retained for further assessment	Associated PCT	Sensitivity to gain class
		BC Act	EPBC Act			
New Holland Mouse	*Pseudomys novaehollandiae*	-	V	Yes	533, 567	High
Olive Whistler	*Pachycephala olivacea*	V	-	Yes	1194	Moderate
Painted Honeyeater	*Grantiella picta*	V	V	Yes	510, 533, 534, 565, 567, 568, 571, 965, 970, 1194	Moderate
Powerful Owl (Foraging)	*Ninox strenua*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Regent Honeyeater (Foraging)	*Anthochaera phrygia*	CE	CE	Yes	510, 567, 571, 970	High
Scarlet Robin	*Petroica boodang*	V	-	Yes	510, 533, 534, 565, 567, 568, 766, 965, 970, 1194	Moderate
Sooty Owl (Foraging)	*Tyto tenebricosa*	V	-	Yes	565	High
South-eastern Glossy Black-Cockatoo (Foraging)	*Calyptorhynchus lathami lathami*	V	V	Yes (in part) Absence of foraging resources in selected PCTs	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
South-eastern Hooded Robin	*Melanodryas cucullata cucullata*	E	E	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	Moderate
Speckled Warbler	*Chthonicola sagittata*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Spotted Harrier	*Circus assimilis*	V	-	Yes	533, 567, 766	Moderate
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Square-tailed Kite (Foraging)	*Lophoictinia isura*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	Moderate
Swift Parrot (Foraging)	*Lathamus discolor*	E	CE	Yes	510, 533, 534, 565, 567, 568, 571, 965, 970, 1194	Moderate

Common name	Scientific name	Listing status		Species retained for further assessment	Associated PCT	Sensitivity to gain class
		BC Act	EPBC Act			
Varied Sittella	*Daphoenositta chrysoptera*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	Moderate
White-bellied Sea-Eagle (Foraging)	*Haliaeetus leucogaster*	V	-	Yes	510, 533, 534, 565, 567, 568, 571, 965, 970	High
White-throated Needletail	*Hirundapus caudacutus*	-	V, Mi	Yes	510, 533, 534, 565, 567, 568, 571, 766, 965, 970, 1194	High
Yellow-bellied Glider	*Petaurus australis*	V	V	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194	High
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-	Yes	510, 533, 534, 565, 567, 568, 766, 965, 970, 1194	High

5.1.2 SPECIES CREDIT SPECIES

The species credit species (candidate species) identified by the BAM-C are listed in Table 5-2 and Table 5-3 .

TABLE 5-2 FLORA CANDIDATE SPECIES

Common Name	Scientific Name	Listing status		Species retained for further assessment	Associated PCTs
		BC Act	EPBC Act		
Narrow-leaved Bertya	*Bertya ingramii*	E	E	No	567
Pygmy Cypress Pine	*Callitris oblonga*	V	V	Yes	533, 534, 567, 965, 970
Bird Orchid	*Chiloglottis anaticeps*	E	E	Yes	965, 970, 1192, 1194
Barrington Tops Ant Orchid	*Chiloglottis platyptera*	V	-	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1192, 1194
Leafless Tongue Orchid	*Cryptostylis hunteriana*	V	V	Yes	533, 1194

Common Name	Scientific Name	Listing status		Species retained for further assessment	Associated PCTs
		BC Act	EPBC Act		
Bluegrass	*Dichanthium setosum*	V	V	Yes	501, 510, 534, 567
	Diuris eborensis				1192
Small Snake Orchid	*Diuris pedunculata*	E	E	Yes	501, 510, 533, 534, 567, 965, 970, 1192, 1194
Northern Blue Box	*Eucalyptus magnificata*	E	-	Yes	510, 533, 534, 567, 965, 970, 1192, 1194
Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	V	V	Yes	510, 533, 534, 565, 567, 568, 965, 970
Small-fruited Mountain Gum	*Eucalyptus oresbia*	V	-	Yes	501
-	*Euphrasia arguta*	CE	CE	Yes	510, 533, 534, 567, 568, 965, 1192, 1194
Polblue Eyebright	*Euphrasia ciliolata*	V	-	Yes	534, 568, 766, 965, 970, 1194
Tall Velvet Sea-berry	*Haloragis exalata* subsp. *velutina*	V	V	Yes	567, 568, 965, 970
Singleton Mint Bush	*Prostanthera cineolifera*	V	V	Yes	510, 965, 970
Elegant Greenhood	*Pterotylis elegans*	V	-	Yes	510, 965, 970, 1194
Broad-leaved Pepperbush	*Tasmannia purpurascens*	V	-	Yes	534, 1194
Austral Toadflax	*Thesium australe*	V	V	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194

TABLE 5-3 FAUNA CANDIDATE SPECIES

Common name	Scientific name	Listed status		Retained for further assessment	Dual credit species	Associated PCTs
		BC Act	EPBC Act			
Tusked Frog population in the Nandewar and New England Tableland Bioregions	*Adelotus brevis* – endangered population	EP	-	No		510, 533, 534, 567, 766
Rufous Bettong	*Aepyprymnus rufescens*	V	-	No	No	510, 533, 534, 565, 567, 568, 965, 970, 1194
Regent Honeyeater (Breeding)	*Anthochaera phrygia*	CE	CE	No	Yes	510, 567, 571, 970
Bush Stone-curlew	*Burhinus grallarius*	E	-	No	No	510, 533, 534, 567, 965, 970, 1192, 1194
South-eastern Glossy Black-Cockatoo (Breeding)	*Calyptorhynchus lathami lathami*	V	V	Yes	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1192, 1194
Eastern Pygmy-possum	*Cercartetus nanus*	V	-	No	No	510, 533, 534, 565, 567, 568, 965, 970, 1192, 1194
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	E	No	No	510, 533, 534, 565, 567, 568, 965, 970, 1194
White-bellied Sea-Eagle (Breeding)	*Haliaetus leucogaster*	V	-	No	Yes	501, 510, 533, 534, 565, 567, 568, 571, 965, 970
Little Eagle (Breeding)	*Hieraaetus morphnoides*	V	-	No	Yes	510, 533, 534, 565, 567, 568, 766, 965, 970, 1192, 1194
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	-	No	No	510, 533, 534, 567, 965, 970, 1192, 1194
Swift Parrot (Breeding)	*Lathamus discolor*	E	CE	No	Yes	510, 533, 534, 565, 567, 568, 571, 965, 970, 1194
Booroolong Frog	*Litoria booroolongensis*	E	E	No	No	533, 534, 565, 567, 568, 965, 970, 1194

Common name	Scientific name	Listed status		Retained for further assessment	Dual credit species	Associated PCTs
		BC Act	EPBC Act			
Davies' Tree Frog	*Litoria daviesae*	V	V	No	No	510, 533, 565, 567, 568, 766, 965, 970, 1194
Glandular Frog	*Litoria subglandulosa*	V	V	No	No	533, 534, 565, 567, 568, 766, 965, 970, 1192, 1194
Square-tailed Kite (Breeding)	*Lophoictinia isura*	V	-	No	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1192, 1194
Southern Myotis	*Myotis macropus*	V	-	Yes	No	510, 533, 534, 565, 567, 568, 571, 766, 965, 970, 1194
Large Bent-winged Bat (Breeding)	*Miniopterus orianae oceanensis*	V	-	No	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1194
Barking Owl (Breeding)	*Ninox connivens*	V	-	Yes	Yes	501, 510, 533, 534, 565, 567, 568, 571, 965, 970, 1192, 1194
Powerful Owl (Breeding)	*Ninox strenua*	V	-	No	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1192, 1194
Southern Greater Glider	*Petauroides volans*	E	E	Yes	No	510, 567, 568, 965, 970, 1192, 1194
Squirrel Glider	*Petaurus norfolcensis*	V	-	Yes	No	510, 533, 534, 565, 567, 568, 965, 1194
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	No	No	510, 567, 568, 965, 970, 1194
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	-	No	No	510, 533, 534, 565, 567, 568, 965, 970
Koala (Breeding)	*Phascolarctos cinereus*	E	E	Yes	Yes	501, 510, 533, 534, 565, 567, 568, 571, 965, 970, 1192, 1194
Grey-headed Flying-fox (Breeding)	*Pteropus poliocephalus*	V	V	No	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1192, 1194
Masked Owl (Breeding)	*Tyto novaehollandiae*	V	-	No	Yes	510, 533, 534, 565, 567, 568, 965, 970, 1192, 1194
Sooty Owl (Breeding)	*Tyto tenebricosa*	V	-	No	Yes	565

5.1.3 EXCLUDED THREATENED SPECIES

Modification to the BAM-C generated list is appropriate where one or more of the following factors is relevant to the species:

- Disturbance;
- Vagrancy;
- Geographical limitations; and
- Absence of habitat constraints.

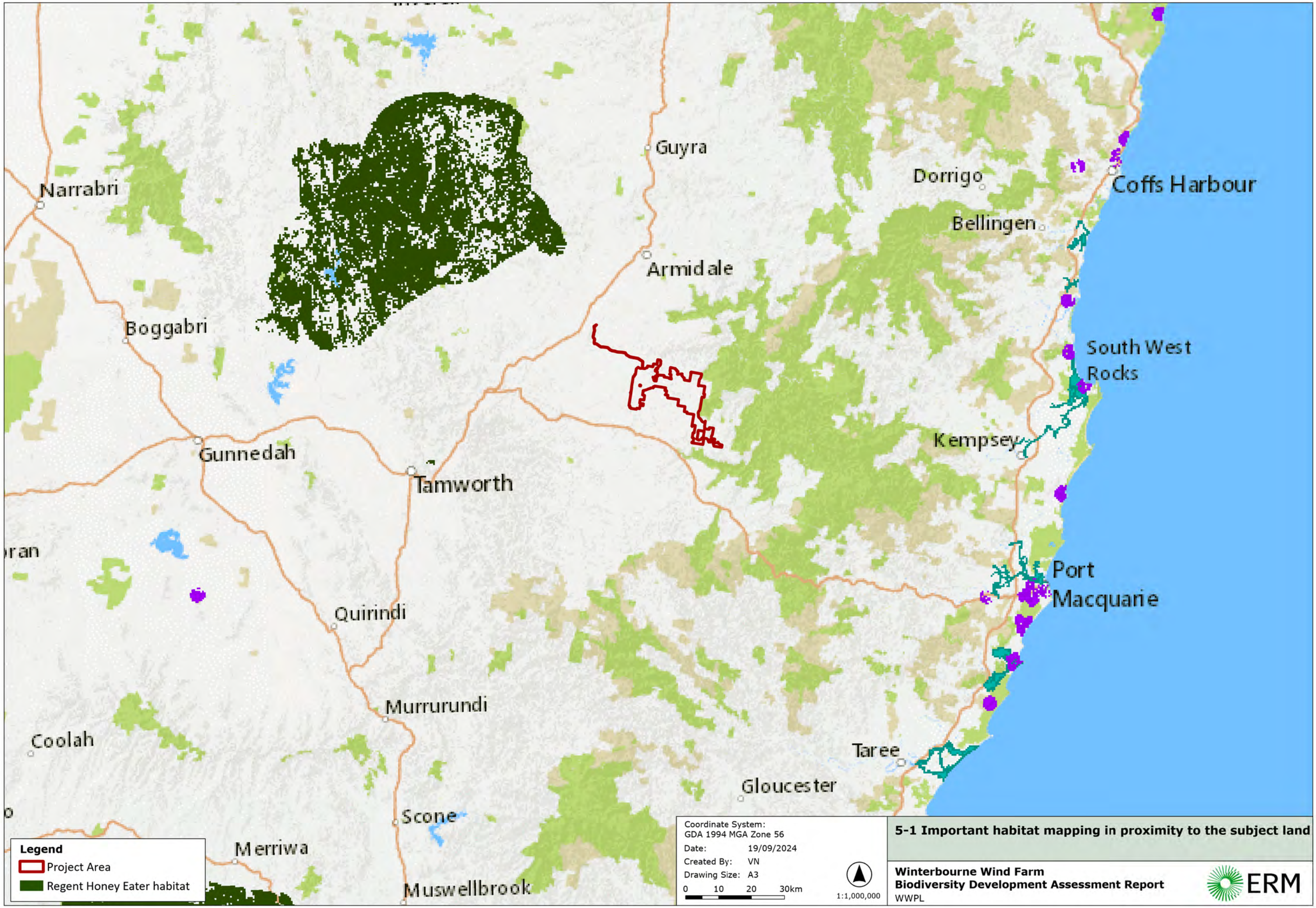
Seven species have been excluded from the assessment as outlined below:

- Two species excluded based on the absence of Important Mapped Areas for the species across the Subject Land. Important habitat mapping in proximity to the Subject Land is displayed in Figure 5-1:
  - Regent Honeyeater (*Anthochaera phrygia*); and
  - Swift Parrot (*Lathamus discolor*).
- Five species excluded based on TBDC listed habitat constraints:
  - Narrow-leaved Bertya (*Bertya ingramii*);
  - Brush-tailed Rock-wallaby (*Petrogale penicillata*);
  - Brush-tailed Phascogale (*Phascogale tapoatafa*);
  - Large Bent-winged Bat (*Miniopterus orianae oceanensis*); and
  - Large-eared Pied-bat (*Chalinolobus dwyeri*).

Justification for the exclusion of threatened species in this assessment is provided in Table 5-4.

TABLE 5-4 JUSTIFICATION FOR EXCLUSION

Common Name	Scientific Name	Justification for Exclusion
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	Habitat constraints – No cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding present within the Subject Land
Large-eared Pied-bat	*Chalinolobus dwyeri*	Habitat constraints – No rocky areas containing caves, overhangs, escarpments, outcrops, crevices, old mines or tunnels present within the Subject Land
Narrow-leaved Bertya	*Bertya ingramii*	Habitat constraints – No cliffs, escarpments or rocky areas present within the Subject Land
Brush-tailed Phascogale	*Phascogale tapoatafa*	Geographic constraint – west of Tia River. Decision supported by BioNet records.
Brush-tailed Rock-wallaby	*Petrogale penicillata*	Habitat constraints – No cliffs, escarpments or rocky areas present within the Subject Land
Regent Honeyeater	*Anthochaera phrygia*	Subject Land does not contain any areas of Important Habitat Mapping as per the NSW DPIE BAM – Important Areas viewer
Swift Parrot	*Lathamus discolor*	Subject Land does not contain any areas of Important Habitat Mapping as per the NSW DPIE BAM – Important Areas viewer



5-1 Important habitat mapping in proximity to the subject land

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R4.aprx

5.2 HABITAT SURVEYS - CANDIDATE SPECIES CREDIT SPECIES

A targeted survey or an expert report is required to confirm the presence of these species on the Subject Land. Alternatively, for a development activity, the Applicant may elect to assume the species is present.

5.2.1 CANDIDATE SPECIES OCCURRENCE

Presence of a species can be determined based on the following:

- Assumed presence within the Subject Land; or
- An Important Mapped Area; or
- Targeted threatened species surveys; or
- An expert report.

5.2.1.1 ASSUMED PRESENCE

Targeted threatened flora surveys were completed across the Subject Land, presence for threatened flora has been assumed in areas where survey was not completed to the level of requirement as detailed in the BAM. One species credit species, Leafless Tongue Orchid (*Cryptostylis hunteriana*) was assumed to be present in associated PCTs occurring in a condition state suitable for habitat occupation (i.e., woody vegetation).

Detections of Barking Owl and Glossy-black Cockatoo in the Subject Land are not attributed to breeding activity. The status of breeding activity for these species in the Subject Land is not fully understood. For this reason, both species were conservatively assumed to occur for breeding habitat (although it is likely that breeding by these two species in the local area is not within the Subject Land).

A species polygon will be established for these species.

5.2.1.2 IMPORTANT AREAS

The Subject Land contains no important mapped areas. Species excluded on this basis include:

- Regent Honeyeater;
- Swift Parrot;
- Migratory Shorebirds; and
- Plains Wanderer.

Targeted survey and species polygons are not required for these species.

5.2.1.3 TARGETED THREATENED SPECIES SURVEYS

Candidate threatened species identified as not present within the Subject Land after the completion of targeted surveys are listing in Table 5-5. Species polygons are not required for these species.

TABLE 5-5 THREATENED SPECIES EFFORT

Species	Effort / Justification
Austral Toadflax *Thesium australe*	Targeted flora surveys for *Thesium australe* were completed in associated PCTs (see Table 5-2). Despite the survey effort, no records of the species were observed. The nearest recent records (2007) of this species are located approximately 4 km south-west and 6 km south of the Subject Land. The species is semi-parasitic on native grass species and has potential to utilise shrubland, grassland or woodland ecosystems, particularly within damp areas without intensive grazing from livestock, native or feral herbivores. These areas are dispersed throughout the Project Area. Based on survey effort completed across the Subject Land, lack of known recent records within the Project Area, and extensive land use history of grazing within the Development Footprint, the species is not considered to be impacted by the Project.
Bird Orchid *Chiloglottis anaticeps*	Targeted flora surveys for *Chiloglottis anaticeps* were completed in associated PCTs (see Table 5-2). The nearest recent records (2021) of the species are located approximately 30 km east, and 53 km north-east of the Subject Land in the Werrikimbe National Park and Cathedral Rock National Park. The species is known only from three subpopulations within these two national parks and all subpopulations occur at high elevation (800-1400m above sea level). The species is known to occur on steep slopes in clay loam over basalt in montane wet sclerophyll forest. Suitable conditions are not considered to be present and so the Subject Land is unlikely to support the species. Based on survey effort completed across the Subject Land, substantial distance from known records and a lack of suitable habitat present within the Development Footprint, the species is not considered to be impacted by the Project.
Booroolong Frog *Litoria booroolongensis*	Targeted fauna surveys for *Litoria booroolongensis* were completed in areas of potential breeding habitat using a combination of Nocturnal aural-visual surveys and tadpole searches. Surveys were conducted in 2021 and 2023 and achieved suitable variation in weather conditions. Although the survey effort completed is considered suitable for this species, no records of the species were observed. The closest recent records of the species (2017) are located approximately 40 km south west of the Project Area in Swamp Oak Creek and Jamiesons Creek. The species is known to be limited to habitats containing permanent creeks or rivers where rock structures or rock crevices are present in relatively shallow, slow to medium flowing sections of stream. Suitable habitat features are largely absent from the Project Area and so it is considered unlikely to support the species. Based on survey effort completed across the Subject Land, substantial distance from known records and the limited presence of suitable habitat within the Development Footprint, the species is not considered to be impacted by the Project.

Species	Effort / Justification
Broad-leaved Pepperbush *Tasmannia purpurascens*	Targeted flora surveys for *Tasmannia purpurascens* were completed in associated PCTs (see Table 5-2). Despite the survey effort, no records of the species were observed. The nearest known record of the species (2017) is located approximately 34km south-east of the Subject Land within Werrikimbe National Park. The species is known to occur in tall, moist eucalypt forest, sub-alpine woodland and cool temperate rainforest. No suitable wet forest or rainforest habitat is present and so the Subject Land is unlikely to support the species. Based on survey effort completed across the Subject Land, substantial distance from recent records and lack of suitable habitat, the species is not considered to occur within the Subject Land and so is not considered to be impacted by the Project.
Brush-tailed Rock-wallaby *Petrogale penicillata*	The Brush-tailed Rock-wallaby is known to be restricted to areas where rocky escarpments, gorges, steep slopes, boulder piles, rocky outcrops or cliff lines are present. Although recent records (2021) are present within Oxley Wild Rivers National Park approximately 2km east of the Project Area, no such habitat is present within the Subject Land. Due to the absence of suitable habitat. This species has been excluded from assessment and is not considered to be impacted by the Project.
Bush Stone-curlew *Burhinus grallarius*	Targeted fauna surveys for *Burhinus grallariu*, including call-playback and spotlighting transects, were undertaken throughout areas identified as possessing suitable habitat. Opportunistic detection was also possible throughout all time spent on site and survey effort is considered to be sufficient for the species. No detections of the species were made following survey effort. Most recent records (2019) are approximately 34 km north of the Project Area in the town of Armidale. The species is known to occur throughout open forests and grassy woodlands. Potentially suitable habitat is present throughout the Subject Land however the species is considered unlikely to be present.
Davies' Tree Frog *Litoria daviesae*	Targeted fauna surveys for *Litoria daviesae* were completed in areas of potential breeding habitat using a combination of Nocturnal aural-visual surveys and tadpole searches. Surveys were conducted in 2021 and 2023 and achieved suitable variation in weather conditions. Although the survey effort completed is considered suitable for this species, no records of the species were observed.
Eastern Pygmy-possum *Cercartetus nanus*	Targeted fauna surveys for the Eastern Pygmy Possum (*Cercartetus nanus*) involving camera traps baited with universal bait and hair tubes, were undertaken within areas of suitable habitat. No detection of the species was made and due to the limited available habitat within the Subject Land survey effort is considered to be sufficient for detection. Most recent records (2020) of the species are approximately 35 km east of the Project Area within the Carrai National Park. In the species range north of Newcastle the species is found at higher elevations only in sclerophyll forests and rainforests. Although possessing a broad range, recent studies show that within this range the species is patchily distributed with low abundance overall. Although potential habitat is present in parts of the Subject Land, due to the distance from known recent records and a lack of a detection following targeted surveys, the species is not considered to be impacted by the Project.

Species	Effort / Justification
Elegant Greenhood *Pterostylis elegans*	Targeted flora surveys for Elegant Greenhood were completed in associated PCTs (see Table 5-2). Despite the survey effort, no records of the species were observed. Most recent records (2007) of the species are approximately 30 km east of the Project Area within the Oxley River Wilds National Park. The species is known to occur on red-brown loams at elevations between 950m and 1200m within tall open eucalypt forests. The species has a restricted range and is known from eight small subpopulations and although potential open eucalypt woodland is present within the Subject Land it is considered unlikely to support the species. Based on survey effort completed across the Subject Land and substantial distance from recent records, the species is not considered to occur within the Subject Land and so is not considered to be impacted by the Project.
Euphrasia arguta	Surveys were undertaken where the 100-square-metre gridlines intersect within suitable habitat for a target species. Surveys for multiple target species occurred. At each survey location point (grid intersect), a 40-metre diameter area (1,256 m2 circular area) was systematically surveyed for the target species. A total of 518 survey points were undertaken within the development site resulting in a total of 65 hectares of potential threatened flora habitat inspected across the development footprint which represented approximately 670 survey hours.
Koala *Phascolarctos cinereus*	Targeted fauna surveys for the Koala (*Phascolarctos cinereus*) were undertaken throughout areas identified as possessing suitable habitat using a combination of nocturnal spotlighting and Koala Spot Assessment Technique. Although no detections of individuals were made during survey effort, Koala scat was detected and has subsequently confirmed by Koala experts. Recent records (2014 and 2019) of Koala are present within the Project Area with additional records present in the nearby Oxley Wild Rivers National Park. The species is considered present within the Project Area and while broader landscape connectivity is maintained within the broader landscapes, some impacts to the species may occur as a result of the Project.
Leafless Tongue Orchid *Cryptostylis hunteriana*	No targeted survey has been performed in associated PCTs (see Table 5-2) for this species within its flowering period. Assumed presence.
Little Eagle (Breeding) *Hieraaetus morphnoides*	Bird utilisation and raptor surveys (BUS) were undertaken over 4 years and 3 seasons. The fixed-point bird count method was used; 15 min surveys were carried out. Eight impact points were surveyed 8 times each (2 reference points were also surveyed 8 times each). BUS surveys totaled 48 hours of survey effort for Oct 2020 (8 days), Mar-Apr 2021 (6 days) and Jan 2022 (5 days) and were conducted to detect diurnal bird activity within the subject land over a 2-year period. An additional BUS survey was conducted in Mar 2022 (3 days). Stick nest surveys were carried out in woodland areas during other field surveys. Vantage point surveys and BUS surveys completed in 2023 and 2024.
Masked Owl *Tyto novaehollandiae*	Nocturnal bird surveys were conducted following dusk over a period of four nights in August 2020 as well as over eight nights in August 2021. In August 2021 from 23, 25-28 August and 1 to 2 September 2021 a total of 44 sites were surveyed for nocturnal forest owls with call playback and spotlighting conducted. Surveys were conducted from approximately 6pm to between 8:30pm and 10:30pm. Total survey effort was 23 hours of nocturnal surveys including spotlighting and call playback during 2021.

Species	Effort / Justification
Northern Blue Box *Eucalyptus magnificata*	Surveys were undertaken where the 100-square-metre gridlines intersect within suitable habitat for a target species. Surveys for multiple target species occurred. At each survey location point (grid intersect), a 40-metre diameter area (1,256 m^2 circular area) was systematically surveyed for the target species. A total of 518 survey points were undertaken within the development site resulting in a total of 65 hectares of potential threatened flora habitat inspected across the development footprint which represented approximately 670 survey hours.
Pale-headed Snake *Hoplocephalus bitorquatus*	Twelve sites were surveyed for this species with the transect at each site replicated twice on different nights. Survey effort for each transect was one person-hour (standard spotlighting techniques were used with a focus placed on the tree trunks and other habitat likely to be used by the Pale-headed snake). There are no records of the Pale-headed snake on the Walcha Plateau. Species is unlikely to occur within the Subject Land and on this basis could be classified as a vagrant species.
Polblue Eyebright *Euphrasia ciliolata*	Surveys were undertaken where the 100-square-metre gridlines intersect within suitable habitat for a target species. Surveys for multiple target species occurred. At each survey location point (grid intersect), a 40-metre diameter area (1,256 m^2 circular area) was systematically surveyed for the target species. A total of 518 survey points were undertaken within the development site resulting in a total of 65 hectares of potential threatened flora habitat inspected across the development footprint which represented approximately 670 survey hours.
Powerful Owl *Ninox strenua*	Nocturnal bird surveys were conducted following dusk over a period of four nights in August 2020 as well as over eight nights in August 2021. In August 2021 from 23, 25-28 August and 1 to 2 September 2021 a total of 44 sites were surveyed for nocturnal forest owls with call playback and spotlighting conducted. Surveys were conducted from approximately 6pm to between 8:30pm and 10:30pm. Total survey effort was 23 hours of nocturnal surveys including spotlighting and call playback during 2021.
Pygmy Cypress Pine *Callitris oblonga*	Surveys were undertaken where the 100-square-metre gridlines intersect within suitable habitat for a target species. Surveys for multiple target species occurred. At each survey location point (grid intersect), a 40-metre diameter area (1,256 m^2 circular area) was systematically surveyed for the target species. A total of 518 survey points were undertaken within the development site resulting in a total of 65 hectares of potential threatened flora habitat inspected across the development footprint which represented approximately 670 survey hours.
Rufous Bettong *Aepyprymnus rufescens*	There are no records of the Rufous Bettong on the Walcha Plateau. Species is unlikely to occur within the Subject Land and on this basis could be classified as a vagrant species.
Singleton Mint Bush *Prostanthera cineolifera*	Surveys were undertaken where the 100-square-metre gridlines intersect within suitable habitat for a target species. Surveys for multiple target species occurred. At each survey location point (grid intersect), a 40-metre diameter area (1,256 m2 circular area) was systematically surveyed for the target species. A total of 518 survey points were undertaken within the development site resulting in a total of 65 hectares of potential threatened flora habitat inspected across the development footprint which represented approximately 670 survey hours.

Species	Effort / Justification
Small Snake Orchid *Diuris pedunculata*	Surveys were undertaken where the 100-square-metre gridlines intersect within suitable habitat for a target species. Surveys for multiple target species occurred. At each survey location point (grid intersect), a 40-metre diameter area (1,256 m2 circular area) was systematically surveyed for the target species. A total of 518 survey points were undertaken within the development site resulting in a total of 65 hectares of potential threatened flora habitat inspected across the development footprint which represented approximately 670 survey hours.
Sooty Owl *Tyto tenebricosa*	Nocturnal bird surveys were conducted following dusk over a period of four nights in August 2020 as well as over eight nights in August 2021. In August 2021 from 23, 25-28 August and 1 to 2 September 2021 a total of 44 sites were surveyed for nocturnal forest owls with call playback and spotlighting conducted. Surveys were conducted from approximately 6pm to between 8:30pm and 10:30pm. Total survey effort was 23 hours of nocturnal surveys including spotlighting and call playback during 2021.
Square-tailed Kite *Lophoictinia isura*	Bird utilisation and raptor surveys (BUS) were undertaken over 4 years and 3 seasons. The fixed-point bird count method was used; 15 min surveys were carried out. Eight impact points were surveyed 8 times each (2 reference points were also surveyed 8 times each). BUS surveys totaled 48 hours of survey effort for Oct 2020 (8 days), Mar-Apr 2021 (6 days) and Jan 2022 (5 days) and were conducted to detect diurnal bird activity within the subject land over a 2-year period. An additional BUS survey was conducted in Mar 2022 (3 days). Stick nest surveys were carried out in woodland areas during other field surveys. Vantage point surveys and BUS surveys completed in 2023 and 2024.
Tall Velvet Sea-berry *Haloragis exalata subsp. velutina*	Surveys were undertaken where the 100-square-metre gridlines intersect within suitable habitat for a target species. Surveys for multiple target species occurred. At each survey location point (grid intersect), a 40-metre diameter area (1,256 m2 circular area) was systematically surveyed for the target species. A total of 518 survey points were undertaken within the development site resulting in a total of 65 hectares of potential threatened flora habitat inspected across the development footprint which represented approximately 670 survey hours.
Tusked Frog population in the Nandewar and New England Tableland Bioregions *Adelotus brevis* – endangered population	Targeted fauna surveys for *Litoria booroolongensis* were completed in areas of potential breeding habitat using a combination of Nocturnal aural-visual surveys and tadpole searches. Surveys were conducted in 2021 and 2023 and achieved suitable variation in weather conditions. Although the survey effort completed is considered suitable for this species, no records of the species were observed. An old record (1972) of the species in the western part of the Project Area with additional records present along the southern margin of the Walcha Plateau IBRA subregion. The species is not considered present within the Subject land.
White-bellied Sea-Eagle *Haliaeetus leucogaster*	Bird utilisation and raptor surveys (BUS) were undertaken over 4 years and 3 seasons. The fixed-point bird count method was used; 15 min surveys were carried out. Eight impact points were surveyed 8 times each (2 reference points were also surveyed 8 times each). BUS surveys totaled 48 hours of survey effort for Oct 2020 (8 days), Mar-Apr 2021 (6 days) and Jan 2022 (5 days) and were conducted to detect diurnal bird activity within the subject land over a 2-year period. An additional BUS survey was conducted in Mar 2022 (3 days). Stick nest surveys were carried out in woodland areas during other field surveys. Vantage point surveys and BUS surveys completed in 2023 and 2024.

Targeted surveys identified several Candidate species as occurring within the Subject Land. These species are detailed in Table 5-6.

Species polygons are required to be prepared in accordance with the BAM for each species credit species present, or assumed to be present, within the Subject Land. Species polygons have been developed for eight species and are based on the species polygon specifications outlined in the TBDC and relevant guidelines for the species detailed in Table 5-6. Species Polygons are provided for the following species:

- Barking Owl (Figure 5-2);
- Bluegrass (Figure 5-3);
- Koala (Figure 5-4);
- Narrow-leaved Black Peppermint (Figure 5-5);
- South-eastern Glossy Black-Cockatoo (Figure 5-6);
- Southern Greater Glider (Figure 5-7);
- Southern Myotis (Figure 5-8);
- Squirrel Glider (Figure 5-9); and
- Leafless Tongue Orchid (Figure 5-10).

5.2.1.4 EXPERT REPORTS

BCD sought additional information with respect to threatened frogs within the Subject Land, including the Yellow-spotted Tree Frog (*Litoria castanea*), which has subsequently become irrelevant to the assessment following BAM-C changes applied by BCD. Dr Frank Lemckert was commissioned as an expert to analyse the biodiversity values of the Subject Land against the species ecology, habitat and recorded incidence. The expert report concluded that the species has likely never occurred within the Subject Land and that no habitat important to the species is present and therefore no further assessment is required. The expert report, attached as Appendix E, justifies the use of an expert report for determining presence of the species and Dr Lemckert's credentials as an expert on the species.

TABLE 5-6 CANDIDATE SPECIES IDENTIFIED BY TARGETED SURVEY

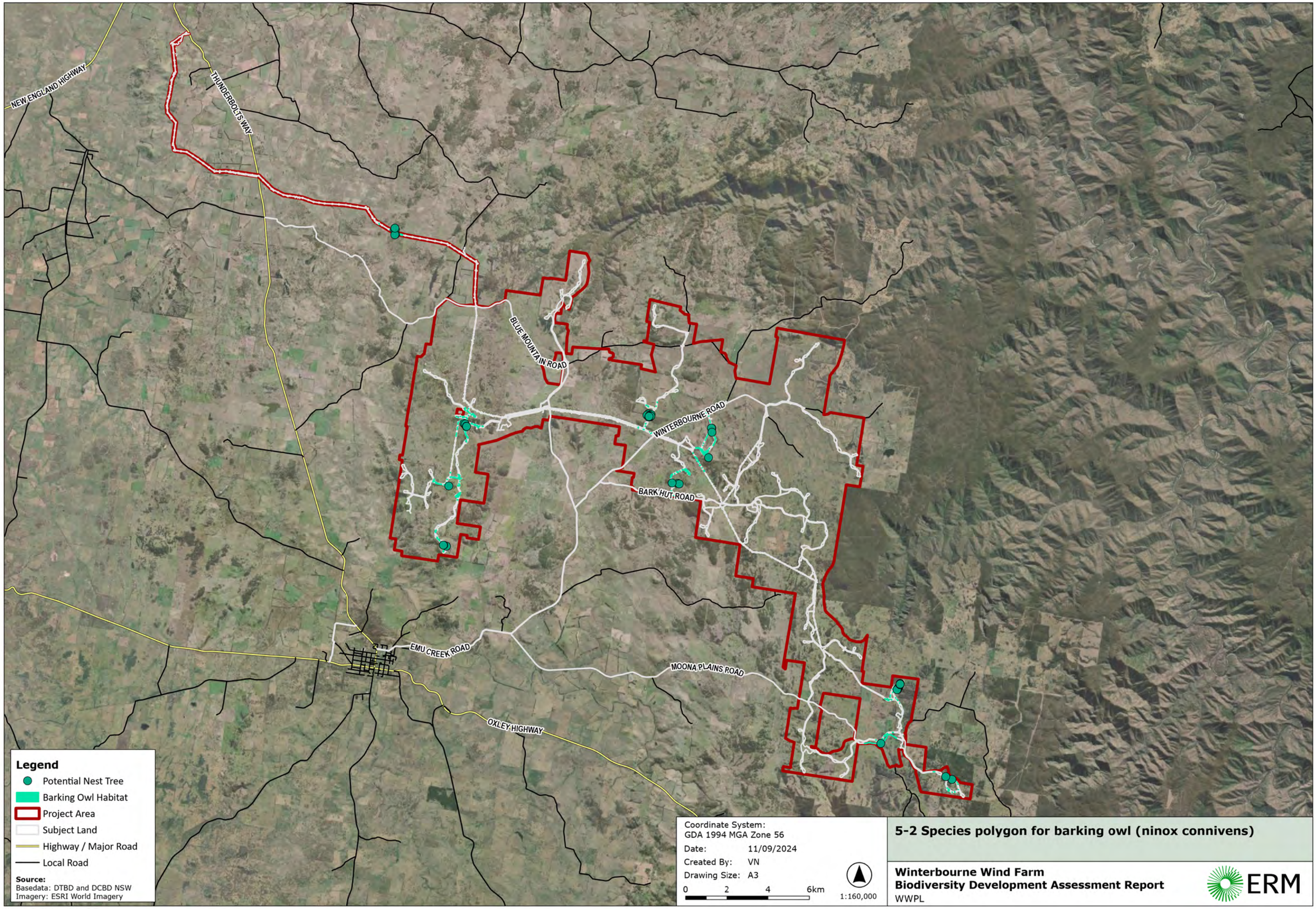
Common name	Scientific name	BC Act	EPBC Act	Biodiversity risk weighting	SAII entity	Record Notes	Species Polygon
Candidate Species							
Barking Owl	*Ninox connivens*	V	-	2.00	No	One individual opportunistically observed outside of the breeding season.	All woody VZs; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20cm diameter that occurs >4m above the ground.
Bluegrass	*Dichanthium setosum*	V	V	2.00	No	Eight individuals observed in PCT 965.	VZ where observed.
Koala	*Phascolarctos cinereus*	E	E	2.00	No	Detected through scats that were positively identified by Koala experts.	All woody VZs associated with the species. Conservative estimate.
Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	V	V	2.00	No	59 individuals observed within the Project Area during targeted flora surveys.	Assessed as individuals. All individuals known to occur within the Subject Land and within 5 m of Subject Land. Conservative estimate.
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	V	V	2.00	No	Opportunistically observed and two individuals detected by NA at BUS7 during Autumn 2021 surveys. Evidence of foraging observed in proximity to suitable breeding habitat.	Woody VZs within a 200m buffer of potential nest trees. Conservative estimate as extent of 'breeding habitat' for this rule is greater than likely actually breeding within the local area.
Southern Greater Glider	*Petauroides volans*	E	E	2.00	No	13 individuals detected at one location and scats detected at one location.	No species polygon guidelines. All woody VZs for associated PCTs. Conservative estimate noting no consideration of hollow-bearing trees.

Common name	Scientific name	BC Act	EPBC Act	Biodiversity risk weighting	SAII entity	Record Notes	Species Polygon
Southern Myotis	*Myotis macropus*	V	-	2.00	No	Possible calls detected from multiple devices from May/June 2023	Woody VZs within 200m of a waterbody. Conservative estimate.
Squirrel Glider	*Petaurus norfolcensis*	V	-	2.00	No	Detected through call playback response and camera traps.	No species polygon guidelines
Ecosystem Credit Species							
Diamond Firetail	*Stagonopleura guttata*	V	V	N/A	N/A	Nine individuals were recorded by NA at BUS3 during the Summer 2022 survey.	N/A
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-	N/A	N/A	One to five individuals observed at multiple BUS locations over multiple seasons	N/A
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	N/A	N/A	Possible and probable calls detected from multiple devices from May/June 2023 and possible detection in October/November 2020	N/A
Flame Robin	*Petroica phoenicea*	V	-	N/A	N/A	One individual observed at BUS5 by ERM in Spring 2023	N/A
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	N/A	N/A	Possible and probable calls detected from multiple devices from May/June 2023 and positively identified from October/November 2020	N/A
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	N/A	N/A	Definite and probable calls detected from multiple devices from May/June 2023, Spring 2023 and October/November 2020	N/A

Common name	Scientific name	BC Act	EPBC Act	Biodiversity risk weighting	SAII entity	Record Notes	Species Polygon
Little Eagle	*Hieraaetus morphnoides*	V	-	N/A	N/A	Two incidental observations made by NA, one within the Project Area and one in proximity to the Project Area.	N/A
Scarlet Robin	*Petroica boodang*	V	-	N/A	N/A	One to four individuals observed at multiple BUS locations and opportunistically over multiple surveys by ERM.	N/A
Speckled Warbler	*Chthonicola sagittata*	V	-	N/A	N/A	4 individuals observed at BUS3 by NA in Autumn 2021.	N/A
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	N/A	N/A	1 individual was detected through camera traps in October 2023	N/A
Varied Sitella	*Daphoenositta chrysoptera*	V	-	N/A	N/A	Between 3 and 12 individuals were observed at multiple locations across multiple seasons.	N/A
White-throated Needletail	*Hirundapus caudacutus*	V	V, Mi	N/A	No	Nine individuals opportunistically observed flying between 40 and 60 m high in a south-easterly direction.	N/A
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	V	-	N/A	N/A	Definite call recorded on one device from May/June 2023 and definite call from Spring 2023.	N/A

Common name	Scientific name	BC Act	EPBC Act	Biodiversity risk weighting	SAII entity	Record Notes	Species Polygon
Other listed species							
Black Falcon	*Falco subniger*	V	-	N/A	N/A	One individual observed perched	N/A
Blue-billed Duck	*Oxyura australis*	V	-	N/A	N/A	Two to four males observed on a dam during surveys at BUS01 by ERM in Winter 2023.	N/A
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	3.00	Yes	Possible and probable calls detected from multiple devices from May/June 2023 and Spring 2023.	Species credit species – not added for species credits as per habitat constraints
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V	-	N/A	No	Possible calls detected from multiple devices from May/June 2023	Ecosystem credit species
Little Bent-winged Bat	*Miniopterus australis*	V	-	3.00	Yes	Possible calls detected in October/November 2020	Dual credit species – not added for species credits as per habitat constraints

*Possible: call is comparable with the named species, with a moderate to high probability of confusion with species of similar calls.

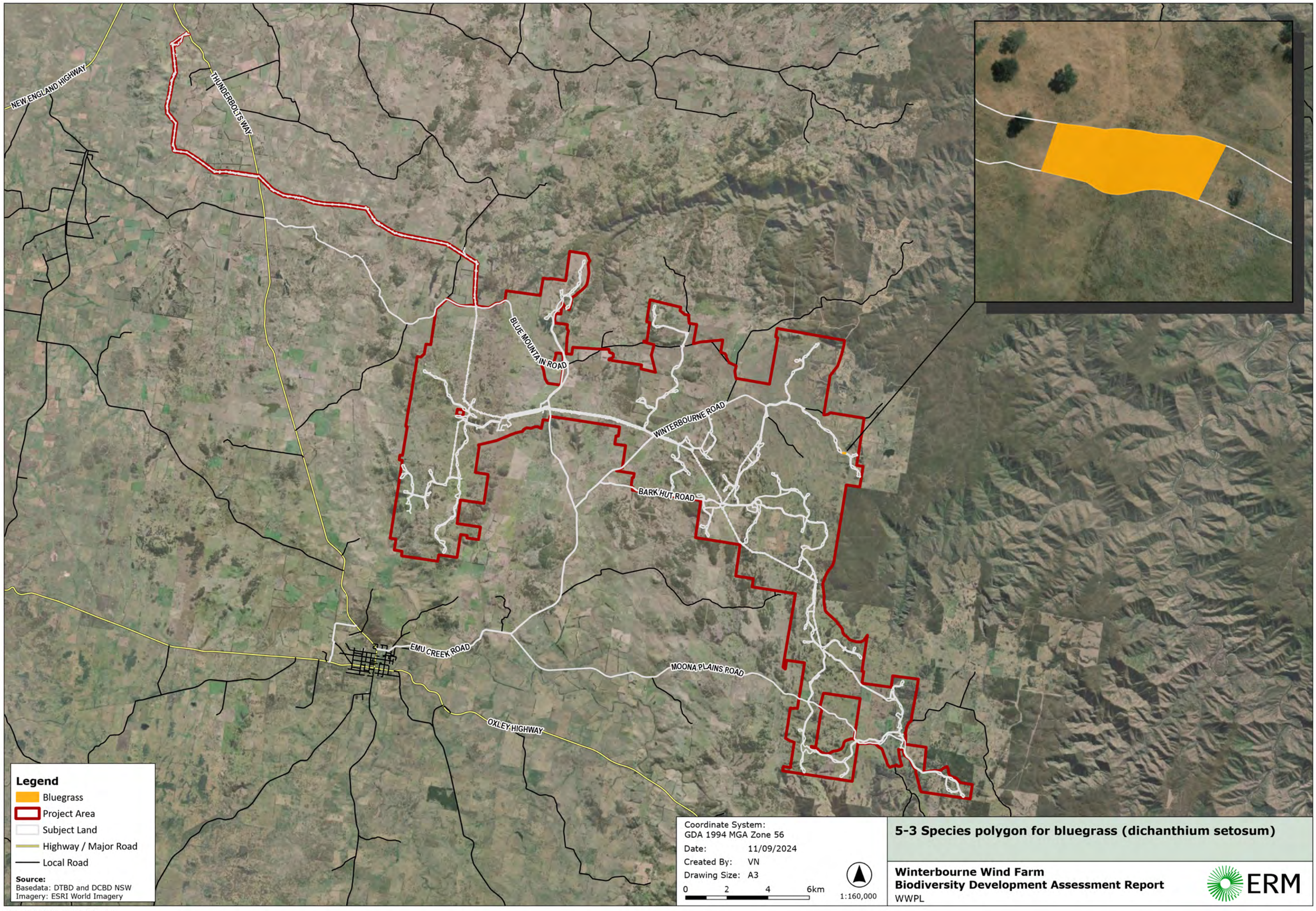


5-2 Species polygon for barking owl (ninox connivens)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

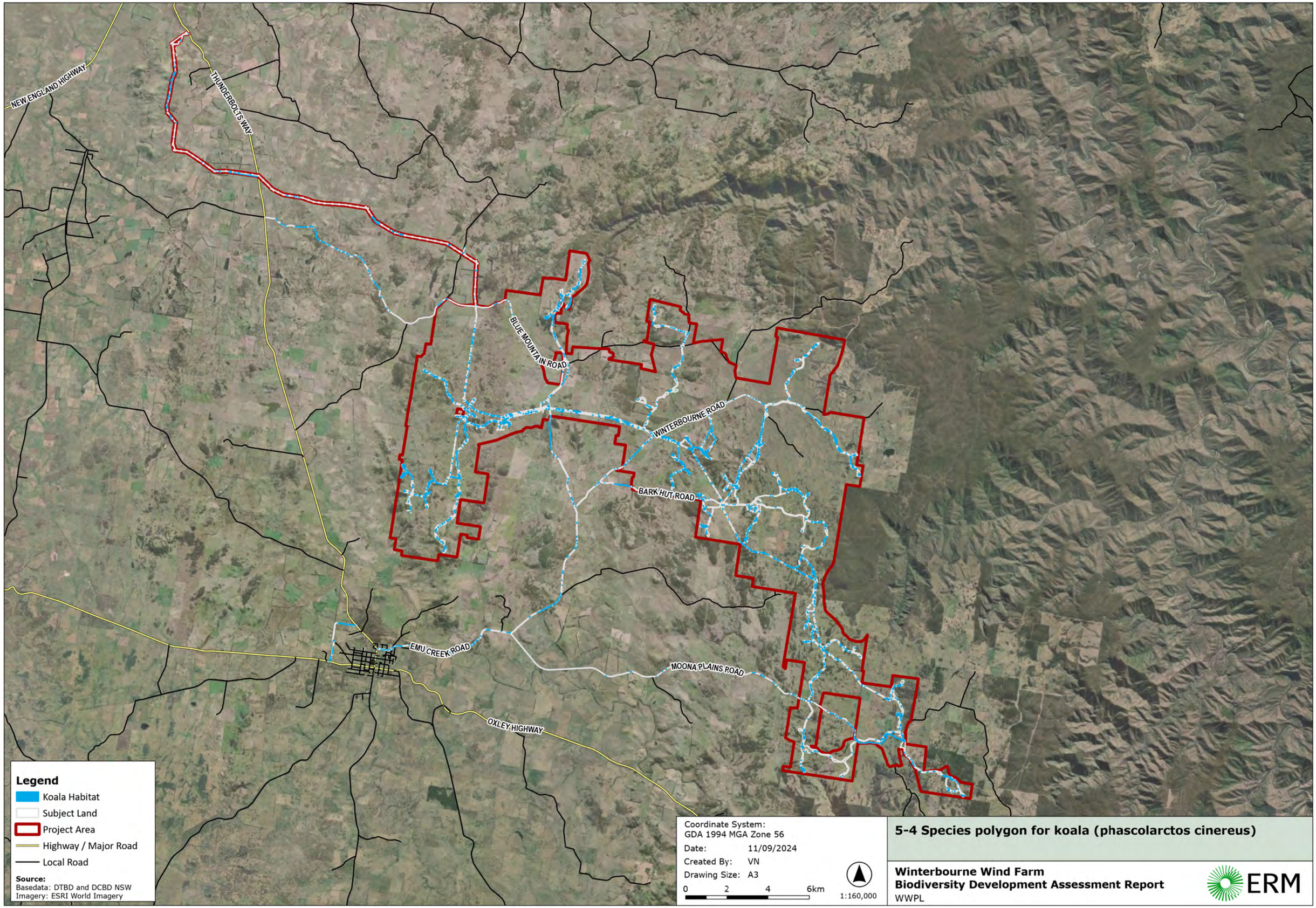


5-3 Species polygon for bluegrass (dichanthium setosum)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

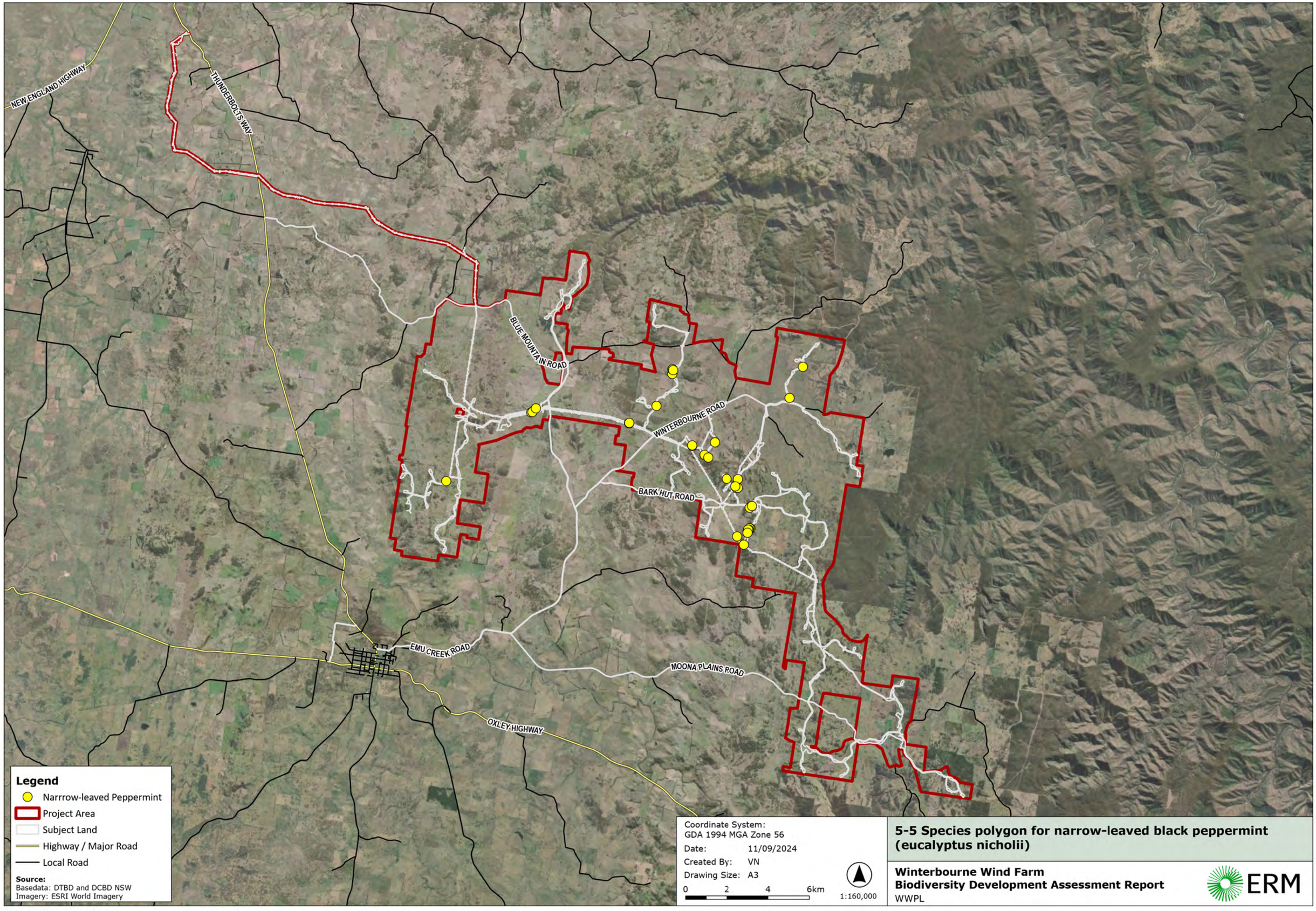


5-4 Species polygon for koala (phascolarctos cinereus)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



5-5 Species polygon for narrow-leaved black peppermint (eucalyptus nicholii)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend

- Potential Nest Tree
- South-eastern glossy black-cockatoo Habitat
- Project Area
- Subject Land
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

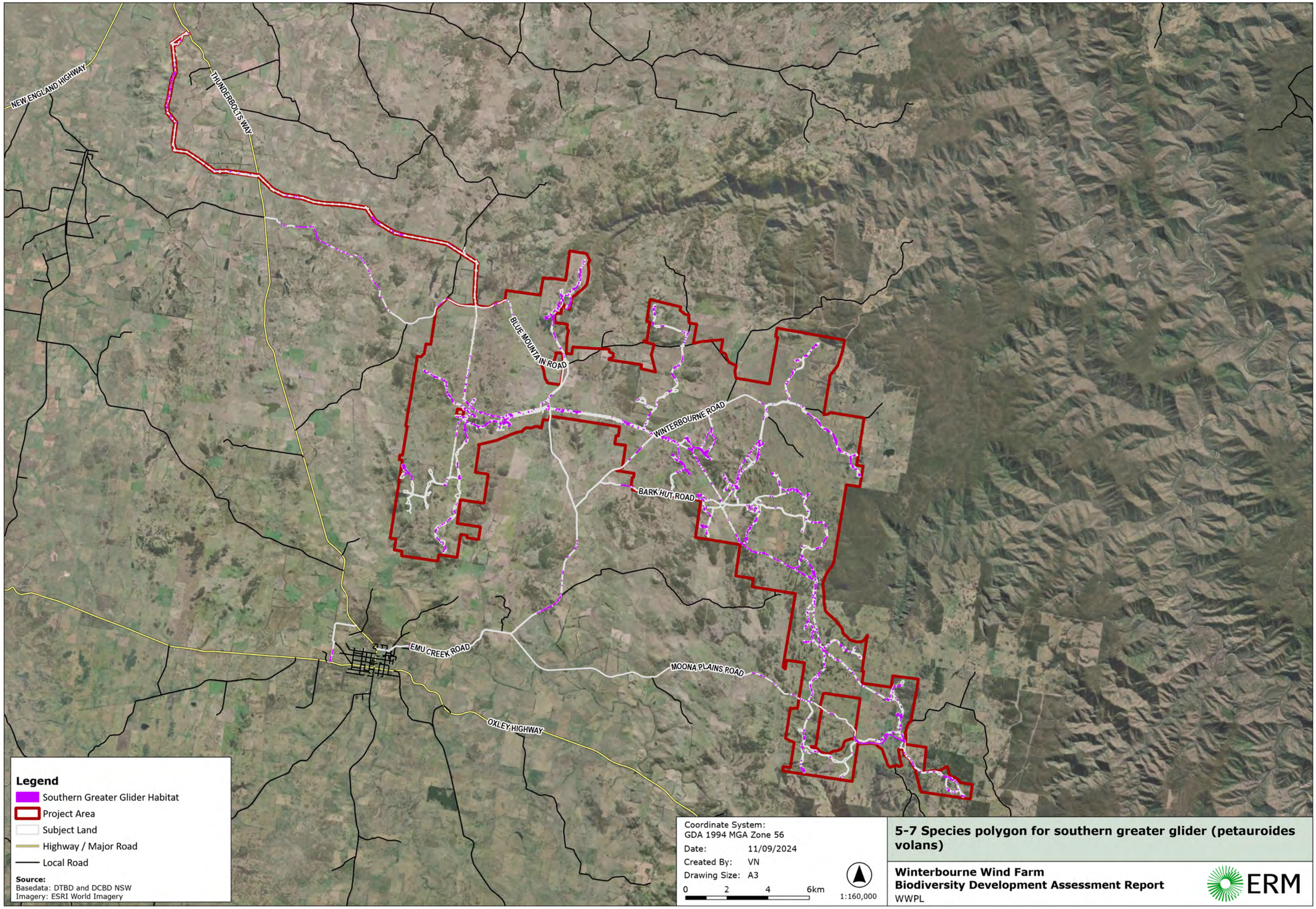
Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

5-6 Species polygon for south-eastern glossy black-cockatoo (calyptorhynchus lathami lathami)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

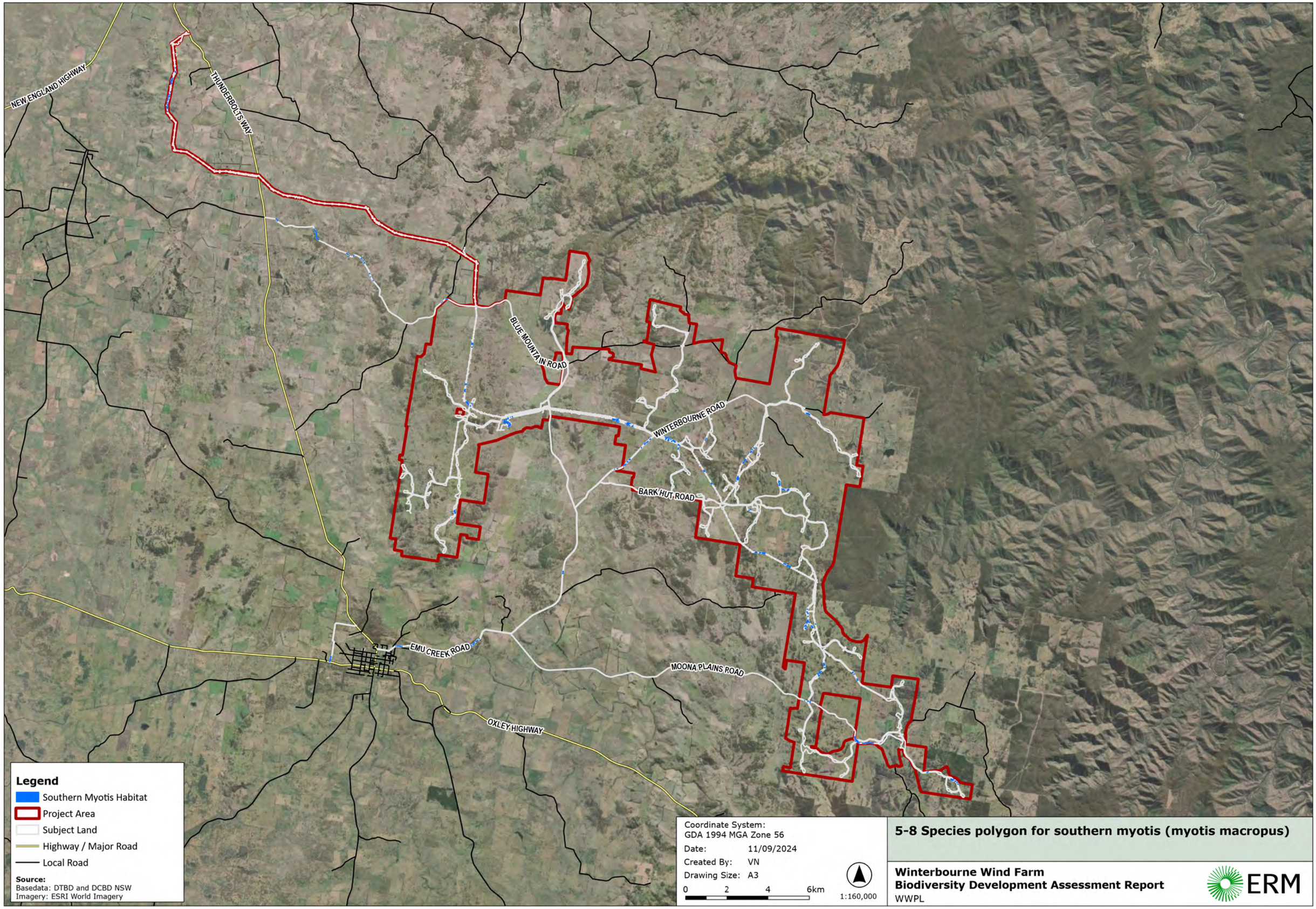


5-7 Species polygon for southern greater glider (petauroides volans)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

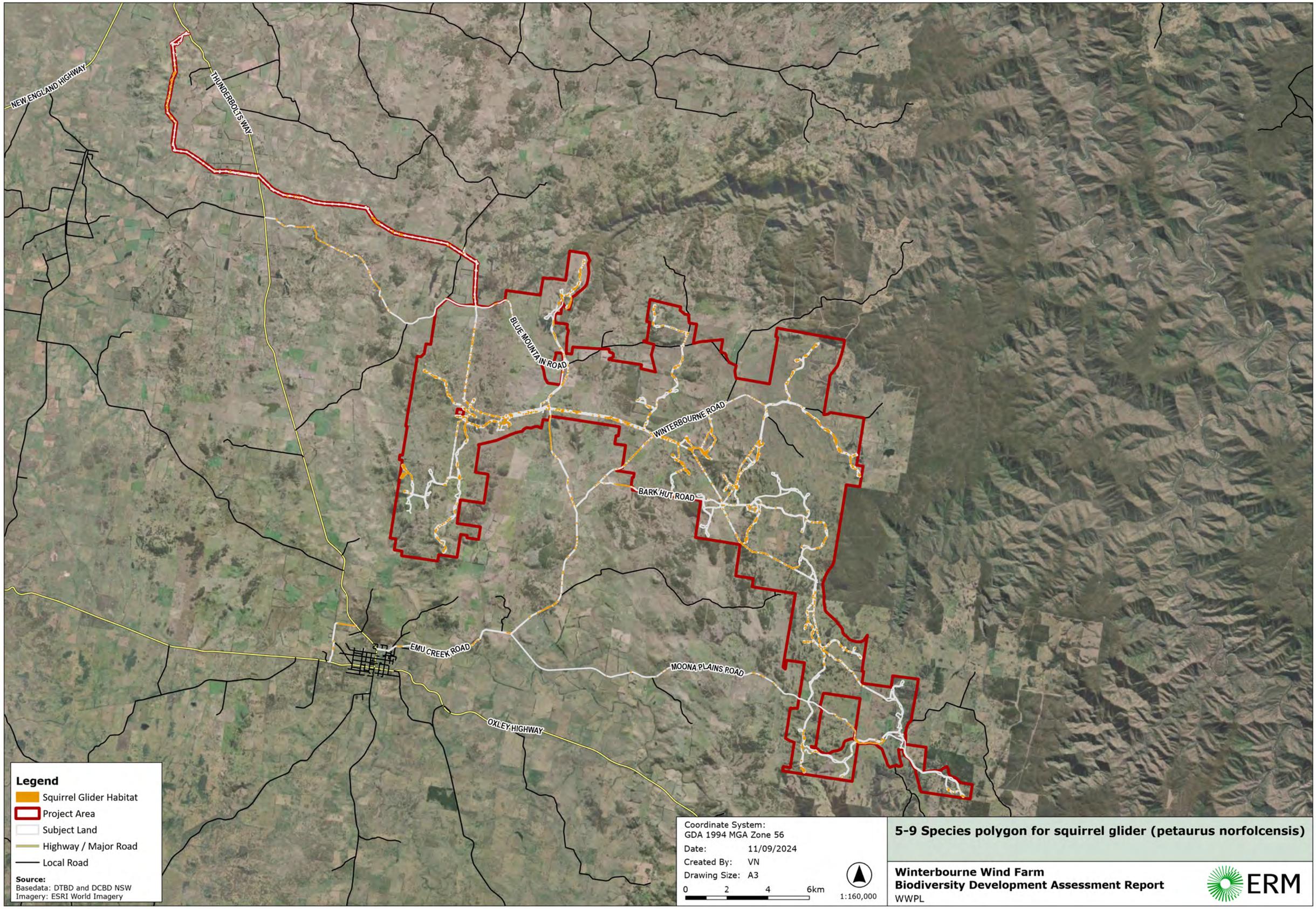


5-8 Species polygon for southern myotis (myotis macropus)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

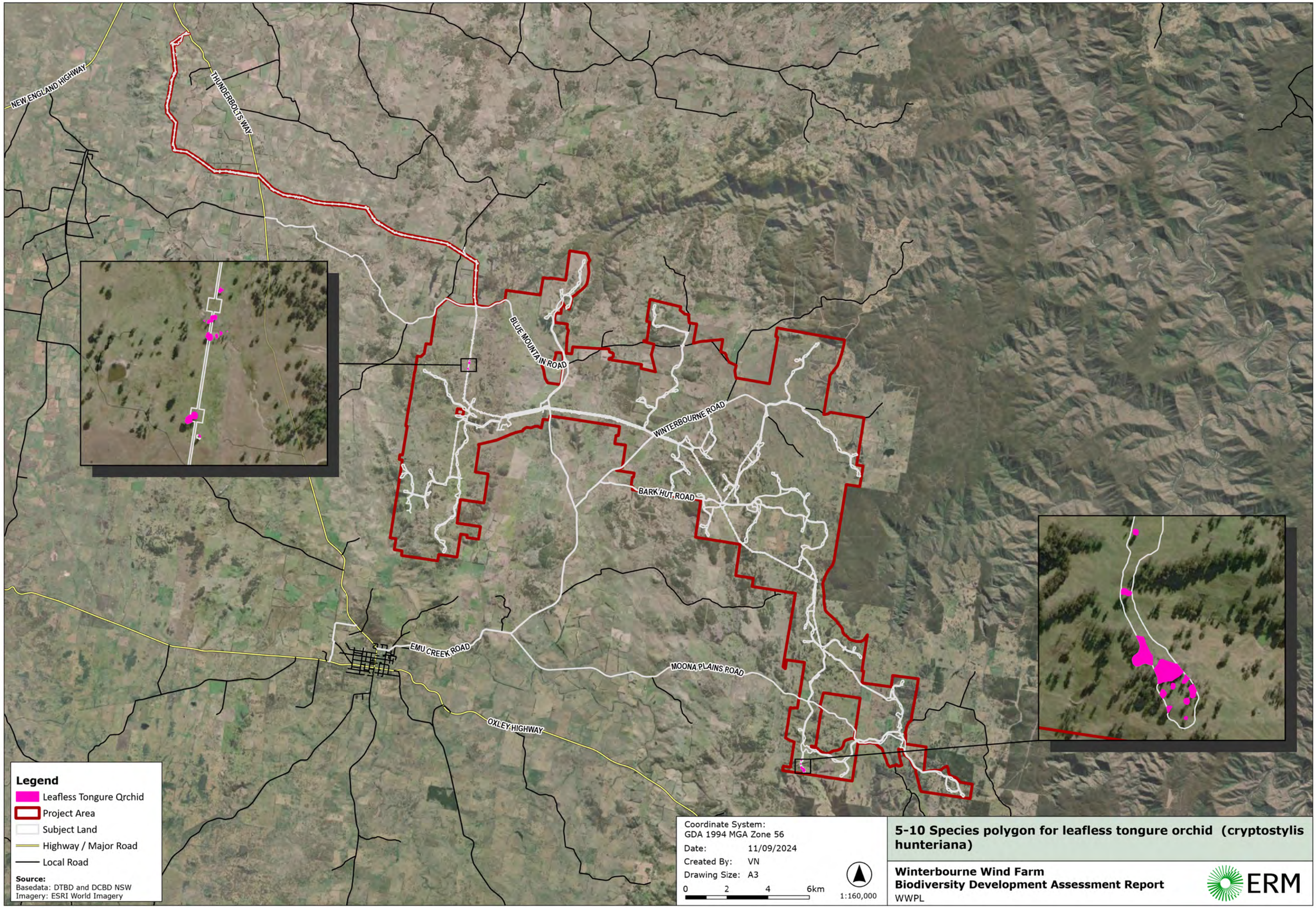


5-9 Species polygon for squirrel glider (petaurus norfolcensis)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



5-10 Species polygon for leafless tongure orchid (cryptostylis hunteriana)

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

5.3 SUPPLEMENTARY SEARS REQUIREMENTS

Supplementary SEARs provided by the Commonwealth, identified additional matters for consideration, as listed in Table 1-1. Table 5-7 discusses the methods used to determine presence and impact of the Project to the identified threatened entities.

TABLE 5-7 SUPPLEMENTARY SEARS OUTCOMES

Threatened Species/Community	EPBC Act Listing	Survey Method	Outcome
Threatened Species and Communities			
New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands ecological community	Critically Endangered	• Rapid vegetation assessments • BAM Plots • Desktop assessment against the Key Diagnostic Criteria and Condition Thresholds	This community has been determined to occur within the Subject Land in association with areas of PCT 534 and 533. Avoid and minimise outcomes have been achieved to reduce the impact on this TEC. Residual impacts have been determined to calculate the offset liability in accordance with the BAM.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community (Haul Route)	Critically Endangered	• Rapid vegetation assessments • BAM Plots • Desktop assessment against the Key Diagnostic Criteria and Condition Thresholds	This community has been determined to occur within the Subject Land in association with areas of PCT 510. Avoid and minimise outcomes have been achieved to reduce the impact on this TEC. Residual impacts have been determined to calculate the offset liability in accordance with the BAM.
Spotted-tailed Quoll (SE mainland population) (*Dasyurus maculatus maculatus*)	Endangered	• Targeted threatened fauna survey	The Spotted-tailed Quoll was detected during field surveys. Avoid and minimise outcomes have been achieved to reduce the impact on this threatened species. This species is assessed as an ecosystem credit species and the appropriate ecosystem credits have been generated.
Koala (combined populations of QLD, NSW and ACT) (*Phascolarctos cinerus*)	Endangered	• Targeted surveys in accordance with Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (DPE, 2022)	Koala scats were detected during field surveys and positively identified by Koala experts. Avoid and minimise outcomes have been achieved to reduce the impact on this threatened species. As a result, the species is assumed to occur within the Project Area and appropriate credits have been generated.
Narrow-leaved Black Peppermint (*Eucalyptus nicholli*)	Vulnerable	• Targeted threatened flora surveys • BAM Plots	Several Narrow-leaved Black Peppermint individuals were detected within the Project Area. Subsequent Project design changes were implemented to avoid most of these individuals. Several individuals will be cleared. Appropriate credits have been generated.

Threatened Species/Community	EPBC Act Listing	Survey Method	Outcome
Greater Glider (*Petauroides volans*)	Endangered	• Targeted threatened fauna survey	Targeted surveys conducted are considered sufficient for the detection of this species. The species was not detected in the impact area. No further assessment is required.
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	Endangered	• Targeted threatened fauna survey	Targeted surveys conducted are considered sufficient for the detection of this species. The species was not detected in the impact area. No further assessment is required.
Beadle's Grevillea (*Grevillea beadleana*)	Vulnerable	• Targeted threatened flora survey	Targeted surveys conducted are considered sufficient for the detection of this species. The species was not detected in the impact area. No further assessment is required.
Narrow-leaved Bertya (*Bertya ingramii*)	Endangered	• Targeted threatened flora survey	Targeted surveys conducted are considered sufficient for the detection of this species. The species was not detected in the impact area. No further assessment is required.
Austral Toadflax (*Thesium australe*) (Haul Route)	Vulnerable	• Targeted threatened flora survey	Targeted surveys conducted are considered sufficient for the detection of this species. The species was not detected in the impact area. No further assessment is required.
World Heritage properties and National Heritage places			
Gondwana Rainforests of Australia World Heritage Property and National Heritage Place	N/A	• Considered through the indirect impact assessment	Indirect impacts as described by the BAM have been assessed in Section 8.2 of this report. The 16 indirect impacts have all been assessed for their potential effect on the Oxley Wild Rivers National Park which forms part of the World Heritage-listed Gondwana Rainforest.
Listed Migratory Species			
White-throated Needletail (*Hirundapus caudacutus*)	Migratory	• Bird Utilisation Surveys	While this species was not detected during field surveys, an impact assessment was conducted as part of the BBAMP process and the risk to this species has been identified. Mitigation measures to reduce impacts to this species have been identified.
Fork-tailed Swift (*Apus pacificus*)	Migratory	• Bird Utilisation Surveys	While this species was not detected during field surveys, an impact assessment was conducted as part of the BBAMP process and the risk to this species has been identified. Mitigation measures to reduce impacts to this species have been identified.

6. IDENTIFYING PRESCRIBED IMPACTS

Prescribed impacts are identified in Clause 6.1 of the BC Regulation. Prescribed impacts are those that are additional to the clearing of native vegetation and associated habitat. These include:

- Development on the habitat of threatened species or ecological communities associated with:
  - Karst, caves, crevices, cliffs, rock outcrops and other geological features of significance;
  - Human-made structures; and
  - Non-native vegetation.
- Development on areas connecting threatened species habitat, such as biodiversity corridors;
- Impacts on water quality, waterbodies and hydrological processes that sustain threatened species and TECs;
- Wind turbine strikes on protected animals; and
- Vehicle strikes on threatened species or on animals that are part of a TEC.

The BAM does not provide an approach to determine the number and class of biodiversity credits that are required for a prescribed impact. However, the additional prescribed impacts on biodiversity may be considered by a consent authority when they determine the biodiversity credits required to be retired (or other conservation measures required to be taken) under a planning approval.

An assessment of the relevance of these prescribed impacts to the Project is provided in Table 6-1.

TABLE 6-1 ASSESSMENT OF PRESCRIBED IMPACTS

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☒Yes ☐No	Areas of rocky outcrops are present within the Subject Land. No karst, caves, crevices, cliffs or other geological features of significance are present.	Rocky outcrops may act as areas of suitable habitat for threatened species such as the Pale-headed Snake and Parma Wallaby. No species that may utilise this feature were found to occur within the Subject Land. These areas are also considered to have low habitat value due to degradation of surrounding vegetation and therefore no further assessment is required.
Human-made structures	☒Yes ☐No	Human-made structures subject to impacts as a result of the Project include fences, gates and other agricultural infrastructure.	Raptors and other avian species are known to frequently use human-made structures for foraging, perching and nesting. While current human-made structures may be removed during construction of the Project, it is noted that additional fencing and infrastructure will be installed with the Project and therefore there is no expected limitation to the availability of this feature and no further assessment is required.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Non-native vegetation	☒Yes ☐No	Areas comprised of non-native vegetation or lacking vegetation entirely occur throughout the Subject Land. These areas are subject to high levels of disturbance including grazing, cropping and vehicle movements.	It is considered unlikely that the impacts to this feature will have a significant impact on threatened species due to their history of high levels of disturbance and therefore no further assessment is required.
Habitat connectivity	☒Yes ☐No	Habitat connectivity to the neighbouring Oxley Wild Rivers National Park is present in the east of the Subject Land. Little habitat connectivity occurs in the centre and west of the Subject Land.	Impacts to habitat corridors between the Subject Land and the neighbouring National Park will impact species that utilise the canopy for movement, such as the Squirrel Glider, Greater Glider and Koala. Mitigation measures to reduce this risk are discussed in Section 7.2.1.
Waterbodies, water quality and hydrological processes	☒Yes ☐No	Several natural and artificial waterbodies such as creeks, dams and irrigation channels occur throughout the Subject Land that may be subject to alteration of water quality or hydrological processes.	These features within the landscape are not sustaining any threatened species or threatened ecological communities and therefore no further assessment is required.
Wind turbine strikes	☒Yes ☐No	The operation of 118 wind turbines is proposed for the Project.	Threatened and migratory avian and microbat species have potential to be impacted by wind turbine strike. A detailed assessment is provided for this impact. Mitigation measures will be implemented to reduce the risk of turbine strike, this is discussed in Section 7.2.2.
Vehicle strikes	☒Yes ☐No	The Project will include the construction of internal access tracks and use of existing roads and tracks within the Subject Land as well as the transportation of materials from the Port of Newcastle to the Project Area. An increase in vehicular traffic will occur during construction and operation of the Project.	Ground-dwelling species such as the Spotted-tailed Quoll are most at risk of vehicle strike resulting from the Project. Mitigation measures will be implemented to reduce the risk of vehicle strike, discussed in Section 7.2.3.

STAGE 2: IMPACT ASSESSMENT (BIODIVERSITY VALUES AND PRESCRIBED IMPACTS)

7. AVOID AND MINIMISE IMPACTS

The Applicant has focused on attaining impact avoidance outcomes through site selection and avoidance of higher quality native vegetation and habitat. This approach is consistent with the BAMs focus on avoiding or minimising impacts during site selection and design.

The initial design for the project, which was presented in the EIS, was for a development footprint of 586.17 ha (NGH 2022). This total impact area has increased to an assessable development footprint of approximately 913.60 ha (324.15 ha increase in disturbance), with this increase in assessable impacts due to the following:

- Inclusion of local road network. Previously the assessment of impacts on the roadside environment was based on 'pinch points', which has now been amended to include a quantitative assessment of a widened road surface including roadside drainage and cut and fill;
- Revision of design to avoid impacts on high biodiversity values resulting in a more sinuous design with greater area;
- Revision of design to include detail of required cut and fill for construction (including temporary impact areas); and
- Inclusion of a quarry, which was not previously considered.

The mapping of native vegetation at a high resolution (i.e., capture scale of 1:1,000 or better (Section 4.1 of the BAM)) has substantially assisted the identification of impact avoidance outcomes during the design process. The mapping of woody vegetation and its separation from areas of treeless grasslands used for agricultural purposes has resulted in the avoidance of high VIS vegetation cover; this being a core BAM principle for demonstrating impact avoidance (Section 7.1 of the BAM). By directing impacts away from woody vegetation, the high-resolution vegetation mapping used in this assessment has encouraged the Applicants design team to preferentially utilise low condition grasslands and, where unavoidable, use moderate condition grasslands. Courser vegetation mapping such as the State Vegetation Type Map is captured at a broader scale (e.g., 5 m pixel scale for woody vegetation) and is unsuitable for such purposes as it generally over estimates the extent of woody vegetation cover. Such mapping is informative at a landscape scale but lacks the detail necessary to encourage the application of sensitive design principles. The Project design has incorporated considerable impact avoidance measures, which reflects in the residual impact calculated for the Project.

Despite the increased footprint, an overall reduction in impacts on areas of higher biodiversity value has been achieved. This reduction has focused largely on avoiding impacts on vegetation associated with a CEEC, these being:

- Box Gum Woodland CEEC; and
- New England Peppermint Woodland CEEC.

The Applicant has designed the Project to avoid and minimise impacts on high quality vegetation and habitat, including:

- Ensuring landscape scale connectivity between the site and adjoining national park estate to the east would be maintained as far as practicable;
- Avoiding/minimizing impacts on riparian corridors by limiting crossing points; and
- Minimising impacts to areas of Box Gum Woodland CEEC and New England Peppermint Woodland CEEC, including targeting retention of areas of woodland and higher quality moderate condition grassland vegetation zones.

Unavoidable impacts exist within the local road reserve following inclusion of this in the Subject Land footprint. These impacts are unavoidable as the works proposed include the widening of existing infrastructure to include proximal vegetation. Where possible, these impacts have been minimised.

The following sections outline the process involved in defining the impact avoidance outcomes.

7.1 AVOID AND MINIMISE DIRECT AND INDIRECT IMPACTS

Since the conception of this Project, the design has evolved through consideration of technical, environmental, social, and commercial constraints. A significant aspect of this design refinement was engagement with landowners, neighbours to the Project, the broader community, local government, State and Federal Agencies, and business and stakeholder groups. This engagement, along with technical studies undertaken, has helped to shape the current layout of the Development Footprint.

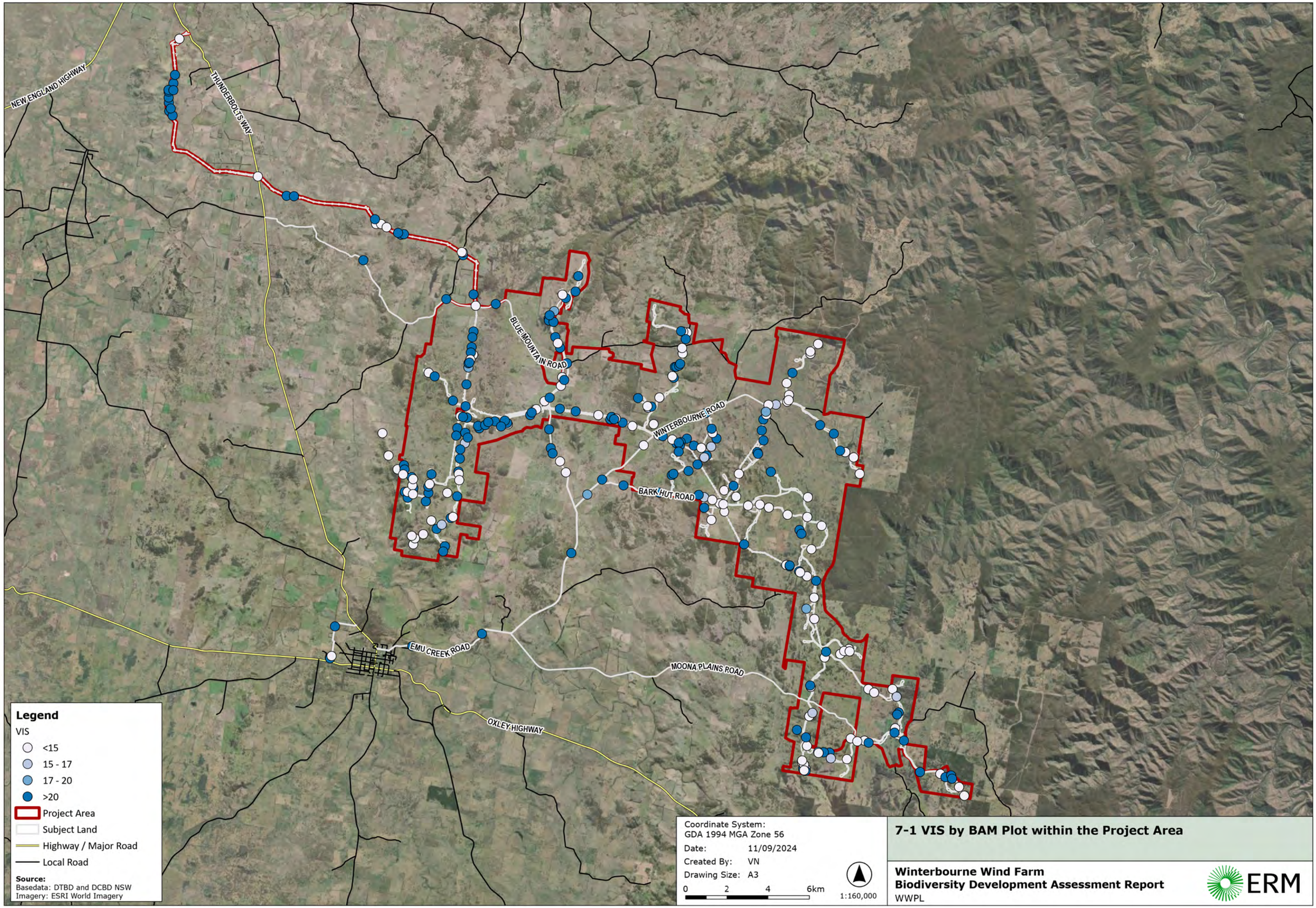
7.1.1 AVOID AND MINIMISE FRAMEWORK

For the reasons outlined in the following sections, the Project will utilise lands that will result in unavoidable impacts. This is because the landscape, since European settlement, has only ever been used for agricultural purposes and has retained biodiversity values. The retained biodiversity values range from highly degraded grasslands to woody vegetation with increased habitat values. This assessment has sought to differentiate between high and low biodiversity values, to aid in identifying opportunities for impact avoidance and minimization outcomes. Table 7-1 outlines the factors considered in Project design.

TABLE 7-1 BIODIVERISTY FACTORS CONSIDERED IN PROJECT REDESIGN

Factor	Design preference	Metric	Outcome
VIS	Non-woody vegetation Low calculated VIS	VZ mapping separating woody from non-woody vegetation. VIS calculated by BAM plot using BAM-C. <15 for TEC, and <17 for non-TEC	Project footprint aligns, where possible, with native vegetation in a low condition state
Grassland condition	'Low conservation value grasslands'	Non-woody vegetation BAM plots. Native vegetation cover <50% for full floristic plot nested within a BAM plot	Project aligns with low conservation value grasslands where possible
Connectivity	Avoid or minimise impacts on connected vegetation	-	Reduction in fragmentation
Patch size	Design to coincide with smaller patches and paddock trees. Minimise impacts on larger patches by avoiding unnecessary clearing	Reduced average patch size within clearing footprint	Project preferentially aligns with small vegetation patches rather than larger patches
Proximity to World Heritage	Locate all turbines at least 500m away from World Heritage areas	-	Avoid turbine placement within 500 m of World Heritage areas.

Project design had regard for areas of high VIS (i.e., VIZ >17) and 'low conservation value grasslands', which have been calculated by BAM plots performed as part of this assessment. These are shown in Figure 7-1 and Figure 7-2 respectively.

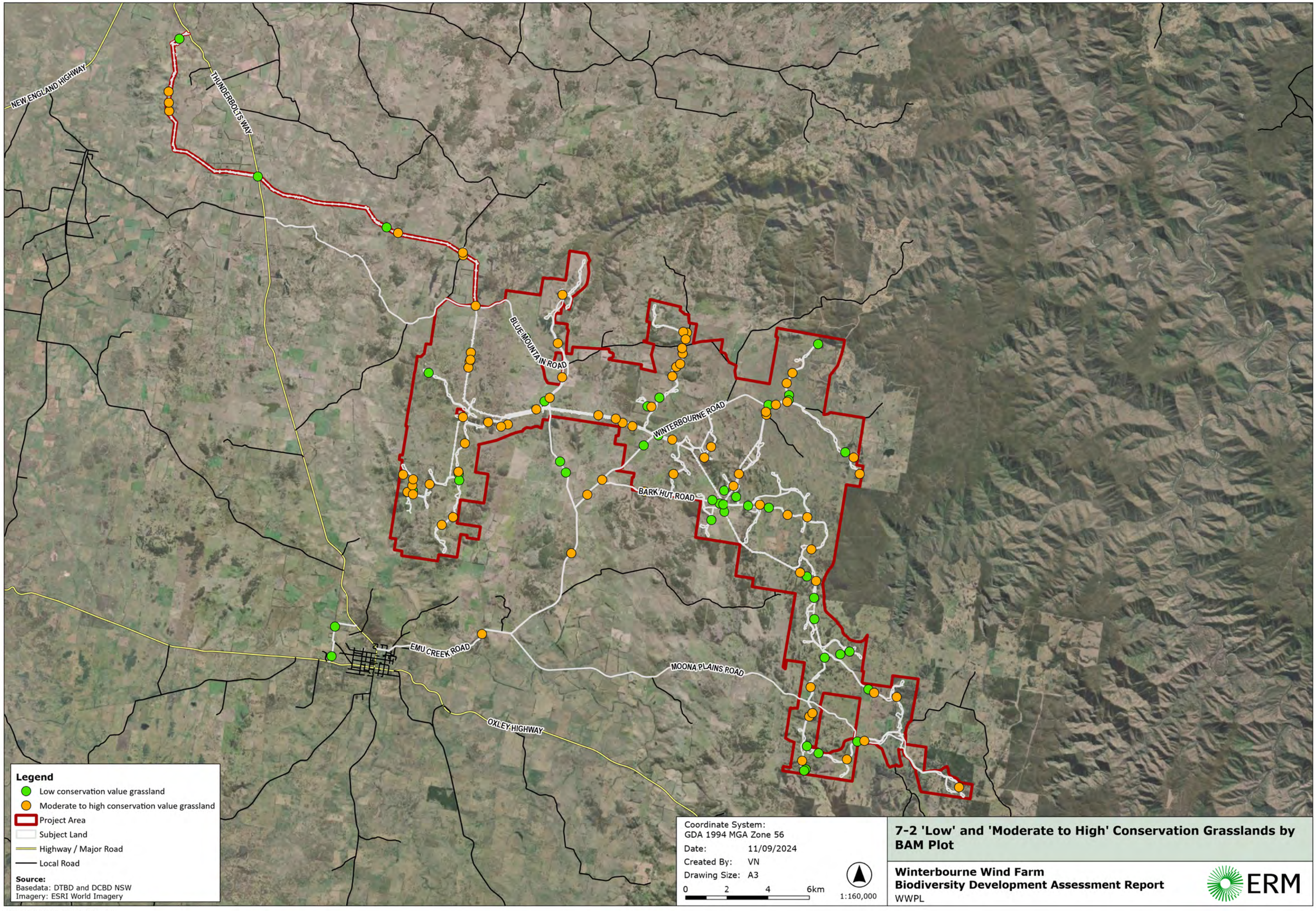


7-1 VIS by BAM Plot within the Project Area

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx



7-2 'Low' and 'Moderate to High' Conservation Grasslands by BAM Plot

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

7.1.2 PROJECT LOCATION AND DESIGN

7.1.2.1 STRATEGIC DEVELOPMENT CONTEXT

The Project is in the New England REZ. The New England REZ encompasses some of Australia's best natural energy resources. The location of the New England REZ was selected based on detailed geospatial mapping, which identified areas of high renewable energy resource potential (e.g., wind speeds, solar irradiance), proximity to existing transmission infrastructure, and interactions with existing land uses. The New England REZ was declared by the Minister for Energy and Environment in December 2021. The declaration begins the process of formalising the REZ under the *Electricity Infrastructure Investment Act 2020*, establishes EnergyCo as the Infrastructure Planner for the REZ, and sets the intended network capacity. The declaration of the New England REZ also supports the implementation of the Australian Energy Market Operator's Integrated System Plan.

The objectives of REZs are to:

- Deliver affordable energy into the future;
- Diversify the NSW energy mix;
- Expand electrical transmission capabilities; and
- Open up new parts of the NEM for energy generation in locations that can benefit from diverse weather patterns.

The Project is strategically located within the New England REZ and aligns with the strategic objectives of the New England REZ as identified above. The Project will deliver affordable clean energy, contribute to the diversification of the NSW energy sector, and facilitate the expansion of electrical transmissions capabilities and opening new parts of the NEM for energy generation. The Project has been optimised to make the most of the wind resources, allowing clean, reliable energy that can be matched with transmission and demand. The intent of the REZ is to set up renewable resource rich areas with the right infrastructure and transmission capacity to facilitate the delivery of clean energy where it is needed. While the Project is not connecting to any proposed new REZ infrastructure, it will augment both the generation and transmission of clean energy within the REZ.

The Subject Land is situated at an optimal location to benefit from the New England REZ and can demonstrate the suitability of its location against the Wind Energy Framework for State Significant Development (DPE, 2016) outlined in Table 7-2.

TABLE 7-2 SITE SELECTION JUSTIFICATION CRITERIA

Preferable site condition	Applicability to the Project
Optimal renewable energy resources	The Project is located within an area of mapped high wind speeds. There are several other existing and proposed renewable energy projects located within the region and near the Project Area.
Suitable land	The Project is located on relatively flat topography and low relief on RU 1 zoning which allows for the development of complementary non-agricultural land use that is compatible with the existing land uses of the Site and its surrounding areas.

Preferable site condition	Applicability to the Project
Local impacts minimised	The Project is located within a remote and sparsely populated area with limited receptors near the Project Area. The Development Footprint incorporates a minimum buffer of 3 km between a WTG and the 11 non-involved dwellings.
Proximity to electrical network	The Project is located 7 km from a new switchyard approximately 7 km south of Uralla and will connect via approximately 44 km of overhead transmission line.
Accessibility	The Project Area is easily accessible via several local roads in the area and accessibility has been optimised through identifying topographic constraints and strategic positioning of the Project to minimise earthworks required during construction.

7.1.2.2 PROJECT DESIGN AND ITERATION RESULTS

The Applicant has completed environmental assessment of the Project Area in accordance with the SEARs and has modified the project layout based on the outcomes of these assessments, consideration of technical, environmental, and constructability issues, and community feedback. This section describes Project alternatives that were considered, and modifications made to previous designs.

Throughout the Project design process, the Applicant has undertaken additional surveys and design work to avoid and minimise potential environmental impacts and optimise the Project layout and constructability. Where the potential for impacts could not be avoided, design principles were sought to minimise environmental impacts, and mitigation measures have been proposed to manage the extent and severity of any residual impacts.

The Project originally consisted of up to 130 WTGs (Figure 7-3) and has since been refined to up to 118 WTGs to avoid sensitive areas comprising high biodiversity values such as the neighbouring World Heritage Area and CEECs, and reduce visual impacts from the Oxley Highway and Apsley Falls. While this alleviated some of the potential impacts, additional design refinements were required to further reduce visual and construction impacts. These included a reduction in the proposed maximum blade tip height from 250 m to 230 m.

In addition to the reduction in number of WTGs, several WTGs were relocated to reduce impact to native vegetation, increase the distance of the WTGs from the neighbouring National Park and reduce impact to SAII entities. Refinement of WTG locations included:

- Relocation (>100 m movement) of 11 turbine locations to reduce biodiversity impact and/or improve constructability of hardstands and access tracks;
- Micrositing (<100 m movement) of 47 turbine locations to reduce biodiversity impact and/or improve constructability of hardstands and access tracks.

The Project's Development Footprint, as assessed by NGH (2022), comprised an area of approximately 586.17 ha comprising 236.15 ha of assessable native vegetation requiring the calculation of residual impacts.

The amended Project area assessed in this Amended BDAR comprises over 900 ha, including 261.41 ha of assessable native vegetation where the VIS is >15 for TEC and >17 for non-TECs. While the assessable area has increased, the condition of this vegetation is less. Generally, the design opted for the utilization of non-woody vegetation wherever possible where VISs were generally lower. Additional considerations for the amended Development Footprint included:

- Retention of existing native vegetation which avoided areas of high biodiversity value, notable areas of woody vegetation with elevated VIS and lands containing SAII entities (i.e., CEECs); and
- Avoidance of impacts to affected species credit species following review of further survey results and design amendment.

The alignment of the Project with low condition grasslands has significantly reduced impacts on biodiversity values. The mean VIS for low condition grasslands (i.e., 10.4±4.6) verified the benefit of aligning the Project to this condition state (i.e., VIS <15 for TECs and <17 for non-TECs). Low condition grasslands typically have high exotic plant species richness and cover, low native plant species richness and cover resulting in lower diversity measures. These grasslands are heavily modified and are, by definition, sufficiently degraded to not support habitat constraints or microhabitats of species credit species.

The mean VIS for moderate condition grasslands (i.e., 19.4±10.4) exhibited a higher average than that calculated for low condition grassland, thus generally verifying this condition state assignment. However, the relatively higher variance reflects the uncertainty in assigning an evidence-based condition state for some VZ (i.e., where doubt existed, the condition state of the grassland was assigned to a moderate class).

The Project has been designed to maximise use of existing public and internal access tracks and access points across the Project Area minimising vegetation clearance required and preventing an increase to access routes and activity. The width of clearing required for tracks and transmission lines has been designed at less than 40 m to retain habitat connectivity. In the instance that clearing of greater than 50 m widths are found to be required in areas of glider habitat, habitat connectivity infrastructure such as glide poles and rope bridges will be installed.

Table 7-3 summarises the evolution of the Project layout and the amendment responses to key environmental and other land use limitations identified.

TABLE 7-3 PROJECT AMENDMENTS

Project Element	Initial Layout (Scoping)	Amended Project
Project Area	24,400 ha	21,844 ha
Development Footprint	< 1,000 ha	913.6 ha
No. of WTGs	130	118
WTG dimensions (maximums)	Hub height of 155 to 160 m Tip height of 250 m	Hub height of 149 m Tip height of 230 m
Site Access Points	22 site access points	32 site access points

Project Element	Initial Layout (Scoping)	Amended Project
Electrical Reticulation Network	1 x 330 kV main substation and 2 x 132 kV collector substations	2 x 33/330 kV substations
	~ 164 km of internal electrical reticulation network, underground and overhead 33 kV and 132 kV	~ 210.5 km of internal electrical reticulation network, underground and overhead 33 kV
	~ 60 km of 330 kV overhead transmission lines	~ 44 km of 330 kV overhead transmission lines
	100 MW / 200 MWh lithium ion battery (indicative)	No change
Impacts to Native Vegetation with VIS >15 for TECs and >17 for non-TECs	746 ha	• 261.41 ha • Assessment includes previously unassessed local road network
PCT 567 TEC	43.67 ha	• 0 ha • Lands that satisfy inclusion in Box Gum Woodland have been included in PCT 510 CEEC
Box Gum Woodland CEEC (PCT 510)	55.25 ha	97.55 ha comprising a greater use of low condition grasslands • 4.62 ha of woody vegetation • 18.69 ha of moderate grassland
New England Peppermint Woodland CEEC (PCTs 533 and 534)	34.92 ha	98.24 ha comprising greater use of low condition grasslands • 5.94 ha of woody vegetation • 13.70 ha of moderate grassland

A more granular examination of impacts on TECs is provided in Table 7-4, which demonstrates that impacts are substantially reduced on CEECs.

TABLE 7-4 PROJECTS IMAPCT ON TECS WITH VIS >15

TEC	PCTs	Tenure	Condition	Area (ha)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions CEEC	510	Freehold	Woody	3.27
			Non-woody	13.22
		Crown (road reserve)	Woody	1.35
			Non-woody	5.47
New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion CEEC	533, 534	Freehold	Woody	2.69
			Non-woody	13.70
		Crown (road reserve)	Woody	3.25
			Non-woody	0.00
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	766	Freehold	N/A	0.00
Ribbon gum - mountain gum - snow gum grassy forest/woodland of the New England Tableland Bioregion	1192, 1194	Freehold	Woody	3.42

7.1.2.3 ALTERNATIVE LOCATIONS THAT WOULD AVOID OR MINIMISE IMPACTS ON BIODIVERSITY VALUES AND JUSTIFICATION FOR SELECTING THE PROPOSED LOCATION

Conservation of biodiversity has been a fundamental consideration throughout development of the Project. Extensive desktop, field assessment and additional design work have been undertaken to understand the anticipated biodiversity impacts. The findings of the biodiversity assessment have informed an ongoing iterative design for the layout of the amended Project and siting of WTGs and other key infrastructure.

Impacts to biodiversity will be avoided, mitigated and offset where necessary to ensure that there is no net loss in biological diversity and that ecological integrity is maintained. The environmental impacts of the amendments to the Project have been carefully evaluated and where practicable have been (or will be) avoided, mitigated, managed or offset. Various options have been considered for the WTGs, BESS and associated infrastructure having regard to environmental risks. Ultimately, options with lower environmental impacts and risks have been selected to avoid and minimise potential biodiversity impacts. Management measures have been proposed for all significant environmental impacts, and where uncertainty exists, measures have been suggested to address the uncertainty. As such, there is no threat of serious or irreversible damage to the environment and no alternative locations that would avoid or minimise impacts on biodiversity values are considered practical.

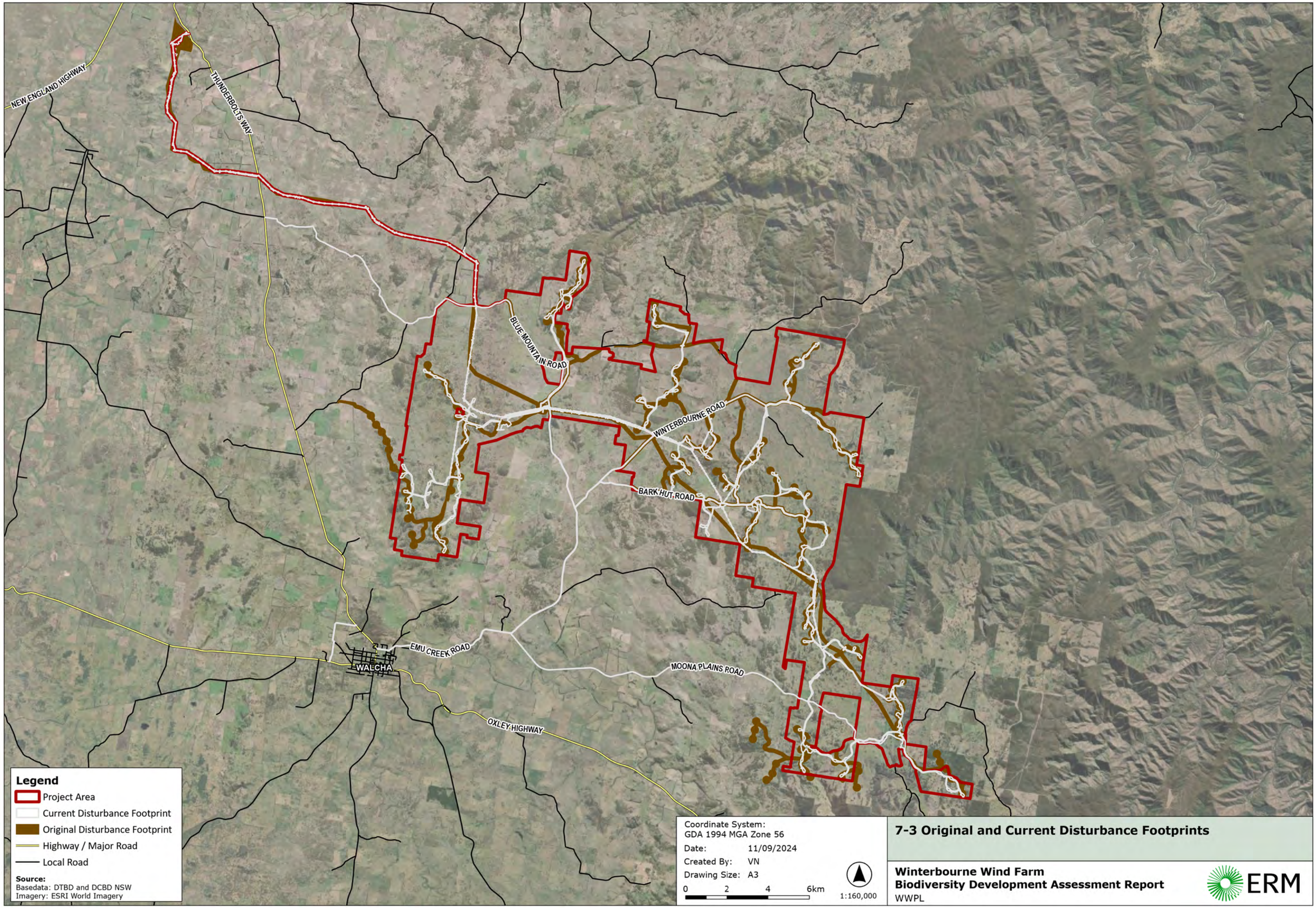
7.1.3 ALTERNATIVE HAUL ROUTES

The proposed haul routes 1 and 2 are considered to provide the most appropriate route alignments. An alternative haul route for the blades via the Tamworth bypass (Route 3) is to be considered further prior to construction. This alternative route would include Whitehouse Lane, Marsden Park Road, O'Briens Lane, and Nundle Road in Tamworth.

7.1.4 FURTHER MEASURES TO AVOID AND MINIMISE IMPACTS

Impacts will be further avoided and minimised where possible through additional detailed design. Notably, it is anticipated that additional impact avoidance outcomes will be achieved in the local road reserve network as the Project currently assumes a conservative design in these areas.

A Biodiversity Management Plan (BMP) will be prepared in consultation with relevant regulators prior to construction in conjunction with several other management plans including a Bird and Bat Adaptive Management Plan (BBAMP), Traffic Management Plan, Soil and Water Management Plan and Waste Management Plan. Further discussion of these management measures and their application to the prescribed impacts are detailed in Section 7.2 of this BDAR.



7-3 Original and Current Disturbance Footprints

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

7.2 AVOID AND MINIMISE PRESCRIBED IMPACTS

7.2.1 HABITAT CONNECTIVITY

The Project poses risk to habitat connectivity for threatened species between the Subject Land and the adjoining Oxley Wild Rivers National Park as a result of clearing native vegetation in proximity to the National Park boundary. The Subject Land has been historically cleared and altered for agricultural use however some vegetation has been retained and serves as habitat corridors and connectivity to nearby National Parks.

The eastern portion of the Project Area has the highest concentration of remnant vegetation and connects with Oxley Wild Rivers National Park. The value of this connectivity is already compromised by fencing and permissible land uses.

Vegetation connectivity decreases substantially in the western half of the Subject Land in step with the arable nature of this area (i.e., topographically less diverse), which has given rise to considerable historical land clearing for agricultural production (e.g., livestock grazing and cropping). Figure 3-2 displays the extent of native vegetation within the Subject Land and the surrounding areas to demonstrate the habitat connectivity features present.

Localised impacts to habitat connectivity for arboreal mammals is expected such as the Greater Glider, Squirrel Glider and Koala, with the former two requiring relatively continuous canopies for movement through a home range and dispersal. The Project has been designed to maximise use of existing public and internal access tracks and access points across the Project Area, minimising vegetation clearance required and avoiding development on much of the eastern side of the Project Area where the highest concentration of habitat connectivity is present. The width of clearing required for tracks and transmission lines has been designed at less than 40 m to retain habitat connectivity. In the instance that clearing of greater than 50 m widths are found to be required in areas of glider habitat, habitat connectivity infrastructure such as glide poles and rope bridges will be installed.

7.2.2 WIND TURBINE STRIKES

To minimise any potential impacts to bird and bat species, associated with operation of the WTGs, within the vicinity of the Subject Land, a BBAMP will be prepared. The BBAMP will intend to enable the implementation of a long-term approach to the mitigation and management of potential impacts on listed threatened and migratory species. Monitoring will also identify any potential changes to the species' utilisation of the Subject Land and the surrounding landscape.

In accordance with the Draft BBAMP guidance provided by DPE in 2023 and 2024, the following aspects of the Draft BBAMP have been detailed in the following sections:

- BBAMP objectives and consent conditions;
- Baseline data;
- Proposed monitoring program;
- Preliminary turbine risk assessment;
- Proposed trigger action response plan;
- Heat mapping;
- Offsetting and compensatory means; and

- Proposed turbine strike notification process.

The final BBAMP is to be prepared in consultation with the Biodiversity Conservation Division (BCD), following approval of the Project.

7.2.3 VEHICLE STRIKES

Vehicle strikes can pose a substantial threat to wildlife, including ground-dwelling species such as the Spotted-tailed Quoll and Koalas during dispersal. The Project will result in an increased vehicular presence across the Subject Land and proposes the construction of internal access tracks. It is possible that fauna will venture onto these roads and access tracks resulting in vehicle strikes.

The highest risk period for vehicle collision is anticipated during the construction and decommissioning stages, which generate trips associated with the workforce accessing and traversing the site and the delivery/removal of raw materials and plant. During operation, vehicle movement will be considerably reduced; however, also presents potential collision hazard with a limited number of vehicles entering for routine maintenance and monitoring purposes.

The construction period is expected to take approximately 52 months. A construction workforce of up to 390 personnel would be on-site during the peak construction phase. The peak construction traffic movement will occur in the morning when light vehicles transporting the construction workforce arrive onsite (between 7:00 am and 8:00 am) and leaving site (staggered finish times). Heavy vehicle movements will be scattered throughout the day, with equal inbound and outbound movements.

Native wildlife mortality due to vehicle strike above current/baseline levels is possible; however, if evident, is expected to be relatively low following implementation of mitigation measures. These measures will be addressed in the Construction Traffic Management Plan and Construction Environmental Management Plan, and include examples such as on-site education, identifying and reporting hazards as they occur during construction, use of appropriate signage and creating driving policies such as appropriate working hours and vehicle speed limits.

7.3 BIRD AND BAT ADAPTIVE MANAGEMENT PLAN FRAMEWORK

7.3.1 OBJECTIVES AND POLICY

7.3.1.1 OBJECTIVES

The objective of the BBAMP is to minimise and manage the impact of operation of the WTGs associated with the proposed development on birds and bats that occur within the vicinity of the wind farm. Specifically, the BBAMP will:

- Detail potential mitigation measures and implementation strategies to minimise impacts to birds and bats;
- Establish an adaptive management framework for managing and mitigating impacts on birds and bats;
- Outline a monitoring program to understand the impact of the proposed development to at-risk birds and bats;

- Document an agreed decision-making framework that identifies operational-phase impact triggers leading to a management response;
- Identify any additional measures that can be used to manage impacts based on the outcomes of ongoing monitoring; and
- Aim to offset mortality impacts to listed threatened species where applicable.

The BBAMP will aim to achieve the following environmental outcomes:

- An improved understanding of the risk of turbine collision and barotrauma impacts on listed bird and bat species;
- An improved understanding of weather and how project site usage changes as a result of wind farm construction and operation;
- An improved monitoring approach for the timely identification of turbine collisions and collection and analysis of data;
- An improved approach to the timely and regular validation and update to the Collision Risk Modelling (CRM) using monitoring data, and a robust adaptive management approach; and
- Development of management and corrective actions to minimise risk of turbine collision and other impacts on threatened bird and bat species.

7.3.1.2 LEGISLATION AND POLICY REQUIREMENTS

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) *Onshore Wind Farms – interim guidance on bird and bat management* (DCCEEW, 2023) states that:

> *The BBAMP (Bird and Bat Adaptive Management Plan) must be prepared by a suitably qualified ecologist and in accordance with the department's Environmental Management Plan Guidelines. The BBAMP must be informed by desktop and field-derived information, and best available practices, and include the following key requirements at a minimum:*
>
> - *standards for pre- and post-commissioning surveys that are appropriate to the scale and environmental risks of the project;*
> - *evidence of effectiveness of the methods used for other similar actions;*
> - *demonstration that the proposed measures and outcomes of the BBAMP are supported by published scientific evidence; and*
> - *where innovative measures are proposed, details about how desired outcomes will be met.*

In line with the *Onshore Wind Farm Guidance* (DCCEEW, 2023), specific objectives of individual species to achieve outcomes will be provided. Specific objectives include the implementation of mitigations measures against not to exceed designated thresholds. If thresholds are reached, corrective actions will be implemented.

The BBAMP will be adaptive in response to outcomes of monitoring, detection of potential species triggers that could result due to identified impacts to bird and bats from WTG collisions. This adaptive management framework will involve consultation with BCD for a management response following identification of mortality considered to meet trigger levels for at risk species.

The BBAMP will be implemented during pre-commissioning, and construction, and it is proposed to be implemented across the first two years of operation, commensurate to the level of potential risk to birds and bats resulting from the Project.

7.3.1.3 BASELINE DATA

Baseline data collected to date to inform the BBAMP has been determined through survey events across the broader Project Area completed between 2020 and 2023, literature reviews, desktop searches and statistical analysis.

Prior to field surveys, several desktop sources were reviewed to identify ecological values that may occur within the Subject Land. Desktop analysis was also used to guide development of field survey sampling techniques, followed by a field survey program to collect data to describe on-ground conditions. The information from the desktop sources and field surveys were used to assess and document the likelihood of occurrence and potential occurrence of bird and bat species within the Subject Land.

7.3.2 BIRD AND BAT SURVEY METHODS

A summary of the survey efforts undertaken to date to inform this report were conducted between October 2020 and November 2023. The survey design, including targeted surveys for candidate species with potential to occur in the Subject Land, was developed based on the survey guidelines detailed below. Additional survey effort will be completed to inform the final BBAMP.

Bird utilisation surveys (BUSs) were undertaken across the broader Project Area, which involved fixed point surveys aimed to provide data based on the species present and their height, speed and direction of flight as stipulated by the Band Model (SNH 2012, Band 2000). These survey methods are further detailed below. BUS locations surveyed between Spring 2020 and Summer 2023 totalled 368 BUS surveys. Survey locations are presented in Figure 7-4.

7.3.2.1 2020 – 2022: DAWE ONSHORE WIND FARMS – INTERIM GUIDANCE ON BIRD AND BAT MANAGEMENT

BUSs undertaken between 2020 and 2022 were completed in accordance with guidance by DAWE (2021), provided in the *Onshore Wind Farms – interim guidance on bird and bat management.* Searches were conducted between 15 and 20 minutes at each survey site per season and were primarily focused on birds most likely to be affected by the development, such as raptors (birds of prey) and large flocks of birds. Under the interim guidance, BUSs were required to be completed over each relevant season over a minimum of 24 months prior to commissioning of the wind farm.

Survey Guidelines for Australia's threatened birds (DEWHA, 2011) outlines steps that aid in determining survey effort and timing, noting a particular focus on optimal timing for surveys of 'target' taxa. With the timing of surveys critical to species detection, it is important that surveys be timed to maximise potential detection across the year. As such, BUS survey events were initially proposed over distinct seasons in NSW over a 12-month period.

7.3.2.2 2023: DRAFT WIND FARM ASSESSMENT GUIDANCE

The Draft Wind Farm Assessment Guidance was released in July 2023 and was inclusive of a suggested BUS method. This method was adopted and applied to the Winter - Spring 2023 and Summer – Autum 2024 BUS events. Survey locations were adjusted where required to best align with the current development layout. The Subject Land presents as an open landscape with flat topography allowing for high levels of visibility for avifauna in flight.

BUS events were conducted over 30 minutes, repeated on six (6) occasions at each survey site. The six occasions were completed over the following periods:

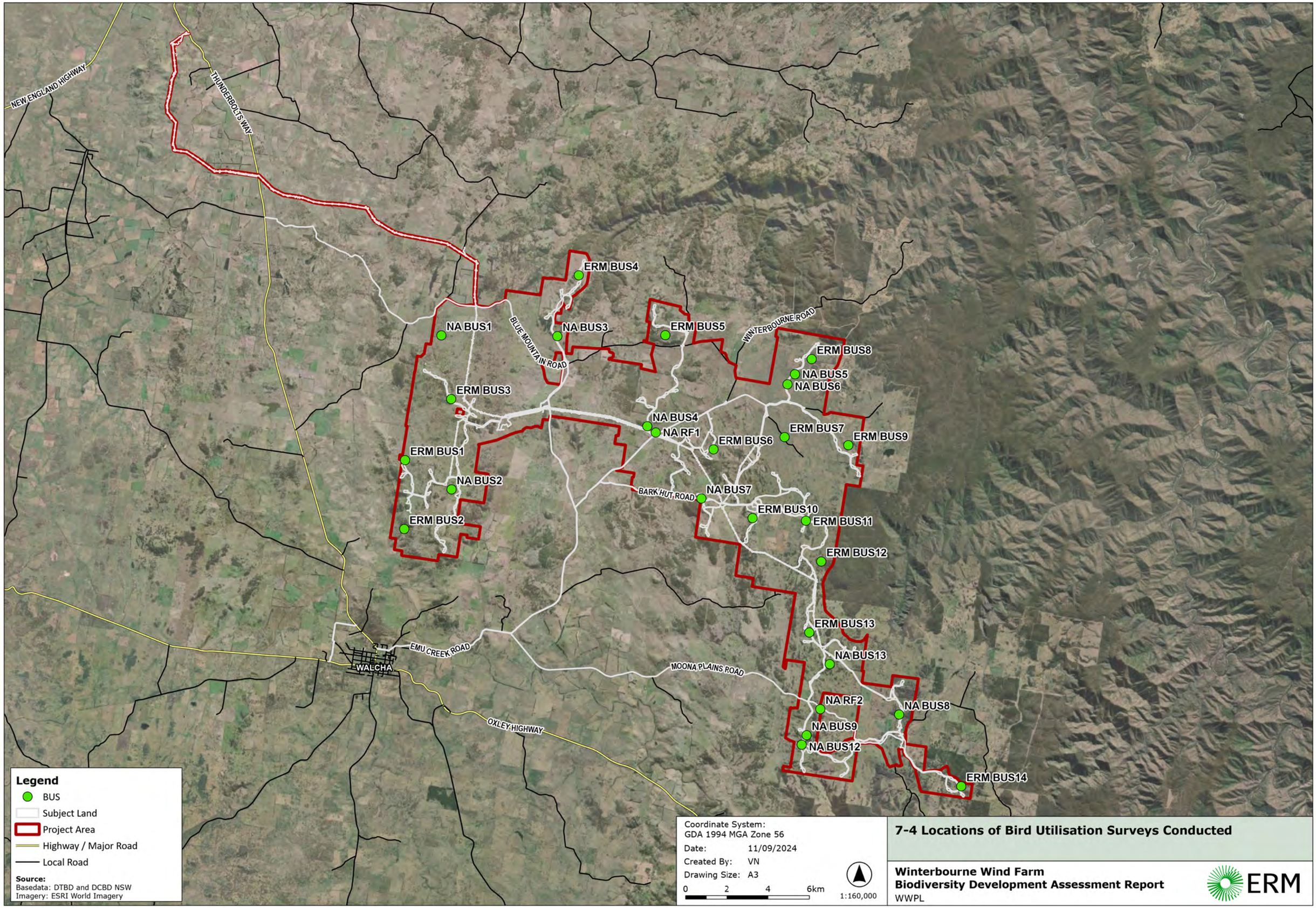
- 2 x Morning (sunrise to 10:00am);
- 2 x Midday (10:00am to 2:00pm); and
- 2 x Afternoon (2:00pm to sunset).

All detections were recorded, irrespective of distance from the survey site, behaviour or flight height of the observed bird/s.

Anabat devices were deployed across the broader Project Area to provide microbat community data. This included the following:

- 8 devices were deployed in Spring 2020 recording for up to 55 nights;
- 8 devices were deployed in Spring 2021 in the same locations as Spring 2020, recording for up to 44 nights;
- 11 devices were deployed in Autumn 2023 in new locations, recording for up to 14 nights; and
- 9 devices were deployed to metmasts (3 metmasts) recording at 3 different heights (2 m, 30 m and 70 m) in Spring 2023 recording for up to 45 nights.

The Applicant has installed Anabat™ devices at height on Met Masts across the Project Area are shown in Figure 7-5.



7-4 Locations of Bird Utilisation Surveys Conducted

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend
- Anabat
- Met Mast
- Subject Land
- Project Area
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

7-5 Locations of Anabat Detectors Deployed

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

7.3.3 PRELIMINARY TURBINE RISK ASSESSMENT

A preliminary turbine risk assessment framework has been developed, considering the likelihood and consequences of events including collision with WTGs and the impact of construction and operation on the proposed development causing changes in site utilisation by bird and bat species.

Before-After-Control-Impact (BACI) is recommended by DCCEEW (2021) as a design principle for surveys where the Subject Land is determined to support significant bird species. The aim of the BACI design is to compare environmental variables before and after a human activity and between the area affected by the development (impact) and an unaffected area (control) (Stewart-Oaten, 1986). In this instance, this would compare control and impact areas, before and after the construction of the windfarm, to determine if there are any avian impacts as a result of the development.

Collision Risk Modelling (CRM) will be undertaken in accordance with the Band CRM Method (Band, 2007) for any non-threatened raptor species and listed threatened and migratory species recorded in the Subject Land and assessed as having a potential collision risk. This will be dependent on the collection of additional data in accordance with the latest BUS guidance.

7.3.3.1 TURBINE PRELIMINARY RISK RATING

A total of 118 WTGs have been proposed across the Subject Land. The Amended Project layout, shown in Figure 2-3 has been refined following preliminary ecological investigations to ensure the suitable avoidance of areas of high ecological value and habitat quality. Risk factors associated with the current turbine layout can be categorized by the proximity of turbines to important habitat features, such as woodlands and important wetlands. A preliminary risk matrix (Table 7-5) has been developed to assess turbine specific risk in relation to available habitat features.

TABLE 7-5 TURBINE PRELIMINARY RISK MATRIX

Risk	Description
Very High	***Very High*** risk based on any of the following being located within **200 m** of the proposed turbine location: • Resident threatened species habitat or non-threatened raptor species habitat. • Migratory or nomadic species habitual flight path • Landscape feature/s likely to increase bird and/or bat activity (including distance to nearest canopy, waterbodies, riparian corridors, updraft locations, caves etc.)
High	***High*** risk based on any of the following being located within **500 m** of the proposed turbine location: • Resident threatened species habitat or non-threatened raptor species habitat. • Migratory or nomadic species habitual flight path • Landscape feature/s likely to increase bird and/or bat activity (including distance to nearest canopy, waterbodies, riparian corridors, updraft locations, caves etc.)
Medium	***Moderate*** risk based on any of the following being located within **1000 m** of the proposed turbine location: • Resident threatened species habitat or non-threatened raptor species habitat. • Migratory or nomadic species habitual flight path • Landscape feature/s known or predicted to increase bird and/or bat activity (including distance to nearest canopy, waterbodies, riparian corridors, updraft locations, caves etc.)

Risk	Description
Low	***Low*** risk based on any of the following being located greater than **1000 m** away (or absent): • Resident threatened species habitat or non-threatened raptor habitat. • Migratory or nomadic species habitual flight path • Landscape feature/s known or predicted to increase bird and/or bat activity (including distance to nearest canopy, waterbodies, riparian corridors, updraft locations, caves etc.)

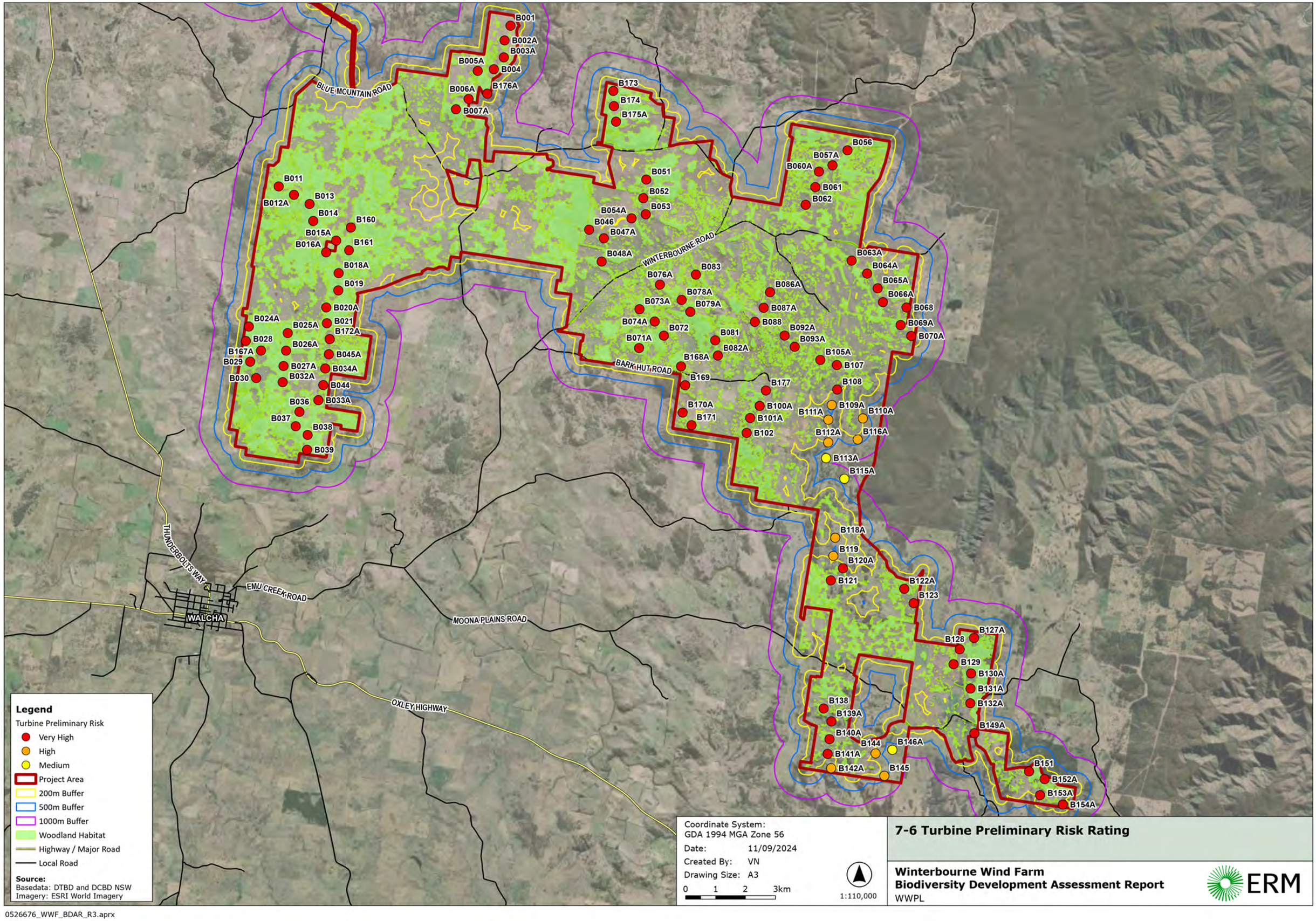
For the purposes of this preliminary turbine risk assessment, potential habitat has been defined as any mapped woodland vegetation regardless of size, quality or composition. To ensure consistency in spatial scale, the extent of mapped vegetation has been informed by State Vegetation Type Map C2.0M2.0 (December 2023). Turbines are predominantly situated within vegetation communities mapped as open eucalypt woodland of the Tableland Clay Grassy Woodlands and New England Grassy Woodlands vegetation classes. Following ground-truthing, these communities have been found to provide foraging and breeding habitat for avifauna and bats and are associated with an increase in species diversity and site utilization. Using the matrix presented in Table 7-5, a preliminary risk rating for each turbine has been established and is presented in Table 7-6.

While this preliminary assessment of turbine risk establishes an estimate of theoretical risk based on the proximity of potential habitat to turbines, species are only considered at risk of collision during flight behaviours at heights within the rotor swept area (RSA). As such, flight paths and collision estimates informed by site specific bird utilisation data is presented in Section 7.3.4 and Section 7.4 of the BDAR.

TABLE 7-6 TURBINE PRELIMINARY RISK RATING

Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating
B001	Very High	B015A	Very High	B029	Very High	B046	Very High	B062	Very High	B074A	Very High	B093A	Very High
B002A	Very High	B016A	Very High	B030	Very High	B047A	Very High	B063A	Very High	B076A	Very High	B100a	Very High
B003A	Very High	B018A	Very High	B032A	Very High	B048A	Very High	B064A	Very High	B078A	Very High	B101A	Very High
B004	Very High	B019	Very High	B033A	Very High	B051	Very High	B065A	Very High	B079A	Very High	B102	Very High
B005A	Very High	B020A	Very High	B034A	Very High	B052	Very High	B066A	Very High	B081	Very High	B105A	Very High
B006A	Very High	B021A	Very High	B036	Very High	B053	Very High	B068	Very High	B082A	Very High	B107	Very High
B007A	Very High	B024A	Very High	B037	Very High	B054A	Very High	B069A	Very High	B083	Very High	B108	Very High
B011	Very High	B025A	Very High	B038	Very High	B056	Very High	B070A	Very High	B086A	Very High	B109A	High
B012A	Very High	B026A	Very High	B039	Very High	B057A	Very High	B071A	Very High	B087A	Very High	B110A	High
B013	Very High	B027A	Very High	B044	Very High	B060A	Very High	B072	Very High	B088	Very High	B111A	High
B014	Very High	B028	Very High	B045A	Very High	B061	Very High	B073A	Very High	B092A	Very High	B112A	High

Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating	Turbine Number	Risk Rating
B113A	Medium	B120A	Very High	B129	Very High	B140A	Very High	B149A	Very High	B161	Very High	B172A	Very High
B115A	Medium	B121	Very High	B130A	Very High	B141A	Very High	B151	Very High	B167A	Very High	B173	Very High
B116A	High	B122A	Very High	B131A	Very High	B142A	High	B152A	Very High	B168A	Very High	B174	Very High
B118A	High	B123	Very High	B132A	Very High	B144	High	B153A	Very High	B169	Very High	B175A	Very High
B119	High	B127	Very High	B138	Very High	B145	High	B154A	Very High	B170A	Very High	B176A	Very High
		B128	Very High	B139A	Very High	B146A	Medium	B160	Very High	B171	Very High	B177	Very High



7-6 Turbine Preliminary Risk Rating

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

Impacts to species during operation of the Project are limited to direct mortality through collision with WTGs, and indirect impacts of barotrauma. Although potentially suitable habitat for listed threatened and migratory species is present throughout the site, not all species move at heights considered to be at risk of collision with WTGs and so the operation of the Project will pose a negligible risk. To identify the potential risk of collision for each Candidate and Ecosystem Credit species, a literature review was undertaken to identify the following aspects of species behaviour and ecology:

- Are there documented maximum flight heights for a species that are below that of the RSA?;
- Is the species known to be behaviorally restricted by the height of available canopy or shrub cover?; and
- Is the species known to rarely disperse over long distances, is behaviorally sedentary or possesses rigid territory boundaries, and does not undertake seasonal migrations?

Risk has been determined as a function of the consequence that a turbine strike is expected to have on a species and the likelihood that a strike will occur.

The BBAMP will further assess turbine risk rating (Table 7-10), informed by the risk matrix of risk level (Table 7-9) which is determined by the level of consequence (Table 7-7) and likelihood.

TABLE 7-7 CONSEQUENCES OF TURBINE STRIKE CRITERIA

Minor	Moderate	Major	Severe
• Protected (non-threatened) species (or no species detected). • Occasional individuals lost but no reduction in local or regional population viability.	• Species listed under BC Act or EPBC Act; • Moderate loss of numbers of individuals leaving to minor reduction in localised or regional population viability between one and five years	• Species listed under BC Act or EPBC Act; • Major loss in numbers of individuals, leading to a reduction in regional or state population viability for between five and ten years	• Species listed as Endangered or Critically Endangered under BC Act or EPBC Act; • Extreme loss in numbers of individuals, leading to a reduction in regional or state population viability for a period of at least 10 years

TABLE 7-8 LIKELIHOOD OF TURBINE STRIKE CRITERIA

Likelihood	Description
Very Likely	***Very High*** likelihood of turbine strike based on any of the following: • Threatened species or non-threatened raptor species known to occur within the Project Area. • Moderate to high amounts of critical breeding and/or foraging habitat known to be present within the Project Area and likely to impacted by the Project. • Flight characteristics of non-threatened raptor or threatened species are known to occur within the RSA. • The Project is located within known migratory or habitual flight pathways; or • Landscape feature/s likely to increase bird and/or bat activity present throughout the Project Area (including distance to nearest canopy, waterbodies, riparian corridors, updraft locations, caves etc.).
Likely	***High*** likelihood of turbine strike based on any of the following: • Species known to occur within the Project Area. • Low to moderate numbers of records within the Project Area within 10 years. • Moderate to high numbers of records within the locality within 10 years (up to 150km from the Project Area). • Species flight height is known to be within RSA and species exhibits flight characteristics more susceptible to collision (soaring, circling at height, etc.). • Moderate to High amounts of breeding or foraging habitat present within the Project Area and likely to be impacted by the Project; or • Landscape feature/s likely to increase bird and/or bat activity present in parts of the Project Area (including distance to nearest canopy, waterbodies, riparian corridors, updraft locations, caves etc.).
Moderately Likely	***Moderate*** likelihood of turbine strike based on any of the following: • Species with the potential to occur within the Project Area. • No to low numbers of records within the Project Area within 10 years. • Low to Moderate numbers of historic records within the Project Area locality within 10 years (up to 150km from Project Area). • Species is known to occasionally fly at heights within the RSA and/or is known to occasionally collide with wind turbines on other projects; or • Low to Moderate amount of potentially suitable habitat for threatened species or non-threatened raptors present within the Project Area.
Less Likely	***Low*** likelihood of turbine strike based on any of the following: • Species not detected or is considered unlikely to occur. • No Records of the species in the Project Area or surrounding locality within 10 years (up to 150km for Project Area). • Species flight heights outside of RSA and/or is not known to have collided with turbines at other sites; or • No to low amounts of threatened species or non-threatened raptor habitat within the Project Area.

TABLE 7-9 RISK MATRIX OF RISK LEVEL BASED ON LIKELIHOOD AND CONSEQUENCE

Likelihood Criteria	Consequence Criteria			
	Severe	High	Moderate	Minor
Very Likely	**Very High**	**Very High**	**Very High**	**High**
Likely	**Very High**	**High**	**High**	**Moderate**
Moderately Likely	**Very High**	**High**	**Moderate**	**Low**
Less Likely	**High**	**Moderate**	**Low**	**Low**

TABLE 7-10 RISK ASSESSMENT SPECIFIC CRITERIA

Risk Category	Category Criteria and Detail
Low	• Species unlikely, or with the potential to occur within the Subject Land. • No records in the Subject Land and locality for 10 years. • No to low record count in the broader locality for 10 years (up to 150 km from Subject Land). • Flight height outside of RSA. • No to low amounts of potential habitat in the Subject Land / no impact to site utilisation.
Moderate	• Species with the potential to occur within the Subject Land. • No records in the Subject Land and locality for 10 years. • Low to moderate records in the broader locality within 10 years (up to 150 km from Subject Land). • Flight height inside of RSA. • Low to moderate amount of potential or suitable habitat in the Subject Land, unlikely to be impacted by the proposed development (such that site utilisation unlikely to be impacted).
High	• Species known, likely or with the potential to occur within the Subject Land. • No to low record count in the Subject Land and locality for 10 years. • Moderate to high record count in the broader locality for 10 years (up to 150 km from Subject Land). • Flight height inside of RSA. • Moderate to high amounts of potential or known habitat in the Subject Land, likely to be significantly impacted by the proposed development (such that site utilisation likely to be impacted).
Very High	• Species known, likely or with the potential to occur within the Subject Land. • Moderate to high amounts of records in the Subject Land and locality for 10 years. • Moderate to high number of records in the broader locality for 10 years (up to 150 km from Subject Land). • Flight height inside of RSA. • Moderate to high amounts of potential or known habitat in the Subject Land, likely to be significantly impacted by the proposed development (such that site utilisation likely to be impacted).

7.3.3.2 ASSUMPTIONS

This approach has the following assumptions:

- That the observer will see the bird on the given day of the surveys, at the given times;
- The number of records is in line with literature on flock size, and number of records recorded within the broader locality of 150 km (from the past 10 years);
- The seasonality of observations and migratory pathways has been taken into account however, it is not certain that such survey periods would capture the species flying through; and
- All sightings of individuals within the Project Area occur within the RSA.

Other factors used to determine bird and bat species risk was whether any site-specific information identified any WTGs that were of 'high risk' to relevant species.

It is emphasized that this risk assessment assumes a worst-case scenario for most of the species, based upon literature and realistic observational expectations. Therefore, the final risk ratings assigned to bird species that have the potential to occur within the Project Area, are conservative and enable this worst-case scenario to be considered. This includes those species assessed as "potentially low" as discussed in the following section. A summary of the risk assessment can be found in Table 7-11.

TABLE 7-11 COLLISION RISK ASSESSMENT OF LISTED PRIORITY SPECIES

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Birds						
Hirundapus caudacutus (White-throated needletail)	V, M	-	Moderate	Moderately Likely	**Moderate**	The White-throated Needle-tail is a migratory species with a global distribution. The species breeds in Siberia, and typically migrates to Australia between September and April. Behavioural observations of the species in Australia suggest it is almost exclusively an aerial flyover species, with only occasional observations of roosting. There is evidence that this species will stop to forage or roost within eucalypt forests while in Australia (Vanderduys, Macdonald, & Pavey, 2024). The species was not recorded during surveys undertaken for the Project. A desktop review of publicly available records (eBird; Cornell University Laboratory of Ornithology) identified recent (since 2019) records of the species within 10 km of the Project Area. Foraging behaviour exhibited by the species may lead to risk of turbine collision in areas where the species is present. There is limited evidence that the species collides with wind turbines (Moloney, Lumsden, & Smales, 2019); therefore, avoidance rates are considered high. Potential foraging habitat for the species is present throughout the Project area and within proximity to WTGs. This species was assessed to have a **Moderate** risk of collision with a Project WTG.
Hieraaetus morphnoides (Little Eagle [Breeding])	-	V	Moderate	Likely	**High**	The Little Eagle has a broad range throughout mainland Australia and can be found in a variety of ecosystems – open woodland, riparian zones, grassland, arid regions in proximity to these habitats. The species does not preference heavily forested areas of the Great Dividing Range. While hunting, the little eagle soars up to 500 m high in search prey. The species will typically take prey on the ground or from trees and shrubs in open woodlands. The species was not observed during surveys undertaken for the Project; however, there were two incidental observations made. One sighting from within, and one sighting from near the Project Area.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
						Suitable habitat for the species is present within 500 m of a Project WTG. This species was assessed to have a **High** risk of collision with a Project WTG.
Glossopsitta pusilla (Little lorikeet)	-	V	Moderate	Less Likely	**Low**	The Little Lorikeet is a nectivore that primarily forages in the canopy of open Eucalypt forests and woodlands, particularly those within riparian woodlands. The species is gregarious, known to travel and feed in small flocks usually up to 10 individuals and will often mix with other species of lorikeets. Nesting is typically within proximity to feeding areas, within tree hollows with an entrance of approximately 3 cm wide. The species is known to occur within the Project area, with one individual detected during surveys undertaken prior to 2022 for the Project (Nature Advisory, 2022; Appendix F). The flight height of this individual was not recorded; however, it was observed flying outside of the RSA. Empirical evidence suggest that this species may fly at heights that would increase risk of collision. Due to the lack of further observations of this species during surveys undertaken for the Project, it is unlikely the species will be present in large numbers. This species was assessed to have a **Low** risk of collision with a Project WTG.
Calyptorhynchus lathami lathami (South-eastern Glossy Black-cockatoo)	V	V	Moderate	Moderately Likely	**Moderate**	The South-eastern Glossy Black-cockatoo has a restricted diet comprised of only the seeds of a few species of *Allocasuarina* and occasionally *Casuarina*. The species requires the presence of suitably sized tree hollows for breeding and favours areas with a high density of old growth trees. The species has been detected in the Project Area. Maximum flight heights are not known for the species and no observed individuals were flying at heights within the RSA however it is likely that individuals will fly at heights considered at risk of collision, particularly when undertaking larger scale movements between foraging and nesting sites.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
						The species has been assessed to have a **Moderate** risk of collision with a Project WTG.
Circus assimilis (Spotted Harrier)	-	V	Moderate	Moderately Likely	**Moderate**	The Spotted Harrier typically inhabits open woodland in semi-arid to arid areas of tropical and temperate Australia. Breeding habitat is characterised by open or remnant woodland. Nests area rarely being built in isolated trees. The species is diurnal, feeding primarily on ground active birds, mammals, and reptiles. The species is nomadic and hunts by hedge-hopping, low soaring and low quartering over open vegetation, often within five m of the ground (BirdLife 2017, Schodde & Tidemann 2007). Spotted Harrier breed in response to prey availability and typically build a new nest, rather than using an existing nest. Display flights involve high soaring, spiraling and plummeting (Schodde & Tidemann 2007). The likelihood of collision with a WTG is considered rare given that they may only encounter the rotor-swept area during breeding display flights. The consequence of collision is minor, considering that the semi-arid and arid parts of Australia are considered the species' stronghold and key breeding areas (BirdLife Australia 2017). The was not observed in the Project Area; however, suitable habitat is present. This species was assessed to have a **Moderate** risk of collision with a Project WTG.
Artamus cyanopterus (Dusky Woodswallow)	-	V	Moderate	Moderately Likely	**Moderate**	The Dusky Woodswallow typically inhabits woodlands and dry open sclerophyll forests, including regenerating forests, as well as farmlands and agricultural lands. The species primarily eats invertebrates which are captured in the air above the canopy or over water. Although maximum flight heights for the species are not known, low number of individuals have been recorded colliding with wind turbines on other sites (Moloney, Lumsden, & Smales, 2019). Anecdotal records indicate that flocks, which may be large, also circle high above the ground when preparing to migrate northward in autumn (Lloyd undated, COG undated). The was observed within the Project Area.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
						The species was assessed to have a **Moderate** risk of collision with a Project WTG.
Anthochaera phrygia (Regent Honeyeater)	CE	CE	Severe	Less Likely	**High**	The regent honeyeater is a critically endangered species with a heavily fragmented population across eastern Australia (Crates, et al., 2018). The species is commonly associated with box-iron bark eucalypt woodland and dry sclerophyll forest (DOE, 2016). The maximum flight heights for the species are not known and it is unknown to what extent the species is at risk of collision with wind turbines. There are no known observations of the species within the Project Area and due to the small population size, it is unlikely that the species will interact with the Project. However, a single mortality will constitute an ecological significant impact to the species. While it is very unlikely that a collision will occur, the species was assessed to have a **High** of collision with a Project WTG.
Burhinus grallarius (Bush Stone-curlew)	-	E	Minor	Less Likely	**Low**	Bush stone-curlew are nocturnal, ground-dwelling birds preferring open forests and grassy woodlands (Murialdo, Kleisner, Wolfenden, & Old, 2015). Although capable of flight, the species rarely does so unless threatened and rarely, if ever, at heights considered to be at risk of collision. While potential habitat may be impacted, no detections have been made of bush stone-curlews across any survey efforts for Project. No historic records are present within the Project Area with the closest known record located in the town of Armidale approximately 34.12 km north. Suitable habitat is present within proximity to Project WTGs; however, this species was assessed to have a **Low** risk of collision with a Project WTGs.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Stagonopleura guttata (Diamond Firetail)	V	V	Minor	Less Likely	**Low**	The diamond firetail is a mostly sedentary species with some local movements. They occur primarily in open eucalypt forest, grassy woodland, heaths and farmland or grassland with scattered trees. Diamond firetails are predominantly ground feeders that eat seeds of various grasses but are also known to feed on seeds of herbs, bushes and trees, as well as insects and worms (Immlemann 1982, Read 1987). They fly low below the canopy and are not known to fly at heights above the canopy unless disturbed. Diamond Firetails are often recorded building their nests into the base of the large stick-nest of a bird of prey, others choose to build their nests among the prickly foliage of shrubs. Nine individuals were recorded in surveys undertaken for the Project in 2022 and suitable woodland habitat is present throughout the Project Area. Regardless, the species is unlikely to be flying at heights within the RSA; therefore this species was assessed to have a **Low** risk of collision with a Project WTG.
Melanodryas cucullata cucullate (Hooded Robin [south-eastern form])	-	V	Minor	Less Likely	**Low**	The hooded robin is a largely sedentary species of robin typically seen in pairs or small groups in areas characterised by dry eucalypt and acacia woodlands and shrublands with an open understory, some grassy areas and a complex understory. Being a shy and unobtrusive species, Hooded Robins are often rather quiet during the day, especially in the afternoon, but are one of the first birds to call in the morning (Birdlife, 2024). Foraging typically occurs at ground level or the first few meters of vegetation height and is not considered to exceed that of the canopy (Antos, Bennett, & White, 2008). The Hooded Robin sits on exposed perches, such as dead branches and stumps and pounces on arthropods. Due to minimal movement ecology and flight and foraging activities not at RAS heights, this species was been assessed to have a **Low** risk of collision with a Project WTG.
Petroica boodang (Scarlet Robin)	-	V	Minor	Less Likely	**Low**	The Scarlet Robin is found in south-eastern and south-western Australia, as well as on Norfolk Island. In Australia, it is found south

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
						of latitude 25°S, from south-eastern Queensland along the coast of New South Wales (and inland to western slopes of Great Dividing Range). The Scarlet Robin lives in open forests and woodlands in Australia, while it prefers rainforest habitats on Norfolk Island. During winter, it will visit more open habitats such as grasslands and will be seen in farmland and urban parks and gardens at this time. The Scarlet Robin feeds mainly on insects and forages on or near the ground. It will sit on a perch and fly down to catch prey. While the species disperses seasonally, movement heights are restricted to the canopy height of available woodland vegetation (Robinson, 1992). Although multiple observations were made at various BUS locations, as well as opportunistically over multiple surveys by ERM, the species is not considered to be at heights at risk of collision. Therefore, this species was assessed to have a **Low** risk of collision with a Project WTG.
Petroica phoenicea (Flame Robin)	-	V	Minor	Less Likely	**Low**	The flame robin is a small woodland species considered to be a ground-foraging insectivore but have been found to 'hawk' for aerial insects. The flame robin is generally migratory throughout its range, moving from alpine and sub-alpine areas to lowlands during colder months. Although recognized as a highly mobile species, movement is within the canopy with known heights not considered to extend far beyond these heights. While an individual was observed at BUS5 by ERM in Spring 2023 and suitable habitat is present within 200m of WTG, the species is unlikely to be flying at heights within the RSA and was assessed to have a **Low** risk of collision with a Project WTG.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Pachycephala olivacea (Olive Whistler)	-	V	Minor	Less Likely	**Low**	The olive whistler are small and largely sedentary woodland species found typically in wet forests between 500 and 1500m. Olive whistlers are known to forage between the canopy and the ground and are not known to fly at heights that extend beyond the tree line (Higgins & Peter, 2002). The Olive Whistler mainly feeds on invertebrates, some seed and leaves. It forages from the trees down to the ground, usually in dense vegetation. While suitable habitat is present within 500m of a WTG, the known behaviour of the species is unlikely to result in flight within the RSA; therefore, the species was assessed to have a **Low** risk of collision with a Project WTG.
Chthonicola sagittate (Speckled Warbler)	-	V	Minor	Less Likely	**Low**	The speckled warbler is a small bird found in open eucalypt forest, particularly those containing rocky gullies, tussock grasses and scattered logs with a sparse shrub cover. The species is known to forage almost exclusively at lower strata or at ground level; however, will fly to the canopy when disturbed (Tzaros, 1996). Although four individuals were observed at BUS3 by NA in Autumn 2021 and suitable habitat is present within proximity to WTGs, the known behaviour of the species is unlikely to result in flight within the RSA; therefore, the species was assessed to have a **Low** risk of collision with a Project WTG.
Climacteris picumnus victoriae (Brown Treecreeper [eastern subspecies])	V	V	Minor	Less Likely	**Low**	The Brown Treecreeper is found along the east coast of Australia. Specifically, this species occurs from South Australia, Victoria through NSW to Queensland. The Brown Treecreeper does not always forage in trees. Unlike most other treecreepers, it often spends just as much time foraging on the ground in eucalypt forests and woodlands. It hops over fallen branches and other debris where it gleans insects and other invertebrates from among the deep layers of leaf litter. However, when foraging in trees, the Brown Treecreeper spirals up the trunk in the characteristic manner of other treecreepers, gleaning insects from the surface or probing cracks and crevices in the bark. The brown treecreeper is not known to move far beyond the canopy and dispersal is limited to connected patches of eucalypt-dominated woodland, or where there are

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
						paddock trees in suitable distances for dispersal. While suitable habitat may be present the species was assessed to have a **Low** risk of collision with a Project WTG.
Tyto novaehollandiae (Masked Owl)	-	V	Moderate	Moderately Likely	**Low**	The Australian masked owl inhabits forests, woodlands and timbred waterways particularly in areas with a dense shrub cover. The species is reliant on the presence of mature hollow bearing trees located within proximity to foraging areas for roosting and breeding (Todd, Kavanagh, Penman, Bell, & Munks, 2018). While specific maximum flight heights are not known, the species is noted to be heavily influenced by the behaviours of suitable prey species which are taken at ground level or below the canopy (McNabb, McNabb, & Barker, 2003). Masked Owl hunts by low quartering through forest or clearings or by perch-pounce from vegetation or the ground (Schodde & Tidemann 2007). Although little information is available about dispersal methods, it is likely that the dispersing owls fly between patches of similar habitat along vegetated corridors. No records are known within the Project Area and the species has not been detected following survey effort to date. Isolated records are present along the Apsley River approximately 3.14km south of the Project Area within the Oxley Wild Rivers National Park. Although woodland habitat is abundant throughout the Project, the species is considered unlikely to fly at heights considered within the RSA. In the event of a collision, the consequence is considered minor (may cause non-significant changes to the local abundance of species), as the species is not known to occur on site and breeding is not known to occur in the project area. Therefore, the Masked Owl was assessed to have a **Low** risk of collision with a Project WTG.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Ninox strenua (Powerful Owl)	-	V	Moderate	Moderately Likely	**Low**	The powerful owl inhabits forests, woodlands, and riparian vegetation. The species is reliant on the presence of hollow-bearing trees for nesting as well as to support arboreal prey items. The Powerful Owl swoops upon prey (mostly arboreal mammals) within the canopy and sub-canopy of woodland and forest. It is unlikely to encounter the rotor-swept area during foraging. Although powerful owls may occasionally fly at large heights over gullies, flight and foraging behaviour is thought to be largely restricted to just above or below the available canopy (Carter, et al., 2019; Bradsworth, et al., 2022). While dispersing, it is likely that the dispersing owls fly between patches of similar habitat along vegetated corridors. Although woodland habitat is abundant throughout the Project, the species is unlikely to fly at heights within the RSA; therefore, the species was assessed to have a **Low** risk of collisions with a Project WTG.
Ninox connivens (Barking Owl)	-	V	Moderate	Less Likely	**Low**	The barking owl is a medium sized owl that typically inhabits woodlands and open forests, including those in disturbed agricultural landscapes. The barking owl preferentially hunts small arboreal mammals but will persist on birds, invertebrates and terrestrial mammals when tree hollows become less abundant. Barking owls are reliant on the presence of suitably sized hollows for breeding and maintain permanent defines territories which can be up to 6000ha. Maximum flight heights are not known for the species however as a specialist of arboreal mammals it is unlikely that the species will fly at heights much greater than the canopy unless flying over gullies. The species is known to be present on site following positive detections by Nature Advisory (Appendix F) and was assessed to have a **Low** risk of collision with a Project WTG.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Haliaeetus leucogaster (White-bellied Sea-eagle [Breeding])	-	V	Moderate	Moderately Likely	**Moderate**	The white-bellied sea-eagle is distributed throughout coastal areas and in proximity to large waterbodies in inland Australia (Marchant & Higgins, 1993). Breeding habitat is typically located close to water and typically within tall open forests or woodland (Marchant & Higgins, 1993). Although the Project Area lacks large areas of permanent wetlands, an active nest was observed in the north-west of the Project Area from 2019. The species was assessed to have a **Moderate** risk of collision with a Project WTG.
Lophochroa leadbeateri (Pink Cockatoo)	E	V	Moderate	Less Likely	**Low**	The Pink Cockatoo occurs in the Murray– Darling, Eyre and Bulloo River basins from Isisford and Roma in the north, through western New South Wales to north-west Victoria and west to eastern South Australia (Higgins 1999).The pink cockatoo is associated with arid and semi-arid woodlands of inland Australia (DCCEEW, 2023). In fragmented landscapes, they tend to travel along vegetated corridors to feeding sites (DSE 2004) where they take seeds of native shrubs and trees, especially cypress pines, and some insect larvae and seeds of some crops and weeds (Higgins 1999). The Project Area is not considered to be within the distribution of the species and no suitable habitat is present. The species was assessed to have a **Low** risk of collision with a Project WTG.
Lophoictinia isura (Square-tailed Kite)	-	V	Moderate	Less Likely	**Medium**	The square-tailed kite is a specialised canopy-dwelling predator and can be found in several different habitats. The Square-tailed Kite forages over coastal and subcoastal, eucalypt-dominated open forests and woodlands, and inland riparian woodland. It also forages over coastal heathlands, and often near openings and edges of forest (Marchant & Higgins, 1993). When hunting, the kite quarters and circles over tree canopies and occasionally soars (Schodde & Tidemann 2007). No historic records are present within the Project Area with the closest known record located approximately 26.96km west. The NSW Scientific Committee (2009) considers that "windfarms may cause occasional collision mortalities of Square-tailed Kites, although this species is a very manoeuvrable, slow flyer and is probably capable of generally avoiding collisions with turbines

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
						blades." However, the consequence of a Square-tailed Kite collision with a turbine is considered potentially significant due to the low fecundity, low breeding density and low recruitment, as well as it being a sparsely distributed species across its range. While suitable habitat is present within proximity to turbines this species is not considered to be at risk of collision with WTGs and was assessed to have a **Medium** risk of collision with a Project WTG.
Anseranas semipalmata (Magpie Goose)	-	V	Moderate	Less Likely	**Low**	The magpie goose is a widespread waterbird throughout Australia and is typically found in areas of open wetlands, floodplains and swamps (Morcombe, 2000). Although the species is thought to be largely sedentary, large flocks are known during periods of inundation. Although agricultural dams are present throughout the Project Area, these are small and unlikely to provide suitable habitat for breeding and foraging. Historic observations are not known within the Project Boundary within the last 10 years with the closes record being located at Dangars lagoon near the town of Uralla approximately 20km northwest of the Project Area. While it is possible that individuals may occasionally occur, the species was assessed to have a **Low** risk of collision with a Project WTG.
Botaurus poiciloptilus (Australasian Bittern)	E	E	Moderate	Less Likely	**Low**	The Australasian Bittern is found in coastal and sub-coastal areas of south-eastern and south-western mainland Australia, and the eastern marshes of Tasmania. The species frequents reedbeds and other areas, particularly those dominated by sedges, rushes, reeds or cutting grass. The species is generally sedentary and spends most of their time on the ground, both nesting and hunting. Historic observations are not known within the Project Boundary within the last 10 years. The Project Area is not considered to be within the likely distribution of the species. While it is possible that individuals may occasionally occur, the species was assessed to have a **Low** risk of collision with a Project WTG.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Daphoenositta chrysoptera (Varied Sitella)	-	V	Moderate	Less Likely	**Low**	Found in Eucalypt woodlands and forests, moving swiftly between trees or foraging busily over branches or the trunk. Flight heights are largely restricted to canopy heights of vegetation. Varied Sitellas feed mainly by gleaning on tree trunks or branches, moving downwards or along branches, searching for insects. They land at the top of a tree and work downwards, searching and poking into cracks and under things. Historic observations are observed within the Project Area, as well as detected at multiple locations across multiple seasons, however none at RSA heights. While it is known that individuals occur, the species is unlikely to occur at RSA heights and was assessed to have a **Low** risk of collision with a Project WTG.
Falco hypoleucos (Grey Falcon)	V	V	Major	Less Likely	**Moderate**	The Grey Falcon is a highly mobile and dispersive or migratory species, occurring in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia (Marchant and Higgins 1993). When they have been occasionally seen outside of these areas, they have been found in similar dry, low altitude, open woodland or grassland, however they are essentially confined to the arid and semi-arid zones (Schoenjahn 2018). The species is always found at very low densities, with population size estimated at about 1,000 mature individuals (Schoenjahn 2011, 2013; Mullin *et al.* 2020b; Schoenjahn *et al.* 2020). Historic observations are not known within the Project Boundary within the last 10 years with the closest record being located southeast of Uralla and approximately 19.14km northwest of the Project Area. While it is considered unlikely that the species will interact with the Project due to a lack of suitable habitat, a single mortality is likely to have a major impact due to the low population size for the species. As such, the species was assessed to have a **Moderate** risk of collision with a Project WTG.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Rostratula australis (Australian Painted Snipe)	E	E	Moderate	Less Likely	**Low**	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Australian Painted Snipe breeding habitat requirements is quite specific, shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. Nest records are all, or nearly all, from or near small islands in freshwater wetlands (D. Rogers 2002, pers. comm.) There are no historical observations recorded in the Project Area or adjacent. The Project Area is not considered to be within the distribution of the species and no suitable habitat is present. The species was assessed to have a **Low** risk of collision with a Project WTG.
Stagonopleura guttata (Freckled Duck)	-	V	Minor	Moderately Likely	**Low**	The freckled duck is mainly situated throughout inland regions of the Eastern section of the country. Due to habitat requirements, distribution of the freckled duck directly correlates to water flow, preferring large bodies of fresh water with thick vegetation. Usual contenders are recently flooded wetland systems and swamps. This species does not appear to have any sort of distinct migratory pathway or seasonal migration to find suitable breeding habitat (Blakers, M.; Davies, S.; Reilly, P. N. (1984)). There are no historical observations recorded in the Project Area, closest records have been observed approximately 20.29km northwest of the Project Area. The Project Area is not considered to be suitable habitat; therefore, the species was assessed to have a **Low** risk of collision with a Project WTG.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Grus rubicunda (Brolga)	-	V	Minor	Less Likely	**Low**	The Brolga is found across tropical northern Australia, southwards through north-east and east central areas, as well as central New South Wales to western Victoria. The Brolga inhabits large open wetlands, grassy plains, coastal mudflats and irrigated croplands and, less frequently, mangrove-studded creeks and estuaries. It is less common in arid and semi-arid regions but will occur close to water. There are no historical observations recorded in the Project Area or adjacent. The Project Area is not considered to be within the distribution of the species and no suitable habitat is present. The species was assessed to have a **Low** risk of collision with a Project WTG.
Falsistrellus tasmaniensis (Eastern False Pipistrelle)	-	V	Moderate	Moderately Likely	**Moderate**	The Eastern False Pipistrelle is known to hunt beetles, moths, weevils and other flying insects above or just below the tree canopy. They inhabit tall, mature, wet forests, generally roosting in eucalypt hollows or in buildings. The species is known to be present within the Project Area following bat call analysis. Potentially suitable woodland habitat is present throughout the Project Area and occurs within proximity to turbines. Maximum flight heights for the species are not well understood however the species is known to collide with wind turbines in other parts of its distribution (Symbolix, 2020). The species was assessed to have a **Moderate** risk of collision with a Project WTG.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Pteropus poliocephalus *(Grey-headed Flying Fox)*	V	V	Moderate	Moderately Likely	**Moderate**	The distribution range is at the eastern regions of the Australian continent, mostly within 200 kilometres of the coast. The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands. The Grey-headed Flying-fox is highly mobile (Menkhorst 1995; Tidemann 1998) and the national population is fluid, moving up and down the east coast in search of food. Potentially suitable woodland habitat is present throughout the Project Area and occurs within proximity to turbines. Maximum flight heights for the species are not well understood however the species is known to collide with wind turbines in other parts of its distribution (Symbolix, 2020). The species was assessed to have a **Moderate** risk of collision with a Project WTG.
Miniopterus orianae oceanensis (Large Bent-winged Bat)	-	V	Moderate	Moderately Likely	**Moderate**	Large Bent-winged Bats occur along the east and north-west coasts of Australia. Usually, caves are their primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. They feed mainly on moths and other flying insects. They fly quickly above the treetops in valleys, making fast dives to catch prey. The species is known to be present within the Project Area following bat call analysis. Potentially suitable woodland habitat is present throughout the Project Area and occurs within proximity to turbines. Maximum flight heights for the species are not well understood and mortality records could not be found for other wind farms within its distribution however emerging literature has identified microbats as being susceptible to mortality due to collision and barotrauma (Cryan, et al., 2014); and so the species may be of risk of collision. The species was assessed to have a **Moderate** risk of collision with a Project WTG.

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
Miniopterus australis (Little Bent-winged Bat)	-	V	Moderate	Moderately Likely	**Moderate**	Inhabits moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bent-winged Bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. There are only five nursery sites /maternity colonies are known in Australia. The species is known to be present within the Project Area following bat call analysis. Potentially suitable woodland habitat is present throughout the Project Area and occurs within proximity to turbines. Maximum flight heights for the species are not well understood and mortality records could not be found for other wind farms within its distribution however emerging literature has identified microbats as being susceptible to mortality due to collision and barotrauma (Cryan, et al., 2014); and so the species may be of risk of collision. The species was assessed to have a **Moderate** risk of collision with a Project WTG.
Scoteanax rueppellii (Greater Broad-nosed Bat)	-	V	Moderate	Less Likely	**Low**	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands; however, does not occur at altitudes above 500 m. Know to utilise a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects. It usually forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. The species is not known to be present within the Project Area following bat call analysis, however there is a probable chance. Potentially suitable woodland habitat is present throughout the Project Area and occurs within proximity to turbines however as the Project Area is located at an elevation above 500 m

Species	Threatened Species Status		Consequence of Event	Likelihood of Event	Risk Rating	Comments
	EPBC Act	BC Act				
						above sea level, the species is unlikely to be present. The species was assessed to have a **Low** risk of collision with a Project WTG.
Saccolaimus flaviventris (Yellow-bellied Sheath-tailed bat)	-	V	Moderate	Moderately Likely	**Moderate**	Yellow-bellied Sheathtail-bats occur in a range of habitats including rainforest, woodland and grassland (Churchill 2008). Yellow-bellied Sheathtail-bats are fast, agile predators that intercept insects in flight. They utilise open and semi-open microhabitat just above the canopy of a range of vegetation communities (McKenzie et al. 2002, Richards 2005a). They may occur more than five metres from the tree canopy (McKenzie et al. 2002). They fly fast and straight most often 15-25 m above the ground even in open habitat, although they may also fly close to the ground (Churchill 2008, Rhodes & Hall 1997, Kitchener 1987). The species is known to be present within the Project Area following bat call analysis. Potentially suitable woodland habitat is present throughout the Project Area and occurs within proximity to turbines. Maximum flight heights for the species are not well understood however the species is known to collide with wind turbines in other parts of its distribution (Symbolix, 2020). The species was assessed to have a **Moderate** risk of collision with a Project WTG.

Status listing per EPBC and BC Acts: CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory; LC = Least Concern; SLC = Special Least Concern.

7.3.4 HEAT MAPPING

Bird abundance and site utilisation is highly variable throughout the Project Area and is heavily influenced by the availability and suitability of habitat, topography, and season. Where turbines are in areas of higher site utilisation, particularly flight heights within the RSA, higher rates of collision and mortality are expected. In order to identify these high-risk areas, heat mapping of bird abundance has been undertaken in order to map areas that may represent flight paths across the Project Area.

A heat mapping generated from the bird utilisation data collected across all seasonal surveys is shown in Figure 7-7. A 1km radius was applied to each BUS location sampled to reflect the approximate average survey area in which an accurate species identification with a high level of confidence could be obtained. Total species abundance observed at each BUS point was then applied as a gradient to identify areas of higher utilisation.

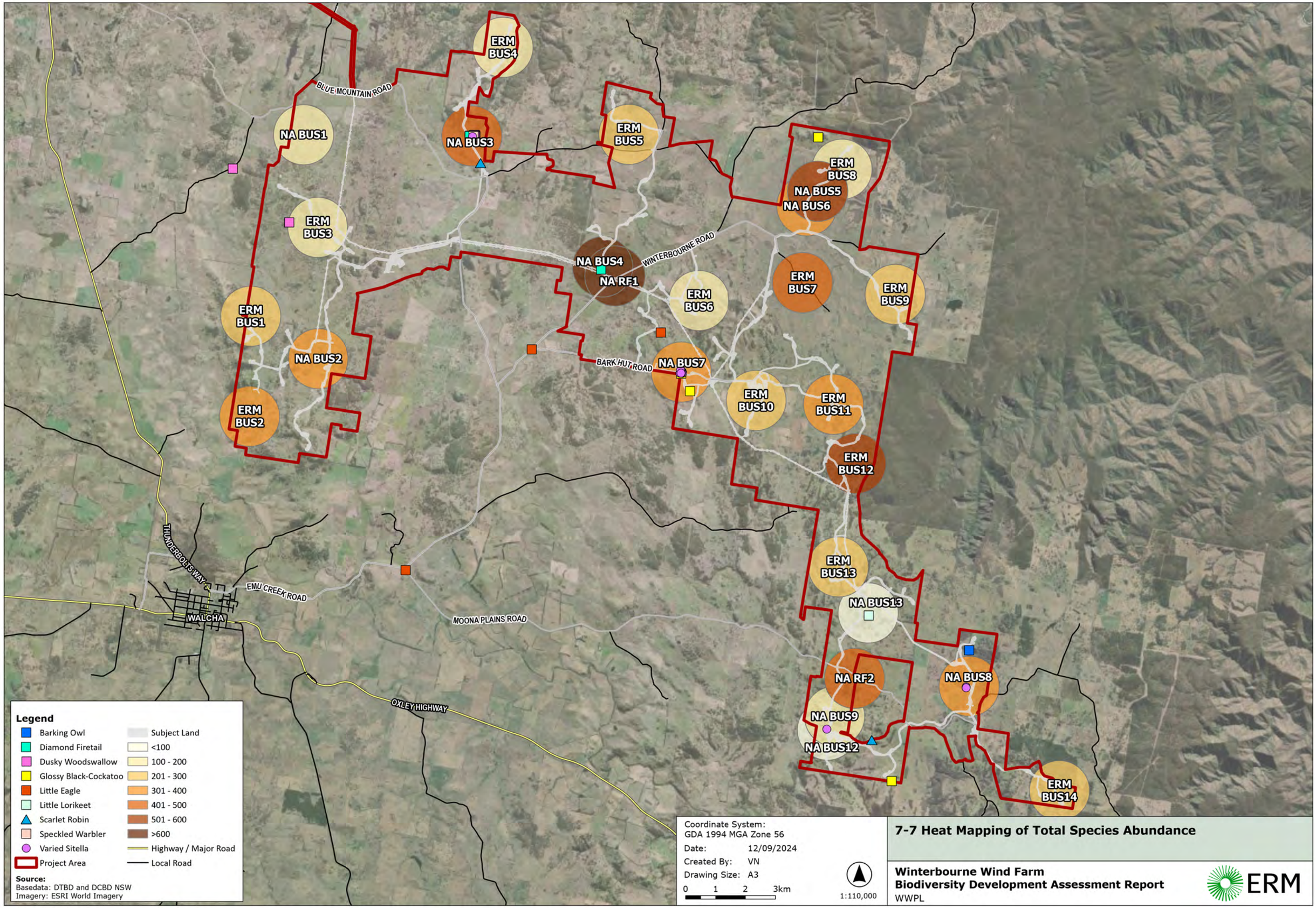
Due to the large size of the Project Area, mapping of flight paths using a heat mapping approach is limited to sampled survey locations within proximity to indicative turbine locations. Incidental observations of potentially at-risk raptors, and species observed flying at heights considered at risk of collision (within the RSA) were recorded beyond the extent of sampled BUS locations and offer important insights into site level movements for species.

7.3.4.1 TOTAL SPECIES ABUNDANCE

Mapped site utilisation in relation to abundance of all species observed is presented in Figure 7-7. A colour gradient has been applied to the buffered BUS location based on the total abundance of individual birds across all detected species from all survey periods completed by ERM and NGH.

A colour gradient has been applied ranging from <100 to >600 individuals. Although mapped woodland vegetation is present throughout the site, much of this has been significantly disturbed by agricultural land use practices. Areas of high bird abundance are located within proximity to larger and denser patches of vegetation that likely provide more suitable habitat for a higher diversity of species. Higher bird abundance is also present in areas of more contiguous vegetation, particularly associated with the Pasley Gorge National Park located to the Site’s east.

Although heat mapping possesses a degree of bias towards locations sampled during survey events, incidental observations of threatened species made during traversing the site show similar correlations between site utilisation and more contiguous vegetation. Of these species, the Dusky Woodswallow, Little Eagle, Wedge-tail Eagle, and Glossy Black-cockatoo are of particular interest in the risk of collision with wind turbines. While these species are highly mobile, the presence of higher abundance is likely to reflect a higher suitability of habitat and thus greater potential for an interaction with a turbine. Flight height is an important element to collision risk, which is further evaluated in the mathematic al collision risk modelling.



0526676_WWF_BDAR_R3.aprx

7.3.4.2 SPECIES ABUNDANCE WITHIN THE RSA BY DISTANCE

Although suitable habitat for at risk bird species is present throughout much of the Project Area, site utilisation is not constant across the whole Project Area.

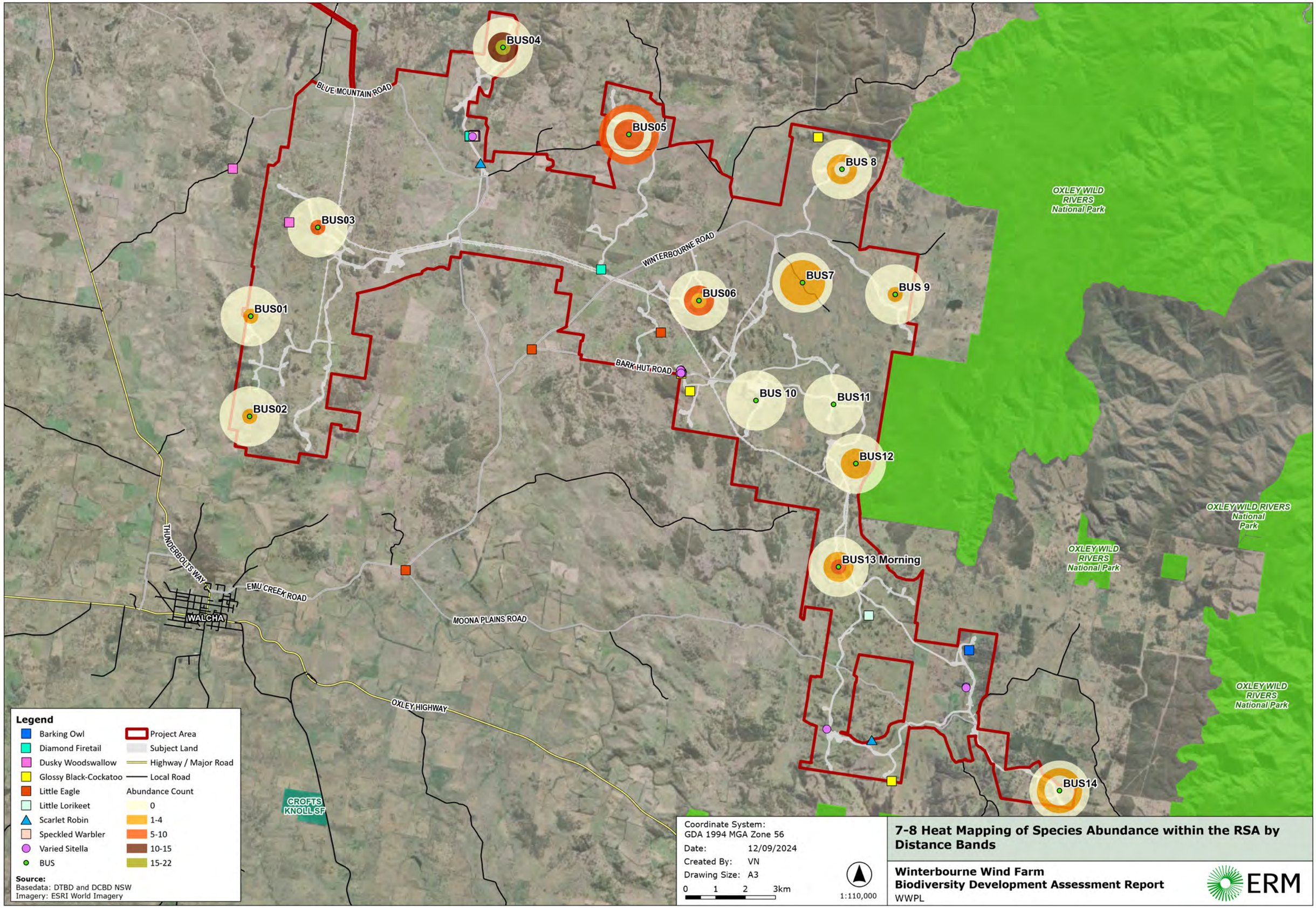
While total species abundance can provide meaningful insights into avifauna site utilisation as a whole, Figure 7-7 is heavily influenced by the presence of species that are not considered to be at risk of collision, particularly woodland species, as they do not fly in the RSA.

Figure 7-8 provides heat mapping of the total abundance of bird observed flying at heights within the RSA. Observations have been separated into distance bands of 250 m increments from the BUS location to provide further detail regarding site utilisation at the local scale.

As the distance estimates of birds is unknown for those observation collected by Naure Advisory, only data collected by ERM has been used in this analysis. Flight height within the RSA was relatively low across much of the Project Area with most survey locations reporting less than four individuals flying at 70 m or higher.

Flight heights within the RSA were highest at BUS04 and BUS05 to the north of the Project Area. These areas of the site contain are of higher elevation and steep ridgelines with pockets of vegetation in gullies. These changes in topography may influence the variation flight heights observed across BUS locations when compared to BUS locations in flatter areas.

Although preliminary assessments of turbine risk provided in Section 7.3.3 provides a highly conservative estimate of potential risk, this is based solely on the proximity of habitat in linear distances form the turbine and is not able to account for potential changes to collision risk due to several factors such as topography, level of connectivity, patch size, vegetation type and site utilisation. While birds are highly mobile, it is expected that at risk flight behaviour will be more abundant in the north of the Project Area where conditions are favourable for raptors to forage at height and more contiguous vegetation is present.



7-8 Heat Mapping of Species Abundance within the RSA by Distance Bands

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

7.4 MATHEMATICAL COLLISION RISK MODELLING

The Band Collision Risk Model (Band, 2007) will be used to predict the total number of bird collisions that may result from the Project. This method of CRM requires the input of parameters that describe species-specific biometrics, flight speeds and characteristics and the expected amount of flight activity as derived from field surveys in the Subject Land. It also requires the input of WTG specific information such as the blade size and pitch, hub height and rotor rotation period as well as the proportion of time the WTG will be operational (Band, 2007).

The CRM should use observational BUS data to determine the flight heights, frequency of time spent in the RSA for the species known to occur within the RSA. Literature may be used to determine average flock size, but observational data must be used for presence/absence of species, as well as time spent within the RSA. This follows the process of determining:

- Stage 1: the number of birds or bats colliding per annum = the number of birds or bats flying through the RSA); and
- Stage 2: the probability of the bird or bats flying through the RSA being hit (Band, Madders & Whitfield 2007).

Stage 1 depends on bird surveys at vantage points used to gather information on frequency of bird and bat flights in the RSA (Band, Madders & Whitfield 2007) and has been informed from data across 6 survey periods across both relevant seasons in the Project Area. This also depends on the flock size of the species as well as the species activity during the year (e.g., whether it is diurnal or nocturnal, migratory or present all year round).

Stage 2 depends on the characteristics of the bird and bat such as length and wingspan, as well as the breadth and pitch of the WTG blades, rotation speed of the WTG and average flight speed of birds and bats identified as flying in the rotor swept volume (Band, Madders & Whitfield 2007).

A CRM model has been developed based on site specific observations and data.

Further to this, the interim guidelines for birds and bats (as of December 2021) and State Code 23 (SDAP version 3.0, February 2022) have listed that CRM only be undertaken for listed threatened and/or migratory species, or raptors, that occur within the RSA and that are identified as at risk from the proposed development. Therefore, the risk assessment has identified species at risk of collision with WTGs, and those which occur within the RSA (or that have been concluded as low to moderate risk) have been considered for inclusive in the CRM.

7.4.1 BIRD UTILISATION SURVEY GUIDELINES

The BAM guidance for wind farm turbine strike assessment and adaptive impact management has undergone changes since the commencement of seasonal surveys. As of June 2023, BUS length was required to be 30 minutes with six replicates across three time periods for each season. This survey effort was not required prior to the implementation of these updated guidelines and surveys prior to this were conducted for 20 minutes. To maintain consistencies in modelling output, all survey samples are assumed to be 30 minutes in duration regardless of the guidelines in place at the time of survey. While this assumption may lead to an increased modelled annual collision estimate for each species the output can be considered the most conservative estimate.

7.4.2 ASSUMED BIRD FLIGHT ACTIVITY

BUS provide site specific data to inform bird utilization; however, are limited by the short sampling period length within a single twelve-month period. For the purposes of the collision risk model, bird utilisation is assumed to be constant across year regardless of the season. Average hours of daylight (the time between dawn and dusk) have been calculated using data obtained from Geoscience Australia's Geodetic Calculator and have been used to calculate the proportion of time birds spent within the RSA per year. Although the times that birds are active at heights within the RSA is likely to vary depending on season, weather, and bird functional groups, to establish the most conservative estimate of collision risk annually, it has been assumed that birds are active for 100% of available daylight hours.

7.4.3 SPECIES MORPHOMETRICS

To calculate the total numbers of collisions per annum for each species, species specific morphometric data including wing length, body length, and flight speed is required. Flight speeds are not well understood for Australian birds and where estimates of flight speeds could not be found from within the scientific literature, estimates have been taken from closely related species of similar size.

For those species in which flight speeds could be sourced, only the maximum observed flight speed could be found. Birds likely to be interacting with wind turbines are expected to only rarely fly at maximum speeds and so collision risk may fluctuate to a degree depending on the speed in which the bird is flying.

7.4.4 COLLISION RISK MODEL INCLUSION CRITERIA

The following section details the CRM and the process that was undertaken for the threatened, migratory and raptor species considered for the proposed development CRM. The species that were assessed as having a low, high, and very high risk of impact from the proposed development, as determined by the risk assessment, were considered for the CRM.

To accurately model collision risk for a species, a minimum number of observations are needed. This BBAMP has only undertaken collision risk modeling for those species with a minimum of three observations of flight heights within the RSA. Although listed threatened species have been detected within the Project Area following seasonal surveys, no observations of listed species have been made flying at heights considered at risk of collision and so a CRM has not been completed for these species. Based on seasonal surveys completed to date a total of five species have been recorded in sufficient numbers to undertake a CRM.

Individuals of five additional species (Black-shouldered Kite, Channel-billed Cuckoo, Little Pied-cormorant, Forest Raven and Crimson Rosella) have been observed flying within the RSA however there is insufficient data to model estimates of expected mortalities at this time. A residual risk is still present however and where additional surveys post construction identifies further observations of at-risk flight heights this CRM can be updated accordingly.

The following Section details the CRM and the process that was undertaken for the threatened, migratory and raptor species considered for the proposed development CRM.

The risk assessment identified the following three categories listed in Table 7-12.

TABLE 7-12 COLLISION RISK MODEL INCLUSIVE CRITERIA

Risk Category	Category Criteria and Detail	Included in CRM
Low	• Species unlikely, or with the potential to occur within the Subject Land; • No records in the Subject Land and locality for 10 years; • No to low records in the broader locality for 10 years (up to 150 km from Subject Land); • Flight height outside of RSA; and • No to low amounts of potential habitat in the Subject Land / no impact to site utilisation.	NO
Moderate	• Species with the potential to occur within the Subject Land; • No records in the Subject Land and locality for 10 years; • Low to moderate records in the broader locality for 10 years (up to 150 km from Subject Land); • Flight height inside of RSA; and • Limited potential habitat in the Subject Land/ no to low impact to site utilisation.	YES (only with sightings in RSA)
High	• Species known, likely or with the potential to occur within the Subject Land; • No to low amounts of records in the Subject Land and locality for 10 years; • Moderate to high records in the broader locality for 10 years (up to 150 km from Subject Land); • Flight height inside of RSA; and • Limited to moderate known and potential habitat in the Subject Land / likely impact to site utilisation.	YES (only with sightings in RSA)
Very High	• Species known, likely or with the potential to occur within the Subject Land; • No to low amounts of records in the Subject Land and locality for 10 years; • high records in the broader locality for 10 years (up to 150 km from Subject Land); • Flight height inside of RSA; and • moderate to high known and potential habitat in the Subject Land / likely impact to site utilisation	YES (only with sightings in RSA)

Only the species that were assessed as having a low and moderate risk of impact from the proposed development, as determined by the risk assessment, were considered for the CRM. It is noted that no observations of listed threatened and/or migratory species flying within the RSA were made during the field surveys. For that reason, only raptor species that are of low or moderate risk, have been analysed as part of the CRM. It is noted that species with a low risk, that have not been recorded in the RSA, will be monitored for, during future surveys.

Additionally, such species will be considered for any potential impacts in the future if they are to occur within the RSA for the proposed development.

7.4.5 WINDFARM AND WTG PARAMETERS

Table 7-13 details the WTG parameters of the planned infrastructure for the proposed development. These parameters have been used in the CRM for the Project Area to calculate collision risk for detected species under different scenarios.

TABLE 7-13 WTG PARAMETERS FOR THE PROPOSED DEVELOPMENT

WTG Parameters	WTG Specifications
Number of WTG	118
WTG Hub Height	149 m
WTG Rotor Diameter	162 m
RSA Height	68-230 m (lowest point and highest point)
Number of Blades	3
Chord Width of Blades	4.3 m
Average Pitch Angle of Rotor	5 degrees
Average Rotation Period of WTG	5 Seconds
Project Area	21,844 ha

7.4.6 BIRD SPECIES PARAMETERS

Table 7-14 provides morphometric parameters, known behavioural traits, and observations of site utilisation following seasonal surveys. The parameters presented below have informed the collision risk model undertaken for each species and have been obtained through a combination of literature review and field observations. The range of flight heights and flock size of the species does not reflect the observed flight heights during survey seasons to date, but rather a maximum estimate based on known behaviours.

TABLE 7-14 SPECIES OBSERVED WITHIN THE RSA

Species Name	Wingspan (cm)	Length (cm)	Flight Speed (m/s)	Range of Known Flight Heights for the Species (m)	Number of Modelled Sightings in the Project Area during Survey Period	Total Minutes Sighted in RSA during Survey Periods
Wedge-tailed Eagle	230	110	16.7	0-2000	189	5670
Australian Raven	100	50	20.1	0-200	25	750
Nankeen Kestral	74	30	17.4	0-200	16	480
Brown Falcon	115	45	13.6	0-200	8	240
Whistling Kite	146	45	30	0-200	3	90

7.4.7 COLLISION RISK MODELLING RESULTS

A summary of model output for preliminary collision risk model is presented in Table 7-15 . Three different avoidance scenarios (95%, 98%, and 99%) have been included.

For the five species included in the model, collision risk has been calculated as the number of collisions per species per annum. It is expected that birds in practice show a high level of avoidance of WTGs (Band, Madders, & Whitfield, 2007). However, avoidance rates have not been calculated for all species and research is necessary to determine each species-specific avoidance rates. For this CRM, 95% 98% and 99% avoidance rates have been used to calculate collision numbers per annum for the given species. These avoidance rates are what is typically used in CRM exercises (Smales and Muir, 2005).

TABLE 7-15 MODEL CRM ESTIMATED COLLISION NUMBERS PER ANNUM

Estimated annual number of collisions (based on a rotor swept range of 68-230 m)			
Species Name	**Avoidance Scenario**		
	95%	**98%**	**99%**
Nankeen Kestrel	0.15	0.06	0.03
Wedge-tailed Eagle	2.84	1.14	0.57
Australian Raven	0.06	0.02	0.01
Brown Falcon	0.07	0.03	0.01
Whistling Kite	0.05	0.02	0.01
Total	**3.17**	**1.27**	**0.63**

In total, this CRM Model indicates that between less than one and three birds are expected to collide with the WTGs per year. This is the worst-case scenario, based on the modelling approach as described. Based on the field investigations that have been undertaken as well as the literature providing the maximum parameters for the species, the total annual collision numbers in the above table are considered the 'worst-case' scenario for the project.

7.4.8 COLLISION RISK MODEL PEER REVIEW RECOMMENDATIONS

The peer review of the CRM was undertaken by Principal Consultant Peter Wright, with 15 years' experience and Senior Consultant Sebastian Ellis, with 4 years' experience, from the ERM Europe Business Unit. These two professionals have each worked on multiple Projects that require the use of CRM using the Band Model, throughout the UK and Europe.

Overall, the peer review detailed the Band Model as an adequate model to analyse the data collected from the survey effort of the Project Area. To provide a more robust, and conservative estimate of collision risk, the peer review detailed several measures to improve the model output.

Table 7-16 details a summary of the recommendations from the peer review.

TABLE 7-16 CRM PEER REVIEW RECOMMENDATIONS AND IMPLIMENTATION

Peer Review Recommendations	Implementation into CRM
• Use of hypothetical data, or data from a broader area than the windfarm Subject Land leads to a large amount of uncertainty and undermines confidence in the model. If a species is not recorded in the survey area but is expected, further survey effort would be preferable to utilisation of data from a wider area. Bird activity is typically site specific, with topography, habitat, food/prey availability and other factors all influencing bird flight activity at any one location. Although regional datasets may provide information on bird density that can be extrapolated to a proposed wind farm site, the CRM requires additional assumptions to be made around bird occupancy (e.g., number and duration of flights at potential collision risk height) or bird flux (number of regular flights through the wind farm at collision risk height). As with all models, the more assumptions made for the model inputs, the more uncertainty there is in the outputs.	• On the guidance of the peer review model, as well as the literature review of models used throughout the world for CRM, hypothetical modelling is not an accurate way to understand the collision risk for a proposed development. using this recommendation, only birds that have been observed within the RSA for the Project Area, will be included in the CRM prepared as part of this BDAR.
• Reference to WTG and bird specific parameters need to be made and justified.	• The parameters for the WTGs are based upon the worst-case scenarios. Bird morphology and flight speed parameters were based on literature and observational data.
• The calculation of bird occupancy across the whole site requires equal duration of survey effort across all areas of the site (e.g., if 2 hours survey is undertaken at 3 locations simultaneously to cover the whole site then this equates to 2 hours surveyed across the site rather than 6 hours in total).	• The calculation for time spent surveying the Project Area was based on surveys conducted by two ecologists at one time. BUS were never conducted simultaneously but rather were conducted one after the other during the survey periods. Therefore, the total time spent surveying the Project Area was calculated based on the accumulation of all survey minutes conducted during each BUS in the Project Area, where no overlap occurred during surveying.
• It is recommended that a rule of 2 km visibility per vantage point survey (BUS equivalent in the UK) be used to calculate the total area surveyed.	• Implementing this recommendation would provide more accurate representation of the total area surveyed across the Project Area. For each BUS point, a visibility estimate was given to be 1 km, which provided a more conservative estimate than the 2 km recommended. This would account for areas with low visibility due to vegetation density, topography and weather.
• The initial infrastructure footprint was calculated using a 100m buffer. In the UK, a 500m buffer around the infrastructure to calculate the risk envelope is typically used.	• A 500 m buffer of the disturbance footprint has been applied to ensure any impacts are not underestimated and provide a worst-case collision risk estimate.

Peer Review Recommendations	Implementation into CRM
• Bird parameters used to calculate collision risk should be referenced and the input of 'flapping' bird behaviour should be applied over 'gliding' bird behaviour to give a precautionary outcome.	• Bird parameters used for the CRM referenced 'flapping' bird behaviour applied.
• One of the assumptions used in the model is that each flight observed lasted 30 minutes duration. No justification is provided for using this value, and best practice would be to use actual flight durations recorded from site specific surveys.	• The data that was recorded was the bird presence within the RSA (68-230 m) and direction flying. The survey effort did not capture the total time that the birds sighted spent in the RSA. • Each BUS lasted for 30 minutes and therefore it was concluded that if any bird was seen during that BUS within the RSA, that it was seen for the total 30 minutes within the RSA. • This does not give the exact period of observation in the RSA, but instead provides the total maximum time the bird could have been sighted in the RSA. Therefore, this provides a conservative and worst-case timeframe for observations in the RSA.
• Incorrect application of avoidance rates and 98% avoidance rates should be applied.	• Avoidance rates have now been implemented correctly for 95%, 98% and 99% avoidance for each bird species, and given as a range.

7.4.9 COLLISION RISK MODEL LITERATURE REVIEW

Australia has been increasingly adopting renewable energy projects, with 94 operational wind farms present in the country as of October 2022, and that number predicted to grow exponentially in the coming years (Australian Renewable Energy Agency, 2023) to meet evolving renewable energy targets.

Collision risk is a factor that needs to be considered from an environmental impact perspective which looks to the collision risk to avian species, if they were to fly within the RSA of a wind farm. Increase in WTGs has resulted in adverse effects on many avian species, through both direct fatalities as a result of the collision with WTG rotor blades as well as secondary impacts such as the result of habitat alteration and loss and the changes in normal flight paths as a result of WTG presence/habitat loss (Drewitt and Langston, 2006, Madders and Whitfield, 2006).

Collision risk is particularly important to determine and account for in proposed wind farm areas where bird species present at a higher risk of decline, such as those of conservation significance. This is such that even a few fatalities can grossly alter the maturing and reproductive rates of a species, thus potentially result in regional and national declines (Drewitt and Langston, 2006, Loss et al., 2013). Other species that are vulnerable to collision with WTGs are high-flying soaring birds of prey, such as raptors (Martin et al., 2022). Collision-related mortality is spread unevenly among species where few species often account for a large proportion of collisions (Madders and Whitfield, 2006, de Lucas et al., 2008, Watson, 2018). Collision risk will also vary dependent on each species, based on factors such as foraging behaviour, flight height, flock sizes, morphology and flight speed (Drewitt and Langston, 2006, de Lucas et al., 2008, Barrios and Rodríguez, 2004). WTG collision rates will vary based on variables such as time of day and time of year, based on the number of birds present in an RSA (Murgatroyd et al., 2018, May et al., 2010).

Raptors are known to utilise thermal soaring (slow circle-soaring flight on thermals) which is highly dependent on weather conditions. Under less favourable conditions for the species to gain altitude, WTG collision risk may be increased with the birds not tending to engage in active flight (Barrios and Rodríguez, 2004, Johnston et al., 2014b, Marques et al., 2014). This is such that the bird is soaring and not actively flapping through an airspace. This may prolong the amount of time it's present within the risk window of a WTG. It has been studied in a wind farm that most raptors will spend little time in a defined collision risk zone, but will often intersect in and out of the risk window (Linder et al., 2022a)

Important predictors of collision risk for raptors have been studied and some of the main findings include that active flight can lead to a higher risk of collision with the tendency for a bird to dissect the path of multiple WTGs in an area (Linder et al., 2022a). Furthermore, track tortuosity can also impact collision risk, such that less tortuosity increases collision risk. This is important as tortuous tracks can be a result of raptors utilising thermal soaring, and thus, thermal soaring may actually reduce collision risk, which is consistent with other studies having been conducted on the topic (Péron et al., 2017, Janss, 2000).

Collision risk models (CRM) have been developed to assess the risk of impact to species as a result of wind farms. It is noted that such models are only able to assess the risk as a result of direct mortality from WTG hits, and not as a result of other impacts like habitat loss and flight redirection. A study by Masden and Cook (2016) reviewed 10 models that have been used broadly to assess the probability of bird species colliding with WTGs during passage through a Project dependent RSA. The methods that were assessed were divided into those based on observational flight data, where flight behaviour, habitat use and flux of birds are analysed, as well as those that focus primarily on collisions based on theoretical parameters in the absence of bird data. The study by Masden and Cook (2016) explained that all collision risk models involve the following:

- To calculate the probability of a collision occurring assuming no evasive action – which requires information on bird morphometrics, flight speed and WTG rotor speed and size; and
- To measure the of the number of birds within a risk window each year – which is formulated based on actual observational data, or theoretical behavioural flight data for species in a given wind farm Project Area.

Table 7-17 shows a summary review of four of the main models mentioned in Masden and Cook (2016), including the Band Model which was used for the proposed development. For each model, this table presents the objective of the model, inputs required as well as the limitations or main assumptions of the model.

TABLE 7-17 COMPARISON OF COLLISION RISK MODELS

Collision Risk Model	Objective and Benefits of the Model	Limitations and Assumptions of the Model
Tucker Model (Tucker, 1996a, Tucker, 1996b).	• The model analyses the motions and dimensions of both birds and propeller-type rotor blades and predicts the probability of a collision when the bird flies through the RSA (Tucker, 1999a). • This model can account for upwind and downwind flights of birds.	• Does not measure a likely number of collisions as a measure of bird density; • Blades are 1 or 3 dimensional which consist of length, chord and twist; • Bird always considered to be gliding, and never flapping in flight behaviour; • Bird dimensions are always rectangular with a wingspan that always exceeds length; • Does not consider the collision with the WTG tower; and • Avoidance behaviour is mainly left out of this model.
Band and Band Model (Band 2007; and Band 2012).	• The model was developed to take into considered the probability of a WTG blade that occupies the same space as a bird, and the time taken for the bird to pass through the rotor swept volume (RSV) of the area occupied by this WTG. • It has two stages for estimating collisions per year: 1) number of birds flying through the rotor and 2) the probability of collision from a single transit of a rotor. • This model accounts for avoidance or evasive behaviour by implementing an avoidance rate often between 95-99%. • Bird specific parameters are included into this model such as bird length, wingspan, height and flight activity (diurnal/ nocturnal/ migratory). • WTG parameters considered such as diameter, length, operational time, rotor speed, hub height. • Considers bird both when flapping and gliding. • Updates as part of 2012 were made to consider offshore wind farms (not applicable to the proposed development).	• In this model the bird is assumed to be a cruciform shape; • The thickness of the WTG blade still not included into this model; • This model only assumes the bird is flying parallel to the wind, such that it is flying perpendicular to the rotation of the WTG; • Assumes effects of approaching WTG at oblique angles will cancel out, although this may underestimate collision risk; and • Does not consider the collision with the WTG tower. • Can be observational data heavy, when normally in Projects the data can be quite limited.

Collision Risk Model	Objective and Benefits of the Model	Limitations and Assumptions of the Model
Monte Carlo Model (McAdam, 2005)	• This model is based upon the original Band Model however includes stochastic modifications to account for variation in flight height and the effects of wind. • This model calculates the probability of bird being struck given it has passed through the plane of the WTG at a given height and distance less than the rotor length from the centre. • This model considers the effect of wind variation on collision variation through the variance of bird speed as well as changes in the direction of the WTG.	• Includes same limitations of Band Model. • This model includes oblique angles but not bird orientation relative to WTG.
Biosis Propriety Limited (Smales et al., 2013).	• This model has been developed to provide a prediction of the number of collisions between WTGs and a local or migratory group of birds. • This model acknowledges that birds won't only approach WTG at a perpendicular angle, but flights can occur from any direction. • Considers the moving and stationary parts of the WTG – including the WTG tower that may be a factor to consider for bird collisions. • Considers bird parameters and WTG parameters considered as in the Band Model. • Considers avoidance rates of birds.	• This model does not consider when the collisions will occur. • Due to statistically minor numbers of collisions that are concluded from the model – it is unlikely that they will be evenly distributed in time. • Can be observational data heavy, when normally in Projects the data can be quite limited.

As well as the limitations above, the following are considered are limitations for all the models:

- Most models assume that avoidance behaviour is constant across all individuals within a species and this is unlikely;
- Can overestimate bird collisions;
- Data incorporated is often count data of number of individuals in the species – the same individual may be counted more than once, however it can only be used in the model once, assuming collision equates to mortality – distinguishing individuals of a species is difficult (Eichhorn et al., 2012) circumvents above limitation by using an agent-based model to describe movements of individuals through a landscape and applying collision risk to each individual but this is specific to a single species, the red kite; and
- Species-specific behaviours, topography and wind parameters not considered for majority of the models.

There are many other models, however, the CRM that was chosen for this proposed development was the Band Model, also known as the Scottish Natural Heritage (SNH) Model. This Band Model was chosen based on its ability to calculate the estimate of collision per year for a bird species which is a pre-construction assessment of collision impacts on local and national populations (SNH, 2016). It considers extensive bird species and WTG model parameters, that ensure that it is specific and situation dependent.

The limitations of the Band Model as discusses in Band et al. (2007) include the following:

- Birds may be more evident and prominent in some habitats;
- Birds may be easier to identify when flying at different elevations;
- Detection rate may differ for different species;
- Plotting routes of flying birds is difficult due to parallax and can be a skill that takes time to develop; and
- For gliding species such as eagles, it can be hard to tell their correspondence to landscape, however this can be circumvented by having knowledge of the species expected to be seen and knowledge of terrain.

It is noted that the disadvantage of the Band Model is that it does not necessary take into account the direction flying of the bird within the Project Area. Such information is important to identify higher risk areas. Nonetheless, this information is accounted for within the risk assessment and identifies areas of high bird activity that will require further surveying in future. Such limitations are all relevant to the proposed development and the CRM undertaken for the species relevant to the Project Area. All species identification parameters and detection rates are going to be the same across all CRM types as this comes down to survey effort rather than the model itself. It is noted that the 95% avoidance rate is dealt with within the Project Model through accounting for 98% and 99% avoidance rates as a result of research done by SNH (2016).

There is constant research going into collision risk, especially with the expansion of renewable energy into new countries and areas, including offshore windfarms. Due to the limited records of listed threatened species (none of which occur within the RSA) that occur within the RSA, as well as the limited raptors within the RSA, the use of the Band Model is considered an adequate model to assess the collision risk associated impacts of the proposed development on bird and bat species. Furthermore, the parameters used this model are based on field observations as well as information from literature, and therefore is a conservative estimate of the collision risk to species which does not limit the data or the outcomes.

7.4.10 CUMULATIVE COLLISION RISK ASSESSMENT FRAMEWORK

While the assessment of potential impacts of wind farms on bird and bat populations is well understood at the scale of a single wind farm, the potential cumulative impacts of multiple adjacent wind farms is not well understood in Australia.

Cumulative impacts refer to the effects of two or more developments and can be described as:

- Additive, where the total cumulative impact is considered the sum of the individual impacts of each relevant wind farm project (Scottish Natural Heritage, 2018);
- Antagonistic, where the cumulative impact is less than the sum (additive) impacts of the multiple individual projects (Scottish Natural Heritage, 2018); or
- Synergistic, where the cumulative impacts are greater than the sum (additive) impacts of the multiple individual projects (Foden, Rogers, & Jones, 2010).

Assessing these cumulative impacts is likely to be important for species known to occupy a wide distribution, occur in low densities, or disperse over large distances (Ian Smales, Impacts of avian collisions with wind power turbines: an overview of the modelling of cumulative risks posed by multiple wind farms, 2006). For such species, these cumulative impacts may be more severe than the sum of individual projects and may impact the suitability and success of species-specific management frameworks (Canter & Kamath, 1995).

Sedentary species that do not typically disperse long distances are only at risk of collision when individual home ranges coincide with wind farms, with most of the population not at risk by proposed infrastructure. For those species that migrate seasonally, particularly across large distances or within narrow flyways, it is possible that large numbers of the population will pass through multiple wind farms over the course of an annual migratory cycle. Example species include the orange-bellied parrot, *Neophema chrysogaster,* and swift parrot, *Lathamus discolor* (Reid , Barry Baker, & Woehler, 2023) and listed migratory species.

Current approaches to cumulative collision models operate under key assumptions, as described by Scottish Natural Heritage (2018). These are:

- The impacts remain constant over the lifetime of the development;
- The impacts from the project are independent of changes in population size or species distribution (although this can be partially addressed through population modelling); and
- Collision risk estimates of a wind farm are independent from those collision risk estimates identified by nearby wind farms.

7.4.10.1 CUMULATIVE COLLISION RISK ASSESSMENT FRAMEWORK METHODOLOGY

To identify bird populations at high risk of cumulative impacts of wind farm projects within the NQSH, a cumulative collision risk assessment (CCRA) framework has been developed to identify the processes to be applied to identify and quantify collision impacts. This framework has been adapted from previous international best practice examples for identifying and assessing cumulative impact assessments for large wind farm projects and the *Assessing the cumulative impacts of onshore wind farms on birds* (Scottish Natural Heritage, 2018)

The CCRA framework follows five (5) steps which can be broadly summarised as:

1. Identify a preliminary list of potentially at-risk species based on publicly available records of bird observations and bird utilisation surveys completed across component Projects;
2. Assess the sensitivities of populations to identify priority at-risk species that may be subject to potential cumulative impacts. Sensitivity refers to the conservation status, the likelihood of presence based on suitable habitat, and likelihood of occurring within the Rotor Swept Area (RSA) based on known flight heights, potential flightpaths and flyways and bird flight behaviours;
3. Estimate the cumulative collision risk for species based on project specific annual likelihood of collision estimates derived from collision risk modelling and monitoring for each component Project;
4. Determine thresholds of fatalities for each species that constitutes a significant ecological loss to the population when assessed cumulatively; and
5. Identify management and mitigation measures to be employed across all projects.

More detail on these five steps relevant to the Project is provided in the following sections.

7.4.10.2 STEP 1: DESKTOP ASSESSMENT OF POTENTIAL AT RISK SPECIES

This CCRA framework has identified the potential at-risk species that are relevant to the Project.

As required by the BAM Wind Farms – turbine strike assessment & adaptive impact assessment (DCCEEW 2024) desktop assessments were undertaken for each project to identify ecological values that may occur within each of the project areas. Each of these assessments is presented within the respective bird and bat management plans and preliminary documentation and inform the on-ground survey effort needed. To quantitatively identify those species at risk of the cumulative impacts of each wind farm, further desktop assessment has been undertaken across a broader scale.

The protected matters search tool (PMST) provides predictive results of matters of national environmental significance based on mapping of known and potential species distribution, habitat, ecological communities, and wetlands. The outputs are based on modelling results and do not necessarily reflect known records of species or communities. A landscape approach was taken with the PMST and a larger buffer (50 km) was applied to more effectively target migratory, and naturally rare occurring or low-density species with the potential to be present.

Records of these at-risk species were sourced from the Atlas of Living Australia (ALA) to identify broad patterns of bird utilisation, abundance and distribution at larger scales to understand the importance of the Project Area.

7.4.10.3 IDENTIFIED AT RISK SPECIES

A desktop assessment using the EPBC Act PMST identified listed threatened and migratory species under the EPBC that are either known to occur, likely to occur, or whose habitat is likely to be present Table 7-18. This list of species provides a baseline from which potentially at-risk species will be identified based on species-specific ecology and behaviour, known distributions, flightpaths and observations from bird utilisation surveys completed across the Project.

TABLE 7-18 IDENTIFIED AT RISK SPECIES

Scientific Name	Common Name	EPBC Act Status	BC Act status
Cyclopsitta diophthalma coxeni	Coxen's Fig-Parrot	Critically Endangered	Critically Endangered
Calidris ferruginea	Curlew Sandpiper	Critically Endangered, migratory	Endangered
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Critically Endangered
Lathamus discolor	Swift Parrot	Critically Endangered	Endangered
Melanodryas cucullata cucullata	Hooded Robin (south-eastern)	Endangered	Endangered
Tringa nebularia	Common Greenshank, Greenshank	Endangered, migratory	-
Erythrotriorchis radiatus	Red Goshawk	Endangered	Endangered
Atrichornis rufescens	Rufous Scrub-bird	Endangered	Vulnerable

Scientific Name	Common Name	EPBC Act Status	BC Act status
Botaurus poiciloptilus	Australasian Bittern	Endangered	Endangered
Rostratula australis	Australian Painted Snipe	Endangered	
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)	Vulnerable	Vulnerable
Falco hypoleucos	Grey Falcon	Vulnerable	Vulnerable
Turnix melanogaster	Black-breasted Button-quail	Vulnerable	Critically Endangered
Stagonopleura guttata	Diamond Firetail	Vulnerable	Vulnerable
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	Vulnerable	Vulnerable
Gallinago hardwickii	Latham's Snipe	Vulnerable, Migratory	-
Hirundapus caudacutus	White-throated Needletail	Vulnerable, migratory	Vulnerable
Polytelis swainsonii	Superb Parrot	Vulnerable	Vulenrable
Grantiella picta	Painted Honeyeater	Vulnerable	Vulnerable
Aphelocephala leucopsis	Southern Whiteface	Vulnerable	Vulnerable
Calidris acuminata	Sharp-tailed Sandpiper	Vulnerable, Migratory	-
Neophema chrysostoma	Blue-winged Parrot	Vulnerable	Vulnerable
Rhipidura rufifrons	Rufous Fantail	Migratory	-
Actitis hypoleucos	Common Sandpiper	Migratory	-
Symposiachrus trivirgatus	Spectacled Monarch	Migratory	-
Apus pacificus	Fork-tailed Swift	Migratory	-
Calidris melanotos	Pectoral Sandpiper	Migratory	-
Motacilla flava	Yellow Wagtail	Migratory	-
Cuculus optatus	Oriental Cuckoo	Migratory	-
Myiagra cyanoleuca	Satin Flycatcher	Migratory	-
Pandion haliaetus	Osprey	Migratory	Vulnerable
Monarcha melanopsis	Black-faced Monarch	Migratory	-
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable
Nyctophilus corbeni	Corben's Long-eared Bat,	Vulnerable	Vulnerable
Hieraaetus morphnoides	Little Eagle	-	Vulnerable
Circus assimilis	Spotted Harrier	-	Vulnerable
Artamus cyanopterus	Dusky Woodswallow	-	Vulnerable
Burhinus grallarius	Bush Stone-Curlew	-	Vulnerable
Petroica boodang	Scarlet Robin	-	Vulnerable
Pachycephala olivacea	Olive Whistler	-	Vulnerable

Scientific Name	Common Name	EPBC Act Status	BC Act status
Chthonicola sagittate	Speckled Warbler	-	Vulnerable
Petroica phoenicea	Flame Robin	-	Vulnerable
Tyto Novaehollandiae	Masked Owl	-	Vulnerable
Ninox strenua	Powerful Owl	-	Vulnerable
Haliaeetus leucogaster	White-bellied Sea-eagle	-	Vulnerable
Lophochroa leadbeateri	Pink Cockatoo	E	Vulnerable
Lophoictinia isura	Square-tailed Kite	-	Vulnerable
Anseranas semipalmata	Magpie Goose	-	Vulnerable
Daphoenositta chrysoptera	Varied Sitella	-	Vulnerable
Stagonopleura guttata	Freckled Duck	-	Vulnerable
Grus rubicunda	Brolga	-	Vulnerable
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	Vulnerable
Miniopterus orianae oceanensis	Large Bent-winged Bat	-	Vulnerable
Miniopterus australis	Little Bent-winged Bat	-	Vulnerable
Scoteanax rueppellii	Greater Broad-nosed Bat	-	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed bat	-	Vulnerable

7.4.11 ASSESSMENT OF SPECIES SENSITIVITY

Risk of turbine strikes, and barotrauma is likely to be restricted to those species flying at heights equivalent with those of the RSA, Confirmation of flight heights within the RSA can be provided for those species where positive detections have been made following BUS. For those species not detected across the Project, or where site utilisation has not been observed within the RSA but a potential collision risk still exists, species behaviour and known flight heights have been considered to identify those species most at risk of collision and barotrauma.

Based on species behaviour and ecology, six broad categories have been established to inform an assessment of sensitivity to the presence of wind farms. These are:

- Resident raptors: Those species of raptors that are typically known to maintain sedentary home ranges that may potentially overlap with wind farms;
- Migratory shorebirds: Migratory species with global distributions that are present in Australia for specific time periods or to complete specific life stages;
- Migratory flyover species: Migratory species with global distributions that are entirely or almost entirely aerial when present in Australia;
- Endemic Listed Birds: species listed under the EPBC Act;
- Endemic Wetland birds: Species of wading or wetland birds that are either non-migratory, or if migratory, will only migrate throughout Australia; and

- Threatened bats: species listed under the EPBC Act and BC Act as threatened and with modelled distributions overlapping with the Project Area.

TABLE 7-19 SPECIES SENSITIVE TO CUMULATIVE IMPACTS BASED ON FUNCTIONAL GROUPS

Scientific Name	Common Name	Category
Birds		
Aquila audax	Wedge-tailed Eagle	Resident raptor
Haliastur sphenurus	Whistling Kite	Resident raptor
Falco berigora	Brown Falcon	Resident raptor
Falco cenchroides	Nankeen Kestrel	Resident raptor
Pandion haliaetus	Osprey	Resident raptor
Falco hypoleucos	Grey Falcon	Resident raptor
Erythrotriorchis radiatus	Red Goshawk	Resident Raptor
Apus pacificus	Fork-tailed Swift	Migratory flyover
Hirundapus caudacutus	White-throated Needletail	Migratory flyover
Calidris melanotos	Pectoral Sandpiper	Migratory shorebird
Actitis hypoleucos	Common Sandpiper	Migratory shorebird
Rostratula australis	Australian Painted Snipe	Endemic Wetland birds
Calidris ferruginea	Curlew Sandpiper	Migratory shorebird
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Migratory shorebird
Calidris acuminata	Sharp-tailed Sandpiper	Migratory shorebird
Tringa nebularia	Common Greenshank, Greenshank	Migratory shorebird
Polytelis swainsonii	Superb Parrot	Endemic Listed Birds
Lathamus discolor	Swift Parrot	Endemic Listed Birds
Calyptorhynchus lathami lathami	South-eastern Glossy-black Cockatoo	Endemic Listed Birds
Anthochaera phrygia	Regent Honeyeater	Endemic Listed Birds
Neophema chrysostoma	Blue-winged Parrot	Endemic Listed Birds
Botaurus poiciloptilus	Australasian Bittern	Endemic Listed Birds
Cyclopsitta diophthalma coxeni	Coxen's Fig-Parrot	Endemic Listed Birds
Hieraaetus morphnoides	Little Eagle	Resident Raptor
Circus assimilis	Spotted Harrier	Resident Raptor
Artamus cyanopterus	Dusky Woodswallow	Endemic Listed Birds
Burhinus grallarius	Bush Stone-Curlew	Endemic Listed Birds
Petroica boodang	Scarlet Robin	Endemic Listed Birds
Pachycephala olivacea	Olive Whistler	Endemic Listed Birds
Chthonicola sagittate	Speckled Warbler	Endemic Listed Birds

Scientific Name	Common Name	Category
Petroica phoenicea	Flame Robin	Endemic Listed Birds
Tyto Novaehollandiae	Masked Owl	Resident Raptor
Ninox strenua	Powerful Owl	Resident Raptor
Haliaeetus leucogaster	White-bellied Sea-eagle	Resident Raptor
Lophochroa leadbeateri	Pink Cockatoo	Endemic Listed Birds
Lophoictinia isura	Square-tailed Kite	Resident Raptor
Anseranas semipalmata	Magpie Goose	Endemic Wetland birds
Daphoenositta chrysoptera	Varied Sitella	Endemic Listed Birds
Stagonopleura guttata	Freckled Duck	Endemic Wetland birds
Grus rubicunda	Brolga	Endemic Wetland birds
Bats		
Pteropus poliocephalus	Grey-headed Flying-fox	Threatened bat
Nyctophilus corbeni	Corben's Long-eared Bat, South-eastern Long-eared Bat	Threatened bat
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Threatened bat
Miniopterus rianae oceanensis	Large Bent-winged Bat	Threatened bat
Miniopterus australis	Little Bent-winged Bat	Threatened bat
Scoteanax rueppellii	Greater Broad-nosed Bat	Threatened bat
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed bat	Threatened bat

7.4.11.1 SENSITIVITY RISK ASSESSMENT

A risk assessment of sensitivity is proposed to follow the same methodology as the collision risk assessment provided in Section 3.1. This approach has the following assumptions:

- The number of records is in line with literature on flock size, and number of records recorded within the broader locality of 150 km (from the past 10 years);
- The wind farms assessed as part of this framework's implementation are the only wind farms in which the species will be interacting with; and
- All instances of individuals interacting with the wind farms will occur within the RSA.

7.4.12 CUMULATIVE COLLISION RISK MODELLING

7.4.12.1 ESTIMATING INDIVIDUAL SITE RISK

The initial stage for modelling the cumulative impacts of wind farms on at risk bird and bat species is to determine a level of risk posed be each individual wind farm. This is already undertaken as part of the approvals process for assessment under the EPBC Act in accordance with the BAM Wind Farms – turbine strike assessment & adaptive impact assessment (DCCEEW 2024).

Collision risk modelling is not possible for microbat species as model requires quantitative data on species utilisation across a study area. The Band Collision Risk Model (Band, 2007) is used to predict the total number of bird collisions that may result from the development of a wind farm. This method of CRM requires the input of parameters that describe species-specific biometrics, flight speeds and characteristics and the expected amount of flight activity in the Study Area. It also requires the input of WTG specific information such as the blade size and pitch, hub height and rotor rotation period as well as the proportion of time the WTG will be operational (Band, 2007).

The CRM should use observational BUS data to determine the flight heights, frequency of time spent in the RSA for the species known to occur within the RSA. Literature may be used to determine average flock size, but observational data must be used for presence/absence of species, as well as time spent within the RSA. This follows the process of determining:

- Stage 1: the number of birds or bats colliding per annum = the number of birds or bats flying through the RSA); and
- Stage 2: the probability of the bird or bats flying through the RSA being hit (Band, Madders & Whitfield 2007).

Stage 1 depends on bird surveys at vantage points used to gather information on frequency of bird and bat flights in the RSA (Band, Madders & Whitfield 2007) and has been informed from data across four survey periods across both relevant seasons in the Study area (dry and wet season). This also depends on the flock size of the species as well as the species activity during the year (e.g., whether it is diurnal or nocturnal, migratory or present all year round).

Stage 2 depends on the characteristics of the bird and bat such as length and wingspan, as well as the breadth and pitch of the WTG blades, rotation speed of the WTG and average flight speed of birds and bats identified as flying in the rotor swept volume (Band, Madders & Whitfield 2007).

7.4.12.2 ESTIMATING CUMULATIVE COLLISION RISK

Having estimated the collision risk for species across sites individually, the cumulative impacts of all wind farms within the NQSH is additive and can be estimated by summing the species-specific CRM estimates to obtain predicted fatalities per year for all sites combined (International Finance Corporation, 2017). The mathematical approach to modelling the potential cumulative impacts on bird populations follows Muir (2005).

Modelling of impacts at a single project scale provides an estimate using the probability of a collision, relying on the assumption that the bird species interacts with the wind farm. To approximate cumulative effects of multiple windfarms on the risk of strike, the assumption that the at-risk species is already interacting with the site is removed. Then, the probabilities of interacting with a given wind farm Project is determined, and the risk of strike associated with that individual wind farm is incorporated into the cumulative model. The survival rate of a bird population residing or moving through a region that has multiple wind farm projects can then be modelled.

1. Identify the sites relevant to each species;
2. Estimate the mortality rate for each site. For the current example, this includes the annual mortality rates for each species;

3. Determine an appropriate chance of site visitation, which applies a basic measure of this probability of visitation by dividing the area of the site by the area of the region, which for these species is the total area of the three bioregions over which the Project occurs;
4. Determine the survival rate at each component project; and
5. Multiply the survival rates at each component project relevant to each species together.

The resultant figure is a chance of survival for the species as a result of the species presence in the habitat or corridor. A figure of one indicates no individual will ever be struck. Zero indicates complete loss of the population.

7.4.13 ECOLOGICALLY SIGNIFICANT MORTALITY THRESHOLDS

It is recognised that the cumulative impact assessment for listed threatened and migratory birds will need to consider potential impacts for birds that occur at very low numbers, meaning data may not be available to carry out collision risk modelling at each component Project or cumulative modelling across multiple Projects. As part of the ecological investigation completed when a mortality is detected during the operation of component project the significance of the impact will be assessed across all Projects that comprise the NQSH with reference to the EPBC Act *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance.*

To assess if an impact exceeds a significant impact threshold (reaches or exceeds an ecologically significant proportion of a population over a defined period), the number of mortalities of each species based on the carcass searches will be quantified.

7.4.14 IDENTIFYING JOINT MITIGATION AND MONITORING ACTIONS

A BBAMP associated with each project provides adaptive management frameworks for assessing the impacts to threatened species in the event of an impact trigger being met. While the identification of these steps is important for the on-site mitigation and monitoring measures of a single wind farm, adaptive management that takes into consideration the cumulative effects of all projects are required to effectively identify suitable actions in the event of an impact trigger being met.

An inter-site monitoring and adaptive management framework will identify collective thresholds and actions across all wind farm projects. This framework would seek to compliment the project specific frameworks already developed within the BBAMPs and would likely focus on higher-risk issues across the broader population scale for affected bird species. If additional wind farms commence operation within the locality of the Project, the cumulative impacts on at risk bird populations may be increased. The implementation of collaborative actions between wind farms, and developers, is likely to be important for minimising impacts to species at the population level.

7.4.15 MONITORING PROGRAM

It is noted that the design for the bird and bat monitoring program has been based on the desktop and field investigations conducted for the proposed development. The design of the monitoring program includes potential habitat that has been mapped for 'low' risk of impact species. This is also applicable to other potentially occurring species with negligible risk of impact, where habitat (or potential habitat) occurs in the Project Area. The following Sections detail the methods and locations for the bird and bat monitoring program.

7.4.15.1 OPERATION PHASE

Bird and bat surveys during the commencement of operation will target the species listed as 'known' or 'likely' to occur within the Project Area as well as those listed species with potential to occur in the Project Area. Bird surveys will occur during the first two years of commencement of operation with surveys being undertaken across each season in those years. The monitoring methods used in the initial two years of operation of the proposed development will be consistent with techniques used during previous field surveys.

The location of the operational phase bird and bat surveys has been informed by the habitat mapping prepared for the species determined as known, likely or having the potential to occur within the Project Area. The detailed surveys that will be undertaken for each species and the timing of such surveys can be found in Section 2.

The monitoring during operation will be based on two main approaches. The first is to monitor bird and bat activity and ongoing mortality searches that aim to determine impacts (collisions) occurring during the first two years of operation. The second is to inform specific response to impact triggers that may result to bird and bat species, which will include increased monitoring surveys and carcass searches, investigation of risk behaviours and subsequent risk mitigation.

7.4.15.2 CARCASS SEARCH METHODOLOGY

As part of the monitoring program, carcass searches will be performed to determine the actual impact of the proposed development on birds and bats. The results of the monitoring will be used to review the risk assessment if necessary and to identify and determine if any further monitoring of bird and bat species is required and to update mitigation measures or adaptive management approaches.

The proposed development is to comprise of up to 118 WTGs, developed across one stage. At the commencement of operation, it is proposed that 30% of the WTGs randomly selected WTGs will be searched over a two-year period, at 6 weekly intervals from late Autumn to early Spring, and 3 weekly intervals from early Spring to late Autumn with increased monitoring in warmer months aligned with increased potential for migratory species to occur within the Project Area.

The selected turbines will be revisited over the course of the first two years of operation. These visits will ensure that carcass searches are able to gain high accuracy on data regarding the mortality associated with WTG strike. The order of selected WTGs searched will be random during each monitoring event. The final number and location of individual WTGs that will be constructed is not yet known, and so this will be reflected in an updated map of selected WTGs for monitoring.

All carcass searches will be undertaken by suitably qualified personnel with appropriate skills in both bird and bat identification as well as in the handing of deceased species. Searches within areas and near selected WTGs will target birds and bats of medium to large size as per the Hull and Muir Model (2010), which uses the Monte Carlo simulation. The model suggests that 95% of bat carcasses should be present within 74 m of a WTG, and the carcasses for birds of medium to large sizes would be distributed to distances up to 122 m. Some species (larger birds) may be found further out from this model, however 95% are expected to occur within an approximate 122 m search area from each selected turbine (Hull & Muir, 2010). This model was based upon parameters of a 72 m rotor radius and 120 m hub height.

Based on the principles adopted in Hull and Muir (2010), the following search areas have been designed for birds and bats for the Winterbourne Wind Farm (proposed development), with its approximate rotor tip height of up to 230 m and turbine rotor diameter of up to 162 m:

- Bats and small to medium sized birds, including some large sized birds: 100 m radius around the turbine. Transects will be spaced every 6 m from the WTG; and
- Medium to large sized birds (and some larger bats): 100-150 m radius around the WTG. Transects in this search area will be 12 m apart, undertaken from the inner (100 m) to outer (150 m) sections of the search area.

It should be noted that in search areas of WTGs that are difficult to access for safety reasons, due to dense vegetation or slope considerations, exceptions may be made as to where transects will be conducted. This will include searching within access tracks and hard-stand areas only. Such exceptions will be noted for reporting purposes.

7.4.15.3 RECORDING INFORMATION AND CARCASS HANDLING PROCEDURES

The following information is to be recorded if a carcass is detected during the carcass searches:

- Position of the carcass in relation to the WTG;
- Comments on the vegetation type and area where the carcass was located, including if the species was found on an access path or on the WTG hard-stand area;
- Details on the individual found such as species, age, sex, number of individuals, the injury description as well as the estimate time of death if found deceased. If the carcass is unable to be identified, this will be taken to appropriate facilities for DNA testing to be undertaken;
- Photos must be taken of the area and of the individual found. Such photos will need to be sent to an appropriately qualified ecologist within two business days so they can adequately undertake identification; and
- Recording when the carcass was found, and weather conditions (wind speed, temperature, rainfall) that preceded the date when the carcass was found.

The carcass found will need to be handled in accordance with the following procedure:

1. Carcass is to be safely removed from the site with appropriate personal protective equipment (PPE) to be worn by personnel. PPE should include thick rubber gloves, long-sleeved shirt, face mask (if possible) and protective eyewear. The carcass should be placed in a plastic bag, then wrapped in newspaper and placed into a second plastic bag. The removal of the carcass from the area ensures that recounting of the same carcass does not occur later;
2. Labelling of the carcass plastic bag to ensure the species is easily identifiable later and all information is correct. This includes placing a completed datasheet with the above listed information into the outer plastic bag; and
3. The carcass bag will then be placed into an appropriate freezer compartment, likely within the proposed development's site office. This will keep the carcass for future examination if required by a suitably qualified ecologist if the original retrieval was made by an unqualified operation staff member. Frozen specimens will also be able to be used for detectability trials later.

An authority (i.e., scientific collection permit) must be obtained to remove the carcasses from the Project Area. This will need to be obtained for the monitoring program and can be referred to get more detail on the disposal methods of the carcasses. Should any carcasses be found at the proposed development during construction, commissioning and maintenance activities, the carcass should be handled as above.

7.4.15.4 SCAVENGER RATES AND TRIALS

The scavenger trial is adopted to ascertain at what rate naturally occurring scavengers remove carcasses from the Project Area. These trials will be developed such that they are adopted twice within the first year following operation commencement, with each trial undertaken across 30 days. This will ensure that the difference in vegetation conditions is accounted for; wet season with long grass and dry season with short grass. Such periods are also going to be associated with different stocking levels across seasons.

Scavenger trials will be undertaken in the inner search area of the turbines selected for carcass search trials (100 m radius from the turbine). Carcasses will be distributed sufficiently with lower than ten carcasses per trial to avoid biasing the results through scavenger swamping. (Smallwood, 2010).

Two different categories of carcasses will be used for the scavenger trials. Such carcasses will be those that are found during mortality trials. Additionally, small mice can be used in place of micro-bats if these carcasses are not able to be found. The two different categories will help to ascertain the different scavenger rates in the search area.

The two categories and the number of replicates that will be used for each trial are:

- Micro-bats and small birds: seven replicates per trial; and
- Medium sized birds: six replicates per trial.

At each of the randomly selected turbines used for the carcass searches, carcasses will be randomly placed under the turbines. The carcasses will be checked as follows:

- Each day for the first five days;
- Every two days from day six to 10;

- Every three days from day 11 to 19; then
- Every four days from day 20 until they disappear or until the end of the 30-day trial period.

The proposed development operation staff will be trained over a five-day period to undertake the scavenger trials following trial establishment by a suitably qualified ecologist.

If a trigger point criteria is approached or met through general monitoring, additional targeted species monitoring may be required in response where additional information is needed.

Additional procedures to follow for scavenger trials is detailed below:

- Timing of searches has been based on the detailed experience and regulatory approval of other windfarms where scavenger trials have been undertaken that show almost all carcasses have been scavenged within a period of 5-10 days. Additionally, GPS coordinates will be taken for all carcasses placed during the scavenger trials, so as not to confuse these with any naturally occurring carcasses in the search areas;
- A mix of carcass sizes of bird and bats (small, medium to very large) will be obtained to use in scavenger trials from prior searches of the Project Area. If a carcass of species at risk or of concern cannot be located for the trial, a substitute of the same colour and size will be used in its place;
- Thick latex gloves must be always worn when handling the bird and bat carcasses. This will ensure that both the safety of the personnel but also that human scent will not replace the scent of the carcass which will alter scavenger behaviour and find rates;
- One carcass at minimum will be placed randomly within the 100 m search area at each trial site. This carcass will be thrown in the air to recreate the natural landing of a carcass from impact with a wind turbine, such that feathers or fur may become dislodged or ruffled from the impact of the simulated fall;
- Detailed observations will be taken at the search areas where carcasses have been scavenged, including the composition of the carcass and weather any types of scavenging behaviour have been present (feathers, bones dispersed, pecking, tearing, partial removal of carcasses, as well as scats and tracks of potential predators); and
- The final state of the carcass will be recorded at the end of the survey period.

The outcome focused objectives for the scavenger trials are detailed below:

- Ascertain at what rate naturally occurring scavengers remove carcasses from the Project Area to determine removal rate of carcasses that cannot be found due to scavenger removal;
- Use removal rates to enable more accurate estimations of fatality rates of turbine strikes, to determine if mortality rates reach or exceeds an ecologically significant proportion of a population.

Scavenger trials will be conducted across seasons to account for different rates of scavenging that has been observed across seasons (Catling 1988; Molsher et al., 2000). Depending on results of the scavenger trials, requirements and procedures (including replicate numbers) will be reassessed to determine if changes to the procedures are warranted.

Alternatively, and subject to detailed design, motion sensor cameras may be installed to monitor scavenger activity. The viability of using motion sensor cameras will be assessed prior to finalizing the survey methods.

7.4.15.5 DETECTABILITY TRIAL

Detectability trials will be conducted at the same time as scavenger trials, during the first day of placing carcasses. These detectability trials will be conducted to test the efficiency of searchers in finding the carcasses for the Project Area. The detectability trials will be conducted twice in the first year of operation, sampling across the wet (September-April) and dry (April-September) seasons. This sampling will represent the greatest change in vegetation cover. Such detectability trials will also be conducted for handlers and dogs, if they are to be used for the proposed development. The detectability trials will be conducted by personnel who have been involved in the monthly carcass searches.

The detection efficiency that is determined from the detectability trials will be incorporated into mortality rates and analyses to account for the error associated with human detection of carcasses. This detectability analysis will be documented in the report at the end of the first two-year monitoring period in accordance with this BBAMP.

Carcasses will be randomly placed in the inner search area of a turbine (100 m zone) and their location noted by the suitably qualified ecologist. The efficiency will be recorded as the number of successful finds by a searcher against the actual carcasses placed by the suitably qualified ecologist.

The categories, number of carcasses and replicates to be used in the detectability trials across the wet and dry season is presented in Table 7-20.

TABLE 7-20 NUMBER OF REPLICATES OF BIRD AND BAT CARCASSES FOR DETECTABILITY TRIALS

Season	Micro-bat - Small birds	Medium sized birds	Large raptor sized birds
Summer	7	7	3
Autumn	7	7	2
Winter	7	7	2
Spring	7	7	3

7.4.15.6 RESULTS ANALYSIS AND PRESENTATION

It is proposed that a 12-month monitoring report and a final monitoring report (end of two-year monitoring period) will be prepared. Annual compliance reports will include an assessment of the monitoring programs and whether any trigger limits have been met. Ongoing monitoring will be assessed following risk assessments as a component of the described adaptive management framework.

Data that will be analysed and documented in the reports will include information on carcass identification and timing, the results of the trials (scavenger and detectability) so that factors influencing mortality can be determined. Mortality rates should be expressed as the number of carcasses discovered per turbine per year and any spatiotemporal variation across the Project Area and seasons should be presented and discussed.

Data analysis will estimate mortality rates of birds and bats within the Project Area, taking into account standard error and variation. Appropriate software packages will be used to inform variables needed to be determined during the carcass, detectability and scavenger trials which will subsequently inform the survey design.

At this stage, prior to construction and knowledge of precise turbines to be constructed, the following software packages and statistical principles are proposed for the proposed development, with specific variables to be measured and data input requirements (and associated assumptions) considered in the final monitoring design:

- Logistical regression (general linear modelling) to be used to determine searcher efficiency. This will account for significance;
- The proportion of the area searched to be estimated using the Monte-Carlo Simulation method as described in Hull and Muir (2010);
- Mortality will be estimated using the Hortvitz-Thompson style estimator from Huso (2011);
- Survival analysis (survival regression to account for interval censoring) to be calculated using Generalised Estimator (GenEst) (or similar). GenEst is used to estimate the total number of individuals that are present within an area in each time period, when their detection probability may not be known. This program is used as counts of carcasses alone is not an accurate way to measure the true number of fatalities in an area due to those that may be missed in the process. This method also allows for comparisons across locations and years taking into account the rate of detection:
    - GenEst includes tools for estimating searcher efficiency, carcass persistence, and other detection probability parameters from experimental field trials. GenEst is not evidence of absence-type estimator and is not going to be used in circumstances where few carcasses are found. This is where the EoA program will be adopted; and
    - Evidence of Absence (EoA). This program can be used to help determine potential fatalities which may have occurred, with respect to the survey effort, even in the absence of a carcass being located.

Statistical analyses will assist in determining potential significant differences across size categories of species, vegetation composition or across seasons.

Documented results will inform adaptive management on whether additional mitigation measures are necessary and whether specific turbines in the Project Area pose higher risks to birds and bats than others. Such adaptive management will occur in consultation with DCCEEW.

7.4.15.7 BBAMP PERSONNEL AND ASSOCIATED TRAINING REQUIREMENTS

All personnel involved in the implementation of the BBAMP will be familiar with this BBAMP, relevant proposed development policies and procedures, and other important administrative matters such as health and safety documents. The Applicant will be responsible for ensuring that suitably qualified and trained people are engaged to supervise and implement the formal monitoring program as defined in this BBAMP. Beyond the formal period of monitoring, the Applicant will be responsible for ensuring ongoing reporting of incidental finds and the engagement of relevant specialists as per the BBAMP.

Training will be provided to all personnel that will be undertaking carcass searches, species identification and handling. Such training will be delivered by suitably qualified ecologists who are specialists in the field of bird and bat carcass retrievals. The training will include trial establishment, transect search techniques, selection of specific turbines for monitoring, species identification, carcass handling practices and PPE management.

The qualified ecologist will be involved in the initial search program of the turbines to oversee and assist with the carcass search, handling and identification. So that the BBAMP is being implemented and monitoring routinely performed to standard, the suitably qualified ecologist will undertake an audit after the first 6 months of the commencement of the implementation of this BBAMP.

The suitably qualified ecologist will be available to identify any carcasses that proposed development personnel are unable to identify, either from frozen specimens or from photographs taken at the search area.

Training will be provided to assigned operational personnel which on how to properly prepare and handle carcasses and how to randomise the placement of carcasses in trial areas.

Scavenger trials will be developed by the suitably qualified ecologist, who will supervise the searches undertaken by trained operational personnel.

The suitably qualified ecologist will undertake data analysis and prepare the 12-month interim and two-year final monitoring reports.

Training will be provided by the suitably qualified ecologist to operational personnel involved in the monitoring program and trials, with refresher training available if requested or deemed necessary during the two-year implementation period of the BBAMP.

7.4.16 HANDLING PROTOCOL AND TRAINING: INJURED AND DECEASED SPECIES

Operational personnel involved in the search for wildlife will be appropriately trained in handling and assisting with injured or deceased wildlife. All injured or deceased wildlife found during the first two years of operation will be reported to the Responsible Officer. Once reported, it will be the responsibility of the Responsible Officer to organise for the retrieval and/or treatment of the individual. Such a protocol will involve defining the correct handling procedures, personal protective equipment, transportation and wildlife hospital treatment arrangements.

Bats can carry many forms of diseases including Hendra virus and Australian Bat Lyssavirus. Extra precaution and care will need to be taken when handling bat species. In this circumstance, professionals should be called to handle injured bat species (e.g., WIRES; 1300 094 737). Appropriate and contemporary advice on the best practice for movement of individuals will be provided by these organisations.

7.4.17 TRIGGER ACTION RESPONSE PLAN

This section outlines the impact triggers and the process for assessing if an impact exceeds a significant residual impact to that species associated with interactions with turbines, including the decision-making framework and adaptive management where a response is required.

Impact triggers and response requirements will be different for both listed and non-listed species. For listed threatened and migratory species, two levels of assessment are considered in this BBAMP:

1. An impact trigger, defined as a single mortality event to a listed species that triggers an ecological investigation into the cause and significance of the event, with recommendations for adaptive management to avoid, minimise and manage the impact; and
2. Assessment of the significance of the impact, with a method for estimating if the impact exceeds a significant residual impact, as defined by Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (DEWHA, 2013) to identify if offsets are required to compensate for the significant residual impact.

The Applicant will be responsible for ensuring implementation of this BBAMP and the adaptive management approach. A suitably qualified ecologist will support decision-making elements and provide advice in relation to the impact significance and where Regulator consultation (State and Commonwealth) is required.

7.4.17.1 THREATENED AND MIGRATORY SPECIES IMPACT TRIGGER REQUIREMENTS

Where a single listed threatened and/or migratory bird or bat species are found dead within the search area of a turbine (proximity that can be attributed to turbine collision) during implementation of this BBAMP, or via an incidental find, then the impact trigger methodology as described below applies. Additionally, if a breeding area for these species is located within 200 m of a turbine, then an impact trigger will occur. There are currently no known breeding places for the likely or known species within the Project Area.

Where a single carcass of a listed threatened and/or migratory species is detected within the Project Area, a decision-making framework will be implemented. This includes additional surveys being undertaken within two weeks of the carcass find by a suitably qualified ecologist, and where data is available, a population viability analysis (PVA) will be undertaken. A report will be prepared by a suitably qualified ecologist and presented to DCCEEW outlining the next steps of mitigation and management. Additionally, the existing collision risk model will be updated following any suspected turbine collision. It is noted that documents that will be assessed in determining impact triggers will include:

- Significant Impact Guidelines 1.1 - Matters of National Environmental Significance per the EPBC Act (DEWHA, 2013);
- Draft referral guideline for 14 birds listed as migratory species under the EPBC Act (Department of the Environment, 2015); and
- Species-specific management plans and Conservation Advice from SPRAT profiles.

Additionally, if any threatened species are identified throughout the monitoring program would trigger additional mitigation actions, including:

- Species-specific monitoring;
- Flight path mapping; and
- Additional targeted surveys.

7.4.17.2 DECISION MAKING FRAMEWORK

If the impact trigger requirements are met for the proposed development the following decision-making framework will be followed:

1. The bird or bat carcass must be immediately reported to the proposed development's Responsible Officer, including information such as the species type, the area where the species was found and any other contributing factors that appear appropriate. Photos must be taken of the carcass or injured species so that correct identification can be carried out.
2. A suitably qualified ecologist, engaged by the Applicant (and managed by the Responsible Officer), will undertake an analysis to determine the presence of the impact trigger either in person or through analysis of the carcass and/or photographic evidence. The ecologist will assess whether the death/injury can be directly attributed to a WTG strike. Where there is conclusive evidence the death/ injury is not related to WTG strike, no further action is required.
3. If the impact trigger has been confirmed by the ecologist, the proposed development's Responsible Officer will report the trigger to BCS and/or DCCEEW within two business days.
4. The suitably qualified ecologist will undertake a detailed investigation to determine the events that caused the death or injury of the listed species. This investigation will include a PVA where data is available for the species. Once this investigation is concluded and if it is deemed that WTG collision or interference with the WTG has caused the death/injury, other factors like species behaviour will also be considered.
5. If the evaluation undertaken by the suitably qualified ecologist (including a PVA) reveals the impact trigger has the potential to contribute a significant impact to the species, species-specific monitoring will likely be recommended and implemented. This monitoring will be informed by the ecologist, with a minimum six-week period of fortnightly monitoring. These monitoring exercises will need to be supervised and reported by the suitably qualified ecologist, who will include in the report any recommendations for additional mitigation measures to manage or reduce the impact to the species, in accordance with the adaptive management measures. BCS and/or DCCEEW will be consulted on the next steps to close-out the response.
6. If the evaluation undertaken by the suitably qualified ecologist can demonstrate that a significant impact is unlikely and no further action will be required. This significant impact will be determined through following the relevant guidelines including but not limited to the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance per the EPBC Act (DEWHA, 2013), and the process to be outlined in the BBAMP. Species-specific guidelines will be applied as well as current knowledge of the species populations and ranges.

7. If the evaluation undertaken by the suitably qualified ecologist cannot determine the cause of the impact trigger beyond reasonable doubt, further monitoring (fortnightly for six-weeks) may be proposed to determine re-occurrences/extent of the impact. As with the previous steps, if the additional monitoring confirms a one-off occurrence to the species, then no further action except advising the relevant authority is required. If more than a one-off occurrence is observed, then step 4b) above applies.

If the impact trigger is assessed as having the potential to contribute to a significant residual impact, adaptive management will be designed to reduce and mitigate impact to the species. Further monitoring of the effect of these additional mitigation measures and their impact would be undertaken by suitably qualified ecologist to determine and report on their effectiveness. The BBAMP will be updated to include any additional or adjusted mitigation measures. As part of the adaptive management strategy, several mitigation measures may be considered, such as:

- Acoustics to discourage foraging birds at selected locations;
- Encourage species into alternative low-risk areas using social attraction techniques (decoys and audio playback systems);
- Removal of foraging habitat where appropriate; and
- Investigate alternative stocking arrangements.

All evaluations and decisions regarding mitigation measures for the impacted species will be reported to BCS and/or DCCEEW, with consultations to ensure the best course of action is applied for the proposed development and species affected. Outcomes will also be reported in the monitoring reports that are prepared by the ecologist to the Applicant.

Offsets may be required where the significant residual impact to the species cannot be effectively mitigated by other measures. Offsets may be in form of financial offsets or research-based offsets where an appropriate institution can undertake species specific research. Offsets will need to be considered and developed in accordance with *EPBC Act Environmental Offsets Policy* (DSEWPC, 2012). Any offset consultations will need to be undertaken with DCCEEW. Additionally, if a trigger is assessed to have occurred, surveys will be undertaken to review the area, and discussions with DCCEEW will occur, which may include turbine curtailing if assessed as appropriate for species management.

7.4.17.3 NON-THREATENED (PROTECTED AND LOCALLY ABUNDANT SPECIES) IMPACT TRIGGER REQUIREMENTS

The impact trigger for the non-listed threatened species in this BBAMP will be a total of five or more bat or bird carcasses of the same species that are recorded at the same WTG during a 12-month period.

The definition of a significant impact to a non-listed threatened species is an impact that is likely to reduce the viability of the population of the species within that bioregion. Sometimes the population numbers for a species are not known or reported. In the case where such information is not publicly available, a suitably qualified ecologist will undertake an assessment of the potential impact to a species in the bioregion to determine whether the impact will exceed indicative significant impact thresholds.

7.4.17.4 DECISION MAKING FRAMEWORK

If the impact trigger requirements are met for the proposed development, the following decision-making framework will be followed:

1. DCCEEW will be notified of the trigger (including species, time and area) within seven days of the trigger event.
2. A suitably qualified ecologist will undertake an analysis to determine if the impact trigger will exceed the indicative significant impact threshold. This assessment will take into account factors like the distribution of the species, known population size and habitat requirements, as well as any literature on specific threats to the species within the bioregion.
3. A report on the findings of the analysis will be prepared by the suitably qualified ecologist and presented to the proposed development's Responsible Officer and subsequently then presented to DCCEEW within three weeks of the impact triggering event (this date may be subject to change upon consultation with DCCEEW).
4. If the evaluation undertaken by the suitably qualified ecologist reveals the impact trigger to be a one-off event and unlikely to occur again, no further action will be required.
5. If the evaluation undertaken by the suitably qualified ecologist reveals the impact trigger may lead to the indicative significant impact thresholds being exceeded, species-specific monitoring will likely be recommended and implemented. These monitoring exercises (fortnightly for six-weeks) will need to be observed and reported on by the suitably qualified ecologist, who will then determine if any additional mitigation measures are necessary to manage or reduce the significant impact upon the species. Such measures will be decided upon through adaptive management approach.
6. The investigations and mitigation measures recommended in the case of a significant impact will need to be included in the monitoring reports, in accordance with this BBAMP.

7.4.17.5 ADAPTIVE MANAGEMENT

In the event of an impact trigger to a listed threatened bird or bat species, adaptive management principles will be applied. Application of adaptive management will be upon written recommendation (from the reporting requirement of the impact trigger response) by a suitably qualified ecologist, in accordance with this BBAMP.

Adaptive management will take into consideration the species impacted, the area of impact and other factors such as population dynamics, to determine the most appropriate solution.

Additional mitigation and monitoring measures, should they be required, and potential effects will be monitored and documented within the monitoring reports, in accordance with this BBAMP, and presented to the DCCEEW for consultation on the next steps for management and mitigation to be implemented.

7.4.18 MITIGATION MEASURES

To minimise any potential impacts to bird and bat species associated with operation of the WTGs within the vicinity of the Project Area this BBAMP intends to enable (in line with the *Onshore Wind Farms – interim guidance on bird and bat management (2021*)), the implementation of a long-term approach to the mitigation and management of potential impacts on listed threatened and migratory species. Monitoring will also identify any potential changes to the species' utilisation of the project site and the surrounding landscape.

This BBAMP has defined environmental objectives for the proposed development that will enable the implementation of a long-term approach to the mitigation and management of potential impacts on listed threatened and migratory species. Monitoring will also identify any potential changes to the species' utilisation of the project site and the surrounding landscape. The environmental outcomes are:

- An improved understanding of the risk of turbine collision and barotrauma impacts on listed bird and bat species;
- An improved understanding of whether and how project site usage changes as a result of wind farm construction and operation;
- An improved monitoring approach for the timely identification of turbine collisions and collection and analysis of data;
- An improved approach to the timely and regular validation and update to the CRM using monitoring data, and a robust adaptive management approach; and
- Development of management and corrective actions to minimise risk of turbine collision and other impacts on threatened bird and bat species.

This section details the mitigation measures that will be implemented for potential significant impacts to listed threatened species arising out of the operation of the proposed development. Impact triggers act as a measure to determine when additional mitigation measures should be implemented. Mitigation measures will be reviewed throughout the monitoring period, and at the end of every two-year monitoring period, a suitably qualified ecologist will oversee and determine whether any adjustments should be made. The required monitoring frequency over the lifetime of the project will be reviewed by a suitably qualified ecologist in consultation with DCCEEW to establish an appropriate frequency based on results and changes in collision risk following monitoring completed to date.

The adaptive management approach will monitor impact triggers and apply corrective actions, as outlined in the BBAMP. The measures in Table 7-21 have been designed so that species (locally abundant, least concern and listed species) are not significantly impacted by the proposed development. If changes to the mitigation measures are likely to result in a new or increased impact to any EPBC Act listed species (i.e., beyond minor variations or updates to the BBAMP), impacts may need to be referred to the Minister in accordance with Section 143A of the EPBC Act, following a self-assessment.

The main causes of impact to listed species for the proposed development are considered as:

- Collision of birds and bats with blades of operating WTGs is likely to occur, with non-listed species most at risk;
- Injury and mortality of birds and bats caused by exposure to rapid air pressure reduction due to proximity to turbine blades, causing barotrauma; and

- Removal or reduction of critical foraging, dispersal and breeding habitat is likely to occur following construction of WTGs and associated infrastructure.

Factors that can increase the potential of impacts to listed species for the proposed development are considered as:

- Promotion of water and foraging resources that result in attracting birds and bats into the vicinity of the WTGs. This could result in higher rates of collision and injury/death. Nesting may occur close to WTGs; and
- Lighting on WTGs and buildings causing an increase in bird and bat prey. This may result in increased bird and bat abundance in the vicinity of the WTGs and increase collision risk.

An adaptive management process has been established by this BBAMP, which includes the following broad elements:

- Baseline monitoring surveys – prior to the commencement of operation of the proposed development;
- Operational monitoring surveys – to be undertaken at selected WTGs throughout the operation of the proposed development, to estimate mortality of bird and bat species as well as record species within the Project Area;
- Reporting – to be undertaken in the first and second year of operation and agreed upon timeframes thereafter with DCCEEW and BCS. Such reports will include mortality estimates, incident findings, mitigation measure effectiveness or inefficiencies; and
- Development of mitigation measures based on monitoring surveys and reporting results to manage risks such as minimising mortality.

Table 7-21 details the management objectives, mitigation measures and controls and subsequent timing of such controls for this BBAMP. It also details the measures of success for these controls, as well as corrective actions that will be implemented if the controls are not meeting such criteria.

Specifically, the management actions aim to minimise the impact of mortality associated with collisions with WTGs. The success of management actions will be measured through performance indicators related to impact triggers, monitoring and assessment outputs. Despite these measures, a residual risk remains. The success of the proposed management actions will be measured through monitoring documentation and reporting, including DCCEEW compliance reporting.

Implementation of the mitigation measures reduces the risk of collisions, and impact triggers are observed, consultations with DCCEEW will occur to determine appropriate management in line with the procedure.

TABLE 7-21 PROPOSED MITIGATION MEASURES, TIMING, PERFORMANCE CRITERIA AND CORRECTIVE ACTIONS

Management Objective	Management Activities and Controls	Timing	Performance Criteria for Measurement of Success	Corrective Action
Baseline surveys	• Baseline bird and bat data to be obtained from BUS, Anabat and harp trapping surveys.	• Six surveys between October 2022 and February 2024. • An additional two BUS to be undertaken prior to operation for a total of eight BUS.	• BUS to be undertaken in areas already chosen, in accordance with the method described in this BBAMP. • Bat surveys to be undertaken in areas already chosen, in accordance with the method described in this BBAMP.	• Bird and bat surveys have been undertaken in accordance with the method and timing described in this BBAMP. • The two remaining surveys are scheduled to occur prior to commissioning.
Operational phase mortality monitoring	• Chosen WTGs to be searched in the inner and outer search areas each month. • Mortality estimates to be made for each searched WTG for birds and bats. Such mortality estimates to be made upon considering factors like detector efficiency trials and scavenger trials. • Operational phase monitoring in response to any impact triggers and consultation with the Department.	• Operational phase –searches on approximate monthly basis for the first two years	• Mortality surveys to be undertaken at 30% (approximately 29) of the WTGs within areas identified as habitat for listed species, within the Study Area. Reviews on locations will be undertaken after the first year of operation and updated if appropriate. • Scavenger and carcass detectability trials to be undertaken in accordance with the methods described in this BBAMP. • Mortality estimates to be undertaken and analysed per the methods described in this BBAMP. Such estimates will be included in monitoring reports. • Responses to impact triggers will be reported and analysed by a suitably qualified ecologist as described in this BBAMP.	• If operational phase surveys are not commenced during this phase, they will be commenced as soon the error is realised and as reasonably possible. • If mortality estimates are not undertaken, they will be added to an amended/updated report. • Where responses to impact triggers are not implemented, they will be undertaken as soon as this is realised and as reasonably possible.

Management Objective	Management Activities and Controls	Timing	Performance Criteria for Measurement of Success	Corrective Action
Monitoring reporting	• Preparation and submission of monitoring reports to BCS and DCCEEW.	• After the first year of operation, after year 3 (reporting on years 2-3), and subsequent reporting as agree upon by consultations with DCCEEW/BCS.	• Monitoring reports to be completed at allocated times, within three months of the years monitoring program completion. • Such monitoring reports will include mortality estimates and carcass's findings/locations, mitigation measure effectiveness or inefficiencies, incident reporting, any impact triggers, recommendations for ongoing monitoring activities etc. • Ongoing monitoring reporting to occur based on an outcome of the two-year monitoring program included in this BBAMP and by agreement between the landowner, Applicant and BCS/DCCEEW.	• Where monitoring reports are not prepared, or lack information necessary, this report/information is to be prepared and presented to DCCEEW/BCS as soon as reasonably practicable.
Mitigation measures to reduce risk - Movement of water and foraging resources that result in attracting birds and bats into the vicinity of the WTGs.	• Subject to agreement with landowners, determine a system which will allow for grain feeders to be placed outside of a 200 m radius of the WTGs where possible. These grain feeders should be placed as practicable to avoid creating a collision risk for parrots and cockatoos. • Carcass removal should be undertaken by	• During operational phase.	• Carcasses/carrion to be removed when found and this is to be reported in an incident report. All measures taken to reduce risk are to be recorded on the date they are implemented – in the same incident report. • No increase or continuation of bird/bat mortality due to grain or carcass presence under WTGs.	• Where mortality of birds due to presence of carcasses or grain occurs, options will be undertaken to immediately rectify the problem, including increasing methods to reduce grain and/or carcass occurrences around WTGs. • Increased consultation with landholders on grain-feeding locations.

Management Objective	Management Activities and Controls	Timing	Performance Criteria for Measurement of Success	Corrective Action
	suitably qualified personnel. This includes operation and construction staff, carcass searches and landowners if suitable training has been provided. Such carcasses should be appropriately recorded for GPS locations, photos taken and then disposed of in a safe manner. • Feral animal carcass removal and appropriate disposal within 200 m of a WTG. If many pests are recognised as a problem near WTGs, integrated pest management may be required after consultation and cooperation of landowners. • Monthly searches for any stock or introduced species and bird carcasses that may attract larger raptor species. • Reporting on carcass removal based on Proposed Action's carcass removal register/data sheets. • Subject to Landowner agreement, provide			

Management Objective	Management Activities and Controls	Timing	Performance Criteria for Measurement of Success	Corrective Action
	alternative stock watering arrangements (e.g. establish replacement water sources further from WTGs).			
Mitigation measures to reduce risk – Removal/adjustment of lighting on WTGs and buildings causing an increase in bird and bat prey.	• Yellow or white light is proposed: • At entrance door to each WTGs, office building, substation • As portable and temporary lighting required to ensure the safety of workers. • Aligned with State DA requirements for monitoring masts. • Switch off unnecessary lights when not needed (building lights turned off when not in use). • Synchronise any flashing of lights.	• During operational phases.	• Bird and bat mortality to be low at unlit WTGs/infrastructure.	• Type and placement of lights will be reviewed in response to bird/bat mortality rates.

7.4.19 TURBINE STRIKE NOTIFICATION

7.4.19.1 ASSESSMENT OF SIGNIFICANT RESIDUAL IMPACTS

As part of the ecological investigation completed when an impact trigger is detected, the significance of impact will be assessed by a suitably qualified ecologist with reference to the EPBC Act *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance.*

It is proposed that the method for assessment for identifying if an impact will exceed an indicative significant impact threshold will quantify the number of mortalities of each species based on the carcass search results (see section 5.3 Carcass Search Methodology) that reaches or exceeds an ecologically significant proportion of a population over a defined period (referred to as a "significant impact threshold").

As described in the referral guideline for 14 birds listed as migratory species under the EPBC Act (2015), an ecologically significant proportion of a population is defined as being 0.1% of the estimated national population size for a species. Where this is exceeded, offsets may be required for the significant residual impact.

A high-level review of species population ecology has been used to establish an indicative significant impact estimate, that considers the number of mortality events and time frame considered as potentially significant to the species identified as moderate to very high risk in this BBAMP. Generational time, defined as the average interval between the birth of an individual and the birth of its offspring, is approximately ten years for most species identified as having a potential future risk in this BBAMP. These generational times can be used as an indication of the time required for a population to replace individuals lost to turbine collisions. The species ranges and population sizes have also been considered for these estimates presented in this BBAMP, with those having larger populations.

Table 7-22 provides an indicative significant impact threshold associated with at risk listed threatened and migratory bird species.

TABLE 7-22 SPECIES INDICATIVE SIGNIFICANT IMPACT THRESHOLD

Common Name	Scientific Name	Australian Population Estimate	Indicative Significant Impact Threshold (0.1% of population)
White-throated Needletail	*Hirundapus caudacutus*	41,000	41 mortalities over a five-year period
Little Eagle	*Hieraaetus morphnoides*	Unknown*	1 mortality within a five-year period[3]
Spotted Harrier	*Circus assimilis*	Unknown*	1 mortality within a five-year period*
Grey Falcon	*Falco hypoleucos*	1,000	1 individual within a five-year period
White-bellied Sea-eagle	*Haliaeetus leucogaster*	1,600 (NSW)	1 individual within a five-year period

[3] A conservative estimate of significant impact threshold has been made in the absence of population estimates. See section 7.2.2.7

Common Name	Scientific Name	Australian Population Estimate	Indicative Significant Impact Threshold (0.1% of population)
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	7,500	7 individuals in a 5-year period
Square-tailed Kite	*Lophoictinia isura*	Unknown*	1 mortality within a one-year period*
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	200,000	200 mortalities within a five-year period
Regent Honeyeater	*Anthochaera phrygia*	240	1 mortality within a 5-year period
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	Unknown*	1 mortality within a 5-year period
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	Unknown*	1 mortality within a 5-year period
Little Bent-winged Bat	*Miniopterus australis*	Unknown*	1 mortality within a 5-year period
Yellow-bellied Sheath-tailed Bat	*Saccolaimus flaviventris*	Unknown*	1 mortality within a 5-year period
Grey-headed Flying Fox	*Pteropus poliocephalus*	400,000	400 Mortalities in a 5-year period

Due to unknown population estimates for some species, a conservative approach has been taken to proposed impact thresholds that are likely to be a greater proportion of the population than is applied to the remaining species. In these instances, a significant impact threshold of one mortality has been proposed. If population estimates for a species become available, the significant impact thresholds proposed will be updated accordingly. Where a species is listed as threatened under the BC Act but not listed as threatened under the EPBC Act, known population estimates specific to NSW have been used to calculate mortality thresholds.

These significant impact thresholds are indicative only, and the actual significant impact assessment and associated advice will be provided by a qualified ecologist aligned with the investigation process. These indicative thresholds may exhibit fluctuations through time as updated species population estimates become available and it is expected that contemporary information be used during an investigation, as required throughout the life of the BBAMP.

7.4.19.2 SPECIFIC MANAGEMENT OBJECTIVES, ACTIVITIES, TIMING AND PERFORMANCE CRITERIA

Table 7-23 summarises management objectives, activities, timing and responsible parties for the implementation of the BBAMP. This table should be referred to for reporting and monitoring purposes throughout the two-year monitoring period. It is noted that adaptive management may require an adjustment to the requirements in Table 7-23 under the direction of a suitably qualified ecologist.

TABLE 7-23 MANAGEMENT ACTIONS

Stage	Management Actions	Responsibility	Timing
Pre-Development	The two-stage impact and disturbance mitigation process will be implemented. Areas of remnant and regrowth vegetation will be avoided at the design and micro-siting phases	Applicant	Design
	Design of a turbine with a blade sweep area >60 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy	Applicant	Design
	Locating turbines away from key bird and bat habitats (waterways and drainage lines)	Applicant	Design
	Initial field surveys for bird and bats will be undertaken. Impacts areas to be selected as part of the BACI designed bird surveys. A further iteration of the CRM to be undertaken, utilising updated BUS data, and incorporating any additional listed threatened or migratory species detected.	Applicant	Design
Pre-Construction	Pre-clearing surveys shall be undertaken prior to clearing efforts within the marked boundaries. These pre-clearance surveys will form part of the micro-siting process, which will closely analyse potential infrastructure locations. If potential habitat for bats, such as riparian areas and dense woodlands, occur in such locations, development layout will be adjusted. Control areas to be selected as part of BACI designed bird surveys. Surveys will then be undertaken in the control and impact areas prior to construction beginning. These surveys will include BUS such as point, waterbody and bird of prey surveys, to determine species presence in the RSA and bat surveys will be conducted via the use of echolocation call detectors and harp trapping	EPC Contractor	Prior to Construction
	Targeted surveys to identify important habitat features of value to birds and bats in the Project Area including raptor nesting sites so that turbine location can be adjusted as part of micro-siting requirements to minimise collision risk	EPC Contractor	Prior to Construction

Stage	Management Actions	Responsibility	Timing
Construction	All clearing shall be within clearly marked boundaries and in accordance with the Development Permit	EPC Contractor	At all times
	Where trenching and excavations are created which may entrap fauna, suitable escape measures are put in place, and excavation are checked for fauna before backfilling	EPC Contractor	At all times
	Include toolbox talks for site specific bird and bat information during the proposed development	EPC Contractor	Daily
	Ensure appropriate waste management (lidded bins), including food scraps, to reduce potential for feral species to become established on-site	EPC Contractor	At all times
	BACI surveys conducted at impact and control areas during construction to determine bird and bat composition, abundance and density at control and development areas. This includes BUS and use of bat survey techniques	EPC Contractor	Bi-annually to Quarterly
Monitoring	Daily inspections by spotter / catcher during clearing, specifically hollow trees, roosting sites, and rocky outcrops and caves for birds and bats	EPC Contractor	Daily
	Weekly site inspections to review flora and fauna control measures during clearing and construction	EPC Contractor	Weekly
	Annual auditing of Construction Environmental Management Plan (CEMP) during construction	EPC Contractor	Quarterly
	BACI surveys to be conducted in the operation phase at control and impacts areas, to determine the 'after' development effect on bird and bat composition, abundance and density.	EPC Contractor	Bi-annually to Quarterly
	Mortality monitoring: at approximately 30% of turbines (approximately 8 WTGs) monthly for two years. Any extension to monitoring is considered under Section 7.4.13 of this document.	Ecologist and trained personnel	Monthly
	Scavenger and detectability trials: two of each, undertaken within the first year of monitoring, approximately 6 months apart.	Ecologist and trained personnel	Detectability = biannually Scavenger = biannually
	Adaptive management and inclusion of additional mitigation measures as a result of impact triggers as a result of recommendations from a suitably qualified ecologist	Applicant	As required
	Low wind speed curtailment required when wind speeds are below the manufacturer's cut in speed of 3 m/s (i.e., feathered to prevent turning or other mechanism)	Applicant	At all times

Stage	Management Actions	Responsibility	Timing
Reporting	Sightings and incidents reported in daily Pre-starts	EPC Contractor	Daily
	Fauna spotter-catcher will keep an inventory of any bird and bat species encountered with details of species, capture and release condition and capture and release GPS co-ordinates during construction. This also includes carcass reporting and notification	Spotter Catcher	Daily
	Injured native fauna to be reported to Health, Safety, Environment and Quality (HSEQ) Manager	Site Manager	Within 24 hours
	Preparation of monitoring BBMP reports: one within three months of the first year of monitoring, and one within three months of the second year of monitoring	Ecologist	Year 1 and Year 2 then as required.
	Monitoring report after two years: estimates of mortality for bird and bat species across the monitoring period. Taking into account detectability and scavenger trial results	Ecologist	As required
Corrective Action	All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes	All Personnel	As required

8. IMPACT ASSESSMENT

8.1 DIRECT IMPACTS

The construction and operational phase of the development will result in direct impacts to biodiversity values (change in vegetation integrity score and habitat suitability) within the Subject Land which cannot be avoided. Direct impacts include habitat clearance, noise and disturbance associated with clearing and construction, and presence of infrastructure which may create barriers to movement.

The direct impacts of the development are on:

- Native vegetation (outlined in Table 8-1); and
- Threatened species and threatened species habitat (outlined in Table 8-2).

TABLE 8-1 SUMMARY OF IMPACTS TO NATIVE VEGETATION

VZ	PCT	TEC	SAII entity	Impact type	Extent (ha)
1	510 DC_woodland	Yes	Yes	surface	1.76
2	510 DC_openwoodland	Yes	Yes	surface	0.49
3	510 DC_mod_grassland	Yes	Yes	surface	14.00
4	510 LRC_mod_grassland	Yes	Yes	surface	8.70
5	510 LRC_openwoodland	Yes	Yes	surface	1.60
6	510 TL_canopy	Yes	Yes	tree canopy	1.39
7	533 DC_openwoodland	Yes	Yes	surface	0.06
8	533 DC_modgrassland	Yes	Yes	surface	0.49
9	533 TL_canopy	Yes	Yes	tree canopy	0.08
10	534 DC_woodland	Yes	Yes	surface	1.80
11	534 DC_openwoodland	Yes	Yes	surface	0.76
12	534 DC_mod_grassland	Yes	Yes	surface	15.47
13	534 LRC_mod_grassland	Yes	Yes	surface	10.57
14	534 LRC_openwoodland	Yes	Yes	surface	3.33
15	534 LRC_canopy	No	No	tree canopy	1.19
16	565 DC_woodland	No	No	surface	2.22
17	565 DC_openwoodland	No	No	surface	0.12
18	565 DC_mod_grassland	No	No	surface	3.27
19	567 DC_woodland	No	No	surface	12.94
20	567 DC_openwoodland	No	No	surface	0.63
21	567 DC_mod_grassland	No	No	surface	11.49
22	567 LRC_woodland	No	No	surface	0.89
23	567 LRC_mod_grassland	No	No	surface	2.34

VZ	PCT	TEC	SAII entity	Impact type	Extent (ha)
24	567 TL_canopy	No	No	tree canopy	1.49
25	568 DC_openforest	No	No	surface	6.27
26	568 DC_woodland	No	No	surface	27.72
27	568 DC_openwoodland	No	No	surface	1.70
28	568 DC_mod_grassland	No	No	surface	59.29
29	568 TL_canopy	No	No	tree canopy	1.86
30	571 DC_openwoodland	No	No	surface	0.09
31	571 DC_mod_grassland	No	No	surface	2.36
32	766 DC_sedgeland	Yes	No	surface	10.11
33	766 LRC_sedgeland	Yes	No	surface	0.36
34	965 DC_openforest	No	No	surface	16.07
35	965 DC_woodland	No	No	surface	1.31
36	965 DC_shrubland	No	No	surface	0.23
37	965 DC_mod_grassland	No	No	surface	2.25
38	965 LRC_openforest	No	No	surface	12.56
39	965 LRC_mod_grassland	No	No	surface	0.31
40	965 TL_canopy	No	No	tree canopy	0.95
41	970 DC_openforest	No	No	surface	4.97
42	970 DC_openwoodland	No	No	surface	0.84
43	970 DC_mod_grassland	No	No	surface	0.27
44	970 LRC_openwoodland	No	No	surface	1.26
45	970 LRC_openforest	No	No	surface	4.97
46	970 LRC_mod_grassland	No	No	surface	11.23
47	970 TL_canopy	No	No	tree canopy	24.28
48	1192 DC_woodland	Yes	No	surface	0.32
49	1192 LRC_woodland	Yes	No	surface	0.86
50	1194 DC_openwoodland	Yes	No	surface	1.12
51	1194 DC_low_grassland	Yes	No	surface	0.88
52	501 DC_woodland	No	No	surface	1.55
53	501 DC_mod_grassland	No	No	surface	0.91
54	510 low_grassland	Yes	No	surface	1.07
55	534 low_grassland	Yes	No	surface	0.93
56	565 low_grassland	No	No	surface	3.56
57	567 low_grassland	No	No	surface	4.82

VZ	PCT	TEC	SAII entity	Impact type	Extent (ha)
58	568 low_grassland	No	No	surface	2.23
59	571 low_grassland	No	No	surface	0.21
60	965 low_grassland	No	No	surface	70.30
61	970 low_grassland	No	No	surface	64.44
62	1192 low_grassland	No	No	surface	2.06

TABLE 8-2 SUMMARY OF RESIDUAL IMPACTS TO THREATENED SPECIES AND THREATENED SPECIES HABITAT

Species Credit Species	BC Act	EPBC Act	SAII entity	Impact Type	Impact
Barking Owl	V	-	No	Surface and tree canopy	25.8 ha
Bluegrass	V	V	No	Surface	0.78 ha
Leafless Tongue Orchid	V	V	No	Surface	0.99 ha
Koala	E	E	No	Surface and tree canopy	122.9 ha
Narrow-leaved Black Peppermint	V	V	No	Surface	59 individuals
South-eastern Glossy Black-Cockatoo	V	V	No	Surface and tree canopy	7.8 ha
Southern Greater Glider	E	E	No	Surface and tree canopy	101 ha
Southern Myotis	V	-	No	Surface and tree canopy	9.6 ha
Squirrel Glider	V	-	No	Surface and tree canopy	106.5 ha

8.1.1 CHANGE IN VEGETATION INTEGRITY SCORE

Table 8-3 details the change in vegetation integrity score for each vegetation zone. The direct impacts of the Project involve all vegetation zones. Surface clearing is to affect 55 VZs with seven associated with the clearing of the tree canopy only.

TABLE 8-3 IMPACTS TO VEGETATION INTEGRITY

VZ	PCT ID	Management zone	Area (ha)	Before development			After development			VIS	Comment
				Comp	Struct	Func	Comp	Struct	Func		
1	510	DC_woodland	1.48	70.7	81.2	48.4	0	0	0	0	Residual impact requiring offset
2	510	DC_openwoodland	0.49	47.5	50.8	54.6	0	0	0	0	Residual impact requiring offset
3	510	DC_mod_grassland	13.22	28.6	51.6	15	0	0	0	0	Residual impact requiring offset
4	510	LRC_mod_grassland	5.47	44.1	55.3	12.7	0	0	0	0	Residual impact requiring offset
5	510	LRC_openwoodland	1.35	67.9	84.5	21.6	0	0	0	0	Residual impact requiring offset
6	510	TL_canopy	1.29	51.2	68.6	69.4	48	52.1	31.3	42.8	Impact limited to tree thinning
7	533	DC_openwoodland	0.06	55.5	67.6	29.7	0	0	0	0	Residual impact requiring offset
8	533	DC_mod_grassland	0.49	42.7	51.7	7.9	0	0	0	0	Residual impact requiring offset
9	533	TL_canopy	0.08	49.1	58.6	46.4	47.6	55.3	14.7	33.8	Impact limited to tree thinning
10	534	DC_woodland	1.2	72.6	48.5	59	0	0	0	0	Residual impact requiring offset
11	534	DC_openwoodland	0.59	24.9	25.1	25.4	0	0	0	0	Residual impact requiring offset
12	534	DC_mod_grassland	13.7	34.9	67.1	11.4	0	0	0	0	Residual impact requiring offset
13	534	LRC_mod_grassland	12.37	17.2	22.6	8.6	0	0	0	0	VIS <15 no offsetable residual impact
14	534	LRC_openwoodland	3.25	73	67.3	64.2	0	0	0	0	Residual impact requiring offset
15	534	LRC_canopy	1.26	61.2	62.4	46.2	57.3	50.4	12.4	32.9	Impact limited to tree thinning
16	565	DC_woodland	2.22	47.4	73.3	37.1	0	0	0	0	Residual impact requiring offset
17	565	DC_openwoodland	0.12	3.3	46.5	23.1	0	0	0	0	VIS <17 no offsetable residual impact

VZ	PCT ID	Management zone	Area (ha)	Before development			After development			VIS	Comment
				Comp	Struct	Func	Comp	Struct	Func		
18	565	DC_mod_grassland	3.27	37.5	53.8	0.4	0	0	0	0	VIS <17 no offsetable residual impact
19	567	DC_woodland	12.95	54.6	92.1	95.4	0	0	0	0	Residual impact requiring offset
20	567	DC_openwoodland	0.71	33.9	8.8	24.2	0	0	0	0	Residual impact requiring offset
21	567	DC_mod_grassland	21.65	35.3	60.6	20.5	0	0	0	0	Residual impact requiring offset
22	567	LRC_woodland	0.77	85.2	83.9	90.4	0	0	0	0	Residual impact requiring offset
23	567	LRC_mod_grassland	3.26	45.7	65.1	4.9	0	0	0	0	Residual impact requiring offset
24	567	TL_canopy	1.49	68	70.3	72.9	59	50.9	24.9	42.1	Impact limited to tree thinning
25	568	DC_openforest	6.27	79.2	41.2	83.1	0	0	0	0	Residual impact requiring offset
26	568	DC_woodland	30.47	52.3	59	76.9	0	0	0	0	Residual impact requiring offset
27	568	DC_openwoodland	1.66	9.8	35.6	28.7	0	0	0	0	Residual impact requiring offset
28	568	DC_mod_grassland	60.95	44	48.6	7.6	0	0	0	0	Residual impact requiring offset
29	568	TL_canopy	2.57	44.3	58.6	65.9	39.9	48.2	9.5	26.4	Impact limited to tree thinning
30	571	DC_openwoodland	10.47	55.9	62	64.6	0	0	0	0	Residual impact requiring offset
31	571	DC_mod_grassland	16.07	41.8	58.7	1.3	0	0	0	0	VIS <17 no offsetable residual impact
32	766	DC_sedgeland	1.18	56.4	69.8	...	0	0	...	0	Residual impact requiring offset
33	766	LRC_sedgeland	0.4	48.2	0.1	...	0	0	...	0	VIS <15 no offsetable residual impact
34	965	DC_openforest	2.18	34.8	71.9	72.1	0	0	0	0	Residual impact requiring offset
35	965	DC_woodland	12.82	18.3	48.1	29	0	0	0	0	Residual impact requiring offset
36	965	DC_shrubland	0.95	15.5	25.7	0	0	0	0	0	VIS <17 no offsetable residual impact
37	965	DC_mod_grassland	4.29	10.7	24.3	2.4	0	0	0	0	VIS <17 no offsetable residual impact
38	965	LRC_openforest	0.84	75	58.5	98.8	0	0	0	0	Residual impact requiring offset

VZ	PCT ID	Management zone	Area (ha)	Before development			After development			VIS	Comment
				Comp	Struct	Func	Comp	Struct	Func		
39	965	LRC_mod_grassland	0.27	15.1	0.3	0.2	0	0	0	0	VIS <17 no offsetable residual impact
40	965	TL_canopy	1.26	34.8	59.6	35.5	30.3	52.7	8.1	23.5	Impact limited to tree thinning
41	970	DC_openforest	4.86	59.8	78.4	88.6	0	0	0	0	Residual impact requiring offset
42	970	DC_openwoodland	11.19	26.6	70.2	71	0	0	0	0	Residual impact requiring offset
43	970	DC_mod_grassland	24.29	55.6	52.8	0.8	0	0	0	0	VIS <17 no offsetable residual impact
44	970	LRC_openwoodland	0.4	20.6	49.4	57.5	0	0	0	0	Residual impact requiring offset
45	970	LRC_openforest	0.86	54.4	77.7	96.9	0	0	0	0	Residual impact requiring offset
46	970	LRC_mod_grassland	1.12	26	34.1	2.3	0	0	0	0	VIS <17 no offsetable residual impact
47	970	TL_canopy	0.88	58	81.9	89.6	49.4	47.4	10	28.6	Impact limited to tree thinning
48	1192	DC_woodland	2.45	40.8	49.9	13.6	0	0	0	0	Residual impact requiring offset
49	1192	LRC_woodland	0.82	15.4	31	86.6	0	0	0	0	Residual impact requiring offset
50	1194	DC_openwoodland	0.93	36.4	44.7	69	0	0	0	0	Residual impact requiring offset
51	1194	DC_low_grassland	3.58	29.9	24.6	0.1	0	0	0	0	VIS <17 no offsetable residual impact
52	501	DC_woodland	2.65	77.4	72.9	74.6	0	0	0	0	Residual impact requiring offset
53	501	DC_mod_grassland	4.53	28.9	64.3	7.9	0	0	0	0	Residual impact requiring offset
54	510	low_grassland	45.22	24.3	49.2	0.7	0	0	0	0	VIS <15 no offsetable residual impact
55	534	low_grassland	64.51	23.3	17.5	3.7	0	0	0	0	VIS <15 no offsetable residual impact
56	565	low_grassland	2.06	20.2	16.8	3.4	0	0	0	0	VIS <17 no offsetable residual impact
57	567	low_grassland	85.54	19.9	20.9	3.7	0	0	0	0	VIS <17 no offsetable residual impact
58	568	low_grassland	112.65	42.8	47.9	0.6	0	0	0	0	VIS <17 no offsetable residual impact
59	571	low_grassland	18.92	30	22.7	1.9	0	0	0	0	VIS <17 no offsetable residual impact

VZ	PCT ID	Management zone	Area (ha)	Before development			After development			VIS	Comment
				Comp	Struct	Func	Comp	Struct	Func		
60	965	low_grassland	110.41	17.5	14.8	0.1	0	0	0	0	VIS <17 no offsetable residual impact
61	970	low_grassland	86.65	32.5	44.2	0.3	0	0	0	0	VIS <17 no offsetable residual impact
62	1192	low_grassland	14.07	30.9	50.5	4.7	0	0	0	0	Residual impact requiring offset

The clearing of the tree canopy only in seven of the 62 VZ will result in a partial loss of VIS. This is notated in the above table. The calcaution of this partial loss is as follows:

- Composition: No tree species to remain in the zone. All shrub, grass, forb, fern and other species to be retained post development.
- Structure: No tree cover in the zone. Per cent cover of all shrubs, grass, forb, fern and other species to be retained post development.
- Function: No trees or hollows to be retained in the zone. Maximum 20% leaf litter and 20 m log length/ 1,000m^2 is to be retained in the zone.

8.2 INDIRECT IMPACTS

The BAM (Section 8.2.2) identifies 16 potential indirect impacts that, as a minimum, must be considered as a part of a BDAR. Residual indirect impacts of the Project on native vegetation, threatened entities and their habitat beyond the Development Footprint have been considered in accordance with the BAM in Table 8-4. Impacts to the neighbouring area of Gondwana Rainforest of Australia which is listed as a World Heritage Place on the National Heritage list are addressed in this section, as required by the SEARs.

Despite the propensity for indirect impacts, it is considered that the mitigation measures proposed are reliable and capable of remedying the effects of these impacts without causing harm to the adjoining environment. No residual indirect impacts are expected. See Section 8.5 for recommended mitigation measures.

TABLE 8-4 SUMMARY OF RESIDUAL INDIRECT IMPACTS

Indirect impact	Impacted entities	Project phase/ timing of impact	Likelihood and consequences
Impacts of the proposal on TECs/PCTs and/or threatened species and their habitat beyond the construction area, including but not limited to:			
(a) Inadvertent impacts on adjacent habitat or vegetation	TECs, PCTs and threatened species habitat	Construction	There are potential impacts to retained and adjacent vegetation resulting from incidental trampling by site vehicles, and overstepping clearing and disturbance boundaries. These risks will be mitigated through environmental management measures and controls via the preparation and implementation of a CEMP and CTMP. There is unlikely to be residual inadvertent impacts to adjacent vegetation. Clear boundaries are to be created using fencing, tape, etc. to ensure that no retained vegetation adjacent to the Oxley Wild Rivers National Park (NP) is incidentally impacted. A buffer of at least 500 m is to occur between the Project and the nearby conservation reserve network containing the Gondwana Rainforest of Australia world heritage area. No measurable adverse impact is expected on the values of the Gondwana Rainforest of Australia.
(b) Reduced viability of adjacent habitat due to edge effects	TECs, PCTs and threatened species habitat	Operation	Impacts to viability of adjacent habitat due to edge effects is considered low due to current land use and condition (livestock grazing and weed incursions) of the Subject Land. However, to minimise edge effects as a result of the Project, mitigation measures will be incorporated into the CEMP and the SWMP to manage impacts to soil quality, hydrology regimes and habitat degradation. Clear boundaries are to be created using fencing, tape, etc. to ensure that no retained vegetation adjacent to the Oxley Wild Rivers NP is impacted by edge effects. There is unlikely to be residual inadvertent impacts to adjacent vegetation. A buffer of at least 500m is to occur between the Project and the nearby conservation reserve network containing the Gondwana Rainforest of Australia world heritage area. No measurable adverse impact is expected on the values of the Gondwana Rainforest of Australia.

Indirect impact	Impacted entities	Project phase/ timing of impact	Likelihood and consequences
(c) Reduced viability of adjacent habitat due to noise, dust or light spill	TECs, PCTs and threatened species habitat	Construction	There are potential impacts to the viability of adjacent habitat as a result of artificial light, runoff, noise and dust incursions during construction of the Project. The CTMP will work to mitigate these impacts occurring from vehicular movement, while the CEMP will work to mitigate these impacts occurring from construction. The CEMP and CTMP will specify how artificial lighting is to be directed away from the neighbouring Oxley Wild Rivers NP and potentially use barriers to further minimise noise and dust disturbance. Due to the limited construction hours, noise and light and will be minimal dark when species are most vulnerable to these disturbances. Minimal residual indirect impacts to the viability of adjacent habitat due to noise, dust or light spill may occur.
(d) Transportation of weeds and pathogens from the subject site to adjacent vegetation	TECs, PCTs and threatened species habitat	Construction, operation and rehabilitation	There is a potential risk of transportation of introduced weeds and pathogens during construction and operation to adjacent vegetation. This risk is already present as a result of the current land use however, risk is increased with increased vehicular movements. This risk will be mitigated within the CTMP, CEMP and Pest Management Control Programs to be implemented. There is unlikely to be residual inadvertent impacts to adjacent vegetation.
(e) Increased risk of starvation, exposure and loss of shade or shelter	Threatened fauna species	Construction and operation	Clearing of native vegetation for the construction of the Project will result in reduction of resources available for threatened fauna species that may result in starvation, exposure and loss of shade or shelter. The extent of clearing of native vegetation has been minimised where possible and the extent of clearing is not considered critical to the survival of any threatened species. Ongoing monitoring through the BBAMP and CEMP will identify any increase in risk to threatened species and will manage this accordingly. There is unlikely to be residual inadvertent impacts to threatened fauna species. This risk does not apply to the Oxley Wild Rivers NP.

Indirect impact	Impacted entities	Project phase/ timing of impact	Likelihood and consequences
(f) Loss of breeding habitat due to vegetation clearance	Threatened fauna species	Construction	Project will result in reduction of breeding habitat available for a range of threatened fauna species. Habitat features known to be of importance for breeding, such as hollow bearing trees, have been avoided where possible. Ongoing monitoring through the BBAMP and CEMP will identify any increase in risk to threatened species and will manage this accordingly. There is unlikely to be residual inadvertent impacts to threatened fauna species. This risk does not apply to the Oxley Wild Rivers NP. There will no removal of vegetation associated with the Gondwana Rainforest of Australia world heritage area.
(g) Trampling of threatened flora species	Threatened flora species	Construction, operation and rehabilitation	Bluegrass and juvenile Narrow-leaved Black Peppermint occur within the Project Area with potential to be trampled. These risks will be mitigated through measures and controls via the preparation and implementation of the CEMP. No-go zones are to be established to ensure no incidental trampling occurs. There is unlikely to be residual inadvertent impacts to threatened flora. This risk does not apply to the Oxley Wild Rivers NP.
(h) Inhibition of nitrogen fixation and increased soil salinity	TECs, PCTs and threatened species habitat and threatened flora species	N/A	The Project is not expected to result in the inhibition of nitrogen or increased soil salinity.
(i) Fertiliser drift	TECs, PCTs and threatened species habitat and threatened flora species	N/A	The Project is not expected to result in any fertiliser drift.
(j) Rubbish dumping due to improper management of waste	TECs, PCTs and threatened species habitat.	N/A	The Project is not expected to result in rubbish dumping.
(k) Wood collection	TECs, PCTs and threatened species habitat	N/A	The Project is not expected to result in increased wood collection.

Indirect impact	Impacted entities	Project phase/ timing of impact	Likelihood and consequences
(l) Removal and disturbance of rocks, including bush rocks	TECs, PCTs and threatened species habitat	N/A	The Project is not expected to result in any indirect impacts resulting in Removal and disturbance of rocks, including bush rocks.
(m) Increase in predators	Threatened fauna species	Operation	The Project will involve the construction and upgrading of access tracks throughout the Subject Land, resulting in the potential to increase predator activity. Species such as the Spotted-tailed Quoll and Squirrel Glider are vulnerable to predation by species such as the European Fox. The Project will involve the implementation of a Pest Control Management Program that will aim to eliminate or reduce the risk of increase in predator activity. There is unlikely to be residual inadvertent impacts to threatened fauna species. This risk does not apply to the Oxley Wild Rivers NP.
(n) Increase in pest animal populations	Threatened flora species and their habitat, TECs and PCTs	Operation	The Project will involve the construction and upgrading of access tracks throughout the Subject Land, resulting in the potential to increase pest animal activity. Species such as the European Rabbit can be destructive to native vegetation. The Project will involve the implementation of a Pest Control Management Program that will aim to eliminate or reduce the risk of increase in pest animal populations. There is unlikely to be residual inadvertent impacts to threatened fauna species. This risk does not apply to the Oxley Wild Rivers NP.
(o) Change in fire regimes	TECs, PCTs, threatened species and their habitat	N/A	The Project is not expected to result in any change in fire regimes.
(p) Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds	Threatened fauna species	N/A	The Project is not expected to result in any disturbance to specialist breeding habitat

8.3 PRESCRIBED IMPACTS

8.3.1 HABITAT CONNECTIVITY

Impacts to habitat connectivity have been identified in Section 7.2.1 and have been minimised throughout Project design reiterations and reduction of native vegetation clearing required. The BBAMP and CEMP will include ongoing monitoring of threatened fauna to further understand and mitigate impacts to habitat connectivity.

8.3.2 WIND TURBINE STRIKES

The potential risk of wind turbine strikes as a result of the Project are identified in Section 7.2.2. The BBAMP will be implemented to avoid, minimise and mitigate these impacts and has quantified the risk to species through a number of assessments including turbine risk assessments and collision risk modelling, as described in Section 7.3 and 7.3.4.

8.3.3 VEHICLE STRIKES

The potential increased risk of vehicle strikes as a result of the Project are identified in Section 7.2.3. With the implementation of mitigation measures the risk of vehicle collision will be substantially reduced and considered low. These measures will be addressed in the CEMP, and include examples such as on-site education, identifying and reporting hazards as they occur during construction, and setting appropriate working hours and vehicle speed limits.

8.4 CUMULATIVE IMPACTS

The Project will contribute to the overall development of the New England REZ. REZs combine wind, solar, hydroelectric and energy storage, and high-voltage transmission lines, to generate and deliver clean, renewable energy. Relevant clean energy proposed, approved, under construction and operational SSDs known at the time of finalisation of this BDAR and within and in the vicinity of the New England REZ have been considered.

Potential direct, indirect and prescribed biodiversity impacts because of the Project have been assessed, additionally it is acknowledged the Project will contribute to cumulative impacts during construction and operation within the existing environment. Cumulative impacts occur when impacts from a project interact or overlap with impacts from other projects and can potentially result in a larger overall effect on the environment.

A review of relevant clean energy proposals known at the time of finalisation of this BDAR and within and in the vicinity of the New England REZ has been undertaken, with potential relevance to the Project provided in Table 8-5. A large portion of these projects are in the planning phase, and as such the level of direct impacts to native vegetation, TECs, and threatened and migratory listed species is unknown. It is considered likely that cumulative impacts will increase the loss of similar native vegetation and threatened species habitat in the region.

Since the exhibition of the EIS, three additional relevant future projects have been made public - Kingswood BESS, Nottingham Park Solar Farm and Armidale East BESS. In addition, the Salisbury Solar Farm has been withdrawn. There is no publicly available information relevant to cumulative impacts for Salisbury Wind Farm, Ruby Hills Wind Farm, Yarrowyck Wind Farm, Boorolong Wind Farm or the New England REZ Transmission Project. These projects have therefore been excluded from the cumulative impact assessment.

From these projects, Thunderbolt Wind Farm and Hills of Gold Wind Farm have been identified as the most relevant to cumulative impacts in the region. Thunderbolt Wind Farm is situated within the Eastern Nandewars subregion of the New England Tablelands IBRA Bioregion and is located approximately 26 km from the Project. The direct impact on native vegetation for Thunderbolt Wind Farm is calculated at 211.5 ha, with PCTs/species similar to the direct impact as a result of this Project. Hills of Gold Wind Farm occurs across several IBRA bioregions and subregions, including the Walcha Plateau subregion of the New England Tablelands bioregion, and is located approximately 88 km from the Project. The direct impact on native vegetation as a result of the Hills of Gold Wind Farm is calculated at 206.7 ha with PCTs/species similar to the direct impact as a result of this Project.

TABLE 8-5 POTENTIAL CUMULATIVE IMPACTS

Project	Description / Status*	Approx. distance (km) from the Project	Relevant Future Development
Thunderbolt Wind Farm (Tamworth Regional & Uralla Shire LGAs)	• Approved May 2024 • Nominal generating capacity 192 MW • Up to 32 WTGs • Battery energy storage and ancillary infrastructure • Peak construction workforce up to 190 FTE • Operational workforce of up to 9 FTE • Construction expected to commence early 2025 for 18-24 months (subject to project approval)	26	Likely relevant – The construction periods for the projects could potentially overlap. Both projects are anticipated to have staff located in Armidale, Uralla, and Tamworth and will utilise part of the same transport route to deliver plant from the Port of Newcastle.
Hills of Gold Wind Farm (Tamworth Regional, Liverpool Plains Shire, Upper Hunter Shire LGAs)	• Approved September 2024 • Nominal generating capacity 384 MW • 47 WTGs • Battery energy storage and ancillary infrastructure • Peak construction workforce up to 211 FTE • Operational workforce of up to 28 FTE • Construction expected to commence early 2025 for 18-24 months (subject to project approval)	88	Likely relevant – The construction periods for the projects could potentially overlap. Both projects are anticipated to have staff located in Tamworth and will utilise part of the same transport route to deliver plant from the Port of Newcastle.
Rangoon Wind Farm (Glen Innes Severn Shire & Armidale Regional LGAs)	• In Planning (Prepare EIS) • Nominal generating capacity 130 MW • Up to 25 WTGs • Battery energy storage and ancillary infrastructure • Construction and operational workforce not reported in Scoping Report • Construction commencement not reported. • 18-24 months construction duration	92	Unlikely relevant, noting that this project is still in the "Prepare EIS" phase. Possibly relevant – The construction periods for the projects could potentially overlap. Both projects are anticipated to have staff located in Armidale and the project is likely to utilise the same transport route to deliver plant from the Port of Newcastle.
Oxley Solar Farm (Armidale Regional LGA)	• Approved December 2023 • Approx. 215 MW solar farm • Battery energy storage and ancillary infrastructure • Peak construction workforce up to 300 FTE • Operational workforce of up to 5 FTE. • Approx 12-18 months construction duration. Estimated to commence Q1 2024.	28	Unlikely relevant – It is expected that the construction phase of the project would be completed before the start of Winterbourne. Should there be an overlap there may be traffic impact, this should be minimal as their peak periods will not be occurring at the same time. During operation the projects are both expected to generate a minimal level of traffic.

Project	Description / Status*	Approx. distance (km) from the Project	Relevant Future Development
Bendemeer Solar Farm (Tamworth Regional LGA)	• In Planning (Response to Submissions) • Approx. 210 MW solar farm • Battery energy storage and ancillary infrastructure • Peak construction workforce up to 250 FTE • Operational workforce of up to 10 FTE • Approx 12-18 months estimated to commence Q2 2025.	33	Likely relevant – There is potential for construction of both projects to overlap. Construction traffic generated by the projects may interact within the township of Armidale and Tamworth where staff for both projects are proposed to be located.
Nottingham Park Solar Farm (Tamworth Regional LGA)	• In Planning (Prepare EIS) • Development of a 250 MW solar farm - associated infrastructure and battery storage • Potential to generate 500 jobs during construction, and approximately 10 jobs during operations.	82	Unlikely relevant - The timing for the construction of this project is not reliably known and therefore we have assumed there is no overlap in construction phase and thus no cumulative impact.
Tilbuster Solar Farm (Armidale Regional LGA)	• Approved March 2022 • Approx. 150 MW solar farm • Battery energy storage and ancillary infrastructure	45	Potentially relevant – There is potential for construction of both projects to overlap. The traffic generated by the projects may interact within the township of Armidale where staff for both projects are proposed to be located.
Middlebrook Solar Farm (Tamworth Regional LGA)	• In Planning (Recommendation) • Development of a 320 MW solar farm with battery storage of up to 300 MW/600 MWh (DC coupled) and associated infrastructure. • Construction estimated to commence Q2 2024 (subject to project approval) for a 21 to 30 month period • Operational workforce up to 15 FTE	73	Potentially relevant – There is potential for construction of both projects to overlap. The traffic generated by the projects may interact within the township of Tamworth where staff for both projects are proposed to be located. Upgrades are proposed to the intersection of Middlebrook Road / New England Highway to allow vehicle to turn safely from the state road.
Eathorpe BESS (Armidale Régional LGA)	• In Planning (Prepare EIS) • 150 MW BESS and ancillary infrastructure • Peak construction workforce up to 150 FTE • Operational workforce up to 1 FTE employees (BESS will be operated remotely) • Approx 12 months construction estimated to be completed in 2026	30	Potentially relevant – There is potential for construction of both projects to overlap. The traffic generated by the projects may interact within the township of Armidale where staff for both projects are proposed to be located.

Project	Description / Status*	Approx. distance (km) from the Project	Relevant Future Development
Armidale East BESS (Armidale Régional LGA)	• In Planning (Prepare EIS) • 500MW BESS and ancillary infrastructure • Approx 18 months construction estimated to be completed in 2027 • Peak construction workforce not reported in Scoping Report.	35	Potentially relevant – There is potential for construction of both projects to overlap. The traffic generated by the projects may interact within the township of Armidale where staff for both projects are proposed to be located.
Oven Mountain Pumped Hydro Energy Storage Project (Armidale Regional LGA)	• In Planning (Assessment) • 600 MW pumped hydro energy storage and generation • Ancillary infrastructure • Peak construction workforce up to 600 FTE • Operational workforce up to 30 FTE • Construction estimated to be 36 to 48 months in duration.	33	Potentially relevant – There is potential for construction of both projects to overlap. Temporary accommodation will be required for the construction workforce which will be identified during detailed design and EIS preparation and may be outside the project area. Broader transport logistics options are still under consideration and may include the use of local ports, including the Port of Newcastle.
Tamworth BESS (Tamworth Regional LGA)	• In Planning (Response to Submissions) • 200 MW BESS and ancillary infrastructure • Peak construction workforce up to 150 FTE	67	Potentially relevant – There is potential for construction of both projects to overlap. The traffic generated by the projects may interact within the township of Tamworth where staff for both Projects are proposed to be located.
Kingswood BESS (Tamworth Regional LGA)	• In Planning (Response to Submissions) • 500 MW BESS and ancillary infrastructure • Peak construction workforce up to 100 FTE • Minimal operational workforce (BESS will be operated remotely) • Construction estimated to be up to 18 months. • Construction planned to commence in Q4 of 2024 • Operational workforce up to 1 FTE. • 12 months construction period. Scheduling not reported in Scoping Report.	72	Potentially relevant – There is potential for construction of both projects to overlap. The traffic generated by the projects may interact within the township of Tamworth where staff for both Projects are proposed to be located.

8.5 MITIGATING RESIDUAL IMPACTS – MANAGEMENT MEASURES AND IMPLEMENTATION

A range of mitigation measures have been developed for the Project to mitigate the impacts to native vegetation and habitat that are unable to be avoided. These include a range of measures to be undertaken before and during construction to limit the impact of the Project. Each mitigation measure is discussed in detail below, and a summary is provided in Table 8-6.

TABLE 8-6 SUMMARY OF PROPOSED MITIGATION AND MANAGEMENT MEASURES FOR RESIDUAL IMPACTS (DIRECT, INDIRECT AND PRESCRIBED)

Mitigation measure	Method	Timing	Frequency	Responsibility
Removal of native and threatened species habitat and habitat features				
Offsets	Residual impacts on habitat will be offset through the Biodiversity Offset Scheme.	Detailed design	Planning phase	Applicant
Vegetation Clearing Protocol	Where vegetation is to be removed it will be undertaken in accordance with specifications provided in a vegetation clearing protocol, detailed within the CEMP.	Pre-construction and construction phase	Throughout planning and construction phase	Construction contractor
Fencing Protocol	Plain wire perimeter fencing (opposed to barbed-wire fencing) will be used to avoid potential entrapment of fauna on fences.	Construction phase	Ongoing	Construction contractor
Chemical Protocol	'Environmental Sensitive No-Go Zones' will be established around areas of significance including threatened fauna habitat and threatened flora species locations outside the Development Footprint.	Construction phase	Ongoing	Construction contractor
Impact to native vegetation				
Delineation of clearing areas	To avoid unnecessary removal or damage to retained vegetation, the limit of clearing will be clearly demarcated and signed as 'Environmental Sensitive No-Go Zones' prior to the commencement of clearing. This will be detailed within the BMP, including measures: • Vehicles or machinery will not be permitted to park within or drive through areas of retained vegetation. • Construction materials will not be stockpiled or stored within areas of retained vegetation. • Ancillary facilities, such as site compounds and construction zones, will not be located beyond the limits of clearing. • Temporary fencing and signage will be maintained throughout construction. • Site inductions will be given by the civil contractor to all personnel and visitors to ensure all site workers and visitors are aware of any No-Go Zones. • Clear boundaries on the eastern side will be established to ensure no impacts to Oxley Wild Rivers National Park.	Pre-construction and construction phase	Throughout planning and construction phase	Construction contractor

Mitigation measure	Method	Timing	Frequency	Responsibility
Light/noise/dust				
Daily/seasonal timing of construction activities to reduce impact of noise and light spill	The BMP will include measures to avoid light encroachment on adjacent habitats such as the Oxley Wild Rivers National Park by restricting construction works to daylight hours as much as possible and incorporating sensitive lighting arrays that shield the adjoining native vegetation and habitat from stray light, with low-level lighting installed for all required external lighting.	Pre-construction and construction phase	Throughout planning and construction phase	Construction contractor
Adaptive dust monitoring programs to control air quality	The Applicant will implement programs to monitor the generation of dust during construction activities. All construction activities will be undertaken with the objective of preventing visible dust emissions from construction activities.	Construction phase	Clearing phase	Construction contractor
Invasive flora/pathogens				
Pest Control Management Program - Weed Management	To minimise the spread of weeds throughout the Subject Land and surrounding patches, appropriate weed control activities will be undertaken in accordance with State and regional weed management plans. The Subject Land is subject to the *Northern Tablelands Regional Strategic Weed Management Plan 2017-2022* (LLS, 2017) and management of Weeds of National Significance. The NSW *Biosecurity Act 2015* and regulations provide specific legal requirements for state level priority weeds and high-risk activities. To comply with the objectives of the *Northern Tablelands Regional Strategic Weed Management Plan 2017-2022* (LLS, 2017), the following measures will be implemented as part of the Pest Control Management Program for the Subject Land: • Initial weed treatment - Including eliminating woody species and targeting infestations of exotic herbs. In particular, High Threat Exotic weed species occurring within the subject land will be managed in order to prevent further spread. Prior to any vegetation clearance, High Threat Exotic weeds should be demarcated for these to be disposed of separately from native material. • Containment – Follow-up monitoring and maintenance will be undertaken in areas of the development site that have received past primary weeding treatments to contain any re-emergence of weed species.	Construction and operations phase	Ongoing	Construction and operations contractors

Mitigation measure	Method	Timing	Frequency	Responsibility
	• Minimisation – Minimisation of weed species that cannot be effectively controlled on the site, such as exotic grasses, will be prevented from further spread through construction and operational phase site hygiene procedures.			
Pest Control Management Program - Pathogen Management	A pathogen management protocol will be implemented. Infection of native plants by *Phytophthora cinnamomic* is listed as a key threatening process under the BC Act and EPBC Act. The risk of spreading pathogens and the mitigation measures required on site will be regularly communicated to staff and contractors during inductions and toolbox talks.	Construction and operations	Ongoing	Construction and operations contractors
Increased pest species presence				
Pest Control Management Program - Pest Species Management	Feral pest management programs will be developed and implemented for the Project, with focus on Feral Cats and European Foxes. All control methods will be completed in accordance with relevant legislation / standard operating procedures, including but not limited to the following: • *Northern Tablelands Regional Strategic Pest Animal Management Plan 2018 - 2023* (LLS, 2018) • *NSW Code of Practice and Standard Operating Procedures for the Effective and Humane Management of Feral Cats* (NSW DPI, 2022); and • *NSW Threat Abatement Plan: Predation by the Red Fox (Vulpes vulpes)* (NSW OEH, 2010).	Construction and operations	Ongoing	Construction and operations contractors
Erosion and sediment				
Soil and Water Management Plan - Erosion and Sediment Control Plan	A site-specific Erosion and Sediment Control Plan will be developed and implemented to minimise erosion and sediment control risks. The Plan will include arrangements for managing wet weather events, and working with high surface water levels, including monitoring of potential high-risk events and specific controls and follow-up measures to be applied in the event of wet weather to avoid adverse impacts to hydrological processes, wetlands and ephemeral creek lines.	Construction phase	Ongoing	Construction contractors

Mitigation measure	Method	Timing	Frequency	Responsibility
Turbine Strike				
Bird and Bat Adaptive Management Plan	The final BBAMP will be prepared in consultation with BCS following approval of the Project.	Pre-construction, construction and operations	ongoing	Environmental consultant contractors

9. ASSESSING AND OFFSETTING IMPACTS

9.1 SERIOUS AND IRRIVERSIBLE IMPACTS

A SAII entity is listed under the BC Act as an impact that is likely to contribute significantly to the risk of extinction of a threatened entity.

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct through one or more of the following principles:

1. It will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
2. It will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size.
3. It is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution; or
4. The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

The assessment of entities identified at risk of a SAII, where impacted by a SSD project, the Minister for Planning is required to:

- Take those impacts into consideration, and
- Determine whether there are any additional and appropriate measures that will minimise those impacts if consent or approval is to be granted.

Potential SAII has been addressed in the following sections in accordance with Section 9.1 of the BAM (2020).

9.1.1 ASSESSMENT FOR SERIOUS AND IRREVERSIBLE IMPACTS ON BIODIVERSITY VALUES

Based on candidate ecosystem credit species, species credit species, and result of field surveys, no species impacted by the Project have been identified as being at risk of an SAII.

The Project will have a direct impact on two TECs, which are listed as entities at risk of SAII. These are:

- White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland; and
- New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion.

The first two principles apply to these TECs.

9.1.2 ADDITIONAL IMPACT ASSESSMENT PROVISIONS FOR TECS AT RISK OF AN SAII

The additional impact assessment provisions for TEC at risk of an SAII are assessed for each of the two TECs identified in Section 9.1.1 as entities at risk of an SAII.

9.1.2.1 WHITE BOX - YELLOW BOX - BLAKELY'S RED GUM GRASSY WOODLAND AND DERIVED NATIVE GRASSLAND

Response to BAM Section 9.1.1 Criteria
1. The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII (or reference to where these have been addressed in the relevant section of the BDAR).
The actions and measures proposed to avoid direct and indirect impacts are documented in Section 7 of this report. The Project has preferentially utilised low condition grasslands that may represent the TEC. These low condition grasslands are heavily degraded and have low biodiversity value.
2. The assessor must consult the TBDC and/or other sources to report on the status of the TEC including: a. Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal) b. The extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by: vi. Change in community structure vii. Change in species composition viii. Disruption of ecological processes ix. Invasion and establishment of exotic species x. Degradation of habitat xi. Fragmentation of habitat c. Evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the: i. extent of occurrence ii. area of occupancy iii. number of threat defined locations. d. Evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).
The TBDC has been reviewed in relation to the information available for the TEC. A response to these criteria is as follows: a. The current extent of the TEC and the estimated reduction in the geographic extent since 1970 is not available in the TBDC. BioNet Vegetation Database

Response to BAM Section 9.1.1 Criteria

PCT 510, being the sole PCT representative of this TEC within the Subject Land, is estimated to have had a pre-European extent of 155,000 ha ±30%, with the current estimate of coverage being 32,000 ha ±30%. The percent cleared estimate for this PCT is 79% ±50%.

NSW Threatened Species Scientific Committee (Tozer and Simpson 2020)

The average areas cleared annually attributable to either agriculture or infrastructure in the New England Tablelands in which White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland occurs over the period 2009-2018 is 934 ha. Since European settlement, the estimated loss of this TEC is 93%.

Annual Loss and Reduction in Extent Since 1970

During the period 2009 – 2016 an average of 395 ha of Grassy Woodland (sensu Keith 2004, of which White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is a major component) was lost annually across NSW to agriculture-related activities (cropping, conversion to pasture and thinning) and a further 155 ha/annum due to infrastructure developments (NSW DPIE 2019 in Tozer and Simpson 2020).

Estimated Total Extent (current)

Data limitations prohibit the calculation of an accurate aerial extent of this TEC. Vardan et al (2023) estimates NSW comprised 1,963,578 ha (in the likely category) as of 2017. Tozer and Simpson (2020) estimated of 250,729 ha to occur NSW in 2006, which Vardan et al (2023) estimated 1,817,576 ha to occur at that time. The total extent of the TEC is therefore likely to be somewhere between these two estimates.

b. Tozer and Simpson (2020) report the following in relation to TEC change, disruption, degradation and fragmentation.

Change in community structure

The community structure has been substantially modified across its extent of occurrence because of land clearing and modification.

Change in species composition

Species composition has been simplified through historical land clearing, modification and introduction of alien species.

Disruption of ecological processes

The TEC largely occurs in the sheep wheat belt of NSW where widespread long-term agricultural production has resulted in the clearing and medication of this TEC. Several threats to ecological process remain active throughout the range of the TEC, which adversely affect ecological processes.

Invasion and establishment of exotic species

Exotic plant and animal species are commonly encountered in the TEC. These species directly compete with native species that characterize this ecological community, resulting in reduced abundance and extent for these species.

Degradation of habitat

Response to BAM Section 9.1.1 Criteria

The ecological community generally occurs in a degraded condition across its entire extent. Reduced patch size and associated edge effects with cleared lands has resulted in lower species diversity in remaining patches.

Fragmentation of habitat

Most patches of the ecological community are small and are separated by treeless (cleared) lands. The degree of separation varies across the TECs extent; however, occurrence is commonly hallmarked by paddock trees and small patches with large inter tree/patch distances that often result in fragmentation outcomes (i.e., gaps greater than 30-100m).

c. Principle 3 is not relevant to this TEC.

d. Principle 4 is not relevant to this TEC.

3. Where the TBDC indicates that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Section 9.1.1(2), the assessor must record this in the BDAR

The NSW White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is not identified as 'unknown' or 'data deficient' in the TBDC.

4. The following questions are addressed in relation to the impacts from the proposal of the TEC.
   a. The impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:
      i. in hectares
      ii. as a percentage of the current geographical extent of the TEC in NSW
   b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:
      i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals
      ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:
         - distance between isolated areas of the TEC, presented as the average
         - distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and
         - estimated maximum dispersal distance for native flora species characteristic of the TEC, and
         - other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development
      iii. Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone (s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.

a. The Project will impact the TEC across the Subject Land as follows:
   - Woody patches (i.e., woodland, open woodland and scattered trees) = 4.61 ha
   - Non-woody patches (i.e., moderate and low condition grasslands) = 63.91 ha

Response to BAM Section 9.1.1 Criteria

For woody patches, the impacts are as follows:

- Woodland = 2.65 ha (1.48 ha on freehold land (62 patches) and 1.17 ha in the local road reserve (226 patches))
- Open Woodland = 0.65 ha (0.47 ha on freehold land (45 patches) and 0.18 ha in the local road reserve (22 patches))
- Scattered trees = 0.02 ha (all on freehold land – 2 trees)
- Tree canopy (transmission line) = 1.29 ha (all on freehold land)

For non-woody patches, the impacts are as follows:

- Moderate condition grasslands = 18.70 ha (13.23 ha on freehold land and 5.47 ha in local road reserve)
- Low condition grasslands = 45.23 ha (34.87 ha on freehold land and 10.36 ha in local road reserve)

Relative to the total extent of the TEC in NSW, this impact is estimated to be 0.003 to 0.027% (i.e. 4.61 ha of 250,729 ha/ 1,963,578 ha), with over 90% of this impact associated with the non-woody (grassland) low condition state. Mean patch size for woodland condition state is 0.02 ha, meaning that the Project is minimizing impacts on remnant patches rather than removal of larger more intact patches.

b. The Project is expected to:

- Isolate or fragment woody patches of the TEC in an estimated eight locations (i.e. separation distance of >30 m between patches)
- The remaining patches peripheral to the Subject Land that are within 30 m of each other will remain connected by a distance equal to or less than this separation (i.e., over 30 independent locations).
- The capacity for species to move/disperse throughout the Project Area is unlikely to be changed by the Project and its impacts.

c. The condition of the TEC varies according to vegetation structure and tenure (i.e., freehold versus road reserve). The following VIS were calculated by VZ:

- VZ 1 (woodland – freehold): 67.6
- VZ 2 (open woodland – freehold): 50.9
- VZ 3 (moderate condition grassland - freehold): 28.1
- VZ 4 (moderate condition grassland – road reserve): 31.4
- VZ 5 (woodland – local road reserve): 49.9
- VZ 6 (woodland – tree canopy – freehold): 62.5
- VZ 54 (low condition grassland): 9.5

Response to BAM Section 9.1.1 Criteria
By area, the largest impact on the TEC is on low condition grasslands (42.22 ha), this being an artefact of the avoid minimise efforts expended during design. Refer to Section 8.1.1 for details on composition, structure and function calculations by VZ.

9.1.2.2 NEW ENGLAND PEPPERMINT (*EUCALYPTUS NOVA-ANGLICA*) WOODLAND ON BASALTS AND SEDIMENTS IN THE NEW ENGLAND TABLELAND BIOREGION

Response to BAM Section 9.1.1 Criteria
1. The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII (or reference to where these have been addressed in the relevant section of the BDAR).
The actions and measures proposed to avoid direct and indirect impacts are documented in Section 7 of this report. The Project has preferentially utilised low condition grasslands that may represent the TEC. These low condition grasslands are heavily degraded and have low biodiversity value.
2. The assessor must consult the TBDC and/or other sources to report on the status of the TEC including: a. Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal) b. The extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by: vi. Change in community structure vii. Change in species composition viii. Disruption of ecological processes ix. Invasion and establishment of exotic species x. Degradation of habitat xi. Fragmentation of habitat c. Evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the: i. extent of occurrence ii. area of occupancy iii. number of threat defined locations. d. Evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).
The TBDC has been reviewed in relation to the information available for the TEC. A response to these criteria is as follows: a. The current extent of the TEC and the estimated reduction in the geographic extent since 1970 is not available in the TBDC. BioNet Vegetation Database

Response to BAM Section 9.1.1 Criteria

PCT 533 AND 534, being the PCTS representative of this TEC within the Subject Land, are estimated to have had a pre-European extent of 30,000 ha ±50% and 50,000 ha ±50% respectively, with the current estimate of coverage being 9,000 ha ±50% and 5,000 ha ±30% respectively. The percent cleared estimate for these PCTs is 70% ±50% and 90% ±50% respectively. From this, it is estimated that there is between 7,000 and 21,000 ha remaining of these PCTs across its natural range.

Threatened Species Scientific Committee (Commonwealth 2011)

The estimated extent of this TEC was 14,000 ha (2011), representing an 82.5% decline from a pre-European extent of 80,000 ha.

Annual Loss and Reduction in Extent Since 1970

Not known.

Estimated Total Extent (current)

The current extent of this TEC is likely to be less than the 2011 estimates.

b. TEC change, disruption, degradation and fragmentation is outlined in Threatened Species Scientific Committee listing advice (Commonwealth 2011)

Change in community structure

The community structure has been substantially modified across its extent of occurrence because of land clearing and modification.

Change in species composition

Species composition has been simplified through historical land clearing, modification and introduction of alien species.

Disruption of ecological processes

The TEC largely occurs in the sheep wheat belt of NSW where widespread long-term agricultural production has resulted in the clearing and medication of this TEC. Several threats to ecological process remain active throughout the range of the TEC, which adversely affect ecological processes. Pasture improvement has resulted in substantive soil chemistry changes that has likely permanently degraded many patches of this TEC.

Invasion and establishment of exotic species

Exotic plant and animal species are commonly encountered in the TEC. These species directly compete with native species that characterize this ecological community, resulting in reduced abundance and extent for these species.

Degradation of habitat

The ecological community generally occurs in a degraded condition across its entire extent. Reduced patch size and associated edge effects with cleared lands has resulted in lower species diversity in remaining patches.

Response to BAM Section 9.1.1 Criteria

Fragmentation of habitat

Most patches of the ecological community are small and are separated by treeless (cleared) lands. The degree of separation varies across the TECs extent; however, occurrence is commonly hallmarked by paddock trees and small patches with large inter tree/patch distances that often result in fragmentation outcomes (i.e., gaps greater than 30-100m).

c. Principle 3 is not relevant to this TEC.

d. Principle 4 is not relevant to this TEC.

3. Where the TBDC indicates that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Section 9.1.1(2), the assessor must record this in the BDAR

The NSW New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion CEEC is not identified as 'unknown' or 'data deficient' in the TBDC.

4. The following questions are addressed in relation to the impacts from the proposal of the TEC.
   a. The impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:
      i. in hectares
      ii. as a percentage of the current geographical extent of the TEC in NSW
   b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:
      i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals
      ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:
         - distance between isolated areas of the TEC, presented as the average
         - distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and
         - estimated maximum dispersal distance for native flora species characteristic of the TEC, and
         - other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development
      iii. Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone (s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.

a. The Project will impact the TEC across the Subject Land as follows:

- Woody patches (i.e., woodland, open woodland and scattered trees) = 6.43 ha
- Non-woody patches (i.e., moderate and low condition grasslands) = 91.07ha

For woody patches, the impacts are as follows:

Response to BAM Section 9.1.1 Criteria

- Woodland = 4.38 ha (1.20 ha on freehold land (53 patches) and 3.18 ha in the local road reserve (396 patches))
- Open Woodland = 0.71 ha (0.63 ha on freehold land (61 patches) and 0.07 ha in the local road reserve (6 patches))
- Scattered trees = 0.02 ha (all on freehold land – 3 tree)
- Tree canopy (transmission line) = 1.34 ha (all on freehold land)

For non-woody patches, the impacts are as follows:

- Moderate condition grasslands = 26.56 ha (14.19 ha on freehold land and 12.37 ha in local road reserve)
- Low condition grasslands = 64.51 ha (27.94 ha on freehold land and 36.57 ha in local road reserve)

Relative to the total extent of the TEC in NSW, this impact is estimated to be 0.70% (i.e., 4.61 ha of 14,000 ha), with over 90% of this impact associated with the non-woody low condition grassland. Mean patch size for woodland condition state is 0.08 ha, meaning that the Project is minimizing impacts on remnant patches by avoiding the removal of larger more intact patches.

b. The Project is expected to:

- Isolate or fragment woody patches of the TEC in several locations (i.e., separation distance of >30 m between patches)
- The remaining patches peripheral to the Subject Land that are within 30 m of each other will remain connected by a distance equal to or less than this separation (i.e., over 30 independent locations).
- The capacity for species to move/disperse throughout the Project Area is unlikely to be changed by the Project and its impacts.

c. The condition of the TEC varies according to vegetation structure and tenure (i.e., freehold versus road reserve). The following VIS were calculated by VZ:

- VZ 7 (woodland – freehold): 48.1
- VZ 8 (open woodland – freehold): 26.0
- VZ 9 (canopy - freehold): 51.1
- VZ 10 (woodland - freehold): 59.2
- VZ 11 (open woodland - freehold): 25.1
- VZ 12 (woodland – tree canopy – freehold): 29.9
- VZ 13 (mod condition grassland – road reserve): 14.9
- VZ 14 (woodland – road reserve): 68.1
- VZ 15 (canopy – road reserve): 56.1

Response to BAM Section 9.1.1 Criteria

- VZ55 (low condition grassland): 11.4

By area, the largest impact on the TEC is on low condition grasslands (42.22 ha), this being an artefact of the avoid minimise efforts expended during design. Refer to Section 8.1.1 for details on composition, structure and function calculations by VZ.

9.1.3 PROPOSED ADDITIONAL MEASURES

The Applicant proposes to regenerate up to 15 ha in aggregate of the two affected SAII entities within the local area to an extent that meets or exceeds the woody component lost through clearing for the Project. This additional measure aims to locally compensate for the loss of the woody component of vegetation associated with these PCTs (i.e., higher condition state VZs).

9.1.4 SAII IMPACT CONCLUSION

By addressing the two relevant principles for these SAIIs (i.e., principles 1 and 2), it is concluded that the Project would not increase the risk of local extinction. Thus, it is concluded that the Project is not likely to result in a SAII on the two affected CEECs being:

- New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion CEEC; and
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

Firstly, the Projects impact on SAII entities has been reduced through design. Surface clearing (permanent) has been reduced through avoidance measures. This has been supported by aligning development to areas of low condition grassland, where possible. Impact minimization along transmission lines has been achieved by limiting associated impacts of clearing to the tree canopy only (thus retain the groundcover layer).

Additional measures aim to compensate for the loss of higher condition vegetation within the local area. This directly addresses the principles applicable to these two SAII entities to an extent that exceeds the woody vegetation loss for these two TECs.

9.2 IMPACT SUMMARY

9.2.1 IMPACTS THAT REQUIRE AN OFFSET

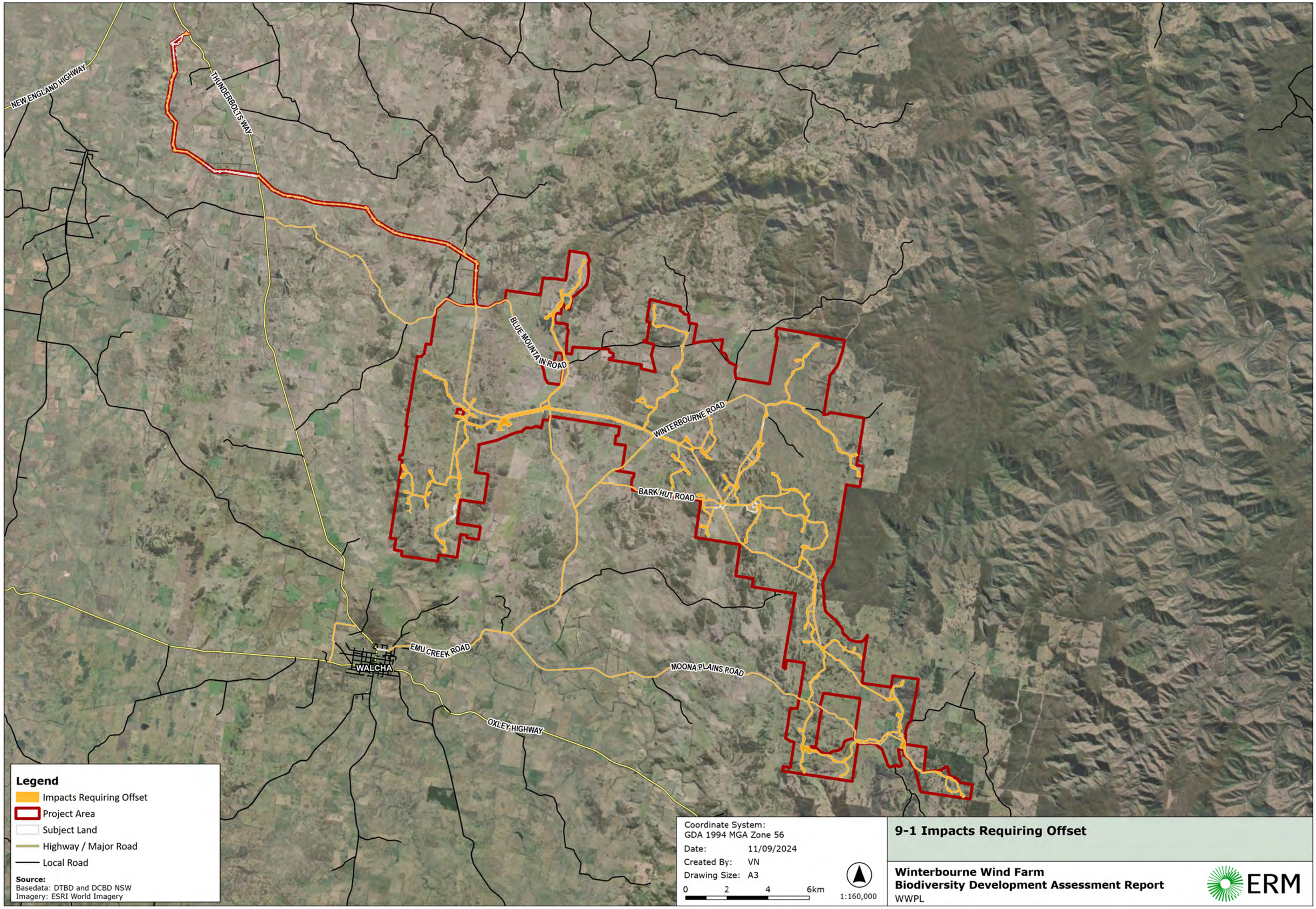
Impacts requiring an offset are shown in Figure 9-1. In accordance with Section 9.2.1 of the BAM, these areas comprise native vegetation with vegetation integrity score of at least:

- ≥15, where the PCT is representative of an EEC or a CEEC;
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community; or
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

All PCTs mapped within the Subject Land that are to experience a permanent direct impact require offsetting as they meet the vegetation integrity score threshold above.

9.2.2 IMPACTS THAT DO NOT REQUIRE FURTHER ASSESSMENT

The Subject Land contains 32.8 ha of non-native vegetation that does not require assessment for ecosystem credits. These areas are lacking vegetation because of clearing for access tracks or for infrastructure such as dams, troughs, and water tanks. This land does not constitute habitat for threatened species. There are no prescribed impacts requiring offsets in areas of non-native vegetation. Non-native vegetation not requiring offset is shown in Figure 9-2.



9-1 Impacts Requiring Offset

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

NEW ENGLAND HIGHWAY
THUNDERBOLTS WAY
BLUE MOUNTAIN ROAD
WINTERBOURNE ROAD
BARK HUT ROAD
EMU CREEK ROAD
WALCHA
MOONA PLAINS ROAD
OXLEY HIGHWAY

Legend

- Impacts Not Requiring Offset
- Project Area
- Subject Land
- Highway / Major Road
- Local Road

Source:
Basedata: DTBD and DCBD NSW
Imagery: ESRI World Imagery

Coordinate System:
GDA 1994 MGA Zone 56
Date: 11/09/2024
Created By: VN
Drawing Size: A3
0 2 4 6km
1:160,000

9-2 Impacts not Requiring Offset

Winterbourne Wind Farm
Biodiversity Development Assessment Report
WWPL

ERM

0526676_WWF_BDAR_R3.aprx

10. APPLYING THE NO NET LOSS STANDARD

The offset liability for the Project is calculated in the following sections. The Biodiversity Credit Report is provided in Appendix G.

10.1 OFFSET REQUIREMENTS FOR DIRECT IMPACTS

10.1.1 ECOSYSTEM CREDITS

Table 10-1 identifies the ecosystem credits required to offset the Project as per BAM Subsection 9.2.1(1.). There are no vegetation zones, TECs or ECs that are assessed as not requiring offsets as per BAM Subsection 9.2.1(3.).

Like for like trading options apply to the Ecosystem credit classes as outlined in Table 10-2.

TABLE 10-1 IMPACTS THAT REQUIRE AN OFFSET – ECOSYSTEM CREDITS

VZ	PCT ID/Condition	Impact area (ha)	VIS Loss	Offsetable Impact	Number of ecosystem credits required
1	510 DC_woodland	1.48	-67.6	Yes	63
2	510 DC_openwoodland	0.49	-50.9	Yes	16
3	510 DC_mod_grassland	13.22	-28.1	Yes	232
4	510 LRC_mod_grassland	5.47	-31.4	Yes	107
5	510 LRC_openwoodland	1.35	-49.9	Yes	42
6	510 TL_canopy	1.29	-19.7	Yes	16
7	533 DC_openwoodland	0.06	-48.1	Yes	2
8	533 DC_modgrassland	0.49	-26	Yes	8
9	533 TL_canopy	0.08	-17.3	Yes	1
10	534 DC_woodland	1.2	-59.2	Yes	44
11	534 DC_openwoodland	0.59	-25.1	Yes	9
12	534 DC_mod_grassland	13.7	-29.9	Yes	256
13	534 LRC_mod_grassland	12.37	-14.9	No	0
14	534 LRC_openwoodland	3.25	-68.1	Yes	138
15	534 LRC_canopy	1.26	-23.2	Yes	18
16	565 DC_woodland	2.22	-50.5	Yes	42
17	565 DC_openwoodland	0.12	-15.3	No	0
18	565 DC_mod_grassland	3.27	-9.3	No	0
19	567 DC_woodland	12.95	-78.3	Yes	444
20	567 DC_openwoodland	0.71	-19.3	Yes	6
21	567 DC_mod_grassland	21.65	-35.3	Yes	334
22	567 LRC_woodland	0.77	-86.4	Yes	29

VZ	PCT ID/Condition	Impact area (ha)	VIS Loss	Offsetable Impact	Number of ecosystem credits required
23	567 LRC_mod_grassland	3.26	-24.4	Yes	35
24	567 TL_canopy	1.49	-28.2	Yes	18
25	568 DC_openforest	6.27	-64.7	Yes	178
26	568 DC_woodland	30.47	-61.5	Yes	819
27	568 DC_openwoodland	1.66	-21.5	Yes	16
28	568 DC_mod_grassland	60.95	-25.3	Yes	675
29	568 TL_canopy	2.57	-29.1	Yes	33
30	571 DC_openwoodland	10.47	-60.7	Yes	318
31	571 DC_mod_grassland	16.07	-14.7	No	0
32	766 DC_sedgeland	1.18	-62.8	Yes	37
33	766 LRC_sedgeland	0.4	-2.2	No	0
34	965 DC_openforest	2.18	-56.5	Yes	62
35	965 DC_woodland	12.82	-29.5	Yes	189
36	965 DC_shrubland	0.95	-7.4	No	0
37	965 DC_mod_grassland	4.29	-8.6	No	0
38	965 LRC_openforest	0.84	-75.7	Yes	32
39	965 LRC_mod_grassland	0.27	-1	No	0
40	965 TL_canopy	1.26	-18.4	Yes	12
41	970 DC_openforest	4.86	-74.6	Yes	159
42	970 DC_openwoodland	11.19	-51	Yes	249
43	970 DC_mod_grassland	24.29	-13.3	No	0
44	970 LRC_openwoodland	0.4	-38.8	Yes	7
45	970 LRC_openforest	0.86	-74.3	Yes	28
46	970 LRC_mod_grassland	1.12	-12.7	No	0
47	970 TL_canopy	0.88	-46.6	Yes	18
48	1192 DC_woodland	2.45	-30.3	Yes	37
49	1192 LRC_woodland	0.82	-34.6	Yes	14
50	1194 DC_openwoodland	0.93	-48.2	Yes	22
51	1194 DC_low_grassland	3.58	-4.5	No	0
52	501 DC_woodland	2.65	-75	Yes	99
53	501 DC_mod_grassland	4.53	-24.6	Yes	56
54	510 low_grassland	45.22	-9.5	No	0
55	534 low_grassland	64.51	-11.4	No	0
56	565 low_grassland	2.06	-10.5	No	0

VZ	PCT ID/Condition	Impact area (ha)	VIS Loss	Offsetable Impact	Number of ecosystem credits required
57	567 low_grassland	85.54	-11.6	No	0
58	568 low_grassland	112.65	-10.8	No	0
59	571 low_grassland	18.92	-10.9	No	0
60	965 low_grassland	110.41	-3.2	No	0
61	970 low_grassland	86.65	-7.4	No	0
62	1192 low_grassland	14.07	-19.4	Yes	136

TABLE 10-2 ECOSYSTEM CREDIT CLASS AND MATCHING CREDIT PROFILE

PCT name	PCT vegetation class	TEC	Offset trading group	Hollow-bearing trees	Credits
501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion	New England Grassy Woodlands	No	New England Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	Yes	99
				No	56
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	New England Grassy Woodlands	Yes	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	32
				No	444
533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	New England Grassy Woodlands	Yes	New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Yes	1
				No	10
534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	Tableland Clay Grassy Woodlands	Yes	New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Yes	200
				No	265
565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	New England Dry Sclerophyll Forests	No	New England Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	42
				No	0
567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	New England Grassy Woodlands	No	New England Grassy Woodlands - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status)	Yes	825
				No	41
568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	New England Dry Sclerophyll Forests	No	New England Grassy Woodlands - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status).	Yes	1,046
				No	675
571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	New England Grassy Woodlands	No	New England Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status).	Yes	318
				No	0

PCT name	PCT vegetation class	TEC	Offset trading group	Hollow-bearing trees	Credits
766-Carex sedgeland of the slopes and tablelands	Montane Bogs and Fens	Yes	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	N/A	37
965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	New England Dry Sclerophyll Forests	No	New England Dry Sclerophyll Forests - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status).	Yes	283
				No	12
970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	New England Dry Sclerophyll Forests	No	New England Dry Sclerophyll Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status).	Yes	461
				No	0
1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	Tableland Clay Grassy Woodlands	Yes	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	Yes	51
				No	136
1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	Northern Tableland Wet Sclerophyll Forests	Yes	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	Yes	22
				No	0

10.1.2 SPECIES CREDITS

Candidate species requiring an offset are presented in Table 10-3.

TABLE 10-3 IMPACTS THAT REQUIRE AN OFFSET – SPECIES CREDITS

Common name	Scientific name	BC Act	EPBC Act	Loss of habitat (ha)/ individual	Biodiversity risk weighting	Species credits
Barking Owl	*Ninox connivens*	V	-	25.8	2	818
Bluegrass	*Dichanthium setosum*	V	V	0.78	2	4
Leafless Tongue Orchid*	*Cryptostylis hunteriana*	V	V	0.99	1.5	18
Koala	*Phascolarctos cinereus*	E	E	122.9	2	3,550
Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	V	V	59 individuals	2	118
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	V	V	7.8	2	256
Southern Greater Glider	*Petauroides volans*	E	E	101	2	2,884
Southern Myotis	*Myotis macropus*	V	-	9.6	2	277
Squirrel Glider	*Petaurus norfolcensis*	V	-	106.5	2	3,082

* Note: This area calculation includes a large proportion of 'assumed presence'.

The area from which the Species credits can be obtained is limited to the State of NSW.

10.2 OFFSET STRATEGY

The No Net Loss standard involves the retirement of ecosystem and species credits for Project related direct impacts in accordance with the BOS. The BOS requires all biodiversity impacts to be calculated using the BAM-C, which provides an output determining the final Species credit and Ecosystem credit obligations for the Project. Typically, the final credit obligations are to be 'retired' prior to construction or in accordance with an approved staged approach.

The Applicant is developing a biodiversity offset strategy in parallel with the Biodiversity Assessment Report. This strategy will detail the offset approach to be undertaken to retire credit obligations and will be achieved by:

- Retiring 'like for like' credits as specified in Sections 7.1 and 7.2 to the amount and from the regions indicated.
- Funding a biodiversity conservation action instead of, or in combination with, the retirement of species credits; or
- Payment into the Biodiversity Conservation Trust (BCT) in lieu of satisfying the offset liability specified in Section 7.1 and 7.2.

11. CONCLUSION

11.1 BIODIVERSITY MATTERS REQUIRING ASSESSMENT

The native vegetation cover mapped within the Subject Land is 853.98 ha, with the composition of this vegetation cover broadly described in Table 11-1.

TABLE 11-1 SUMMARY OF LAND COVERS IN THE SUBJECT LAND

Disturbance	Landcover Class	Landcover Character	Tenure	Draft NVM Land Category	Area (ha)
Surface	Vegetated	Native	Freehold	Category 1 Category 2	382.39 368.95
			Road reserve	Category 1 Category 2 N/A	17.52 76.30 0.48
		Cleared for grazing	Freehold	Category 1	38.75
		Exotic	Freehold	Category 1 Category 2	0.10 0.16
			Road reserve	Category 2 N/A	0.01 0.91
	Unvegetated	Water Roads	Freehold Road reserve	Category 1 Category 1	0.23 15.49
Transmission Line	Tree Canopy	Native	Freehold	Category 2	8.83
		Exotic	Freehold	Category 1 Category 2	0.14 0.06

Thirteen PCTs are mapped within the Subject Land comprising 62 vegetation zones in varying conditions states that are generically described as:

- Woody:
  - Open forests;
  - Woodland;
  - Open Woodland; and
  - Shrubland.
- Non-woody:
  - Moderate condition grasslands;
  - Low condition grasslands; and
  - Sedgeland.

The Haul Route outside the Subject Land boundary contains no assessable native vegetation or habitat.

Four TECs are mapped within the Subject Land these being:

- Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions EEC;
- New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion CEEC;
- Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion EEC; and
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

11.2 AVOID, MINIMISE AND MITIGATE

The amended Project design is based on detailed assessments and in response to the identification and assessment of environmental limitations, constructability requirements, and consideration of the outcomes of agency, landowner, and community consultations. The project design has aimed to avoid areas of biodiversity values as follows:

- Remnant woodland habitat identified as having high biodiversity value for resident and nomadic fauna, and in areas comprising TECs. The mapped extent and condition of this habitat was used to affect an avoidance during Project design; and
- The Project has been designed to maximise use of existing public and internal access tracks across the Subject Land where possible, minimising vegetation clearance required and where possible preventing an increase to predator access routes and activity.

A suite of mitigation measures to avoid and further minimise direct, indirect and prescribed impacts will be implemented, such as the development and implementation of a BBAMP and BMP.

11.3 DIRECT IMPACTS ON ASSESSABLE BIODIVERSITY MATTERS

The Project will have a direct impact on native vegetation and the habitat of known and assumed candidate threatened species. Direct impacts on PCTs are unavoidable and have been subject to residual impact calculations.

Species polygons have been established for eight threatened species that cannot be avoided by the Project. None of the species are identified as SAII entities.

Three PCTs forming part of two CEECs are listed as SAII entities, these being:

- 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion;
- 533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion; and
- 534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion.

The Projects impact on SAII entities has been reduced through design. Additional measures are proposed to locally compensate for the loss of woody vegetation associated with these PCTs (i.e., higher condition state VZs).

It was concluded that the Project is not likely to result in a SAII on the two affected CEECs being:

- New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion CEEC; and
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

The conclusion is supported by addressing the two principles that relate to these two SAIIs (i.e., principles 1 and 2), this being the regeneration of these TECs within the local area to an extent that meets or exceeds the woody component of these TECs cleared the Project.

11.4 INDIRECT IMPACTS ON ASSESSABLE BIODIVERSITY MATTERS

Indirect and prescribed impacts are expected because of the Project and are associated with the following:

- Impacts to hydrological processes;
- Increase risk of mammal predatory species access;
- Increase risk of vehicle strike; and
- Risk of turbine strike.

Mitigation measures will be implemented to mitigate against these indirect impacts and are inclusive of the implementation of a CEMP, BBAMP and BMP.

12. REFERENCES

Armstrong, K. & Aplin, K. 2017. *Rhinolophus megaphyllus*. The IUCN Red List of Threatened Species 2017: e.T19553A21993377. https://dx.doi.org/10.2305/IUCN.UK.2017-2.RLTS.T19553A21993377.en. Downloaded on 15 December 2019.

Armstrong, K. & Lumsden, L. 2017. *Saccolaimus flaviventris*. The IUCN Red List of Threatened Species 2017: e.T19799A22006694. https://dx.doi.org/10.2305/IUCN.UK.2017-2.RLTS.T19799A22006694.en. Downloaded on 15 December 2019.

Band, W., Madders, M. and Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at windfarms. In De Lucas, M., Janss, G. and Ferrer, M. (eds) 'Birds and Wind Power'. www.quercus.pt.

Band, W. (2000). Windfarms and Birds: calculating a theoretical collision risk assuming no avoiding action. Scottish Natural Heritage Guidance Note. http://www.snh.gov.uk/planningand-development/renewable-energy/onshore-wind/assessing-bird-collision-risks/

BirdLife, 2019. Woodland Birds for Biodiversity. Birdlife Australia. Accessed 16 December 2019, <http://www.birdlife.org.au/projects/woodland-birds-for-biodiversity>.

BirdLife, 2021a. Satin Flycatcher *Myiagra cyanoleuca*. BirdLife Australia. Accessed 15 March 2021, < https://www.birdlife.org.au/bird-profile/satin-flycatcher>.

Bureau of Meteorology (BOM) (2024). Climate Data Online. Available at: http://www.bom.gov.au/climate/data/

Bureau of Meteorology (2024). *Groundwater Dependent Ecosystems Atlas*. Retrieved from Bureau of Meteorology (BoM) web site: http://www.bom.gov.au/water/groundwater/gde/

Campbell S., 2009: So long as it's near water: variable roosting behaviour of the large-footed myotis (Myotis macropus). Australian Journal of Zoology, 2009, 57, 89–98.

Catling, P.C. 1988. Similarities and constracts in the diets of foxes, *Vulpes vulpes*, and cats, Felis catus, relative to fluctuating prey populations and drought. *Australian Wildlife Research*, 15:307-317.

Churchill, S. 2008. *Australian Bats*. 2nd edn, Allen & Unwin, Sydney.

Debus, S. and G. M. Kirwan (2020). "Australian Kestrel (Falco cenchroides), version 1.0." In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. doi:10.2173/bow.auskes1.01.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (Commonwealth) (2024). *Directory of Important Wetlands in Australia*. Retrieved from Australian Government https://www.dcceew.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands

DCCEEW (2024). *Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions)*. Retrieved from NSW Government https://datasets.seed.nsw.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7-subregions

DCCEEW (2024). *Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions)*. Retrieved from NSW Government https://datasets.seed.nsw.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7-regions

DCCEEW (2024). *Protected Matters Search Tool*. Retrieved from Australian Government https://pmst.awe.gov.au/#/map?lng=131.52832031250003&lat=-28.671310915880834&zoom=5&baseLayers=Imagery,ImageryLabels

DCCEEW (2024). *Species Profile and Threats Database.* Retrieved from Australian Government https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

DCCEEW (2024). *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland ad Derived Native Grassland Ecological Community Species List*. Available from: https://www.dcceew.gov.au/sites/default/files/documents/box-gum-species.pdf

DCCEEW (2023). *Conservation Advice for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/43-conservation-advice.pdf.

DCCEEW (2010). *Survey guidelines for Australia's threatened birds*. Retrieved from https://www.dcceew.gov.au/sites/default/files/documents/survey-guidelines-birds-april-2017.pdf

Department of the Environment, Water, Heritage and the Arts (DEWHA) (Commonwealth) (2013). Significant Impact Guidelines 1.1 - Matters of National Environmental Significance. https://www.environment.gov.au/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance

DEWHA (2010). Survey Guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act.

Department of Environment, Land, Water and Planning (DEWLP), Victoria (2021). *Threatened Species and Communities Risk Assessment – Little Eagle Risk Assessment.* https://www.environment.vic.gov.au/__data/assets/pdf_file/0029/595037/Little-Eagle-Risk-Assessment-Report.pdf

Department of the Environment (DoE), 2015. Draft referral guideline for 14 birds listed as migratory under the EPBC Act

Department of Sustainability, Environment, Water, Population & Communities (DSEWPC) (Commonwealth) (2011). *Survey Guidelines for Australia's Threatened Mammals*. Available from: https://www.agriculture.gov.au/sites/default/files/documents/survey-guidelines-mammals.pdf

DSEWPC (2011). *Survey Guidelines for Australia's Threatened Reptiles*.

DSEWPC (2011). *Approved Conservation Advice for the New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands*. Canberra, ACT. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/83-conservation-advice.pdf.

Hall, L, Lumsden, L, Parnaby, H. (2008). "Large Forest Bat Vespadelus darlingtoni". IUCN Red List of Threatened Species. IUCN. 2008: e.T15006A4486408. doi:10.2305/IUCN.UK.2008. RLTS.T7920A12870313.en

Heath, Julie A.; Frederick, Peter C.; Kushlan, James A.; Bildstein, Keith L. (10 February 2009). "White Ibis: Behavior". Birds of North America Online. Cornell University. Retrieved 15 January 2012.

Higgins, P.J. (ed.) (1999). Handbook of Australian, New Zealand and Antarctic Birds. Volume Four - Parrots to Dollarbird. Melbourne: Oxford University Press.

Hull, C.L & Muir, S. 2010. Search areas for monitoring bird and bat carcasses at wind farms using a Monte-Carlo method. *Australian Journal of Environmental Management* 17:77-87.

Huso, M.M.P. 2011. An estimator of wildlife fatality from observed carcasses. Environmetrics, 22: 318-329.

Marchant, S. & P.J. Higgins (Eds) (1993) Handbook of Australian, New Zealand and Antarctic Birds. Volume 2: Raptors to Lapwings. (Oxford University Press, Melbourne).

Matheu, Eloïsa, del Hoyo, Josep; Garcia, Ernest; Boesman, Peter F. D. (2020-03-04). "Straw-necked Ibis (Threskiornis spinicollis)". In Shawn M. Billerman; Brooke K. Keeney; Paul G. Rodewald; Thomas S. Schulenberg (eds.). Birds of the World. Cornell Lab of Ornithology. Retrieved 2020-11-27.

Menkhorst, P.W, Knight, F. (2011). A field guide to the mammals of Australia (3rd ed.). Melbourne: Oxford University Press. p. 176. ISBN 9780195573954.

Molsher, R.L, Gifford, E.J, & McIIroy, J.C. 2000. “Temporal, spatial and individual variation in the diet of red foxes (*Vulpes vulpes*) in central New South Wales” Wildlife Research 27, 593-601.

Nature Advisory (2022). Bird Utilisation and Raptor Surveys 2020 – 2022 – Winterbourne Wind Farm

NGH (2024). Survey Technical Memo – Winterbourne Target Flora & BAM Plots Jan/Feb 2024

NGH (2023). Land Category Assessment Report – Winterbourne Wind Farm

NGH (2023). Field Survey Technical Memo 1 – Winterbourne Wind Farm

NGH (2023). Field Survey Technical Memo 2 – Winterbourne Wind Farm

NGH (2023). Field Survey Technical Memo 3 – Winterbourne Wind Farm

NGH (2023). Field Survey Technical Memo 4 – Winterbourne Wind Farm

NGH (2022). Biodiversity Development Assessment Report – Winterbourne Wind Farm

NGH (2021). NGH Consulting Glossy Black Cockatoo Diurnal Survey Summary

National Parks and Wildlife Service (NPWS) NSW (2003). *The Bioregions of New South Wales: their biodiversity, conservation and history*. Retrieved from NSW Government https://www.environment.nsw.gov.au/resources/nature/bioregionscontentsintro.pdf

NPWS (2003). *NSW Mitchell Landscapes map and descriptions*. Available from: https://www.environment.nsw.gov.au/resources/conservation/LandscapesDescriptions.pdf

NSW DCCEEW (2024). *State Vegetation Type Mapping Version C2.0M2.0 (December 2023)* SEED Layer. Available from: https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map

NSW DCCEEW (2024). *NSW Landuse 2017 v1.2* SEED Layer. Available from: https://datasets.seed.nsw.gov.au/dataset/nsw-landuse-2017

NSW DCCEEW (2024). *NSW Woody Vegetation Extent & FPC 2011* SEED Layer. Available from: https://datasets.seed.nsw.gov.au/dataset/nsw-woody-vegetation-extent-fpc-20119bb42

NSW Department of Environment and Conservation (DEC) (2004). *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities*

NSW Department of Environment, Climate Change and Water (DECCW) (2010). *New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion*. Available from: https://www.environment.nsw.gov.au/resources/pnf/10519NewEnglandPeppermintGuidelines.pdf

NSW Department of Planning and Environment (DPE) (2022). *Guidance for the Biodiversity Development Assessment Report Template*. State of NSW and Department of Planning and Environment.

NSW DPE (2022). *Threatened reptiles Biodiversity Assessment Method survey guide*.

NSW DPE (2022). *Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide*.

NSW DPE (2016). *Wind Energy Guidelines, For State significant wind energy development*. Retrieved from NSW Government https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/wind-energy-guideline-for-state-significant-wind-energy-development-2016-12.pdf

NSW Department of Planning, Housing and Infrastructure (DPHI) (2024). *Environmental Planning Instrument - Land Zoning*. Available from: https://www.planningportal.nsw.gov.au/opendata/dataset/environment-planning-instrument-local-environmental-plan-land-zoning

NSW Department of Primary Industries (DPI) (2024). *Key Fish Habitat Maps*. https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/key-fish-habitat-maps#:~:text=KFH%20was%20defined%20to%20include,the%20top%20of%20the%20bank.

NSW DPI (2024). *Fisheries Spatial Data Portal*. Available at: https://www.dpi.nsw.gov.au/fishing/fisheries-research/spatial-data-portal

NSW DPI (2022). *NSW Code of Practice and Standard Operating Procedures for the Effective and Humane Management of Feral Cats.* State of NSW. Available at: https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/1394654/Code-of-Practice-and-Standard-Operating-Procedures-for-the-Effective-and-Humane-Management-of-Feral-Cats.pdf

NSW Department of Planning, Industry and Environment (DPIE) (2020). *Surveying Threatened Plants and their Habitats*, *NSW survey guide for the Biodiversity Assessment Method.* Retrieved from NSW Government https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/surveying-threatened-plants-and-habitats-nsw-survey-guide-biodiversity-assessment-method-200146.pdf

NSW DPIE (2020). *NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method*.

NSW DPIE (2020). *The Biodiversity Assessment Method 2020.* Retrieved from NSW Department of Planning and Environment https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/biodiversity-assessment-method-2020

NSW DPIE (2019). *Guidance to assist a decision-maker to determine a serious and irreversible impact.* State of NSW.

NSW Government Spatial Services (2024). *Historical, Aerial and Satellite Imagery*. Available from: https://www.spatial.nsw.gov.au/products_and_services/aerial_and_historical_imagery

NSW Government (2024). *Bionet Atlas*. Available from: *https://atlaseditor.bionet.nsw.gov.au/UI_Modules/TSM_/Default.aspx*

NSW Government (2024). *NSW Biodiversity Values Map* https://www.lmbc.nsw.gov.au/Maps/index.html? viewer=BVMap

NSW Government (2024). *Biodiversity Assessment Calculator*. Retrieved from NSW Government https://www.lmbc.nsw.gov.au/bamcalc

NSW Government (2024). *BioNet Vegetation Classification*. Retrieved from NSW Government https://www.environment.nsw.gov.au/nswvca20prapp/loginpr.aspx

NSW Local Land Services (LLS) (2018). Northern Tablelands Regional Strategic Pest Animal Management Plan 2018 – 2023. Retrieved from https://www.lls.nsw.gov.au/__data/assets/pdf_file/0008/820808/Northern-Tablelands-Pest-Plan-Web.pdf

NSW Local Land Services (LLS) (2017). Northern Tablelands Regional Strategic Weed Management Plan 2017 – 2022. Retrieved from https://www.newa.com.au/user_data/page/files/1552958917_nt-regionalweedmgmtplan-web-june17.pdf

NSW Office of Environment and Heritage (OEH) (2024) *Threatened Species Database Collection* http://www.environment.nsw.gov.au/threatenedspeciesapp/

NSW OEH (2021) Threatened species profile search, NSW Office of Environment and Heritage, viewed 15th March 2021, http://www.environment.nsw.gov.au

NSW OEH (2018). *'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method.*

NSW OEH (2015). *NSW Threat Abatement Plan: Predation by the Red Fox (Vulpes vulpes)*.

NSW Threatened Species Scientific Committee (NSW TSSC) (2020). *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions – Critically Endangered Ecological Community listing*. Available from: https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2020/white-box-yellow-box-critically-endangered-ecological-community-listing

NSW TSSC (2013). *New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion – critically endangered ecological community listing*. Available from: https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2013-2015/New-England-Peppermint-Woodland-critically-endangered-ecological-community-listing

NSW TSSC (2011). *Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions - endangered ecological community listing*. Available from: https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2011-2012/Carex-Sedgeland-of-the-New-England-Tableland-endangered-ecological-community-listing

Olsen, P. (1995), Australian Birds of Prey, University of New South Wales Press, Sydney.

Phillips & Callaghan (2011). *The Spot Assessment Technique: A tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus*

Scottish Natural Heritage (SNH), (2000). Windfarms and Birds - Calculating a theoretical collision risk assuming no avoiding action. SNH Guidance Note. Available at http://www.snh.gov.uk/docs/C205425.pdf

Simpson, K. and Day, N., (2010), Field guide to the birds of Australia, (8th ed), Penguin Books, Australia.

Smales, I (2015). *Fauna collisions with wind turbines: effects and impacts, individuals and population. What are we trying to assess?* Wild and Wildlife: Proceedings from the Conference on Wind Energy and Wildlife Impacts, Melbourne Australia (pp. 23-40). Springer Netherlands

Smales, I and Muir, S. 2005. Modelled Cumulative Impacts on the Tasmanian Wedge-tailed Eagle of Wind Farms Across the Species' Range. Biosis Research Pty. Ltd. Project no. 4857. Retrieved from: https://www.researchgate.net/publication/237246526_Modelled_Cumulative_Impacts_on_the_Tasmanian_Wedge-tailed_Eagle_of_Wind_Farms_Across_the_Species'_Range.

SMALLWOOD, K. S., BELL, D. A., SNYDER, S. A., & DIDONATO, J. E. (2010). Novel Scavenger Removal Trials Increase Wind Turbine–Caused Avian Fatality Estimates. The Journal of Wildlife Management, 74(5), 1089–1097. https://doi.org/10.2193/2009-266

Stewart-Oaten A, Murdoch WW, and Parker KR. 1986. Environmental impact assessment: "Pseudoreplication" in time? Ecology, 67: 929–940.

Threatened Species Scientific Community (TSSC), NSW. 2020. Grey Falcon (Falco hypoleucos) - endangered species listing. Available at https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2008-2010/grey-falcon-falco-hypoleucos-endangered-species-listing

TSSC (2011). Commonwealth Listing Advice on New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands. Department of Sustainability, Environment, Water, Population and Communities. Canberra, ACT. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/83-listing-advice.pdf.

Threatened Species Scientific Committee (2006). *Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/box-gum.html.

Urban Bird Foundation (2022). *Reducing Bird Strike Mortality*. Retrieved from https://urbanbird.org/reducing-bird-strike-mortality/

Vardon M Chen Y van Dijk A Keith H Burnett P Lindenmayer D (2023). Conservation of the critically endangered Box-gum grassy woodlands with ecosystem accounting in Australia. Biological Conservation vol 284 https://doi.org/10.1016/j.biocon.2023.110129.

APPENDIX A NGH TECHNICAL MEMOS

Field Survey Technical Memo 1

Winterbourne Wind Farm

September 2023

Project Number: 23-247



NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au

Document verification

Survey	Winterbourne Wind Farm
Project Number:	23-247
Project File Name:	23-247 23-247 Field Survey Technical Memo 18-23 September Final V1.0

Revision	Date	Prepared by	Reviewed by	Approved by
Final	17/1123	Elise Keane	Bianca Heinze	Bianca Heinze

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

W. www.nghconsulting.com.au

E. ngh@nghconsulting.com.au

BEGA - ACT & SOUTH EAST NSW
Suite 11, 89-91 Auckland Street
(PO Box 470) Bega NSW 2550
T. (02) 6492 8333

NEWCASTLE - HUNTER & NORTH COAST
Level 1, 31-33 Beaumont Street
Hamilton NSW 2303
T. (02) 4929 2301

BRISBANE
T3, Level 7, 348 Edward Street
Brisbane QLD 4000
T. (07) 3129 7633

SYDNEY REGION
Unit 17, 21 Mary Street
Surry Hills NSW 2010
T. (02) 8202 8333

CANBERRA - NSW SE & ACT
Unit 8, 27 Yallourn Street
(PO Box 62) Fyshwick ACT 2609
T. (02) 6280 5053

WAGGA WAGGA - RIVERINA & WESTERN NSW
35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650
T. (02) 6971 9696

GOLD COAST
2B 34 Tallebudgera Creek Road
Burleigh Heads QLD 4220
(PO Box 424 West Burleigh QLD 4219)
T. (07) 3129 7633

WODONGA
Unit 2, 83 Hume Street
(PO Box 506) Wodonga VIC 3690
T. (02) 6067 2533

NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au
ABN 31 124 444 622 ACN 124 444 622

Table of contents

1. Methods 1

1.1. Desktop assessment 1

1.2. Field survey 1

1.2.1. Consultation 1

1.2.2. Survey team and dates 1

1.2.3. Survey conditions 2

1.2.4. Survey effort 2

2. Results 4

2.1. Threatened species 4

2.2. Rufous Bettong camera locations 5

3. Limitations 6

4. Recommendations 6

5. References 7

Figures

Figure 2-1 Large nest recorded within study area 5

Figure 2-2 Whitewash under tree containing large nest 5

Figure 5-1 Overview of survey effort ..... A-I

Figure 5-2 Survey effort map 1 of 3 ..... A-II

Figure 5-3 Survey effort map 2 of 3 ..... A-III

Figure 5-4 Survey effort map 3 of 3 ..... A-IV

Tables

Table 1-1 Survey Team and Survey Name 1

Table 1-2 Survey weather conditions over the survey period 2

Table 1-3 Survey effort 2

Table 1-4 Species and habitats targeted 3

Table 2-2 Targeted threatened species likelihood of breeding habitat occurrence 5

Appendices

Appendix A Maps ..... A-I

Appendix B Rufous bettong camera locations ..... B-I

Appendix C consultation with BCD ..... C-IX

Executive Summary

Surveys were undertaken across the entire Winterbourne Wind Farm study area to determine locations of breeding habitat for Glossy Black-Cockatoo and Little Eagle. Where habitat was identified, transects were undertaken searching for suitable hollow-bearing trees for Glossy Black-Cockatoo and suitable stick nests for Little Eagle. Vantage point surveys were also undertaken to look for individuals flying within the study area.

A total of 18 suitable hollow-bearing trees were recorded for Glossy Black-Cockatoo and 15 suitable stick nests were recorded for Little Eagle. None of these habitats showed signs of use, and there were no individuals of Glossy Black-Cockatoo or Little Eagle observed within the study area. One raptor was observed flying on the edge of the study area, however it could not be confirmed whether this was a Little Eagle due to the distance. The individual was flying over an open paddock, and not displaying breeding behaviour.

Camera traps were deployed at five sites with suitable habitat for Rufous Bettong, with three cameras per site. Suitable habitat was considered to be those sites with the highest grass cover and the lowest grazing pressure.

There were four areas which were unable to be surveyed for Glossy Black-Cockatoo or Little Eagle due to time and access constraints. It is recommended that these be surveyed within the next round of surveys.

1. Methods

1.1. Desktop assessment

A literature review was carried out, including:

- Breeding habitat, nest-site characteristics and productivity of the little eagle (*Hieraaetus morphnoides*) near Armidale, New South Wales (Larkin, Jenkins, McDonald, & Debus, 2020)
- Parental time-budgets and breeding behaviour of the Little Eagle *Hieraaetus morphnoides* in northern New South Wales (Debus, 2011)
- Glossy Black-Cockatoo Conservation Guidelines for south-eastern Queensland and far north-eastern New South Wales (Glossy Black Conservancy, 2022)
- Characteristics of tree hollows used by Australian birds and bats (Goldingay, 2009)
- The breeding ecology and movements of the Little Eagle in the ACT and nearby NSW, 2017-2020 with reference to the Ginninderry development area (Rae, 2021)
- Heavy livestock grazing negatively impacts a marsupial ecosystem engineer (Neilly & Schwarzkopf, 2018)
- Fauna Technical Note Series: Eagle Nest Management (Forest Practices Authority, 2015)

1.2. Field survey

The following guidelines are relevant to the survey:

- Threatened biodiversity survey and assessment Guidelines for developments and activities (2004 working draft) (DEC, 2004)

Vantage point surveys were undertaken to determine flight paths for Glossy Black-cockatoos and Little Eagle. Survey effort included two within hours of dawn and dusk respectively and five midday surveys. Unbaited camera traps targeting Rufous Bettong were deployed strategically across woodland and forest areas with denser ground cover vegetation. Cameras were pointed diagonally across the trail and left in place for 21 days. Further information is provided in Section 1.2.4.

1.2.1. Consultation

BCD was consulted via email on 27 June 2023 to confirm survey effort and method for Rufous Bettong; BCD input was received on 17 August 2023. These emails are appended in Appendix C.

1.2.2. Survey team and dates

Table 1-1 Survey Team and Survey Name

Name	Role	Fieldwork Conducted	Survey dates
Elise Keane	Senior Ecologist (Team Leader)	Habitat survey for Glossy Black Cockatoo and Little Eagle, marking habitat trees including suitable hollows and nests, vantage point surveys, camera deployment for Rufous Bettong	18th – 22nd Sep 2023

Name	Role	Fieldwork Conducted	Survey dates
Izaac Graham-Higgs	Ecologist	Habitat survey for Glossy Black Cockatoo and Little Eagle, marking habitat trees including suitable hollows and nests, vantage point surveys, camera deployment for Rufous Bettong	18th – 22nd Sep 2023

1.2.3. Survey conditions

Conditions were predominantly mild, dry, and calm during the beginning of the week. Gusty winds were present on Thursday, with overcast and windy conditions on Friday. Weather data from Armidale (BOM) provided in Table 1-2 below.

Table 1-2 Survey weather conditions over the survey period

Date	Min. temp (°C)	Max temp (°C)	Max. wind gust (km/h)	Weather conditions, recorded on site
18th	8.8	26.5	28	Clear day, warm temperatures
19th	9.9	24.8	35	Clear day, warm temperatures
20th	8.8	24.1	39	Clear day, warm temperatures
21st	12.3	25.3	56	Gusty winds
22nd	6.0	15.7	48	Cloudy, windy conditions

1.2.4. Survey effort

Within each nine hour survey day, a total of 14 habitat transects were undertaken for Glossy Black-Cockatoo and 14 habitat transects were undertaken for Little Eagle (see Appendix B). Four vantage point surveys, two within two hours of sunrise and two within two hours of sunset, were undertaken across the study area for Glossy Black-Cockatoo. Vantage point surveys were also undertaken around midday each day for Little Eagle.

Cameras were deployed for Rufous Bettong at five locations, with three cameras deployed at each location (see Appendix B). Suitable habitat as per Table 1-4 was targeted.

Table 1-3 Survey effort

Target	Attributes collected in the field	Survey locations/areas	Survey effort
Habitat ground-truthing for Glossy Black-Cockatoo and Little Eagle	Rapid assessments Habitat tree	Woodland patches across the entire study area	41 rapid assessments of potential habitat for threatened species were undertaken across the entire study area (Appendix A). Where patches met the characteristics, as per Table 1-4, habitat transects were undertaken to record habitat trees and search for threatened species. Vantage point surveys were undertaken for both species, with two undertaken within two hours of dawn and dusk respectively, and five midday surveys.
Rufous Bettong	Fauna survey locations	Grassy woodland with moderate structural diversity	Required survey effort is 238 trap nights. Cameras were deployed at five locations, with three cameras at each location for a total of 15 camera traps. These will be left in place for approximately 31 days with pick-up scheduled 23 October 2023 (total planned trap nights 450).

Table 1-4 Species and habitats targeted

Common name	Scientific Name	BC Act	EPBC Act	Habitats targeted
Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	Vulnerable	Vulnerable	Woodlands with trees greater than 60 DBH, containing hollows greater than 15cm, located >8m above ground. Angle of trunk or branch not more than 45°

Common name	Scientific Name	BC Act	EPBC Act	Habitats targeted
				from vertical.
Little Eagle	*Hieraaetus morphnoides*	Vulnerable	Not listed	Woodland patches at least 4 ha, midslope of approximately 15% less than 200m from woodland edge, sheltered from westerly winds and midday sun. Nest orientation northerly to easterly, in canopy 14-24m high.
Rufous Bettong	*Aepyprymnus rufescens*	Vulnerable	Not listed	Grassy woodland with moderate structural diversity. Associated with medium sized litter (<5mm), high coarse woody debris, high level of fine woody debris, low to tall grass height and medium to low density shrub layer. Avoid heavily grazed areas.

2. Results

2.1. Threatened species

There were no Glossy Black-Cockatoo or Little Eagle recorded during the targeted surveys. The likelihood of breeding habitat occurrence (based on habitat assessment) for these species are listed in Table 2-1. Appendix A shows the locations of potential habitat for these species.

Eighteen (18) suitable hollow bearing trees for Glossy Black-Cockatoo were recorded, however none of these hollows showed signs of use (such as whitewash, debris including chewed *Allocasuarina* seeds (orts) at the base of the tree, or animals coming in or out of the hollow).

A total of 35 stick nests were recorded, of which 15 were considered to be suitable nest trees for Little Eagle. One nest with evidence of use was found and considered likely to be utilised by Wedge-tailed Eagle, due to the size of the nest (1.6m wide; Figure 2-1 and Figure 2-2). The remaining nests had no signs of use (such as whitewash, fresh nesting material, debris at the base of the tree, or birds within or nearby the nest).

Neither Glossy-Black Cockatoo or Little Eagle were observed during the vantage point surveys. One raptor was observed flying on the edge of the study area, however it could not be confirmed whether this was a Little Eagle due to the distance. The individual was flying over open paddock and was not displaying breeding behaviour such as carrying nesting materials, interacting with another individual, such as displaying

(soaring, diving, engaging in chases) or a male calling in flight with a female begging from a tree (OEH, 2023). Seven Wedge-tailed Eagles were recorded within the study area during the targeted surveys.

Table 2-1 Targeted threatened species likelihood of breeding habitat occurrence

Scientific name	Common name	Status		Potential breeding habitat occurrence (Moderate, High, Recorded)
		BC Act	EPBC Act	
Calyptorhynchus lathami lathami	Glossy Black-Cockatoo	Vulnerable	Vulnerable	Low
Hieraaetus morphnoides	Little Eagle	Vulnerable	Not listed	Moderate



Figure 2-1 Large nest recorded within study area



Figure 2-2 Whitewash under tree containing large nest

2.2. Rufous Bettong camera locations

Eleven (11) sites were assessed for potential habitat for Rufous Bettong. Of these, the five sites with the highest quality habitat were selected, with three cameras deployed at each site (locations shown in Appendix B). Optimal habitat was considered areas with the highest grass coverage, and the lowest level of grazing pressure.

3. Limitations

The areas shown on Figure 5-1 (Appendix A) could not be accessed to carry out the surveys due to constraints such as access (lambing) and time limitations.

The gusty winds experienced during the survey on the 21st September may have resulted in lower bird activity. Wind speeds were up to 56 km/hr, and general bird activity was quiet during the morning vantage point survey.

While every effort has been made to obtain accurate and reliable data about presence of hollows, it is difficult to be certain about whether an apparent hollow is actually hollow, and vice versa, without physical inspection. Thus, it is likely that some hollows have been overlooked while others have been recorded when they are in fact not hollow. The figures obtained are considered to be a reliable estimation of type and number of hollows located within the study area. Hollows less than 10 cm diameter may have been overlooked as they are too small to be utilised by Glossy Black-Cockatoos and were outside of the scope of work.

No Glossy Black-Cockatoo or Little Eagle were observed during the vantage point surveys. As such, species presence could not be utilised to prioritise habitat areas to survey. Due to the large area to cover, greater survey effort was undertaken within areas containing patches of large trees (>60 DBH). As such, limited habitat transects were undertaken within woodland patches dominated by younger trees (<60 DBH) or scattered paddock trees, unless time permitted a higher survey effort.

4. Recommendations

There were four patches with potentially suitable breeding habitat for Glossy Black-Cockatoo and/or Little Eagle which were unable to be surveyed, due to time or access constraints (Figure 5-1). It is recommended that surveys are undertaken within these patches during the October survey effort.

5. References

Debus, S. J. (2011). Parental time-budgets and breeding behaviour of the Little Eagle Hieraaetus morphnoides in northern New South Wales. *Corella, 35*(3), 65-72.

DEC. (2004). *Threatened biodiversity survey and assessment: Guidelines for developments and activities (2004 working draft).* Sydney South, NSW: Department of Environment and Conservation.

Forest Practices Authority. (2015). *Fauna Technical Note No 1. Eagle nest searching, activity checking and nest management.* Retrieved from Forest Practices Authority: https://fpa.tas.gov.au/Documents/Fauna_Tech_Note_1_Eagle_nest_management_May_2015.pdf

Glossy Black Conservancy. (2022). *Glossy Black-Cockatoo Conservation Guidelines for South-eastern Queensland and Far North-eastern New South Wales.* Cleveland, Queensland: Glossy Black Conservancy.

Goldingay, R. L. (2009). Characteristics of tree hollows used by Australian birds and bats. *Wildlife Research, 36*(5), 394-409.

Larkin, C., Jenkins, R., McDonald, P. G., & Debus, S. J. (2020). Breeding habitat, nest-site characteristics and productivity of the little eagle (Hieraaetus morphnoides) near Armidale, New South Wales. *Pacific Conservation Biology, 26*(3), 258-268.

Neilly, H., & Schwarzkopf, L. (2018). Heavy livestock grazing negatively impacts a marsupial ecosystem engineer. *Journal of Zoology, 305*(1), 35-42.

OEH. (2023, November 16). *Threatened Biodiversity Data Collection*. Retrieved from https://www.environment.nsw.gov.au/asmslightprofileapp/account/login?ForceLogin=1

Rae, S. (2021). *The breeding ecology and movements of the Little Eagle in the ACT and nearby NSW, 2017-2020 with reference to the Ginninderry development area.* Retrieved from https://ginninderry.com/wp-content/uploads/2021/08/LE-report-2017-2020-Ginninderry70.pdf

APPENDIX A MAPS

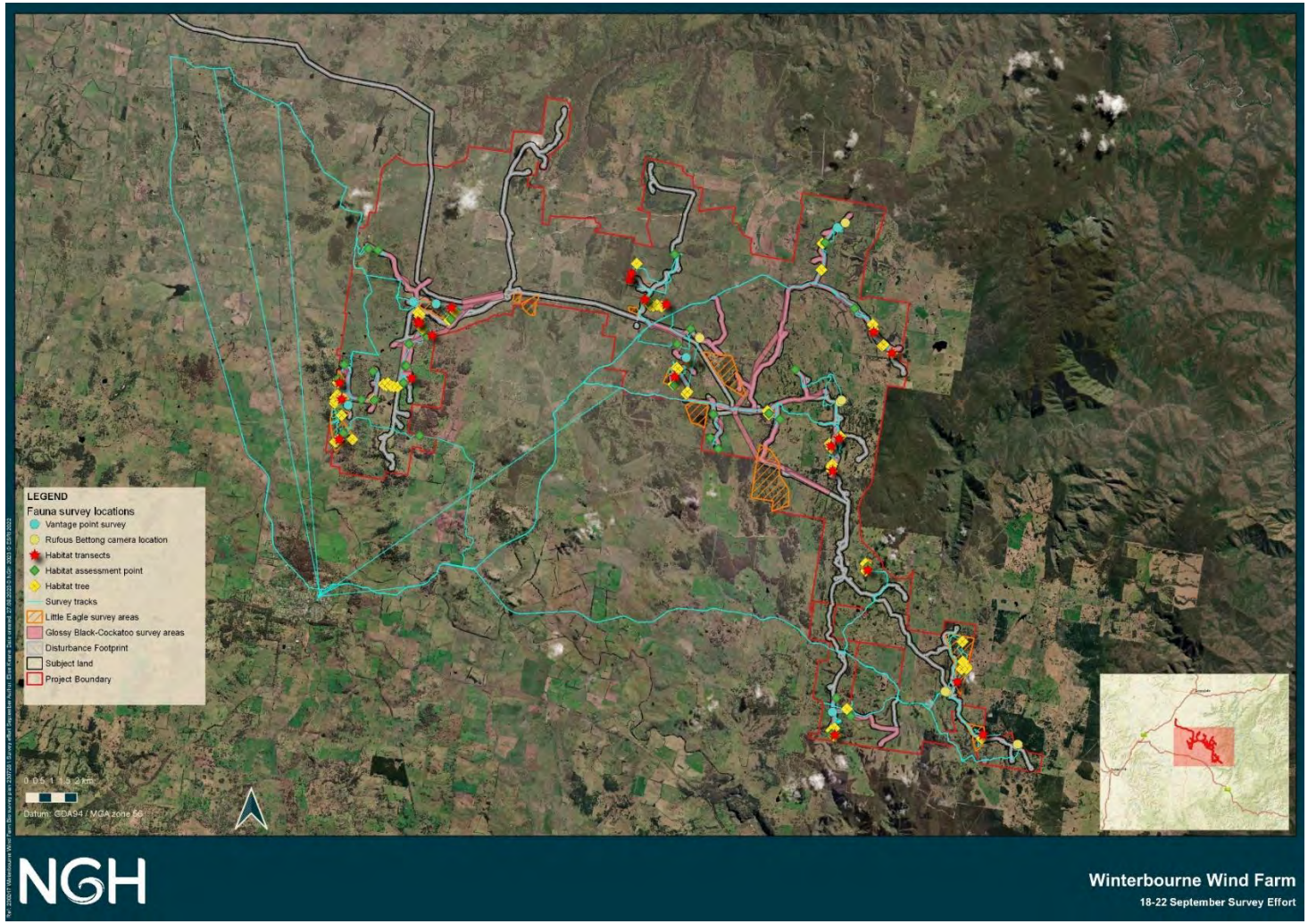


Figure 5-1 Overview of survey effort

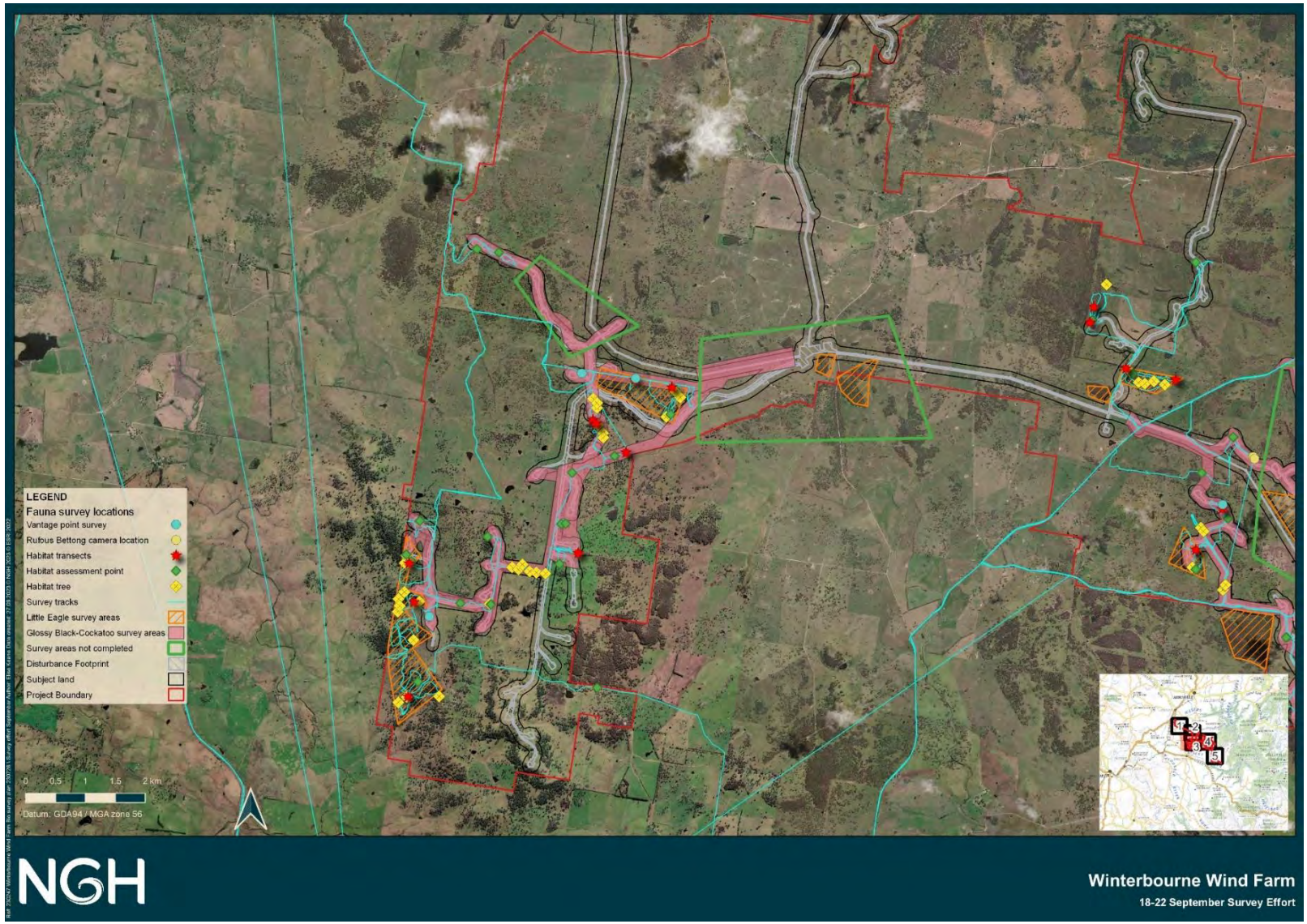


Figure 5-2 Survey effort map 1 of 3

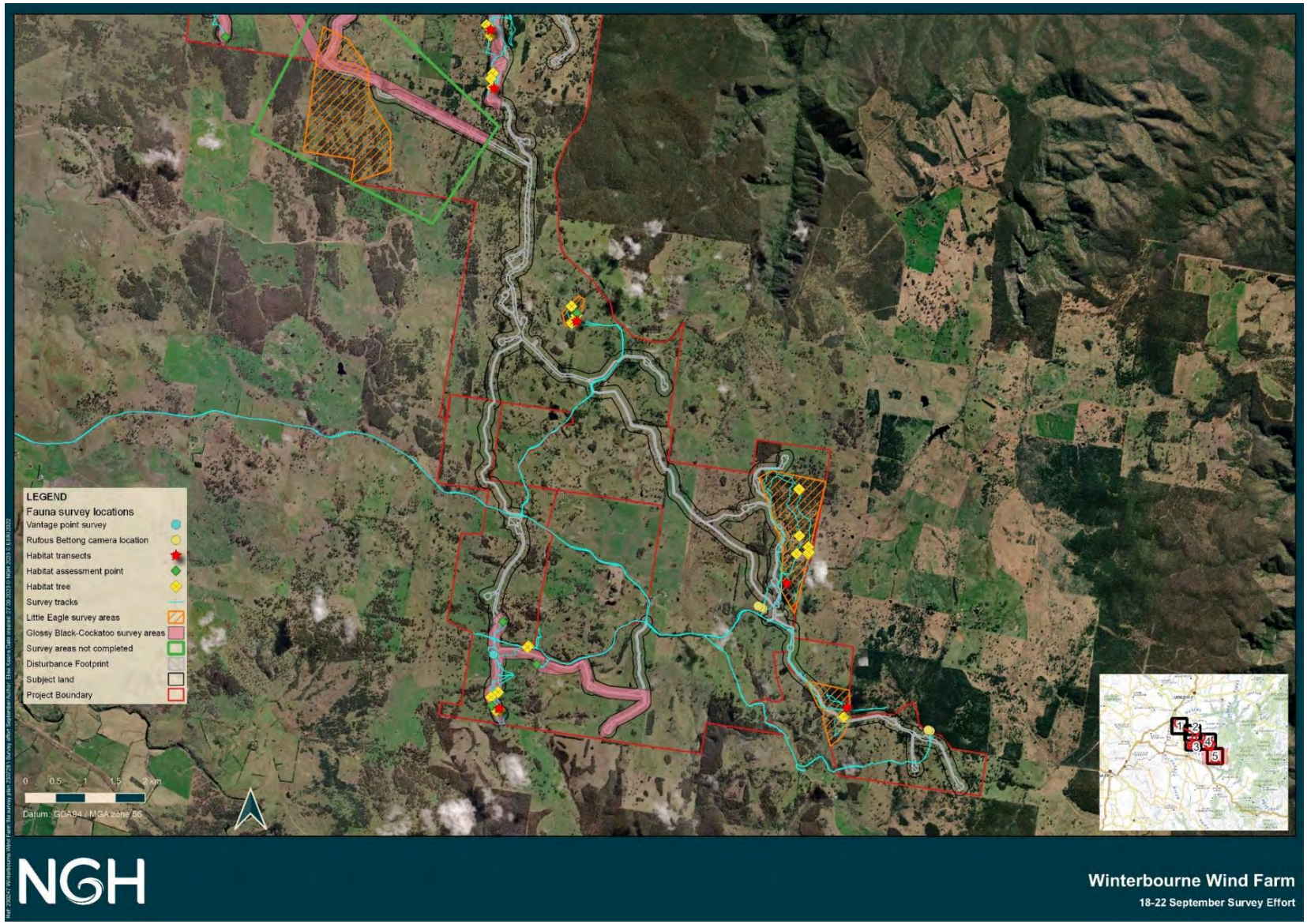


Figure 5-3 Survey effort map 2 of 3

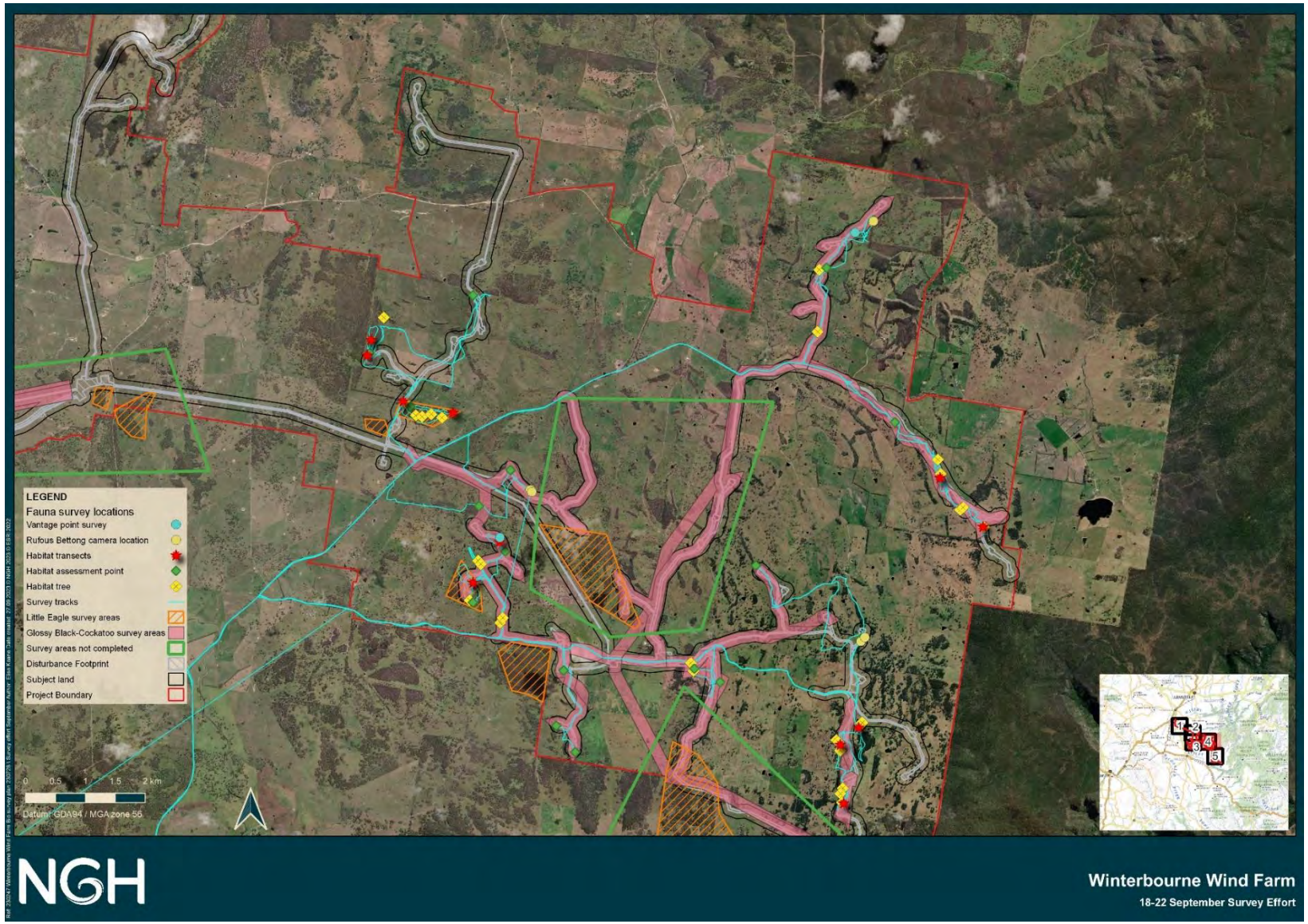


Figure 5-4 Survey effort map 3 of 3

APPENDIX B RUFOUS BETTONG CAMERA LOCATIONS

Coordinates	Photo	Habitat Description
Site 1		
381121, 6581940		Low *Eucalyptus caliginosa* woodland with tussock grasses, including *Austrostipa verticillata*. Lightly grazed.
381137, 6581938		

381157, 6581905		
Site 2		
386851, 6586415		Low *Eucalyptus caliginosa* woodland with tussock grasses, including *Poa sieberiana*, *Microlaena stipoides* and *Echinopogon caespitosus*. Lightly grazed.

386859, 6586422		
386868, 6586432		
Site 3		

386661, 6579404		*Eucalyptusa nobilis, Eucalyptus radiata* subsp. s*ejuncta* and *Eucalyptus obliqua* w*oodland* with sparse grass cover. Grass species include *Dactylis glomerata* and *Microlaena* stipoides. Moderately grazed.
386657, 6579402		

386724, 6579470		
Site 4		
390867, 6567996		*Eucalyptus radiata* subsp. s*ejuncta, Eucalyptus acaciiformis* and *Eucalyptus dalrympleana* w*oodland.* Dominated by *Microlaena stipoides,* with *Poa sieberiana* and *Dactylis glomerata* also present. Some LWD.

390840, 6568014		Moderately grazed.
390789, 6568038		
Site 5		

393666, 6565946		Has been historically burnt, during a high intensity fire in Summer 2019/2020. *Eucalyptus obliqua, Eucalyptus radiata* subsp. s*ejuncta,* and *Eucalyptus nobilis* woodland. Groundcover dominated by *Lomandra longifolia.*
393662, 6565948		

393633, 6565963		

APPENDIX C CONSULTATION WITH BCD

From: Dimitri Young <Dimitri.Young@environment.nsw.gov.au>

Sent: Thursday, August 17, 2023 2:26 PM

To: Bianca Heinze <bianca.h@nghconsulting.com.au>

Cc: Beth Noel <beth.n@nghconsulting.com.au>; Jane Lambert <jane.lambert@nghconsulting.com.au>; Shania Channon <shania.c@nghconsulting.com.au>; Tom Schmidt <tom.schmidt@environment.nsw.gov.au>

Subject: BCD Response - RE: Winterbourne Wind Farm additional surveys - survey effort Rufous Bettong & Eastern Pymgy-possum (SSD-10471) (Our ref 230247)

Dear Ms Heinze

Thank you for your e-mail below to the Biodiversity and Conservation Division (BCD) of the Department of Planning and Environment, seeking advice on Rufous Bettong and Eastern Pygmy-possum survey effort for the Winterbourne Wind Farm Environmental Impact Statement (EIS). I appreciate the opportunity to provide further input and apologise for the delay in responding.

- Rufous Bettong
  - We are satisfied your proposed survey effort accords with our previous advice and is suitable for Rufous Bettong for this site.

- Eastern Pygmy-possum
  - We understand survey for the species to date is 252 hair tube nights and 56 camera nights.
  - We recommend additional survey effort of 20 cameras, each in place for a minimum of 14 nights.
  - Cameras should be:
    - well distributed across the site and target the areas of highest quality habitat
    - arboreally mounted (mounted at approximately head height)
    - baited with universal bait mix (peanut butter/oat/honey) and sprayed very liberally with honey-water in front of each camera, or trained on vegetation which contains profusely flowering species from the families Proteaceae and Mimosaceae
    - aimed with a short field of view (<2m to bait or flowering shrubs).
  - We note your intention to mobilise a survey team in September. The survey period for Eastern Pygmy-possum is October to March. Survey nights for Eastern Pygmy-possum should only be counted starting in October, and baits and honey-water spray should be fresh at this time.
- The suggested survey effort for Rufous Bettong and Eastern Pygmy-possum described above is only specific to the Winterbourne Wind Farm project site and should not be used to inform surveys for any other sites.

If you have any further questions, or wish to discuss this advice, please do not hesitate to contact Mr Tom Schmidt, Senior Conservation Planning Officer, at tom.schmidt@environment.nsw.gov.au or on 6659 8227.

Yours sincerely

Dimitri Young

Senior Team Leader Planning, North East Branch

Biodiversity and Conservation Division

Department of Planning and Environment

T (02) 6659 8272 E dimitri.young@environment.nsw.gov.au

dpie.nsw.gov.au

Locked Bag 914

(Level 8, 24 Moonee St)

Coffs Harbour NSW 2450

Working days Monday to Friday, 09:00am - 05:00pm

From: Bianca Heinze <bianca.h@nghconsulting.com.au>

Sent: Tuesday, 27 June 2023 4:39 PM

To: Dimitri Young <Dimitri.Young@environment.nsw.gov.au>

Cc: Beth Noel <beth.n@nghconsulting.com.au>; Jane Lambert <jane.lambert@nghconsulting.com.au>; Shania Channon <shania.c@nghconsulting.com.au>

Subject: Winterbourne Wind Farm additional surveys - survey effort Rufous Bettong & Eastern Pymgy-possum (SSD-10471) (Our ref 230247)

Hi Dimitri

I am writing in relation to BCD's submission regarding Winterbourne Wind Farm EIS (SSD-10471), specifically in relation to additional targeted surveys for eastern pygmy-possum and rufous bettong. We are seeking confirmation from BCD with our proposed survey approach and effort for additional surveys. There is approximately 200 ha of woodland in the subject site although not all of this has suitable microhabitat for either species. Please note we would need to mobilise a team in September, so would greatly appreciate your response by the end of July to allow for planning and costing the field work.

Rufous Bettong

Following surveys undertaken in 2021, we received advice from BCD (as appended to the BDAR in Appendix O) for Rufous Bettong. We have based our proposed survey plan on this advice as well as on survey effort undertaken to date.

As per the email advice, we propose to place the cameras strategically across denser ground cover vegetation in woodland and forest, point diagonally across a trail, leave in place for 21 days, without bait. The initial survey effort recommended was 16 cameras for 21 nights (336 nights). As 98 camera trap nights have already been undertaken (see table below), we propose to undertake an additional 12 cameras for 21 nights (252 additional nights). This would exceed the total 336 nights recommended.

Rufous Bettong

Total survey nights	Camera
Undertaken	98
Required	336
Difference	**238**

Eastern Pygmy-possum

We have based our proposed survey plan for Eastern Pygmy-possum on the *Threatened Species Survey & Assessment Guidelines*, substituting small Elliot traps with cameras for a total of 100 trap nights per stratification unit and/or 240 hair tubes per 100 ha of stratification unit. There is one stratification unit – broadly, woodland with shrubby understorey in moderate condition. As you can see in the table below, the hair tube effort undertaken is sufficient. The camera trap effort requires an additional 44 nights. We propose 5 tree-mounted cameras with baits for 14 nights.

Eastern Pygmy-possum

Total survey nights	Hair tube	Camera / Elliot
Undertaken	252	56
Required (per 100 or 50 ha)	240	100
Difference	12	44

Happy to discuss with you further. Look forward to your reply by the end of July.

Kind Regards,

Bianca Heinze

Senior Ecologist

0405 042 553 p: 02 6492 8351

bianca.h@nghconsulting.com.au

suite 11, 89-91 Auckland St, Bega, NSW 2550

nghconsulting.com.au | Our commitment to reconciliation

Field Survey Technical Memo 2

Winterbourne Wind Farm

October 2023

Project Number: 23-247



NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au

Document verification

Survey	Winterbourne Wind Farm
Project Number:	23-247
Project File Name:	23-247 Field Survey Technical Memo 2-6 October Final V1.01

Revision	Date	Prepared by	Reviewed by	Approved by
Final V1.0	13/10/2023	Izaak Graham-Higgs	Bianca Heinze	Bianca Heinze
Final V1.01	14/03/2024	Emma Barlow	Bianca Heinze	Bianca Heinze

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

W. www.nghconsulting.com.au

E. ngh@nghconsulting.com.au

BEGA - ACT & SOUTH EAST NSW
Suite 11, 89-91 Auckland Street
(PO Box 470) Bega NSW 2550
T. (02) 6492 8333

NEWCASTLE - HUNTER & NORTH COAST
Level 1, 31-33 Beaumont Street
Hamilton NSW 2303
T. (02) 4929 2301

BRISBANE
T3, Level 7, 348 Edward Street
Brisbane QLD 4000
T. (07) 3129 7633

SYDNEY REGION
Unit 17, 21 Mary Street
Surry Hills NSW 2010
T. (02) 8202 8333

CANBERRA - NSW SE & ACT
Unit 8, 27 Yallourn Street
(PO Box 62) Fyshwick ACT 2609
T. (02) 6280 5053

WAGGA WAGGA - RIVERINA & WESTERN NSW
35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650
T. (02) 6971 9696

GOLD COAST
2B 34 Tallebudgera Creek Road
Burleigh Heads QLD 4220
(PO Box 424 West Burleigh QLD 4219)
T. (07) 3129 7633

WODONGA
Unit 2, 83 Hume Street
(PO Box 506) Wodonga VIC 3690
T. (02) 6067 2533

NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au
ABN 31 124 444 622 ACN 124 444 622

Table of contents

1. Methods 1

1.1. Desktop assessment 1

1.2. Field survey 1

1.2.1. Consultation 1

1.2.2. Survey team and dates 1

1.2.3. Survey conditions 2

1.2.4. Survey effort 2

2. Results 4

2.1. Threatened Species 4

2.2. Eastern Pygmy Possum Camera Locations 6

2.3. Eastern Pygmy Possum camera results 6

3. Limitations 8

4. Recommendations 9

5. References 9

Figures

Figure 2-1 East Lynne property frog habitat 5

Figure 2-2 Ellandonan property frog habitat 5

Figure 2-3 Image of Spotted-tailed Quoll captured on 11th October 2023 at camera site 2 7

Figure 5-1 Overview of survey effort ..... A-II

Figure 5-2 Survey effort map 1 of 4 ..... A-III

Figure 5-3 Survey effort map 2 of 4 / Site 1 and 2 of EPP cameras ..... A-IV

Figure 5-4 Survey effort map 3 of 4 ..... A-V

Figure 5-5 Survey effort map 4 of 4 / Site 3 of EPP cameras ..... A-VI

Tables

Table 1-1 Survey team at Winterbourne 1

Table 1-2 Survey weather conditions over the survey period 2

Table 1-3 Survey effort 2

Table 1-4 Species and habitats targeted 3

Table 2-1 Targeted threatened species surveyed for and the likelihood of occurrence 5

Table 2-2 Eastern Pygmy-possum camera trap locations 6

Table 2-3 Species captured on cameras 7

Appendices

Appendix A Maps.....A-I

Appendix B Eastern Pygmy Possum Camera Locations .....B-I

Appendix C Eastern Pygmy Possum Camera Results.....C-I

Executive Summary

Follow-up surveys were undertaken to complete survey of breeding habitat for Glossy Black-Cockatoo and Little Eagle, commenced in September 2023. Methods followed those used in September.

An additional 21 suitable hollow-bearing trees were recorded for Glossy Black-Cockatoo and 13 suitable stick nests were recorded for Little Eagle. None of these features showed signs of use, and there were no individuals of Glossy Black-Cockatoo or Little Eagle observed within the study area.

Targeted frog surveys were undertaken at East Lynne and Ellandonan properties, to determine if the habitat was suitable for *Litoria boorroolongensis, L.daviesae, L.subglandulosa, L.piperata* and *Adelotus brevis*. Both locations had low quality habitat due to degradation such as pugging by livestock (cows and sheep) and weed invasion such as Fringed Sedge *Carex crinita* and Blackberry *Rubus fruticosus agg*.

Camera traps were deployed at three sites with suitable habitats for the Eastern Pygmy Possum, with 20 total cameras. Suitable habitat was considered to be those sites with PCTs associated with the species and in the highest condition.

None of the targeted species were detected during the surveys.

1. Methods

1.1. Desktop assessment

The following guidelines are relevant to the survey:

- Threatened biodiversity survey and assessment Guidelines for developments and activities (2004 working draft) (DEC 2004)
- NSW Survey Guide for Threatened Frogs (DPE, 2020)

In addition to the literature cited for Survey Memo 1, the following literature review was used to design the survey:

- Detection of the Eastern Pygmy-possum *Cercartetus nanus* (Marsupialia: Burramyidae) at Barren Grounds Nature Reserve, New South Wales (Harris & Goldingay, 2005)

1.2. Field survey

1.2.1. Consultation

BCD was consulted via email on 27 June 2023 to confirm survey effort and method for Eastern Pygmy Possum; BCD input was received on 17 August 2023.

1.2.2. Survey team and dates

The survey was undertaken between 3rd – 6th Oct 2023 as shown in Table 1-1.

Table 1-1 Survey team at Winterbourne

Name	Role	Fieldwork Conducted	Survey dates
Nicholas Gale	Senior Ecologist (Team Leader)	Habitat survey for Glossy Black Cockatoo and Little Eagle, marking habitat trees including suitable hollows and nests, camera deployment for Eastern Pygmy possum. Targeted frog surveys for: *L.boorroolongensis, L.daviesae, L.subglandulosa, L.piperata* and *Adelotus brevis*.	3rd – 6th Oct 2023
Izaak Graham-Higgs	Ecologist	Habitat survey for Glossy Black Cockatoo and Little Eagle, marking habitat trees including suitable hollows and nests, camera deployment for Eastern Pygmy possum. Targeted frog surveys for: *L.boorroolongensis, L.daviesae, L.subglandulosa, L.piperata* and *Adelotus brevis*.	3rd – 6th Oct 2023

1.2.3. Survey conditions

Conditions were predominantly mild, dry, and calm during surveys, with some exceptions. Weather data from Woolbrook (BOM) provided in Table 1-2 below. Scattered showers occurred on 5 October. Conditions were generally calm, with a cool change on 6 October bringing the coldest morning of the month.

Table 1-2 Survey weather conditions over the survey period

Date	Min. temp (°C)	Max temp (°C)	Max. wind gust (km/h)	Rain (mm)	Weather conditions, recorded on site
2/10/2023	7.5	29.0	Calm	0	Travel to site
3/10/2023	6.5	29.0	Calm	0	Clear day. Very hot.
4/10/2023	11.0	23.5	NNW 4	0	Clear day. Cool change and rain in the afternoon.
5/10/2023	5.0	16.0	NW 19	13	Slightly cloudy, with some wind.
6/10/2023	-2.5	20.5	Calm	0	Cold in the morning, clear day.

1.2.4. Survey effort

Survey effort for surveys targeting Glossy Black-Cockatoo, Little Eagle, Eastern Pygmy Possum and amphibians is given in (Table 1-3). Habitat transects were undertaken for Glossy Black-Cockatoo and the Little Eagle in areas of suitable habitat (see Appendix B). Vantage point surveys were undertaken at lunchtime each day for Little Eagle. Cameras were deployed for the Eastern Pygmy Possum at three locations, with six to seven cameras deployed at each location (see Appendix B). Suitable habitat as per Table 1-4 was targeted.

Table 1-3 Survey effort

Target	Attributes collected in the field	Survey locations/areas	Effort
Habitat ground-truthing for Glossy Black-Cockatoo and Little Eagle	Rapid assessments Habitat tree	Potential habitat woodland patches as mapped across the study area	Undertaking rapid assessment of potential habitat for threatened species across the entire study area. Where patches met the characteristics, as per Table 1-4, habitat transects were undertaken to record habitat trees and search for threatened species. Four midday vantage point surveys were undertaken for Little Eagle.

Target	Attributes collected in the field	Survey locations/areas	Effort
Easten Pygmy Possum	Fauna survey locations	Grassy woodland with moderate structural diversity	Cameras were deployed at three locations, with six to seven cameras at each location. A total of 20 cameras were deployed.
Frog surveys for: *L.boorroolongensis, L.daviesae, L.subglandulosa, L.piperata* and *Adelotus brevis*.	Potential habitat Start and end point of survey transect Identified frog locations	Riparian zones	Aural-visual surveys were undertaken looking for potential threatened target species and breeding habitat in accordance with NSW amphibian survey guidelines (DPE, 2020).

Table 1-4 Species and habitats targeted

Common name	Scientific Name	BC Act	EPBC Act	Habitats targeted
Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	Vulnerable	Vulnerable	Woodlands with trees greater than 60cm diameter at breast height (DBH), containing hollows greater than 15cm, located >8m above ground. Angle of trunk or branch not more than 45° from vertical.
Little Eagle	*Hieraaetus morphnoides*	Vulnerable	Not listed	Woodland patches at least 4 ha, midslope of approximately 15% less than 200m from woodland edge, sheltered from westerly winds and midday sun. Nest orientation northerly to easterly, in canopy 14-24m high.
Eastern Pygmy Possum	*Cercartetus nanus*	Vulnerable	Not listed	Associated PCTs in good condition.

Common name	Scientific Name	BC Act	EPBC Act	Habitats targeted
Booroolong Frog	*Litoria booroolongensis*	Endangered	Endangered	Permanent streams with rocky structures
Davies' Tree Frog	*L.daviesae*	Vulnerable	Not listed	Permanent slow flowing small streams
Glandular Frog	*L.subglandulosa*	Vulnerable	Not listed	Permanent streams
Peppered Tree Frog	*L.piperata*	Vulnerable	Vulnerable	Permanent streams with rocky structures
Tusked Frog	*Adelotus brevis*	Endangered Population	Not listed	Permanent slow flowing small streams

2. Results

2.1. Threatened Species

None of the target species were recorded during the targeted surveys, however Spotted-tail Quoll was recorded on Camera Trap 787 located at camera Site 2 on 11 October 2023 (Figure 2-3). The likelihood of occurrence (based on habitat assessment) for frogs is listed in Table 2-1. The likelihood of breeding habitat occurrence for Glossy Black-Cockatoos and Little Eagle remains unchanged from the evaluation given in the September survey memo. Appendix A shows the locations of potential habitat for these species.

An additional twenty-one (21) suitable hollow bearing trees for Glossy Black-Cockatoo were recorded, however none of these hollows showed signs of use (such as whitewash, debris including *Allocasuarina* seeds at the base of the tree, or animals coming in or out of the hollow).

A total of thirteen (13) stick nests were recorded which are considered to be suitable nest trees for Little Eagle, however the nests had no signs of use (such as whitewash, debris at the base of the tree, or animals within or nearby the nest).

No Little Eagles were observed during midday vantage point surveys. One (1) Wedge-tailed Eagle was incidentally recorded within the study area during the targeted surveys, flying less than 20m from the ground.

Targeted frog surveys were undertaken at East Lynne property and Ellandonan property, to determine if the habitat was suitable for *Litoria boorroolongensis, L.daviesae, L.subglandulosa, L.piperata* and *Adelotus brevis*. Both locations had low quality habitat due to degradation such as pugging by livestock (cows and sheep) and weed invasion such as Fringed Sedge *Carex crinita* and Blackberry *Rubus fruticosus agg*.

The East Lynne's habitat overall was not suitable for target species: lacking in cobble banks for *L.boorroolongensis;* no suitable overstorey was present for *L.daviesae, L.subglandulosa, L.piperata* and *Adelotus brevis.* Over the transect *L.dumerlli, L.Verreauxii, L.tasmaniensis* and *Crinia. signifera* were heard calling. See Figure 2-1 for an example of the aquatic habitat.

Ellandonan's habitat was very degraded and not suitable for target species; lacking in cobble banks for *L.boorroolongensis* and no suitable overstorey was present for *L.daviesae, L.subglandulosa, L.piperata.* No frogs were heard or seen along the transect. See Figure 2-2 for an example of the aquatic habitat.

Table 2-1 Targeted threatened species surveyed for and the likelihood of occurrence

Scientific name	Common name	Status		Potential occurrence (Low, Moderate, High, Recorded)	Recorded in targeted surveys
		BC Act	EPBC Act		
Easten Pygmy Possum	*Cercartetus nanus*	Vulnerable	Not listed	Low	No
Booroolong Frog	*Litoria booroolongensis*	Endangered	Endangered	Low	No
Davies' Tree Frog	*L.daviesae*	Vulnerable	Not listed	Low	No
New England Tree Frog	*L.subglandulosa*	Vulnerable	Not listed	Low	No
Peppered Tree Frog	*L.piperata*	Vulnerable	Vulnerable	Low	No
Tusked Frog	*Adelotus brevis*	Endangered Population	Not listed	Low	No



Figure 2-1 East Lynne property frog habitat



Figure 2-2 Ellandonan property frog habitat

2.2. Eastern Pygmy Possum Camera Locations

Four (4) sites were assessed for potential habitat for Eastern Pygmy Possums. Of these, the three sites with the highest quality habitat were selected, with six or seven cameras deployed at each site depending on the quality of habitat (refer to Table 2-2 below and Appendix B for photos and GPS co-ordinates). Suitable habitat was considered to be those sites with PCTs associated with the species and the best condition vegetation.

Table 2-2 Eastern Pygmy Possum camera trap locations

Site ID	Habitat description	Number of cameras
1	PCT 567	6
2	PCT 568	7
3	PCT 1194	7
Total cameras		**20**

2.3. Eastern Pygmy Possum camera results

A total of 14 species were captured on the cameras between 3rd October and 24th October (Table 2-3, Appendix C). This included one sighting of a Spotted-tailed Quoll (*Dasyurus maculatus*) which is shown in Figure 2-3. Characteristics such as exposure and brightness of the image have been altered to improve visibility of the quoll, which is within the yellow circle on the right side of the central tree climbing over a fallen log on the ground.

There were two potential photos of Eastern Pygmy Possum at camera 786, however these images were identified as a Bush Rat (*Rattus fuscipes*) on account of the base and taper of the tail and a Sugar Glider (*Petaurus breviceps*) on account of the large size, fat tail and large pointed ears.



Figure 2-3 Image of Spotted-tailed Quoll captured on 11th October 2023 at camera site 2.

Table 2-3 Species captured on cameras.

Site	Species Name	Common Name	BC Act Status	EPBC Act Status	Number of times seen
1	*Corvus sp.*	Raven			1
	Dasyurus maculatus	Spotted-tailed Quoll	V	E	1
	Felis catus	Feral Cat			1
	Macropus giganteus	Eastern Grey Kangaroo			16
		Eastern Grey Kangaroo with Juvenile			1
	Macropus rufogriseus	Red-necked Wallaby			9
		Red-necked Wallaby Juvenile			1
		Red-necked Wallaby with Juvenile			2
	Trichosurus vulpecula	Common Brushtail Possum			10
		Common Brushtail Possum with Juvenile			4
	Vulpes vulpes	Red Fox			2
	Wallabia bicolor	Swamp Wallaby			6

Site	Species Name	Common Name	BC Act Status	EPBC Act Status	Number of times seen
	Arachnids	Spider			1
	Unknown	Unknown Large Animal			1
2	*Corvus sp.*	Raven			1
	Macropus giganteus	Eastern Grey Kangaroo			5
	Platycercus elegans	Crimson Rosella			1
	Platycercus eximius	Eastern Rosella			3
	Trichosurus vulpecula	Common Brushtail Possum			14
		Common Brushtail Possum with Juvenile			4
	Wallabia bicolor	Swamp Wallaby			1
	Arachnids	Spider			1
	Acridotheres tristis	Common Myna			1
3	*Macropus giganteus*	Eastern Grey Kangaroo			2
	Petaurus breviceps	Sugar Glider			1
	Rattus fuscipes	Bush Rat			1
	Trichosurus vulpecula	Common Brushtail Possum			6

3. Limitations

No Glossy Black-Cockatoo or Little Eagle were observed during the vantage point surveys. As such, species presence could not be utilised to prioritise habitat areas to survey. Due to the large area to cover, greater survey effort was undertaken within areas containing patches of large trees (>60cm diameter-at-breast-height - DBH). As such, limited habitat transects were undertaken within woodland patches dominated by younger trees (<60cm DBH) or scattered paddock trees, unless time permitted a higher survey effort.

The days leading up to and during the frog surveys were mostly dry which may have reduced the detectability of the frog species surveyed.

While every effort has been made to obtain accurate and reliable data about presence of hollows, it is difficult to be certain about whether an apparent hollow is actually hollow, and vice versa, without physical inspection. Thus, it is likely that some hollows have been overlooked while others have been recorded when they are in fact not hollow. The figures obtained are considered to be a reliable estimation of type and number of hollows located within the study area. Hollows less than 10 cm diameter may have been overlooked as they are too small to be utilised by Glossy Black-Cockatoos and were outside of the scope of work.

4. Recommendations

Frog surveys were not able to be completed at the Mount View property due to issues with site accessibility; potential habitat for Booroolong Frog, Davies' Tree Frog, Glandular Tree Frog, Peppered Tree Frog and Tusked Frog may occur here. It is recommended that surveys are undertaken within these patches during the next October survey effort.

5. References

DPE. (2020). *NSW Survey Guide for Threatened Frogs.* Department of Planning and Environment.

Harris, J. M., & Goldingay, R. L. (2005). Detection of the eastern pygmy-possum Cercartetus nanus (Marsupialia: Burramyidae) at Barren Grounds Nature Reserve, New South Wales. *Australian Mammalogy*, 27: 85-88.

APPENDIX A MAPS

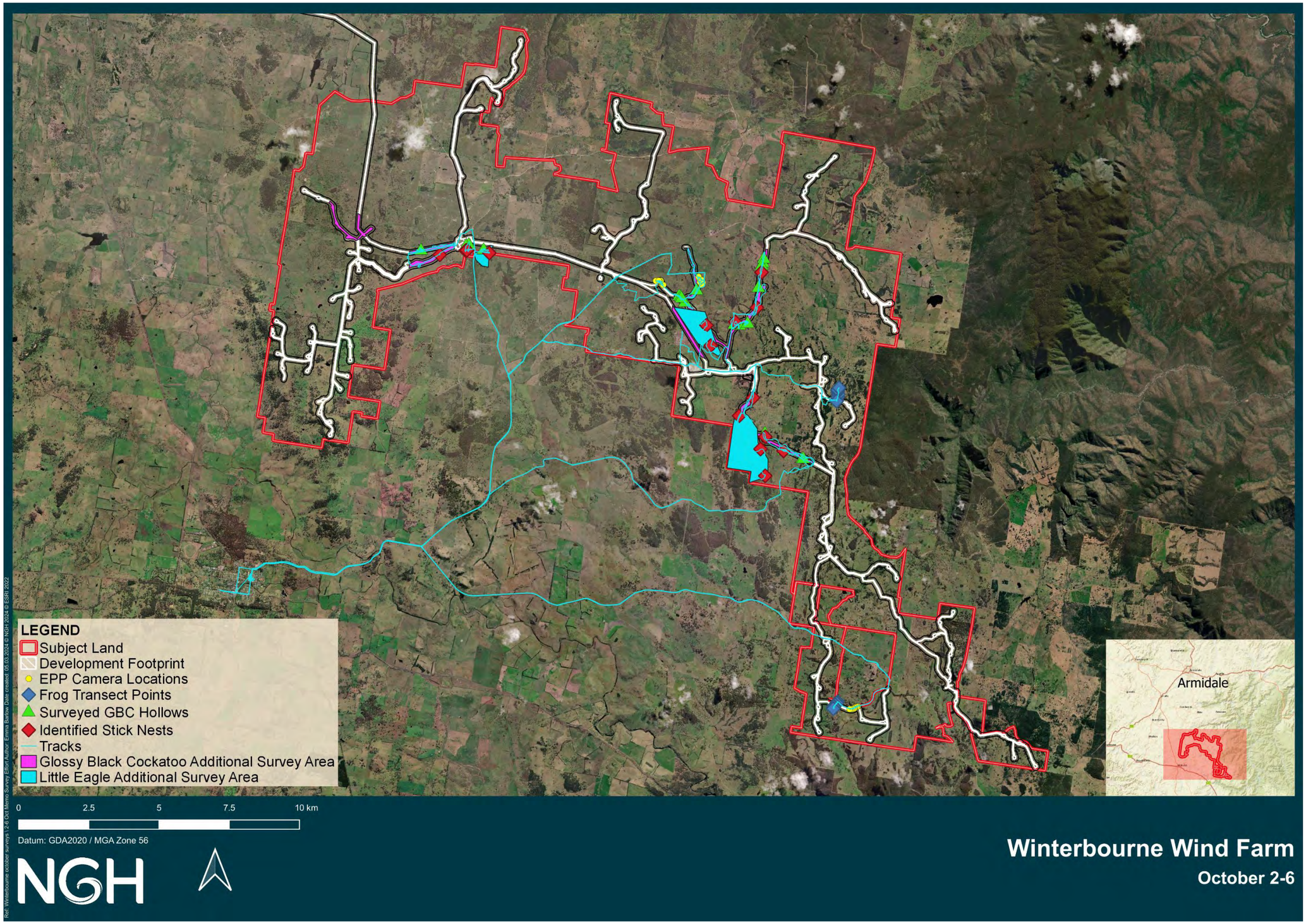


Figure 5-1 Overview of survey effort

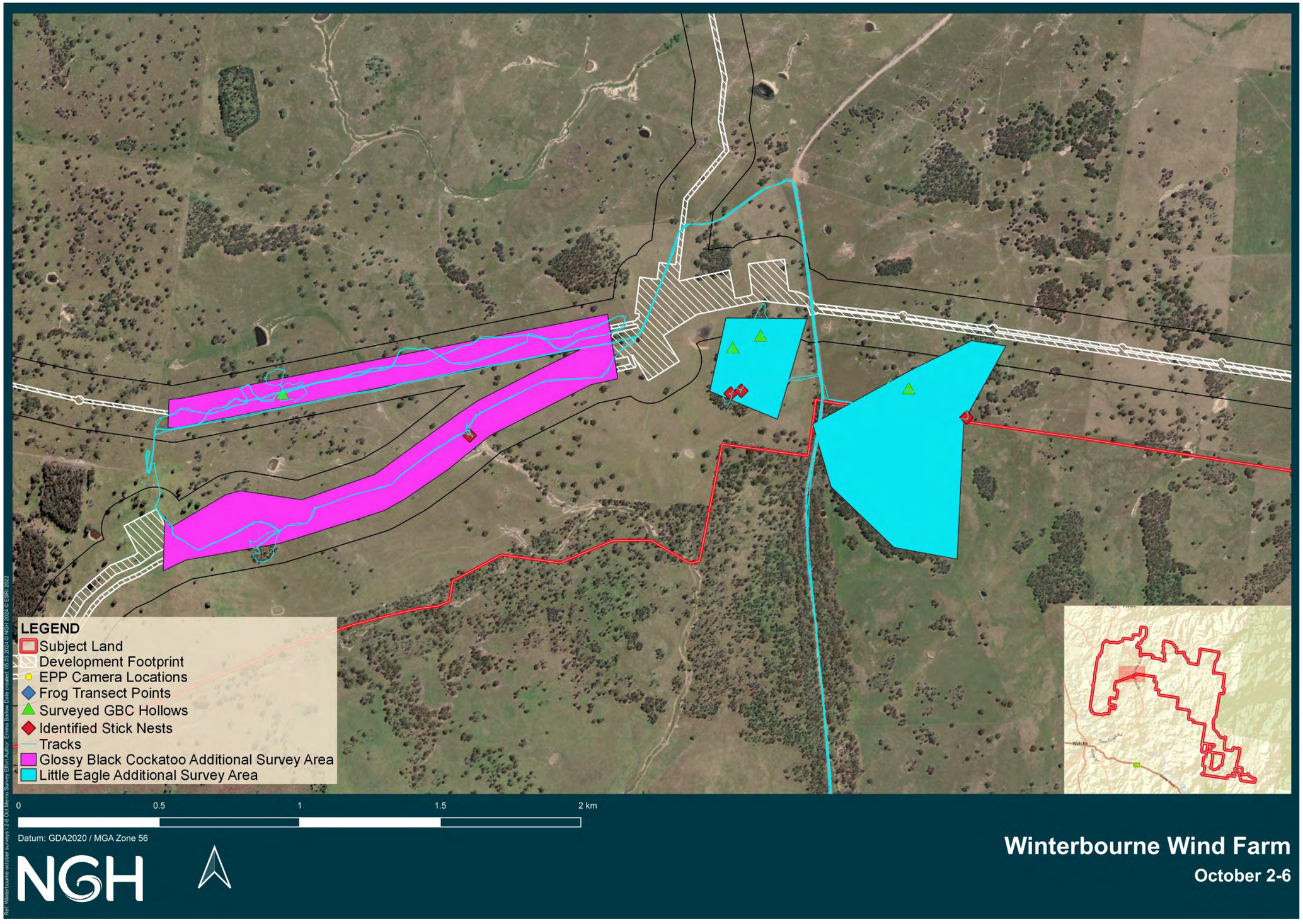


Figure 5-2 Survey effort map 1 of 4

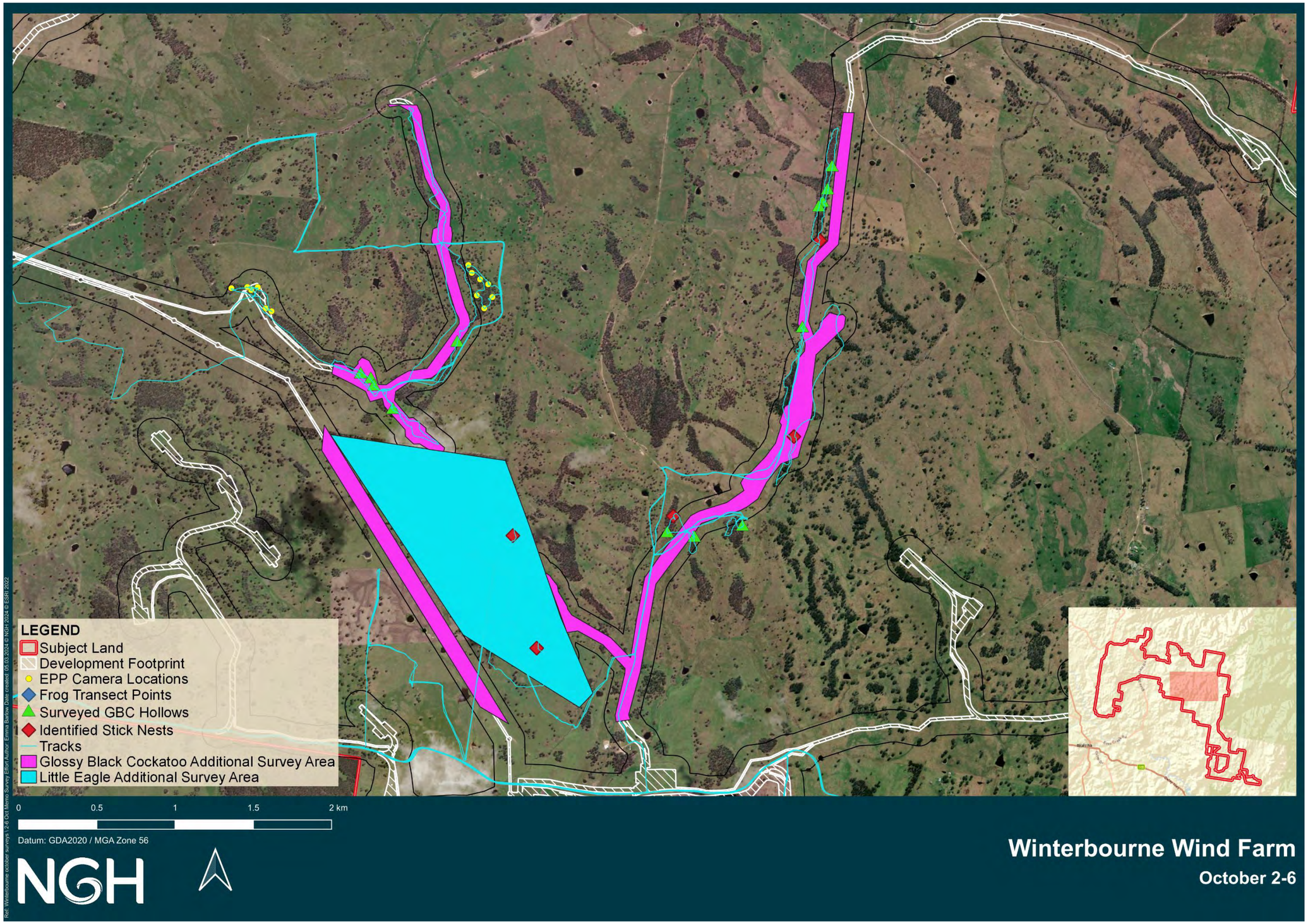


Figure 5-3 Survey effort map 2 of 4 / Site 1 and 2 of EPP cameras

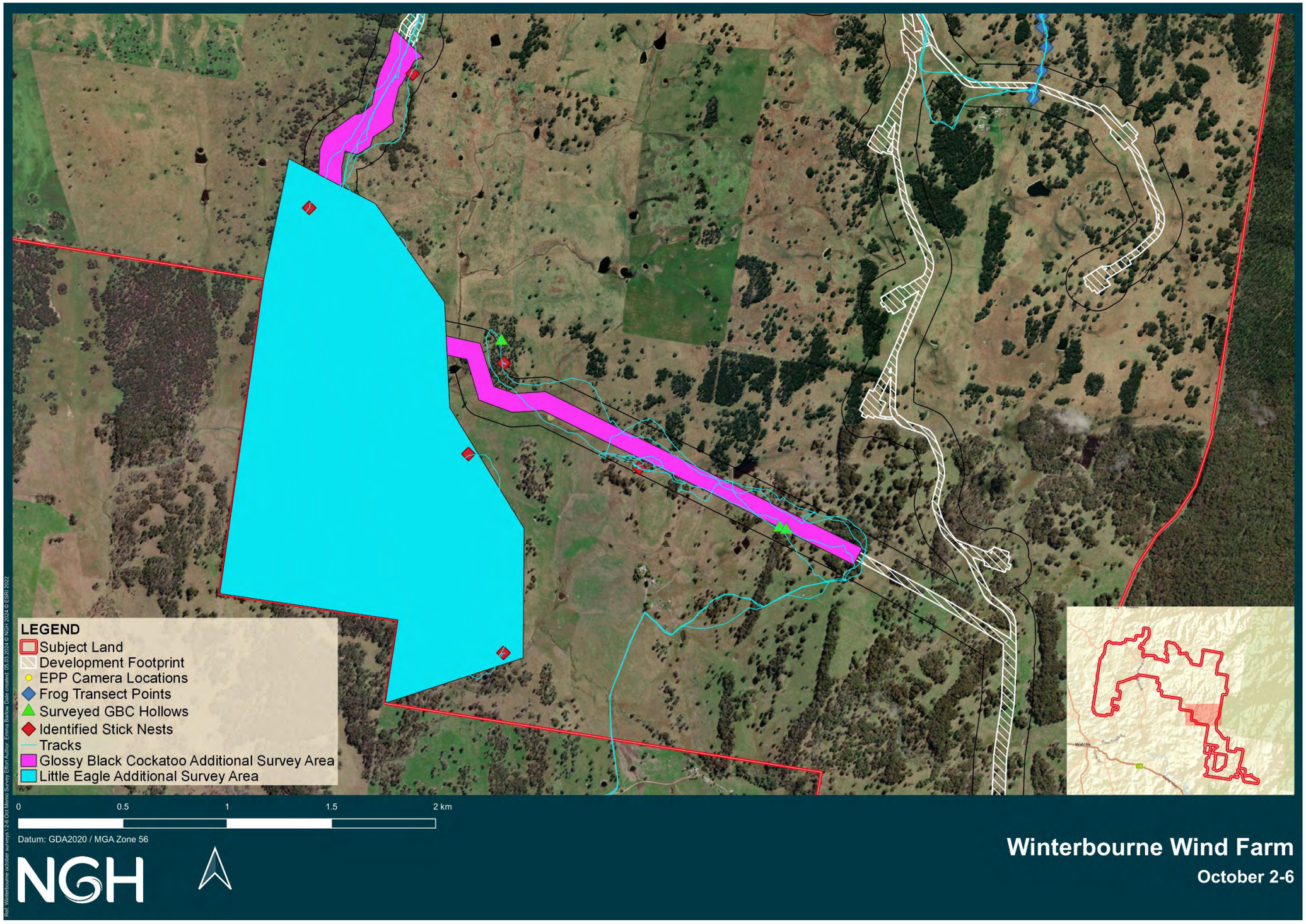


Figure 5-4 Survey effort map 3 of 4

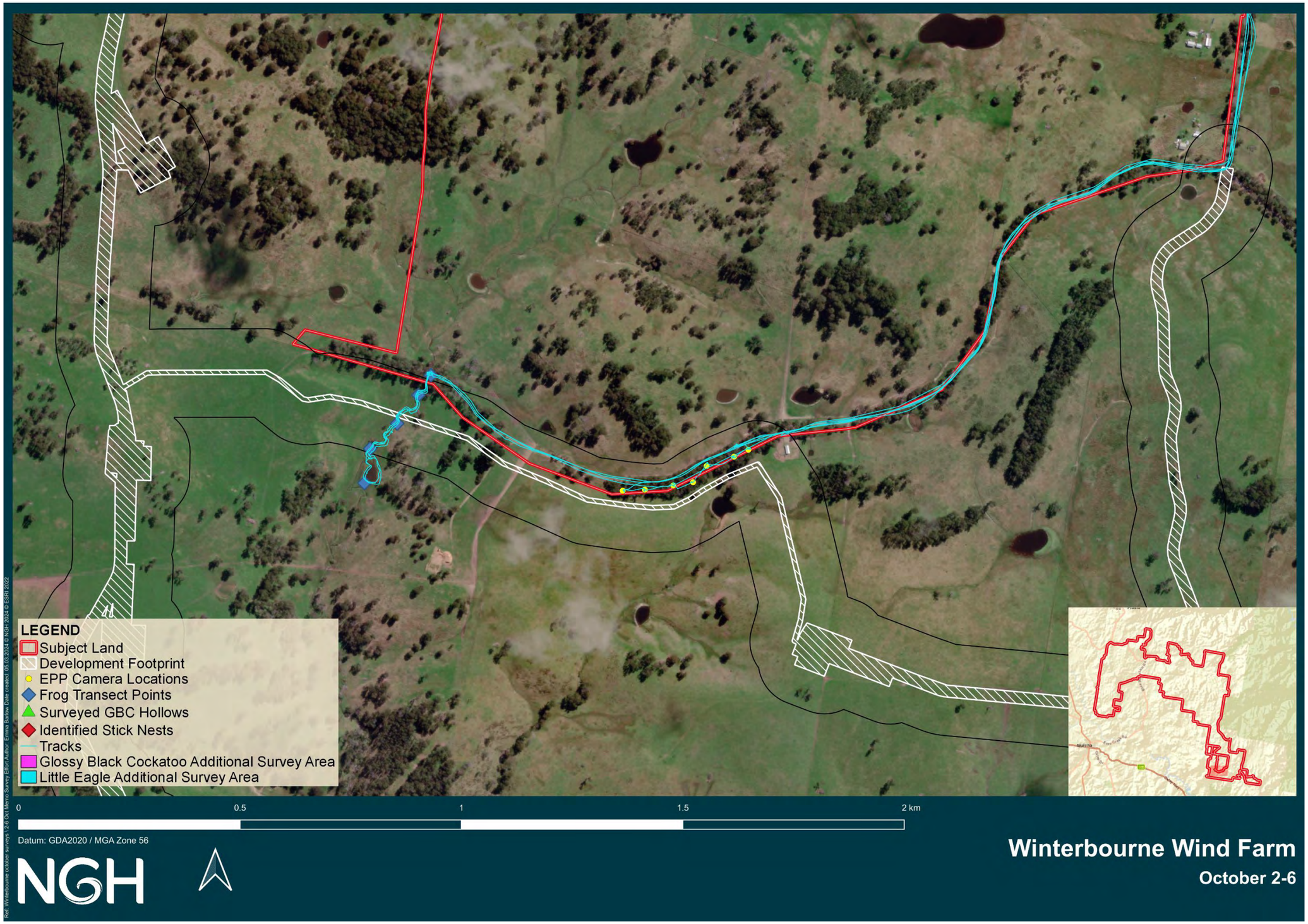


Figure 5-5 Survey effort map 4 of 4 / Site 3 of EPP cameras

APPENDIX B EASTERN PYGMY POSSUM CAMERA LOCATIONS

Coordinates	Photo
Site 1	
382166.9615870167, 6582445.122530098	

382188.545803293, 6582394.906949577	

382241.95437966706, 6582353.192316955



382293.72156542365, 6582322.175079588	

382221.45302980655, 6582250.47396831



382320.420526245, 6582239.899457542	

382268.4254549099, 6582167.922368823	
Site 2	

380909.46963841416, 6582149.415013174	

380872.7701029342,
6582168.465929311



380821.1361841351, 6582303.206098083	

380652.7338071133, 6582296.6283017155	
Site 3	

387834.3694029192,
6567139.254728265



387802.0017707169, 6567123.627406336	

387740.16181698954, 6567102.541936137



387709.5435637416, 6567065.874572336	

387664.7045595491,
6567058.574919308



387600.64086347376, 6567049.096328562	

387550.54456991213, 6567046.683431469



APPENDIX C EASTERN PYGMY POSSUM CAMERA RESULTS

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
643	3	100RCNX	10/16/2023	Common Brushtail Possum	*Trichosurus vulpecula*			97-99
645	3	100MEDIA	10/21/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2696-2701
645	3	100MEDIA	10/24/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4087-4098
647	3	100MEDIA	10/4/2023	Common Brushtail Possum	*Trichosurus vulpecula*			16-19
647	3	100MEDIA	10/6/2023	Common Brushtail Possum	*Trichosurus vulpecula*			466-478
647	3	100MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			3415-3421
648	3			No animals captured on camera				
649	3			No animals captured on camera				
785	1	100MEDIA	3/10/2023-5/10/2023	Common Brushtail Possum	*Trichosurus vulpecula*			36
785	1	100MEDIA	10/5/2023	Common Brushtail Possum	*Trichosurus vulpecula*			43-44
785	1	100MEDIA	10/10/2023	Common Brushtail Possum	*Trichosurus vulpecula*			43-102
785	1	100MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			124-126
785	1	100MEDIA	10/6/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			58-84
785	1	100MEDIA	10/10/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			112-117
785	1	100MEDIA	10/17/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			151-165
785	1	100MEDIA	10/21/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			169-183
785	1	100MEDIA	10/10/2023	Eastern Grey Kangaroo	*Macropus giganteus*			107-108
785	1	100MEDIA	10/14/2023	Eastern Grey Kangaroo	*Macropus giganteus*			128-135

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
785	1	100MEDIA	10/15/2023	Eastern Grey Kangaroo	*Macropus giganteus*			136-141
785	1	100MEDIA	10/22/2023	Eastern Grey Kangaroo	*Macropus giganteus*			184-191
786	3	100MEDIA	10/17/2023	Bush Rat	*Rattus fuscipes*			145-150
786	3	100MEDIA	10/3/2023	Common Brushtail Possum	*Trichosurus vulpecula*			4 to 13
786	3	100MEDIA	10/20/2023	Sugar Glider	*Petaurus breviceps*			151-153
787	1	100MEDIA	10/5/2023	Common Brushtail Possum	*Trichosurus vulpecula*			34-36
787	1	100MEDIA	10/19/2023	Common Brushtail Possum	*Trichosurus vulpecula*			523-525
787	1	100MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			52-58
787	1	100MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			68-72
787	1	100MEDIA	10/9/2023	Eastern Grey Kangaroo	*Macropus giganteus*			118-120
787	1	100MEDIA	10/10/2023	Eastern Grey Kangaroo	*Macropus giganteus*			124-126
787	1	100MEDIA	10/15/2023	Eastern Grey Kangaroo	*Macropus giganteus*			229-234
787	1	100MEDIA	10/16/2023	Eastern Grey Kangaroo	*Macropus giganteus*			262-267
787	1	100MEDIA	10/16/2023	Eastern Grey Kangaroo	*Macropus giganteus*			430-432
787	1	100MEDIA	10/21/2023	Eastern Grey Kangaroo	*Macropus giganteus*			589-592
787	1	100MEDIA	10/8/2023	Eastern Grey Kangaroo with Juvenile	*Macropus giganteus*			109-117
787	1	100MEDIA	10/6/2023	Feral Cat	*Felis catus*			49-51
787	1	100MEDIA	10/6/2023	Red Fox	*Vulpes vulpes*			46-48
787	1	100MEDIA	10/14/2023	Red Fox	*Vulpes vulpes*			205-207
787	1	100MEDIA	10/7/2023	Red-necked Wallaby	*Macropus rufogriseus*			82-87
787	1	100MEDIA	10/10/2023	Red-necked Wallaby	*Macropus rufogriseus*			127-129

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
787	1	100MEDIA	10/12/2023	Red-necked Wallaby	*Macropus rufogriseus*			157-171
787	1	100MEDIA	10/13/2023	Red-necked Wallaby	*Macropus rufogriseus*			196-204
787	1	100MEDIA	10/14/2023	Red-necked Wallaby	*Macropus rufogriseus*			208-210
787	1	100MEDIA	10/17/2023	Red-necked Wallaby	*Macropus rufogriseus*			511-513
787	1	100MEDIA	10/19/2023	Red-necked Wallaby	*Macropus rufogriseus*			526-531
787	1	100MEDIA	10/20/2023	Red-necked Wallaby	*Macropus rufogriseus*			544-546
787	1	100MEDIA	10/14/2023	Red-necked Wallaby Juvenile	*Macropus rufogriseus*			214
787	1	100MEDIA	10/23/2023	Red-necked Wallaby with Juvenile	*Macropus rufogriseus*			895-897
787	**1**	**100MEDIA**	**10/11/2023**	**Spotted-tailed Quoll**	***Dasyurus maculatus***	**V**	**E**	**154-156**
787	1	100MEDIA	10/4/2023	Swamp Wallaby	*Wallabia bicolor*			22-24
787	1	100MEDIA	10/8/2023	Swamp Wallaby	*Wallabia bicolor*			88-102
787	1	100MEDIA	10/11/2023	Swamp Wallaby	*Wallabia bicolor*			139-153
787	1	100MEDIA	10/14/2023	Swamp Wallaby	*Wallabia bicolor*			217-220
787	1	100MEDIA	10/22/2023	Swamp Wallaby	*Wallabia bicolor*			595-597
788	1	100MEDIA	10/12/2023	Raven	*Corvus sp.*			70
789	2	106MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			289-300
789	2	103MEDIA	10/5/2023	Eastern Rosella	*Platycercus eximius*			919-927
789	2	103MEDIA	10/5/2023	Eastern Rosella	*Platycercus eximius*			946-954
789	2	103MEDIA	10/5/2023	Eastern Rosella	*Platycercus eximius*			961-975
789	2	106MEDIA	10/5/2023	Raven	*Corvus sp.*			285
789	2	106MEDIA	10/6/2023	Swamp Wallaby	*Wallabia bicolor*			289-300

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
790	2	100MEDIA	3/18/2023	Common Brushtail Possum	*Trichosurus vulpecula*			127-156
790	2	100MEDIA	3/11/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			52-54
790	2	100MEDIA	3/12/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			82-87
790	2	100MEDIA	3/20/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			169-171
790	2	100MEDIA	3/21/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			178-183
790	2	100MEDIA	3/13/2023	Crimson Rosella	*Platycercus elegans*			88-90
790	2	100MEDIA	3/13/2023	Eastern Grey Kangaroo	*Macropus giganteus*			91-93
790	2	100MEDIA	3/13/2023	Eastern Grey Kangaroo	*Macropus giganteus*			97-99
790	2	100MEDIA	3/19/2023	Eastern Grey Kangaroo	*Macropus giganteus*			160-162
791	1	101MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			429-434
791	1	101MEDIA	10/9/2023	Spider	*Arachnids*			213-218
793	3	100MEDIA	10/5/2023	Common Brushtail Possum	*Trichosurus vulpecula*			7 to 12
795	1	100MEDIA	10/11/2023	Common Brushtail Possum	*Trichosurus vulpecula*			187-189
795	1	100MEDIA	10/16/2023	Common Brushtail Possum	*Trichosurus vulpecula*			235-237
795	2	101MEDIA	10/4/2023	Common Brushtail Possum	*Trichosurus vulpecula*			550-564
795	1	100MEDIA	10/8/2023	Swamp Wallaby	*Wallabia bicolor*			163-165
796	1	100MEDIA	10/16/2023	Common Brushtail Possum	*Trichosurus vulpecula*			64-66
796	1	100MEDIA	10/10/2023	Eastern Grey Kangaroo	*Macropus giganteus*			19-21
796	1	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			68-69
796	1	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			77-78
796	1	100MEDIA	10/22/2023	Eastern Grey Kangaroo	*Macropus giganteus*			97-108

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
796	1	100MEDIA	10/17/2023	Red-necked Wallaby	*Macropus rufogriseus*			70
796	1	100MEDIA	10/19/2023	Unknown Large Animal	Unknown			85-87
798	2	100MEDIA	10/8/2023	Common Brushtail Possum	*Trichosurus vulpecula*			0007-0009
798	2	100MEDIA	10/23/2023	Common Myna	*Acridotheres tristis*			0160-0162
810	2	100MEDIA	10/6/2023	Common Brushtail Possum	*Trichosurus vulpecula*			4627
810	2	100MEDIA	10/8/2023	Common Brushtail Possum	*Trichosurus vulpecula*			4831-4842
810	2	100MEDIA	10/12/2023	Common Brushtail Possum	*Trichosurus vulpecula*			5104-5109
810	2	100MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			5428-5429
810	2	100MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			5569-5571
810	2	100MEDIA	10/19/2023	Common Brushtail Possum	*Trichosurus vulpecula*			7831-7833
810	2	100MEDIA	10/22/2023	Common Brushtail Possum	*Trichosurus vulpecula*			8773-8775
810	2	100MEDIA	10/19/2023	Common Brushtail Possum	*Trichosurus vulpecula*			7585-7611
810	2	100MEDIA	10/16/2023	Spider	*Arachnids*			5707-5715
811	2	100MEDIA	10/6/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1825-1830
818	2	100MEDIA	10/11/2023	Common Brushtail Possum	*Trichosurus vulpecula*			107-109
818	2	100MEDIA	10/16/2023	Common Brushtail Possum	*Trichosurus vulpecula*			119-121
818	2	100MEDIA	10/20/2023	Eastern Grey Kangaroo	*Macropus giganteus*			128-130

Field Survey Technical Memo 4

Winterbourne Wind Farm

December 2023

Project Number: 23-247



NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au

Document verification

Survey	Winterbourne Wind Farm
Project Number:	23-247
Project File Name:	23-247 Field Survey Technical Memo 4-7 December Final V1.01

Revision	Date	Prepared by	Reviewed by	Approved by
Draft V1.0	18/12/2023	Izaak Graham-Higgs	Bianca Heinze	Bianca Heinze
Draft V1.01	14/03/2024	Emma Barlow	Bianca Heinze	Bianca Heinze

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

W. www.nghconsulting.com.au

E. ngh@nghconsulting.com.au

BEGA - ACT & SOUTH EAST NSW
Suite 11, 89-91 Auckland Street
(PO Box 470) Bega NSW 2550
T. (02) 6492 8333

NEWCASTLE - HUNTER & NORTH COAST
Level 1, 31-33 Beaumont Street
Hamilton NSW 2303
T. (02) 4929 2301

BRISBANE
T3, Level 7, 348 Edward Street
Brisbane QLD 4000
T. (07) 3129 7633

SYDNEY REGION
Unit 17, 21 Mary Street
Surry Hills NSW 2010
T. (02) 8202 8333

CANBERRA - NSW SE & ACT
Unit 8, 27 Yallourn Street
(PO Box 62) Fyshwick ACT 2609
T. (02) 6280 5053

WAGGA WAGGA - RIVERINA & WESTERN NSW
35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650
T. (02) 6971 9696

GOLD COAST
2B 34 Tallebudgera Creek Road
Burleigh Heads QLD 4220
(PO Box 424 West Burleigh QLD 4219)
T. (07) 3129 7633

WODONGA
Unit 2, 83 Hume Street
(PO Box 506) Wodonga VIC 3690
T. (02) 6067 2533

NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au
ABN 31 124 444 622 ACN 124 444 622

Table of contents

1. Methods 1

1.1. Desktop assessment 1

1.2. Field survey 1

1.2.1. Survey team and dates 1

1.2.2. Survey conditions 1

1.2.3. Survey effort 2

2. Results 3

2.1. PCT Identification 3

2.2. BAM Plots 3

2.3. Targeted Flora 4

3. Limitations 5

Figures

Figure 3-1 Overview of survey effort 2

Figure 3-2 Survey effort map 1 of 5 3

Figure 3-3 Survey effort map 2 of 5 4

Figure 3-4 Survey effort map 3 of 5 5

Figure 3-5 Survey effort map 4 of 5 \ Location of two conducted BAM plots 6

Figure 3-6 Survey effort map 5 of 5 7

Tables

Table 1-1 Survey Team 1

Table 1-2 Survey weather conditions over the survey period 1

Table 2-1 PCTs determined from RAPs 3

Table 2-2 Flora species targeted and recorded in December 2023 4

1. Methods

1.1. Desktop assessment

The following guidelines are relevant to the survey:

- Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method (DPE, 2020).

1.2. Field survey

The purpose of the December 2023 survey was to identify and map PCTs and undertake BAM plots and targeted flora surveys in new areas. The target species for December 2023 was Streamside Greenhood (*Pterostylis riparia*), an orchid which occurs in association with PCT 766 on the edge of small streams under shrubs. The area was classified 'open vegetation' thus the distance between parallel field traverses was 10m.

1.2.1. Survey team and dates

The survey was undertaken over 4 – 7 December by two ecologists lead by Dr John Hunter (Table 1-1).

Table 1-1 Survey Team

Name	Role	Fieldwork Conducted	Survey dates
Dr John Hunter	Senior Ecologist (Team Leader)	PCT mapping and zoning, BAM plots (1 per PCT), habitat assessments and targeted flora surveys looking for *Pterostylis riparia*.	4th – 7th December 2023
Izaak Graham-Higgs	Ecologist	PCT mapping and zoning, BAM plots (1 per PCT), habitat Assessments and targeted flora surveys looking for *Pterostylis riparia*.	4th – 7th December 2023

1.2.2. Survey conditions

Conditions were predominantly mild, dry, and calm. Table 1-2 below provides temperature and other conditions recorded in the field during the survey week. No rain was recorded during the survey.

Table 1-2 Survey weather conditions over the survey period

Date	Min. temp (°C)	Max temp (°C)	Max. wind gust (km/h)	Weather conditions, recorded on site
4th	12	25.9	43	Partly cloudy, warm temperatures
5th	8.4	27.8	31	Partly cloudy, warm temperatures

Date	Min. temp (°C)	Max temp (°C)	Max. wind gust (km/h)	Weather conditions, recorded on site
6th	15	31.6	37	Partly cloudy, Hot temperatures
7th	14	32.2	52	Partly cloudy, Hot temperatures

1.2.3. Survey effort

Where possible all parts of the additional investigation areas were surveyed by two staff on foot or vehicle depending on access and vegetation complexity.

Rapid Assessment Points

Where possible all patches allocated a PCT by the State Vegetation Type Mapping were visited and a rapid assessment point (RAP) was undertaken whereby the three dominant flora species in each structural layer were recorded along with a photograph of each location. These taxa were then used to determine a likely PCT at each RAP.

BAM plots in Category 1 Land

BAM plots were randomly allocated prior to the site visit within likely Category 1 (Cat 1) land locations. Each of these potential BAM plots were visited and assessed for Cat 1 status. If the lands were obviously of Cat 1 status (i.e. obviously improved pasture with little or on native vegetation cover), BAM plots were not conducted. If the site was found to be at, near or greater than 50% native vegetation cover, a BAM plot was conducted. Only two locations were considered not to be clearly pasture improved and had a sufficient component of native species for BAM plots to be undertaken (i.e. two BAM plots were conducted).

Targeted Flora Surveys

An a-priori desktop assessment was made of locations where drainage lines crossed the new targeted survey areas. These areas were considered prime habitat for *Pterostylis riparia*. Each of these locations was visited and an assessment made of habitat quality. Where locations were obviously of low quality, generally assessed by being intensively pasture improved, no surveys were conducted. If the location was considered potential habitat a walking survey was conducted by two staff walking in parallel transects across the potential habitat polygon. All targeted locations were photographed. Where other threatened species were found, in particular *Eucalyptus nicholii,* these were recorded.

Eight targeted flora surveys were undertaken across a total of 4.2 ha.

Habitat Feature Surveys

Across all parts of the additional investigation area, any hollow-bearing trees or large hollow-bearing logs were recorded, and any stick nest with a radius larger than 0.5m was recorded.

2. Results

2.1. PCT Identification

A total of 306 RAPs were undertaken and used to determine the most likely PCTs. Assessment of PCTs was hampered in many locations by the highly modified condition of the landscape with much of the native vegetation cleared and improved pasture both in open areas and under scattered trees. Many stands were of secondary regrowth and may not have the original combination of dominants *in-situ*. Some PCTs share similar dominants and distinguishing which PCT is the most relevant is problematic as the relative dominance may have changed at this local site due to selective clearing and different regeneration capacities along with the removal of understorey species which are often used for PCT identification.

A total of 12 native PCTs were identified, including two newly identified PCTs that are listed in Table 2-1. Newly identified PCTs in all instances covered comparatively small areas. Of note were small areas dominated by *Eucalyptus dives* which forms a new northern limit of distribution of this species which is generally known from only as far north as the Barrington region in the southern parts of the New England Plateau. The areas in which this species was found dominating were heavily modified by pasture improvement and the removal of structural layers. Both the removal of understorey dominants, potential overstorey-co-dominants and the range extension makes PCT identification of these areas with *E. dives* problematic within the current system. BAM plots will be undertaken in future field surveys to determine PCTs in these areas.

Table 2-1 Newly identified PCTs determined from RAPs

PCT Name	BC Act TEC	EPBC Act TEC
518 - Heath swamps wetland on leucogranite and granite of the New England Tableland Bioregion	Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions **Endangered** Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion **Endangered**	N/A
934 - Messmate open forest of the tableland edge of the NSW North Coast Bioregion and New England Tableland Bioregion	N/A	N/A

2.2. BAM Plots

BAM plots were conducted at two (2) of nineteen (19) randomly allocated points to determine Land Category status. The BAM plots conducted were characterized by 100% vegetation cover; absence of leaf litter; and a predominant 60%-65% coverage of *Poa sieberiana.* This data will inform future land category assessment.

2.3. Targeted Flora

Almost all targeted survey locations were found to be of intensively improved pasture with all natives removed (poisoned) and the areas planted with exotic pasture species. Many areas considered to have been native dominated during past inspections had been converted at the time of this current survey. Only eight locations were found to be less modified and have the potential for the target species to occur. Where on-ground transects were conducted there were no indications of the presence of *Pterostylis riparia*.

Several RAPs recorded *Eucalyptus nichollii* (Table 2-2).

Table 2-2 Flora species targeted and recorded in December 2023

Scientific name	Common name	Status		Potential occurrence (Low, Moderate, High, Recorded)
		BC Act	EPBC Act	
Pterostylis riparia	Streamside Greenhood	Vulnerable	Vulnerable	Low
Eucalyptus nichollii	Narrow-leaved Black Peppermint	Vulnerable	Vulnerable	Recorded

3. Limitations

Pterostylis riparia was not observed during targeted surveys at the eight locations considered suitable habitat for the orchid. As such, species presence could not be utilised to prioritise further habitat areas to survey. Due to the large area to cover, greater survey effort was undertaken within areas containing patches of native grass. As such, limited habitat transects were undertaken in pasture improved paddocks.

Only two locations had a sufficient component of native species for BAM plots to be undertaken; other locations were pasture improved paddocks. As such, few new BAM plots were undertaken.

The limitations of the PCT mapping includes difficulties in accurate identification and classification of PCTs due to landscape modifications, altered dominance of species, challenges in differentiating between similar PCTs and the emergence of new types that don't match with the previous classification system.

APPENDIX A MAPS

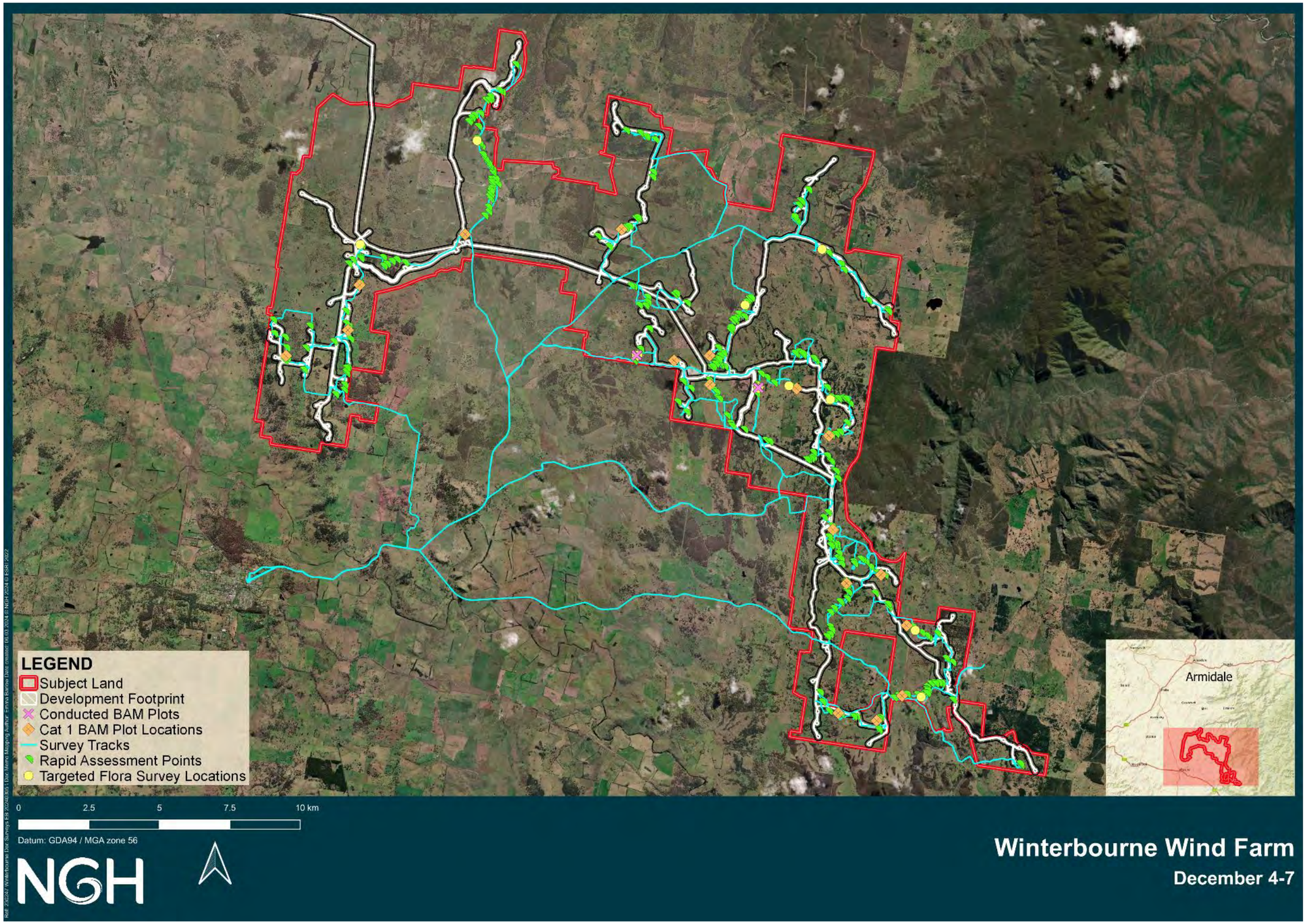


Figure 3-1 Overview of survey effort



Figure 3-2 Survey effort map 1 of 5

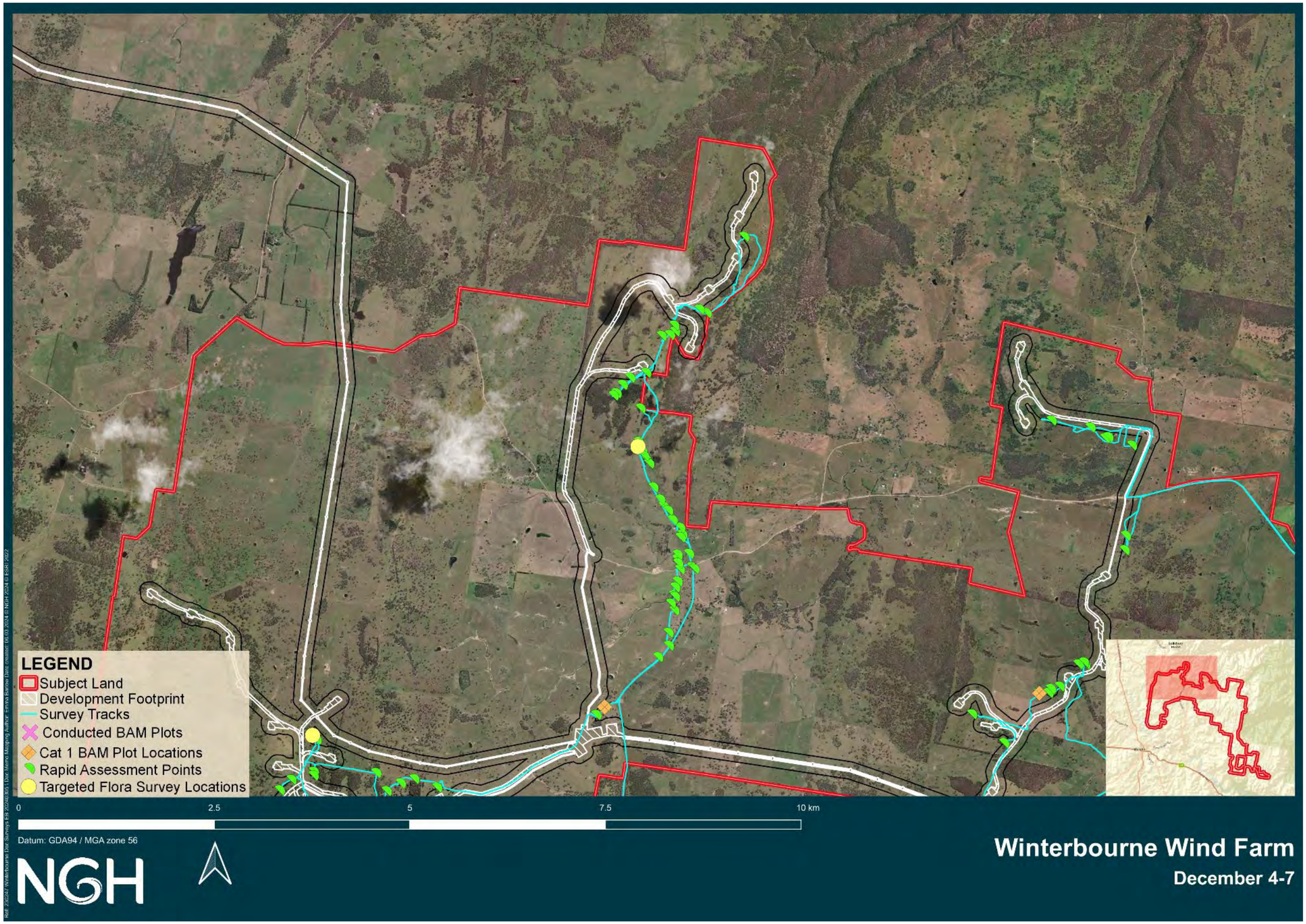


Figure 3-3 Survey effort map 2 of 5

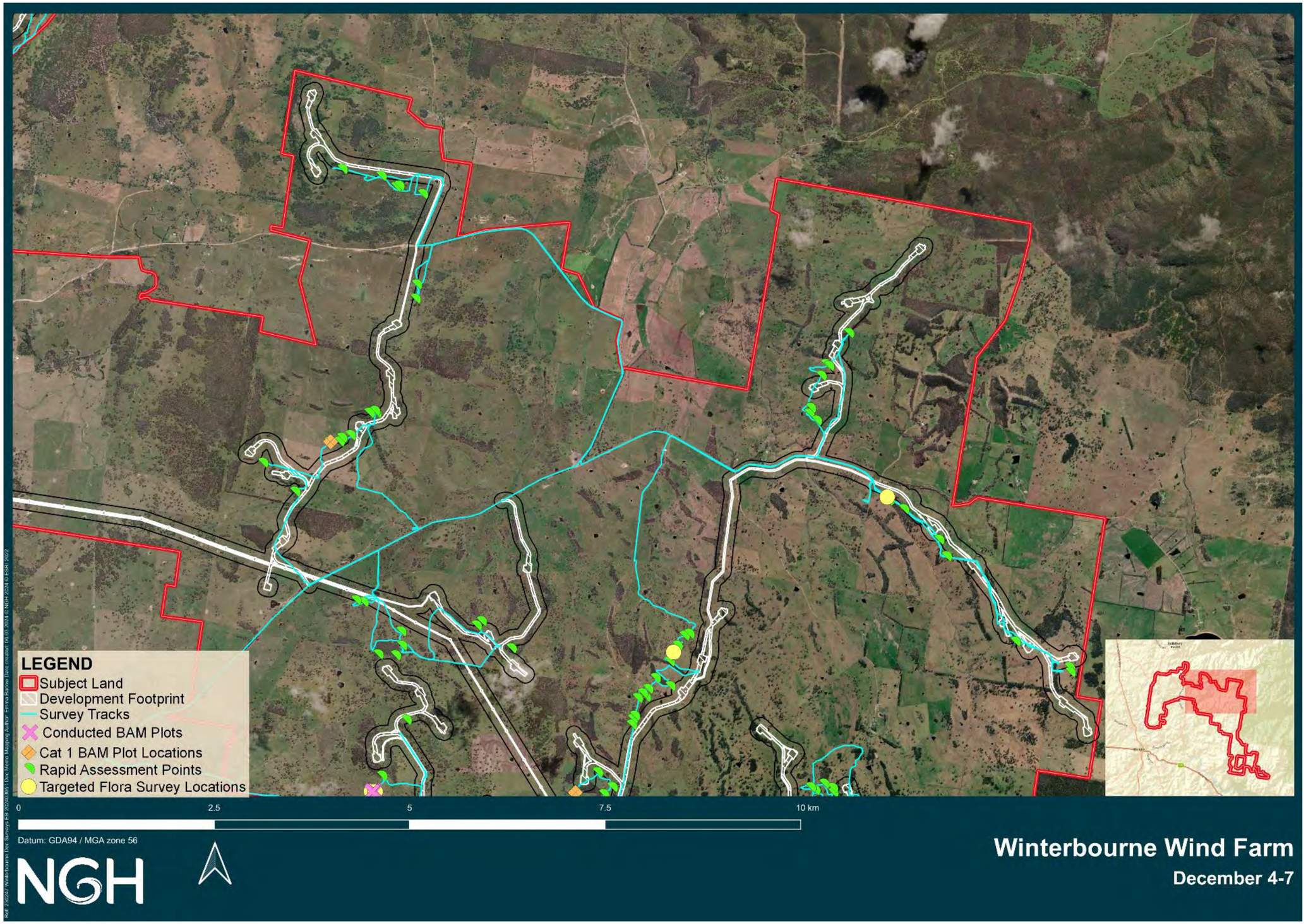


Figure 3-4 Survey effort map 3 of 5

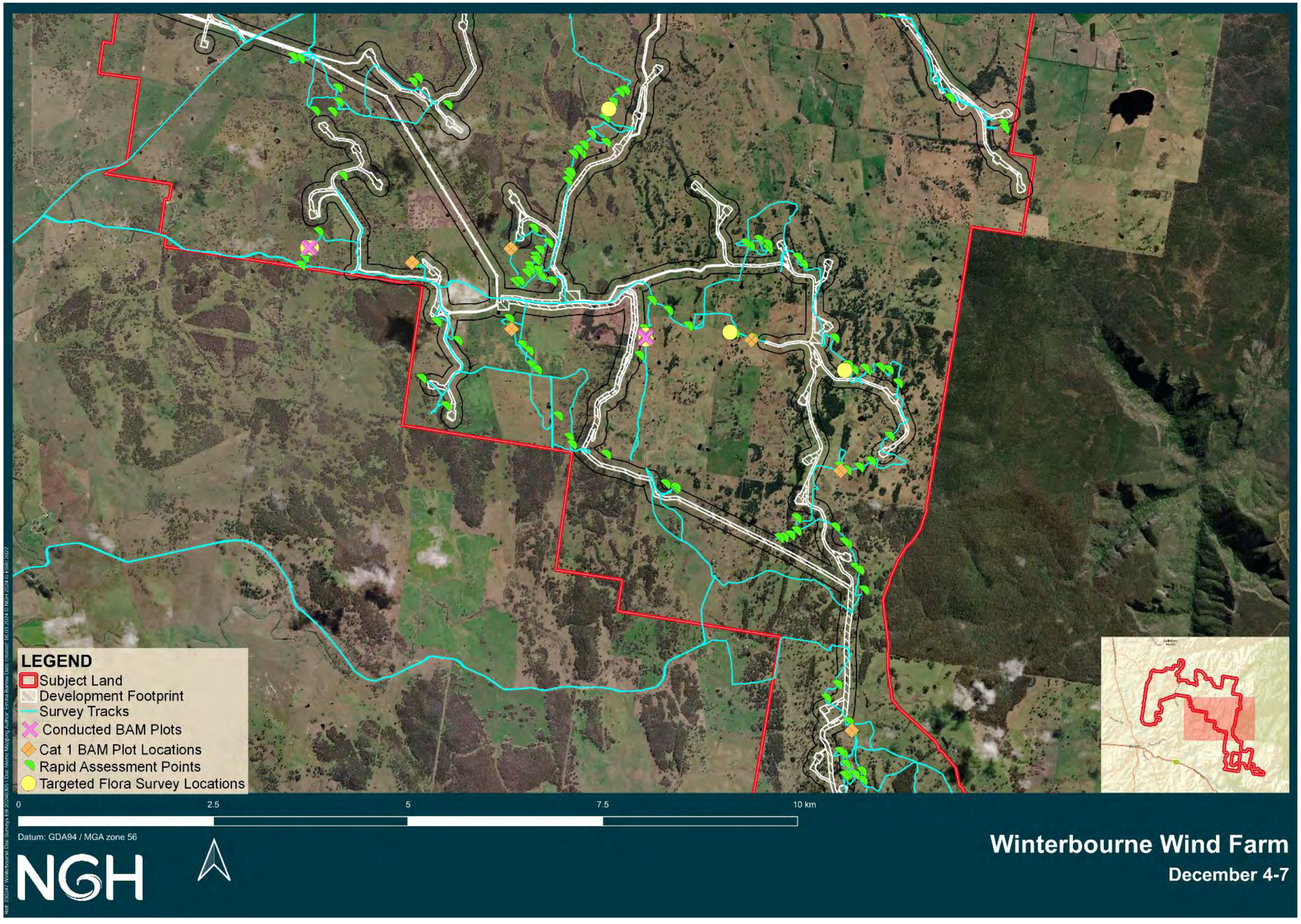


Figure 3-5 Survey effort map 4 of 5 \ Location of two conducted BAM plots

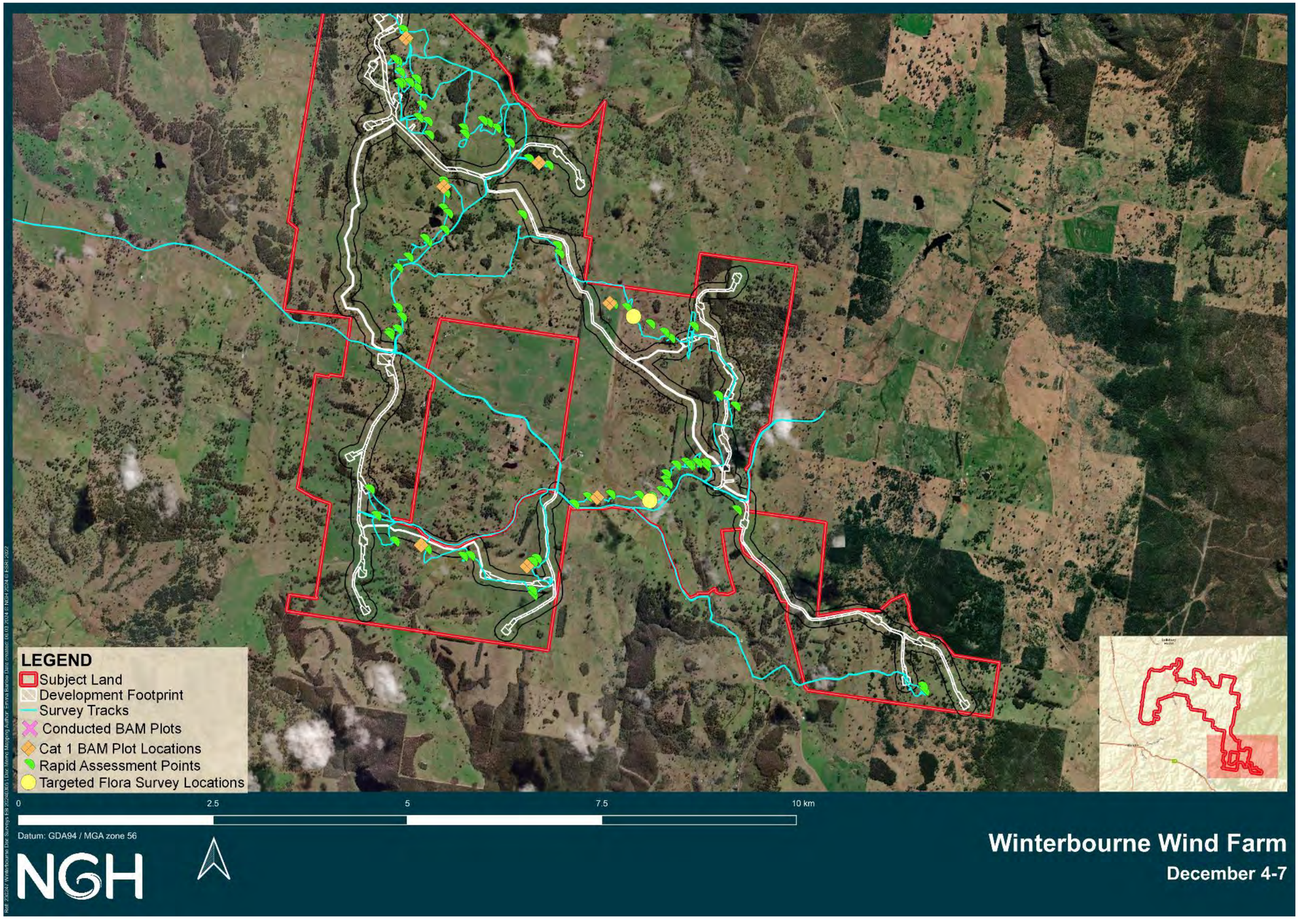


Figure 3-6 Survey effort map 5 of 5

Field Survey Technical Memo 3

Winterbourne Wind Farm

October 2023

Project Number: 23-247



NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au

Document verification

Survey	Winterbourne Wind Farm
Project Number:	23-247
Project File Name:	23-247 Field Survey Technical Memo 23-25 October Final V1.01

Revision	Date	Prepared by	Reviewed by	Approved by
Final V1.0	26/10/23	Izaak Graham-Higgs	Bianca Heinze	Bianca Heinze
Final V1.01	14/03/2024	Emma Barlow	Bianca Heinze	Bianca Heinze

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

W. www.nghconsulting.com.au

E. ngh@nghconsulting.com.au

BEGA - ACT & SOUTH EAST NSW
Suite 11, 89-91 Auckland Street
(PO Box 470) Bega NSW 2550
T. (02) 6492 8333

NEWCASTLE - HUNTER & NORTH COAST
Level 1, 31-33 Beaumont Street
Hamilton NSW 2303
T. (02) 4929 2301

BRISBANE
T3, Level 7, 348 Edward Street
Brisbane QLD 4000
T. (07) 3129 7633

SYDNEY REGION
Unit 17, 21 Mary Street
Surry Hills NSW 2010
T. (02) 8202 8333

CANBERRA - NSW SE & ACT
Unit 8, 27 Yallourn Street
(PO Box 62) Fyshwick ACT 2609
T. (02) 6280 5053

WAGGA WAGGA - RIVERINA & WESTERN NSW
35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650
T. (02) 6971 9696

GOLD COAST
2B 34 Tallebudgera Creek Road
Burleigh Heads QLD 4220
(PO Box 424 West Burleigh QLD 4219)
T. (07) 3129 7633

WODONGA
Unit 2, 83 Hume Street
(PO Box 506) Wodonga VIC 3690
T. (02) 6067 2533

NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au
ABN 31 124 444 622 ACN 124 444 622

Table of Contents

Document verification **1**

Table of Contents ..... **i**

1. Methods **1**

1.1. Desktop assessment 1

1.2. Field survey 1

1.2.1. Survey team and dates 1

1.2.2. Survey conditions 1

1.2.3. Survey effort 2

2. Results **3**

2.1. Threatened Species 3

2.2. Rufous Bettong camera trap results 3

3. Limitations **6**

Figures

Figure 3-1 Overview of survey effort ..... A-II

Figure 3-2 Targeted Flora Survey Transect 1 and 2 ..... A-III

Figure 3-3 Targeted Flora Survey Transect 3 ..... A-IV

Figure 3-4 Targeted Flora Survey Transect 4 ..... A-V

Figure 3-5 Rufous Bettong camera site 1 ..... B-VII

Figure 3-6 Rufous Bettong camera site 2 ..... B-VIII

Figure 3-7 Rufous Bettong camera site 3 ..... B-IX

Figure 3-8 Rufous Bettong camera site 4 ..... B-X

Figure 3-9 Rufous Bettong camera site 5 ..... B-XI

Tables

Table 1-1 Survey Team 1

Table 1-2 Survey weather conditions over the survey period 1

Table 1-3 Plant Community Types and/or native vegetation composition survey effort 2

Table 1-4 Species and habitats targeted 2

Table 2-1 Targeted threatened species surveyed for and the likelihood of occurrence 3

Table 2-2 Species captured on cameras 3

Appendices

Appendix A Maps.....A-I

Appendix B Rufous Bettong Camera Locations ..... B-VI

Appendix C Rufous Bettong Camera Results .....C-I

Executive Summary

Surveys were undertaken across the entire Winterbourne Wind Farm study area to determine if Singleton Mint Bush (*Prostanthera cineolifera*) and the Small-snake Orchid (*Diuris pedunculata*) was present. Four areas on the following properties were surveyed:

- Milbank
- Queenlee,
- Monavale
- Glenoak.

Available habitat in all four areas were not suitable for either species due to disturbance from grazing of livestock and human activity. None of the target species were identified across any of the transects.

All 35 Rufous Bettong and Eastern Pygmy-possum camera traps that were deployed in round 1 and 2 surveys were collected.

1. Methods

1.1. Desktop assessment

The following guidelines are relevant to the survey:

- Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method (DPE, 2020).

1.2. Field survey

The two (2) species surveyed for include an orchid and a shrub. Due to the area being classified as open vegetation, the maximum distance between parallel field traverses was 10m.

1.2.1. Survey team and dates

Survey date and team listed in Table 1-1.

Table 1-1 Survey Team

Name	Role	Fieldwork Conducted	Survey dates
Greg Clarke	Ecologist (Team Leader)	Targeted flora surveys for Singleton Mint bush and Small Snake Orchid, camera retrieval for Rufous Bettong and Eastern Pygmy possums.	23rd – 25th Oct 2023
Izaak Graham-Higgs	Ecologist	Targeted flora surveys for Singleton Mint bush and Small Snake Orchid, camera retrieval for Rufous Bettong and Eastern Pygmy possums.	23rd – 25th Oct 2023

1.2.2. Survey conditions

Conditions were predominantly mild, dry, and calm during surveys. Weather data from Woolbrook (BOM) is provided in Table 1-2 below.

Table 1-2 Survey weather conditions over the survey period

Date	Min. temp (°C)	Max temp (°C)	Max. wind gust (km/h)	Weather conditions, recorded on site
23rd	1.5	26.5	Calm	Clear day, warm temperatures
24th	2	31	Calm	Clear day, hot temperatures,
25th	2	31	NW 4	Clear day, hot temperatures

1.2.3. Survey effort

Due to hot weather being forecast for the following days, the majority of the fieldwork was conducted on the first survey day: all 35 camera traps were collected, and Areas 2-4 flora transects were completed. The remaining Area 1 flora transect was completed the following day. Table 1-3 shows survey type and effort. Table 1-4 shows species and habitats targeted.

Table 1-3 Plant Community Types and/or native vegetation composition survey effort

Target	Survey type	Survey locations/areas	Effort
Singleton Mint Bush, Small Snake Orchid	Parallel field traverse	Area 1 PCT 970: 7.02 ha Area 2 PCT 766: 0.99 ha Area 3 PCT 568: 0.88 ha Area 4 PCT 565: 1.57 ha	5 hours of walking for two Ecologists.
Camera Retrieval	Collecting Eastern Pygmy Possum and Rufous Bettong cameras	35 camera locations as per previous deployment	7 hours for two ecologists.

Table 1-4 Species and habitats targeted

Common name	Scientific Name	BC Act	EPBC Act	Habitats targeted
Singleton Mint Bush	*Prostanthera cineolifera*	Vulnerable	Vulnerable	PCT 970, 766, 658 and 565 Grassland
Small Snake Orchid	*Diuris pedunculata*	Endangered	Endangered	PCT 970, 766, 658 and 565 Grassland

2. Results

2.1. Threatened Species

No targeted species were detected in the area. The habitat was heavily grazed and impacted by humans with rubbish and car tracks present, not suitable for the two species. Table 2-1 shows likelihood of occurrence for each threatened species targeted.

Table 2-1 Targeted threatened species surveyed for and the likelihood of occurrence

Scientific name	Common name	Status		Potential occurrence (Low, Moderate, High, Recorded)
		BC Act	EPBC Act	
Prostanthera cineolifera	Singleton Mint Bush	Vulnerable	Vulnerable	Low
Diuris pedunculata	Small Snake Orchid	Endangered	Endangered	Low

2.2. Rufous Bettong camera trap results

A total of 22 species were identified on the cameras between 20th September and 24th October 2023 (Table 2-2, Appendix B). There was one potential sighting of a Rufous Bettong (*Aepyprymnus rufescens*) at camera 812, however this was later confirmed as a Long-nosed Potoroo (*Potorous tridactylus*) on account of the skinny, short tail and sleek dark fur. Two species were identified that are listed as threatened on the BC Act and/or EPBC Act which include:

- Long-nosed Potoroo (*Potorous tridactylus*), listed as Vulnerable on the BC and EPBC Act
- Flame Robin (*Petroica phoenicea*), listed as Vulnerable on the BC Act only.

Table 2-2 Species captured on cameras

Site	Species Name	Common Name	BC Act Status	EPBC Act Status	Number of times seen
1	*Felis catus*	Feral Cat			2
	Gymnorhina tibicen	Australian Magpie			2
	Macropus giganteus	Eastern Grey Kangaroo			19
	Macropus robustus	Common Wallaroo			3
	Macropus rufogriseus	Red-necked Wallaby			47
		Red-necked Wallaby Juvenile			2
	Oryctolagus cuniculus	European Rabbit			9
	Tachyglossus aculeatus	Short-beaked Echidna			5
	Trichosurus vulpecula	Common Brushtail Possum			28
	Vulpes vulpes	Red Fox			2

Site	Species Name	Common Name	BC Act Status	EPBC Act Status	Number of times seen
	Wallabia bicolor	Swamp Wallaby			22
	Unknown	Unknown			1
		Unknown Wallaby sp.			2
2	*Antechinus sp.*	Antechinus sp.			1
	Dama dama	Fallow Deer			8
	Macropus giganteus	Eastern Grey Kangaroo			15
		Eastern Grey Kangaroo with Juvenile			1
	Macropus robustus	Common Wallaroo			12
	Mus musculus	Mouse			2
	Sus scrofa	Feral Pig			1
	Tachyglossus aculeatus	Short-beaked Echidna			1
	Trichosurus vulpecula	Common Brushtail Possum			8
	Wallabia bicolor	Swamp Wallaby			4
	Unknown	Unknown			4
		Unknown Possum sp.			1
3	*Bos taurus*	Cow			4
	Corvus sp.	Crow			1
		Currawong sp.			1
	Felis catus	Feral Cat			13
	Gymnorhina tibicen	Australian Magpie			4
	Macropus giganteus	Eastern Grey Kangaroo			68
		Eastern Grey Kangaroo with Juvenile			1
	Macropus rufogriseus	Red-necked Wallaby			2
	Platycercus elegans	Crimson Rosella			2
	Podargus strigoides	Tawny Frogmouth			1
	Tachyglossus aculeatus	Short-beaked Echidna			1
	Trichosurus vulpecula	Common Brushtail Possum			9
	Vombatus ursinus	Common Wombat			1
	Wallabia bicolor	Swamp Wallaby			2
	Unknown	Unknown Owl sp.			1
4	*Bos taurus*	Cow			19
		Calf			2
	Corvus sp.	Currawong sp.			2
		Raven			1

Site	Species Name	Common Name	BC Act Status	EPBC Act Status	Number of times seen
	Gymnorhina tibicen	Australian Magpie			1
	Macropus giganteus	Eastern Grey Kangaroo			22
	Ovis aries	Sheep			10
	Trichosurus vulpecula	Common Brushtail Possum with Juvenile			1
	Vulpes vulpes	Red Fox			20
	Wallabia bicolor	Swamp Wallaby			3
	Unknown	Unknown			1
		Unknown Bird sp.			1
		Unknown Possum sp.			2
		Unknown Wallaby sp.			3
		Unknown Kangaroo sp.			19
5	*Felis catus*	Feral Cat			3
	Macropus giganteus	Eastern Grey Kangaroo			21
	Macropus rufogriseus	Red-necked Wallaby			9
		Red-necked Wallaby Juvenile			1
	Oryctolagus cuniculus	European Rabbit			10
	Petroica phoenicea	Flame Robin	V		1
	Potorous tridactylus	Long-nosed Potoroo	V	V	1
	Tachyglossus aculeatus	Short-beaked Echidna			2
	Trichosurus vulpecula	Common Brushtail Possum			4
	Vulpes vulpes	Red Fox			2
	Wallabia bicolor	Swamp Wallaby			6
	Unknown	Unknown Bird sp.			3
		Unknown Marsupial			3
		Unknown Wallaby sp.			10
		Unknown Kangaroo sp.			18

3. Limitations

The areas shown on Figure 3-1 (Appendix A) could not be accessed to carry out the surveys due to access and time constraint reasons.

No Singleton Mint Bush and Small Snake Orchid were observed during the Flora transects. As such, species presence could not be utilised to prioritise habitat areas to survey. Due to the large area to cover, greater survey effort was undertaken within areas containing patches of grass. As such, limited habitat transects were undertaken in paddocks.

APPENDIX A MAPS

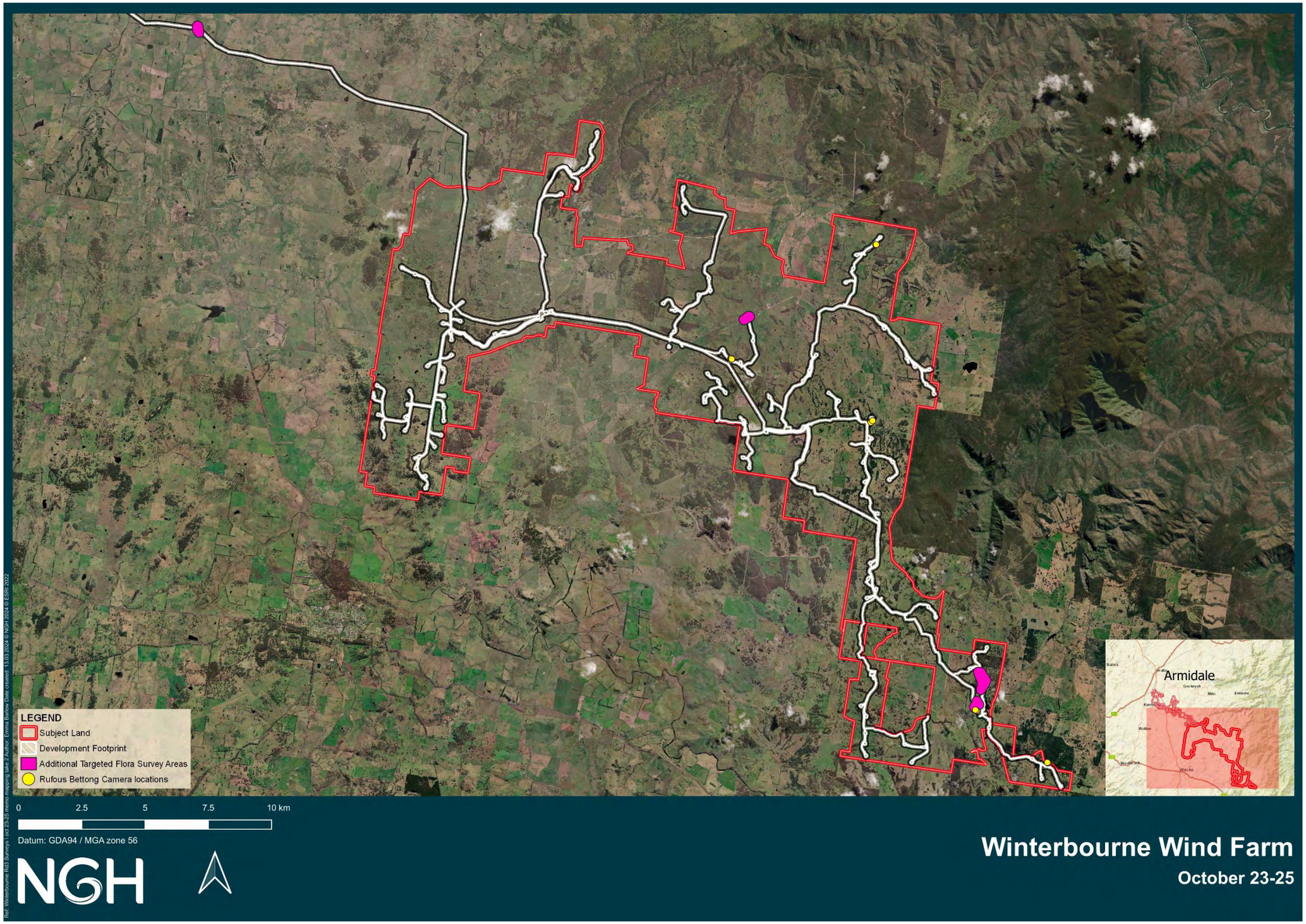


Figure 3-1 Overview of survey effort

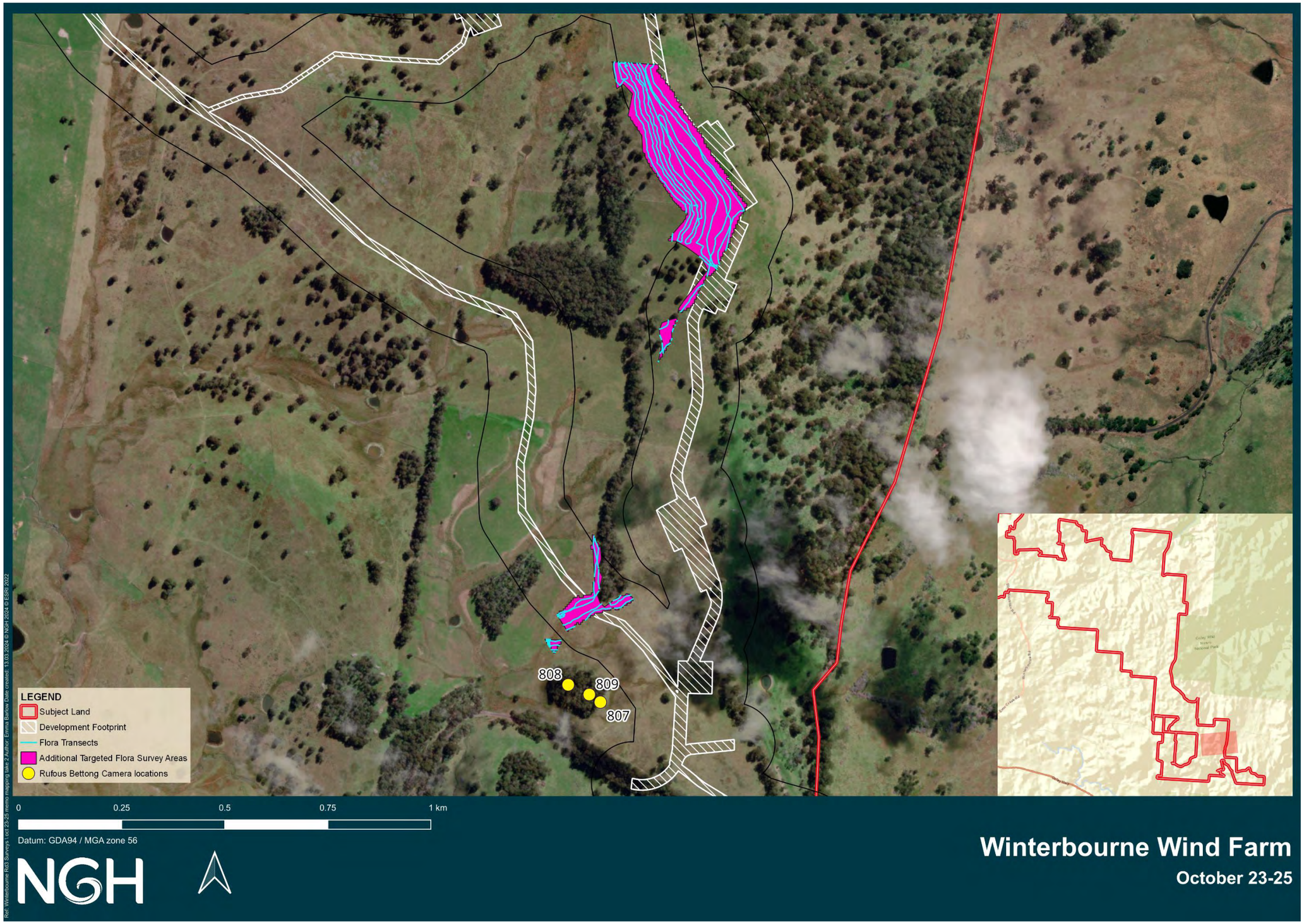


Figure 3-2 Targeted Flora Survey Transect 1 and 2

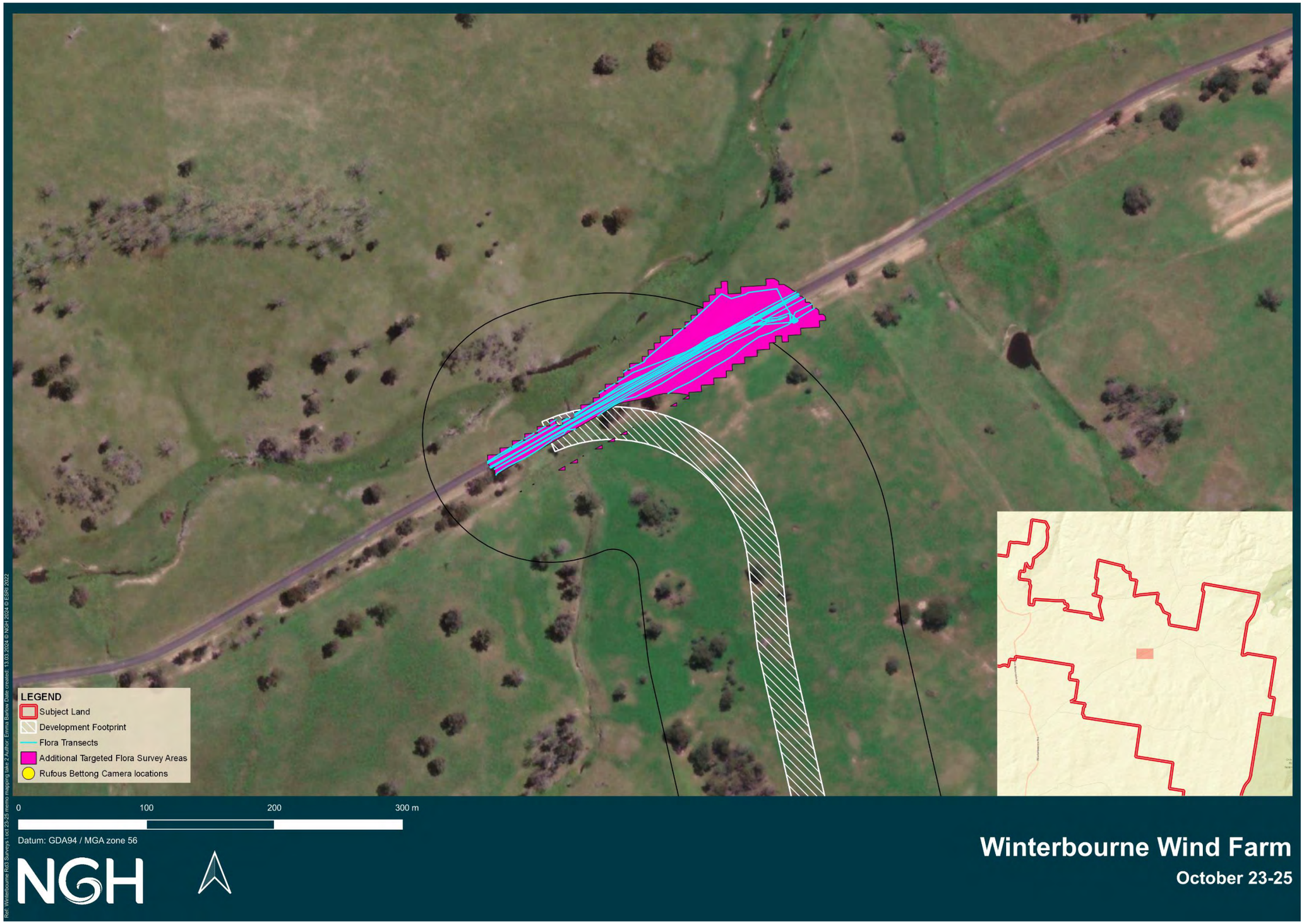


Figure 3-3 Targeted Flora Survey Transect 3



Figure 3-4 Targeted Flora Survey Transect 4

APPENDIX B RUFOUS BETTONG CAMERA LOCATIONS



Figure 3-5 Rufous Bettong camera site 1

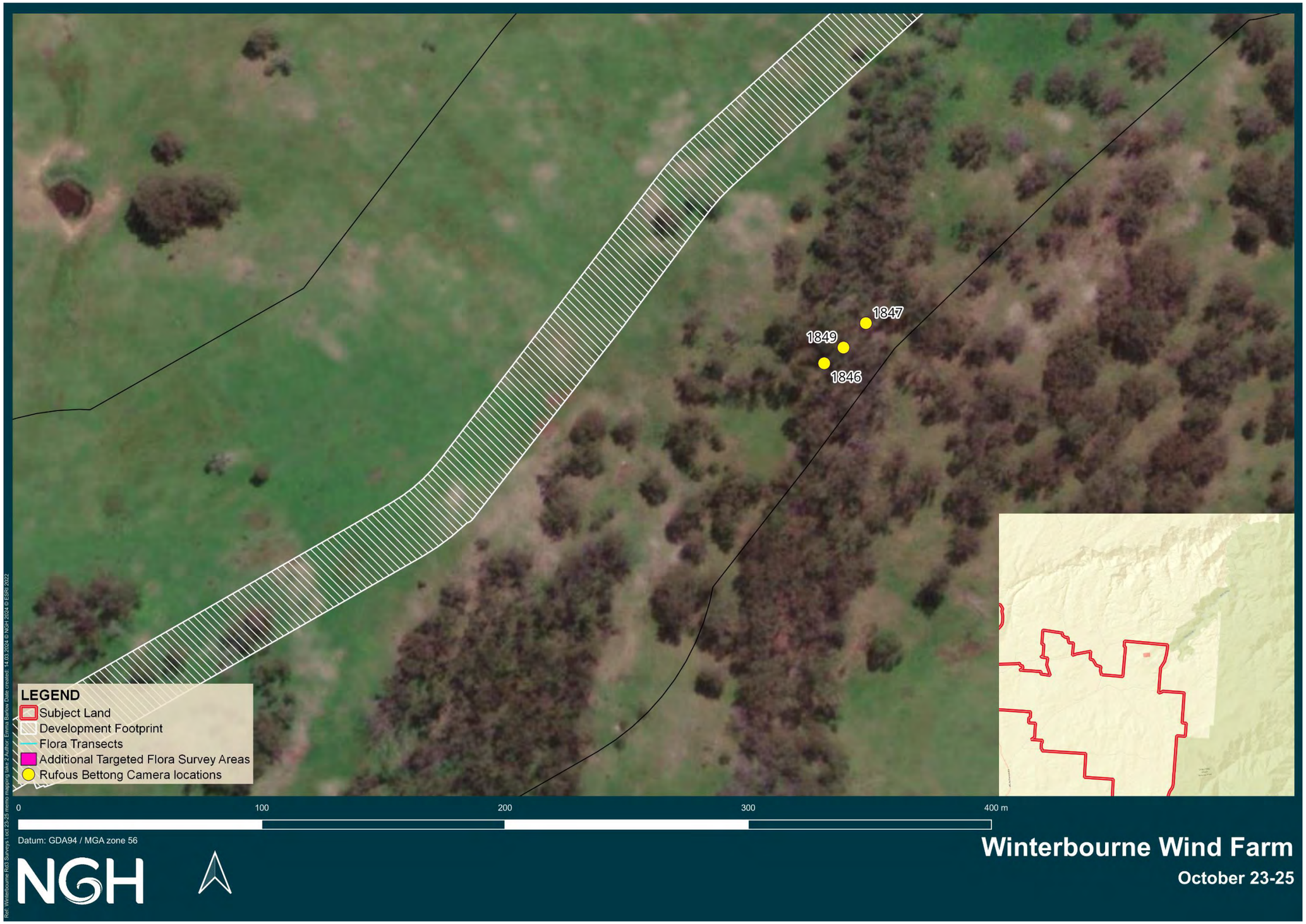


Figure 3-6 Rufous Bettong camera site 2



Figure 3-7 Rufous Bettong camera site 3

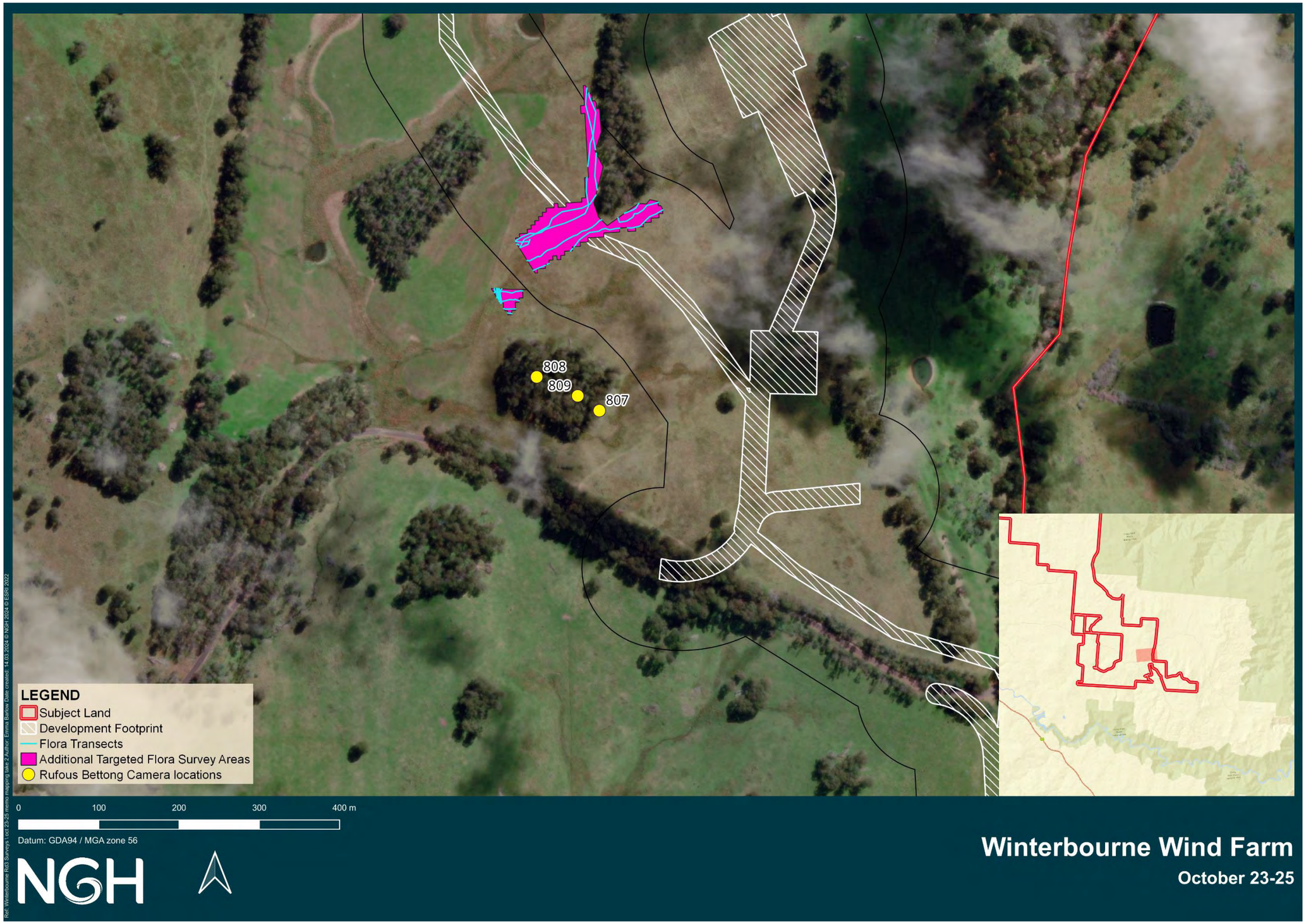


Figure 3-8 Rufous Bettong camera site 4



Figure 3-9 Rufous Bettong camera site 5

APPENDIX C RUFOUS BETTONG CAMERA RESULTS

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
694	5	100MEDIA	9/30/2023	Feral Cat	*Felis catus*			4003-4004
694	5	100MEDIA	9/26/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			2249-2253
694	5	100MEDIA	10/14/2023	Red Fox	*Vulpes vulpes*			9745-9746
694	5	100MEDIA	10/4/2023	Swamp Wallaby	*Wallabia bicolor*			4672-4675
694	5	101MEDIA	10/18/2023	Swamp Wallaby	*Wallabia bicolor*			4219-4239
807	4	100MEDIA	10/6/2023	Cow	*Bos taurus*			2526-2528
807	4	100MEDIA	10/11/2023	Cow	*Bos taurus*			2724-2726
807	4	100MEDIA	10/11/2023	Cow	*Bos taurus*			2772-2774
807	4	100MEDIA	10/17/2023	Cow	*Bos taurus*			3423-3425
807	4	100MEDIA	10/17/2023	Cow	*Bos taurus*			3432-3434
807	4	100MEDIA	10/6/2023	Australian Magpie	*Gymnorhina tibicen*			2520-2522
807	4	100MEDIA	9/28/2023	Eastern Grey Kangaroo	*Macropus giganteus*			966-992
807	4	100MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2508-2517
807	4	100MEDIA	10/7/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2596-2598
807	4	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3402-3414
807	4	100MEDIA	10/18/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3525-3533
807	4	100MEDIA	10/2/2023	Unknown Kangaroo sp.	*Unknown*			2274
807	4	100MEDIA	9/29/2023	Sheep	*Ovis aries*			1041-1043
807	4	100MEDIA	9/29/2023	Sheep	*Ovis aries*			1122-1124

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
807	4	100MEDIA	10/2/2023	Sheep	*Ovis aries*			1770-1772
807	4	100MEDIA	10/21/2023	Common Brushtail Possum with Juvenile	*Trichosurus vulpecula*			3720-3728
807	4	100MEDIA	9/26/2023	Unknown Bird sp.	*Unknown*			495
807	4	100MEDIA	10/2/2023	Red Fox	*Vulpes vulpes*			1752-1753
807	4	100MEDIA	10/3/2023	Red Fox	*Vulpes vulpes*			2469-2470
807	4	100MEDIA	10/5/2023	Red Fox	*Vulpes vulpes*			2490-2496
807	4	100MEDIA	10/5/2023	Red Fox	*Vulpes vulpes*			2505-2507
808	4	100MEDIA	23/09/2023-26/09/2023	Cow	*Bos taurus*			0136-0153
808	4	100MEDIA	9/30/2023	Cow	*Bos taurus*			0220-0252
808	4	100MEDIA	10/6/2023	Cow	*Bos taurus*			0286-0306
808	4	100MEDIA	10/13/2023	Cow	*Bos taurus*			0394-0420
808	4	100MEDIA	9/23/2023	Cow	*Bos taurus*			0124-0129
808	4	100MEDIA	10/10/2023	Cow	*Bos taurus*			0379-0384
808	4	100MEDIA	10/11/2023	Cow	*Bos taurus*			0385-0390
808	4	100MEDIA	10/16/2023	Cow	*Bos taurus*			0466-0468
808	4	100MEDIA	10/23/2023	Cow	*Bos taurus*			898-903
808	4	100MEDIA	10/19/2023	Calf	*Bos taurus*			0586-0891
808	4	100MEDIA	9/29/2023	Calf	*Bos taurus*			0184-0189
808	4	100MEDIA	10/8/2023	Currawong sp.	*Corvus sp.*			0376-0378
808	4	100MEDIA	10/12/2023	Currawong sp.	*Corvus sp.*			391

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
808	4	100MEDIA	10/24/2023	Raven	*Corvus sp.*			955-957
808	4	100MEDIA	9/26/2023	Unknown Kangaroo sp.	*Unknown*			0154-0156
808	4	100MEDIA	9/27/2023	Unknown Kangaroo sp.	*Unknown*			0157-0159
808	4	100MEDIA	9/28/2023	Unknown Kangaroo sp.	*Unknown*			0160-0165
808	4	100MEDIA	10/1/2023	Unknown Kangaroo sp.	*Unknown*			0262-0263
808	4	100MEDIA	10/6/2023	Unknown Kangaroo sp.	*Unknown*			0303-0312
808	4	100MEDIA	10/7/2023	Unknown Kangaroo sp.	*Unknown*			0313-0336
808	4	100MEDIA	10/14/2023	Unknown Kangaroo sp.	*Unknown*			0424-0425
808	4	100MEDIA	10/15/2023	Unknown Kangaroo sp.	*Unknown*			0451-0465
808	4	100MEDIA	17/10/2023-19/10/2023	Unknown Kangaroo sp.	*Unknown*			472-585
808	4	100MEDIA	9/23/2023	Unknown Kangaroo sp.	*Unknown*			0115-0116
808	4	100MEDIA	9/24/2023	Unknown Kangaroo sp.	*Unknown*			118
808	4	100MEDIA	9/25/2023	Unknown Kangaroo sp.	*Unknown*			0121-0122
808	4	100MEDIA	9/23/2023	Unknown Kangaroo sp.	*Unknown*			133
808	4	100MEDIA	9/28/2023	Unknown Kangaroo sp.	*Unknown*			0172-0177
808	4	100MEDIA	9/30/2023	Unknown Kangaroo sp.	*Unknown*			0259-0261
808	4	100MEDIA	10/5/2023	Unknown Kangaroo sp.	*Unknown*			280
808	4	100MEDIA	10/23/2023	Unknown Kangaroo sp.	*Unknown*			925-939
808	4	100MEDIA	10/24/2023	Unknown Kangaroo sp.	*Unknown*			940-954
808	4	100MEDIA	10/8/2023	Unknown Wallaby sp.	*Unknown*			0367-0372

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
808	4	100MEDIA	10/7/2023	Unknown Wallaby sp.	*Unknown*			0337-0339
808	4	100MEDIA	9/29/2023	Sheep	*Ovis aries*			0190-0216
808	4	100MEDIA	10/14/2023	Sheep	*Ovis aries*			0430-0450
808	4	100MEDIA	10/23/2023	Sheep	*Ovis aries*			904-924
808	4	100MEDIA	10/7/2023	Unknown	*Unknown*			346
808	4	100MEDIA	10/22/2023	Unknown Possum sp.	*Unknown*			895
808	4	100MEDIA	10/7/2023	Unknown Possum sp.	*Unknown*			0351-0359
808	4	100MEDIA	9/29/2023	Red Fox	*Vulpes vulpes*			0217-0218
808	4	100MEDIA	10/2/2023	Red Fox	*Vulpes vulpes*			0265-0266
808	4	100MEDIA	10/2/2023	Red Fox	*Vulpes vulpes*			628
808	4	100MEDIA	10/2/2023	Red Fox	*Vulpes vulpes*			0271-0274
808	4	100MEDIA	10/5/2023	Red Fox	*Vulpes vulpes*			0283-0284
808	4	100MEDIA	10/7/2023	Red Fox	*Vulpes vulpes*			0340-0344
808	4	100MEDIA	10/7/2023	Red Fox	*Vulpes vulpes*			0361-0366
808	4	100MEDIA	10/16/2023	Red Fox	*Vulpes vulpes*			469
809	4	100MEDIA	9/29/2023	Cow	*Bos taurus*			2049-2077
809	4	100MEDIA	9/30/2023	Cow	*Bos taurus*			2109-2114
809	4	100MEDIA	10/6/2023	Cow	*Bos taurus*			2247-02249
809	4	100MEDIA	10/11/2023	Cow	*Bos taurus*			2577-2579
809	4	100MEDIA	10/17/2023	Cow	*Bos taurus*			3234-3247
809	4	100MEDIA	10/18/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3625-3653

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
809	4	100MEDIA	10/19/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3657-3686
809	4	100MEDIA	10/8/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2415-2417
809	4	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3180-3232
809	4	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3597-3609
809	4	100MEDIA	9/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1881-1894
809	4	100MEDIA	9/26/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1932-1973
809	4	100MEDIA	9/27/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2013-2015
809	4	100MEDIA	10/1/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2152-2168
809	4	100MEDIA	10/1/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2178-2183
809	4	100MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2250-2258
809	4	100MEDIA	9/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1821-1857
809	4	100MEDIA	9/26/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1917-1928
809	4	100MEDIA	9/28/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2046-2048
809	4	100MEDIA	9/30/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2137-2146
809	4	100MEDIA	10/5/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2229-2230
809	4	100MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2277
809	4	100MEDIA	10/7/2023	Unknown Wallaby sp.	*Unknown*			2341
809	4	100MEDIA	9/29/2023	Sheep	*Ovis aries*			2097-2105
809	4	100MEDIA	9/30/2023	Sheep	*Ovis aries*			2133-2135
809	4	100MEDIA	10/6/2023	Sheep	*Ovis aries*			2328-2330
809	4	100MEDIA	10/14/2023	Sheep	*Ovis aries*			2928-2938

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
809	4	100MEDIA	10/1/2023	Red Fox	*Vulpes vulpes*			2148
809	4	100MEDIA	10/3/2023	Red Fox	*Vulpes vulpes*			2208-2216
809	4	100MEDIA	10/5/2023	Red Fox	*Vulpes vulpes*			2241 and 2244-2245
809	4	100MEDIA	10/6/2023	Red Fox	*Vulpes vulpes*			2331-2335
809	4	100MEDIA	10/6/2023	Red Fox	*Vulpes vulpes*			2337-2339
809	4	100MEDIA	10/8/2023	Red Fox	*Vulpes vulpes*			2412-2414
809	4	100MEDIA	10/16/2023	Red Fox	*Vulpes vulpes*			3174-3179
809	4	100MEDIA	10/21/2023	Red Fox	*Vulpes vulpes*			4233-4235
809	4	100MEDIA	10/7/2023	Swamp Wallaby	*Wallabia bicolor*			2343-2378
809	4	100MEDIA	10/21/2023	Swamp Wallaby	*Wallabia bicolor*			4074-4084
809	4	100MEDIA	10/21/2023	Swamp Wallaby	*Wallabia bicolor*			4086-4088
812	5	100MEDIA	9/22/2023	Feral Cat	*Felis catus*			1274-1284
812	5	100MEDIA	10/9/2023	Feral Cat	*Felis catus*			4889-4902
812	5	100MEDIA	10/20/2023	Eastern Grey Kangaroo	*Macropus giganteus*			7877-7886
812	5	100MEDIA	9/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1331-1356
812	5	100MEDIA	9/25/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1427-1441
812	5	100MEDIA	9/28/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2054
812	5	100MEDIA	10/2/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2480-2488
812	5	100MEDIA	10/4/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3224
812	5	100MEDIA	10/5/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3782-3784

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
812	5	100MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4484
812	5	100MEDIA	10/7/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4766-4801
812	5	100MEDIA	10/9/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4868-4882
812	5	100MEDIA	10/9/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5051-5063
812	5	100MEDIA	10/11/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5234-5243
812	5	100MEDIA	10/12/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5399
812	5	100MEDIA	10/13/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5411-5412
812	5	100MEDIA	10/14/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5514-5516
812	5	100MEDIA	10/15/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5690-5729
812	5	100MEDIA	10/15/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5783-5794
812	5	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6213-6214
812	5	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			7457
812	5	100MEDIA	10/19/2023	Eastern Grey Kangaroo	*Macropus giganteus*			7730-7734
812	5	100MEDIA	9/27/2023	Red-necked Wallaby	*Macropus rufogriseus*			2012-2014
812	5	100MEDIA	9/28/2023	Red-necked Wallaby	*Macropus rufogriseus*			2021
812	5	100MEDIA	10/5/2023	Red-necked Wallaby	*Macropus rufogriseus*			4154-4159
812	5	100MEDIA	10/15/2023	Red-necked Wallaby	*Macropus rufogriseus*			5798-5800
812	5	100MEDIA	10/18/2023	Red-necked Wallaby	*Macropus rufogriseus*			7517-7579
812	5	100MEDIA	10/21/2023	Red-necked Wallaby	*Macropus rufogriseus*			7889-7892
812	5	100MEDIA	10/23/2023	Red-necked Wallaby	*Macropus rufogriseus*			8405-8413
812	5	100MEDIA	9/25/2023	Red-necked Wallaby Juvenile	*Macropus rufogriseus*			1532-1534

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
812	5	100MEDIA	9/23/2023	European Rabbit	*Oryctolagus cuniculus*			1346-1366
812	5	100MEDIA	9/30/2023	European Rabbit	*Oryctolagus cuniculus*			2261-2275
812	5	100MEDIA	10/1/2023	European Rabbit	*Oryctolagus cuniculus*			2354-2362
812	5	100MEDIA	10/4/2023	European Rabbit	*Oryctolagus cuniculus*			3758
812	5	100MEDIA	10/8/2023	European Rabbit	*Oryctolagus cuniculus*			4808-4818
812	5	100MEDIA	10/12/2023	European Rabbit	*Oryctolagus cuniculus*			5402-5470
812	5	100MEDIA	10/19/2023	European Rabbit	*Oryctolagus cuniculus*			7583-7589
812	5	100MEDIA	10/21/2023	European Rabbit	*Oryctolagus cuniculus*			7898-7900
812	5	100MEDIA	10/22/2023	European Rabbit	*Oryctolagus cuniculus*			8045-8047
812	5	100MEDIA	10/23/2023	European Rabbit	*Oryctolagus cuniculus*			8249-8251
812	5	100MEDIA	10/12/2023	Flame Robin	*Petroica phoenicea*	V		5393
812	5	100MEDIA	10/16/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			6197-6199
812	5	100MEDIA	9/29/2023	Red Fox	*Vulpes vulpes*			2246-2254
812	5	100MEDIA	9/22/2023	Swamp Wallaby	*Wallabia bicolor*			1286-1319
812	5	100MEDIA	10/7/2023	Swamp Wallaby	*Wallabia bicolor*			4493
812	5	100MEDIA	10/13/2023	Swamp Wallaby	*Wallabia bicolor*			5504
812	5	100MEDIA	10/14/2023	Swamp Wallaby	*Wallabia bicolor*			5648-5674
812	5	100MEDIA	9/22/2023	Long-nosed Potoroo	*Potorous tridactylus*	V	V	1322-1326
815	5	101MEDIA	10/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5528-5614
815	5	100MEDIA	9/30/2023	Red-necked Wallaby	*Macropus rufogriseus*			5195-5206
815	5	100MEDIA	10/13/2023	Red-necked Wallaby	*Macropus rufogriseus*			9932-9937

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
815	5	100MEDIA	9/22/2023	Unknown Kangaroo sp.	*Unknown*			1836-1841
815	5	100MEDIA	9/26/2023	Unknown Kangaroo sp.	*Unknown*			2648-2692
815	5	100MEDIA	9/27/2023	Unknown Kangaroo sp.	*Unknown*			3068
815	5	100MEDIA	9/28/2023	Unknown Kangaroo sp.	*Unknown*			4292-4321
815	5	100MEDIA	9/30/2023	Unknown Kangaroo sp.	*Unknown*			5207-5273
815	5	100MEDIA	10/3/2023	Unknown Kangaroo sp.	*Unknown*			6281-6283
815	5	100MEDIA	10/7/2023	Unknown Kangaroo sp.	*Unknown*			8168
815	5	100MEDIA	10/8/2023	Unknown Kangaroo sp.	*Unknown*			8177-8179
815	5	100MEDIA	10/8/2023	Unknown Kangaroo sp.	*Unknown*			8186-8187
815	5	100MEDIA	10/9/2023	Unknown Kangaroo sp.	*Unknown*			8315-8316
815	5	100MEDIA	10/10/2023	Unknown Kangaroo sp.	*Unknown*			8429
815	5	100MEDIA	10/10/2023	Unknown Kangaroo sp.	*Unknown*			8432-8440
815	5	100MEDIA	10/12/2023	Unknown Kangaroo sp.	*Unknown*			8693-8698
815	5	100MEDIA	10/14/2023	Unknown Kangaroo sp.	*Unknown*			9947
815	5	101MEDIA	10/20/2023	Unknown Kangaroo sp.	*Unknown*			4079
815	5	101MEDIA	10/21/2023	Unknown Kangaroo sp.	*Unknown*			4247-4249
815	5	101MEDIA	10/21/2023	Unknown Kangaroo sp.	*Unknown*			4330-4447
815	5	101MEDIA	10/21/2023	Unknown Kangaroo sp.	*Unknown*			4553-4559
815	5	100MEDIA	9/25/2023	Unknown Wallaby sp.	*Unknown*			2637-2647
815	5	100MEDIA	9/27/2023	Unknown Wallaby sp.	*Unknown*			3034-3064
815	5	100MEDIA	9/27/2023	Unknown Wallaby sp.	*Unknown*			4208-4288

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
815	5	100MEDIA	9/29/2023	Unknown Wallaby sp.	*Unknown*			5159-5191
815	5	100MEDIA	10/6/2023	Unknown Wallaby sp.	*Unknown*			8108-8132
815	5	100MEDIA	10/14/2023	Unknown Wallaby sp.	*Unknown*			9938-9946
815	5	101MEDIA	10/15/2023	Unknown Wallaby sp.	*Unknown*			1751-1753
815	5	101MEDIA	10/16/2023	Unknown Wallaby sp.	*Unknown*			1766-1771
815	5	101MEDIA	10/17/2023	Unknown Wallaby sp.	*Unknown*			3929-3947
815	5	101MEDIA	10/18/2023	Unknown Wallaby sp.	*Unknown*			3968-4015
815	5	100MEDIA	9/22/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1883-1896
815	5	100MEDIA	10/10/2023	Common Brushtail Possum	*Trichosurus vulpecula*			8447-8473
815	5	100MEDIA	10/11/2023	Common Brushtail Possum	*Trichosurus vulpecula*			8540-8557
815	5	100MEDIA	10/2/2023	Common Brushtail Possum	*Trichosurus vulpecula*			5774-5789
815	5	100MEDIA	9/28/2023	Unknown Bird sp.	*Unknown*			4374
815	5	100MEDIA	9/28/2023	Unknown Bird sp.	*Unknown*			4402
815	5	101MEDIA	10/15/2023	Unknown Bird sp.	*Unknown*			1637
815	5	101MEDIA	10/14/2023	Unknown Marsupial	*Unknown*			866-874
815	5	101MEDIA	10/20/2023	Unknown Marsupial	*Unknown*			4118-4120
815	5	101MEDIA	10/22/2023	Unknown Marsupial	*Unknown*			4604
1838	1	100MEDIA	9/23/2023	Feral Cat	*Felis catus*			555-568
1838	1	100MEDIA	10/4/2023	Australian Magpie	*Gymnorhina tibicen*			1491-1492
1838	1	100MEDIA	10/5/2023	Australian Magpie	*Gymnorhina tibicen*			1506
1838	1	100MEDIA	10/3/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1059-1064

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1838	1	100MEDIA	10/3/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1401-1409
1838	1	100MEDIA	10/11/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1821
1838	1	100MEDIA	10/14/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2139-2144
1838	1	100MEDIA	10/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2829-2863
1838	1	100MEDIA	10/2/2023	Common Wallaroo	*Macropus robustus*			1035
1838	1	100MEDIA	10/4/2023	Common Wallaroo	*Macropus robustus*			1497-1502
1838	1	100MEDIA	10/12/2023	Common Wallaroo	*Macropus robustus*			1929-1937
1838	1	100MEDIA	9/20/2023	Red-necked Wallaby	*Macropus rufogriseus*			417-441
1838	1	100MEDIA	9/24/2023	Red-necked Wallaby	*Macropus rufogriseus*			570-575
1838	1	100MEDIA	9/25/2023	Red-necked Wallaby	*Macropus rufogriseus*			609-636
1838	1	100MEDIA	9/26/2023	Red-necked Wallaby	*Macropus rufogriseus*			644
1838	1	100MEDIA	10/9/2023	Red-necked Wallaby	*Macropus rufogriseus*			1710-1718
1838	1	100MEDIA	10/11/2023	Red-necked Wallaby	*Macropus rufogriseus*			1854-1859
1838	1	100MEDIA	10/12/2023	Red-necked Wallaby	*Macropus rufogriseus*			1881-1907
1838	1	100MEDIA	10/12/2023	Red-necked Wallaby	*Macropus rufogriseus*			1984-2018
1838	1	100MEDIA	10/18/2023	Red-necked Wallaby	*Macropus rufogriseus*			2520-2535
1838	1	100MEDIA	10/20/2023	Red-necked Wallaby	*Macropus rufogriseus*			2601- 2604
1838	1	100MEDIA	10/21/2023	Red-necked Wallaby	*Macropus rufogriseus*			2646-2651
1838	1	100MEDIA	10/22/2023	Red-necked Wallaby	*Macropus rufogriseus*			2682
1838	1	100MEDIA	10/23/2023	Red-necked Wallaby	*Macropus rufogriseus*			2802-2804
1838	1	100MEDIA	10/23/2023	Red-necked Wallaby	*Macropus rufogriseus*			2949-2960

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1838	1	100MEDIA	10/3/2023	Red-necked Wallaby Juvenile	*Macropus rufogriseus*			1050
1838	1	100MEDIA	10/14/2023	Unknown Wallaby sp.	*Unknown*			2220-2234
1838	1	100MEDIA	10/17/2023	European Rabbit	*Oryctolagus cuniculus*			2448-2459
1838	1	100MEDIA	10/18/2023	European Rabbit	*Oryctolagus cuniculus*			2547- 2549
1838	1	100MEDIA	10/20/2023	European Rabbit	*Oryctolagus cuniculus*			2607-2609
1838	1	100MEDIA	10/22/2023	European Rabbit	*Oryctolagus cuniculus*			2790-2798
1838	1	100MEDIA	10/23/2023	European Rabbit	*Oryctolagus cuniculus*			2913-2939
1838	1	100MEDIA	10/13/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			2040-2042
1838	1	100MEDIA	9/22/2023	Common Brushtail Possum	*Trichosurus vulpecula*			543-554
1838	1	100MEDIA	9/24/2023	Common Brushtail Possum	*Trichosurus vulpecula*			585-587
1838	1	100MEDIA	9/27/2023	Common Brushtail Possum	*Trichosurus vulpecula*			696-704
1838	1	100MEDIA	9/27/2023	Common Brushtail Possum	*Trichosurus vulpecula*			723-725
1838	1	100MEDIA	10/3/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1425-1490
1838	1	100MEDIA	10/6/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1602-1622
1838	1	100MEDIA	10/10/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1767-1787
1838	1	100MEDIA	10/11/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1809-1820
1838	1	100MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			2211-2218
1838	1	100MEDIA	10/20/2023	Common Brushtail Possum	*Trichosurus vulpecula*			2583-2585
1838	1	100MEDIA	10/22/2023	Common Brushtail Possum	*Trichosurus vulpecula*			2652-2673
1838	1	100MEDIA	10/6/2023	Red Fox	*Vulpes vulpes*			1575-1577
1838	1	100MEDIA	9/21/2023	Swamp Wallaby	*Wallabia bicolor*			447-466

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1838	1	100MEDIA	9/30/2023	Swamp Wallaby	*Wallabia bicolor*			804-887
1838	1	100MEDIA	10/1/2023	Swamp Wallaby	*Wallabia bicolor*			921-1016
1838	1	100MEDIA	10/3/2023	Swamp Wallaby	*Wallabia bicolor*			1065-1395
1838	1	100MEDIA	10/11/2023	Swamp Wallaby	*Wallabia bicolor*			1842-1850
1838	1	100MEDIA	10/12/2023	Swamp Wallaby	*Wallabia bicolor*			1872-1875
1838	1	100MEDIA	10/12/2023	Swamp Wallaby	*Wallabia bicolor*			1939-1981
1838	1	100MEDIA	10/12/2023	Swamp Wallaby	*Wallabia bicolor*			2034-2039
1838	1	100MEDIA	10/22/2023	Swamp Wallaby	*Wallabia bicolor*			2697-2747
1838	1	100MEDIA	10/23/2023	Swamp Wallaby	*Wallabia bicolor*			2805-2828
1839	3	100MEDIA	9/22/2023	Cow	*Bos taurus*			1930-1960
1839	3	100MEDIA	9/25/2023	Cow	*Bos taurus*			2153-2173
1839	3	100MEDIA	9/26/2023	Feral Cat	*Felis catus*			2201-2215
1839	3	101MEDIA	10/20/2023	Feral Cat	*Felis catus*			671-673
1839	3	101MEDIA	10/23/2023	Australian Magpie	*Gymnorhina tibicen*			3626-3649
1839	3	100MEDIA	9/21/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1901-1902
1839	3	100MEDIA	9/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1961
1839	3	100MEDIA	9/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1980-2051
1839	3	100MEDIA	9/24/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2063-2096
1839	3	100MEDIA	9/24/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2108-2135
1839	3	100MEDIA	9/25/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2138-2143
1839	3	100MEDIA	9/26/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2216-2218

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1839	3	100MEDIA	9/26/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2244-2275
1839	3	100MEDIA	9/27/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3281-3286
1839	3	100MEDIA	9/28/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3296-3328
1839	3	100MEDIA	9/30/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3479-3529
1839	3	100MEDIA	9/30/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3542-3566
1839	3	100MEDIA	10/3/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4922-4927
1839	3	100MEDIA	10/5/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4952
1839	3	100MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			987
1839	3	100MEDIA	10/7/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5999-6013
1839	3	100MEDIA	10/8/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6017-6019
1839	3	100MEDIA	10/9/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6056-6094
1839	3	100MEDIA	10/10/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6272
1839	3	100MEDIA	10/10/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6290-6322
1839	3	100MEDIA	10/13/2023	Eastern Grey Kangaroo	*Macropus giganteus*			7811-7819
1839	3	101MEDIA	10/16/2023	Eastern Grey Kangaroo	*Macropus giganteus*			464
1839	3	101MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			479-481
1839	3	101MEDIA	10/18/2023	Eastern Grey Kangaroo	*Macropus giganteus*			482-489
1839	3	101MEDIA	10/19/2023	Eastern Grey Kangaroo	*Macropus giganteus*			506-536
1839	3	101MEDIA	10/21/2023	Eastern Grey Kangaroo	*Macropus giganteus*			674-677
1839	3	101MEDIA	10/21/2023	Eastern Grey Kangaroo	*Macropus giganteus*			998-1016
1839	3	101MEDIA	10/22/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1022-1024

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1839	3	101MEDIA	10/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2747-2749
1839	3	101MEDIA	10/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			42864306
1839	3	101MEDIA	10/20/2023	Eastern Grey Kangaroo with Juvenile	*Macropus giganteus*			542-551
1839	3	100MEDIA	9/29/2023	Swamp Wallaby	*Wallabia bicolor*			3455
1841	1	100MEDIA	9/23/2023	Feral Cat	*Felis catus*			415-420
1841	1	100MEDIA	9/20/2023	Eastern Grey Kangaroo	*Macropus giganteus*			294-300
1841	1	100MEDIA	9/30/2023	Eastern Grey Kangaroo	*Macropus giganteus*			952-966
1841	1	100MEDIA	10/2/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1054-1059
1841	1	100MEDIA	10/3/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1093-1095
1841	1	100MEDIA	10/16/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2716-2721
1841	1	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2725-2730
1841	1	100MEDIA	10/20/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3142-3144
1841	1	100MEDIA	10/22/2023	Eastern Grey Kangaroo	*Macropus giganteus*			3394-3400
1841	1	100MEDIA	9/25/2023	Red-necked Wallaby	*Macropus rufogriseus*			469-474
1841	1	100MEDIA	9/26/2023	Red-necked Wallaby	*Macropus rufogriseus*			592-600
1841	1	100MEDIA	9/30/2023	Red-necked Wallaby	*Macropus rufogriseus*			871-897
1841	1	100MEDIA	10/2/2023	Red-necked Wallaby	*Macropus rufogriseus*			1030-1051
1841	1	100MEDIA	10/4/2023	Red-necked Wallaby	*Macropus rufogriseus*			1198-1224
1841	1	100MEDIA	10/9/2023	Red-necked Wallaby	*Macropus rufogriseus*			1462-1470
1841	1	100MEDIA	10/12/2023	Red-necked Wallaby	*Macropus rufogriseus*			1606-1642
1841	1	100MEDIA	10/12/2023	Red-necked Wallaby	*Macropus rufogriseus*			1792-1818

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1841	1	100MEDIA	10/12/2023	Red-necked Wallaby	*Macropus rufogriseus*			1826-1827
1841	1	100MEDIA	10/14/2023	Red-necked Wallaby	*Macropus rufogriseus*			2071-2085
1841	1	100MEDIA	10/15/2023	Red-necked Wallaby	*Macropus rufogriseus*			2287
1841	1	100MEDIA	10/16/2023	Red-necked Wallaby	*Macropus rufogriseus*			2427-2482
1841	1	100MEDIA	10/18/2023	Red-necked Wallaby	*Macropus rufogriseus*			2932-2935
1841	1	100MEDIA	10/20/2023	Red-necked Wallaby	*Macropus rufogriseus*			3082-3129
1841	1	100MEDIA	10/20/2023	Red-necked Wallaby	*Macropus rufogriseus*			3151-3156
1841	1	100MEDIA	10/21/2023	Red-necked Wallaby	*Macropus rufogriseus*			3247-3271
1841	1	100MEDIA	10/21/2023	Red-necked Wallaby	*Macropus rufogriseus*			3277-3288
1841	1	100MEDIA	10/22/2023	Red-necked Wallaby	*Macropus rufogriseus*			3418-3453
1841	1	100MEDIA	10/22/2023	Red-necked Wallaby	*Macropus rufogriseus*			3478
1841	1	100MEDIA	10/22/2023	Red-necked Wallaby	*Macropus rufogriseus*			3625-3636
1841	1	100MEDIA	10/23/2023	Red-necked Wallaby	*Macropus rufogriseus*			3655-3735
1841	1	100MEDIA	10/24/2023	Red-necked Wallaby	*Macropus rufogriseus*			3922
1841	1	100MEDIA	9/23/2023	Unknown Wallaby sp.	*Unknown*			439
1841	1	100MEDIA	10/18/2023	European Rabbit	*Oryctolagus cuniculus*			2926-2928
1841	1	100MEDIA	10/19/2023	European Rabbit	*Oryctolagus cuniculus*			2947
1841	1	100MEDIA	10/19/2023	European Rabbit	*Oryctolagus cuniculus*			3079-3081
1841	1	100MEDIA	10/20/2023	European Rabbit	*Oryctolagus cuniculus*			3223
1841	1	100MEDIA	9/22/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			409-411
1841	1	100MEDIA	9/21/2023	Common Brushtail Possum	*Trichosurus vulpecula*			304-306

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1841	1	100MEDIA	9/24/2023	Common Brushtail Possum	*Trichosurus vulpecula*			466
1841	1	100MEDIA	9/26/2023	Common Brushtail Possum	*Trichosurus vulpecula*			562-564
1841	1	100MEDIA	9/30/2023	Common Brushtail Possum	*Trichosurus vulpecula*			865-869
1841	1	100MEDIA	10/1/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1024-1029
1841	1	100MEDIA	10/2/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1087-1089
1841	1	100MEDIA	10/6/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1366-1368
1841	1	100MEDIA	10/7/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1402-1404
1841	1	100MEDIA	10/9/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1531
1841	1	100MEDIA	10/13/2023	Common Brushtail Possum	*Trichosurus vulpecula*			2059-2063
1841	1	100MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			2281-2286
1841	1	100MEDIA	10/21/2023	Common Brushtail Possum	*Trichosurus vulpecula*			3388-3390
1841	1	100MEDIA	10/23/2023	Common Brushtail Possum	*Trichosurus vulpecula*			3646-3649
1841	1	100MEDIA	10/23/2023	Common Brushtail Possum	*Trichosurus vulpecula*			3910-3918
1841	1	100MEDIA	10/17/2023	Unknown	*Unknown*			2722
1841	1	100MEDIA	9/28/2023	Red Fox	*Vulpes vulpes*			820-821
1841	1	100MEDIA	9/21/2023	Swamp Wallaby	*Wallabia bicolor*			307-340
1841	1	100MEDIA	9/25/2023	Swamp Wallaby	*Wallabia bicolor*			475-532
1841	1	100MEDIA	9/27/2023	Swamp Wallaby	*Wallabia bicolor*			748-771
1841	1	100MEDIA	10/1/2023	Swamp Wallaby	*Wallabia bicolor*			976-1014
1841	1	100MEDIA	10/2/2023	Swamp Wallaby	*Wallabia bicolor*			1084
1841	1	100MEDIA	10/12/2023	Swamp Wallaby	*Wallabia bicolor*			1661

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1841	1	100MEDIA	10/12/2023	Swamp Wallaby	*Wallabia bicolor*			1723-1781
1841	1	100MEDIA	10/12/2023	Swamp Wallaby	*Wallabia bicolor*			1831-1847
1841	1	100MEDIA	10/21/2023	Swamp Wallaby	*Wallabia bicolor*			3226-3243
1843	3	100MEDIA	10/5/2023	Crow	*Corvus sp.*			5179-5181
1843	3	101MEDIA	10/20/2023	Australian Magpie	*Gymnorhina tibicen*			1249-1251
1843	3	100MEDIA	9/25/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1858-1938
1843	3	100MEDIA	9/24/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1831-1842
1843	3	100MEDIA	9/26/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1966-2031
1843	3	100MEDIA	9/30/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2083-2127
1843	3	100MEDIA	9/30/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2137-2141
1843	3	100MEDIA	10/1/2023	Eastern Grey Kangaroo	*Macropus giganteus*			2251-2253
1843	3	100MEDIA	10/3/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4393-4398
1843	3	100MEDIA	10/4/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5142
1843	3	100MEDIA	10/4/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5167
1843	3	100MEDIA	10/10/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6034-6047
1843	3	100MEDIA	10/12/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6112-6169
1843	3	100MEDIA	10/14/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6739-6755
1843	3	100MEDIA	10/14/2023	Eastern Grey Kangaroo	*Macropus giganteus*			6760-6764
1843	3	100MEDIA	10/16/2023	Eastern Grey Kangaroo	*Macropus giganteus*			7069-7081
1843	3	101MEDIA	10/18/2023	Eastern Grey Kangaroo	*Macropus giganteus*			977-988
1843	3	101MEDIA	10/19/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1186-1189

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1843	3	101MEDIA	10/22/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1600-1621
1843	3	100MEDIA	10/3/2023	Red-necked Wallaby	*Macropus rufogriseus*			2314-2334
1843	3	100MEDIA	9/24/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1843-1855
1843	3	100MEDIA	9/26/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1945-1951
1844	1	100MEDIA	9/22/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1441-1458
1844	1	100MEDIA	10/4/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4663-4674
1844	1	100MEDIA	10/5/2023	Eastern Grey Kangaroo	*Macropus giganteus*			4678-4686
1844	1	100MEDIA	10/6/2023	Eastern Grey Kangaroo	*Macropus giganteus*			5069
1844	1	100MEDIA	10/13/2023	Eastern Grey Kangaroo	*Macropus giganteus*			7579-7586
1844	1	101MEDIA	10/15/2023	Eastern Grey Kangaroo	*Macropus giganteus*			781-815
1844	1	100MEDIA	9/21/2023	Red-necked Wallaby	*Macropus rufogriseus*			1258-1299
1844	1	100MEDIA	9/26/2023	Red-necked Wallaby	*Macropus rufogriseus*			2077-2109
1844	1	100MEDIA	9/27/2023	Red-necked Wallaby	*Macropus rufogriseus*			2326-2352
1844	1	100MEDIA	9/29/2023	Red-necked Wallaby	*Macropus rufogriseus*			2692-2698
1844	1	100MEDIA	9/30/2023	Red-necked Wallaby	*Macropus rufogriseus*			2908
1844	1	100MEDIA	10/2/2023	Red-necked Wallaby	*Macropus rufogriseus*			3358-3360
1844	1	100MEDIA	10/2/2023	Red-necked Wallaby	*Macropus rufogriseus*			3376-3390
1844	1	100MEDIA	10/10/2023	Red-necked Wallaby	*Macropus rufogriseus*			6469-6493
1844	1	100MEDIA	10/11/2023	Red-necked Wallaby	*Macropus rufogriseus*			6502-6513
1844	1	100MEDIA	10/11/2023	Red-necked Wallaby	*Macropus rufogriseus*			6916-6933
1844	1	100MEDIA	10/15/2023	Red-necked Wallaby	*Macropus rufogriseus*			9715-9717

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1844	1	100MEDIA	10/1/2023	Red-necked Wallaby Juvenile	*Macropus rufogriseus*			2914-2919
1844	1	100MEDIA	9/22/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			1654-1659
1844	1	100MEDIA	10/9/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			6208-6210
1844	1	101MEDIA	10/15/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			778-780
1844	1	100MEDIA	9/22/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1438
1844	1	100MEDIA	9/23/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1837-1839
1844	1	101MEDIA	10/19/2023	Common Brushtail Possum	*Trichosurus vulpecula*			4363-46364
1844	1	100MEDIA	9/25/2023	Swamp Wallaby	*Wallabia bicolor*			1933-1939
1844	1	100MEDIA	9/29/2023	Swamp Wallaby	*Wallabia bicolor*			2809-2820
1844	1	100MEDIA	10/12/2023	Swamp Wallaby	*Wallabia bicolor*			7567-7573
1846	2	100MEDIA	10/1/2023	Antechinus sp.	*Antechinus sp.*			265-267
1846	2	100MEDIA	10/20/2023	Fallow Deer	*Dama dama*			1117-1129
1846	2	100MEDIA	10/2/2023	Eastern Grey Kangaroo	*Macropus giganteus*			277-288
1846	2	100MEDIA	10/3/2023	Eastern Grey Kangaroo	*Macropus giganteus*			304
1846	2	100MEDIA	10/13/2023	Eastern Grey Kangaroo	*Macropus giganteus*			568-590
1846	2	100MEDIA	10/10/2023	Common Wallaroo	*Macropus robustus*			496-505
1846	2	100MEDIA	10/12/2023	Common Wallaroo	*Macropus robustus*			565-567
1846	2	100MEDIA	9/23/2023	Common Brushtail Possum	*Trichosurus vulpecula*			142-144
1846	2	100MEDIA	9/26/2023	Common Brushtail Possum	*Trichosurus vulpecula*			148-153
1846	2	100MEDIA	10/4/2023	Common Brushtail Possum	*Trichosurus vulpecula*			307-309
1846	2	100MEDIA	10/15/2023	Common Brushtail Possum	*Trichosurus vulpecula*			673-678

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1846	2	100MEDIA	10/19/2023	Common Brushtail Possum	*Trichosurus vulpecula*			955-957
1846	2	100MEDIA	10/22/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1315-1338
1846	2	100MEDIA	9/30/2023	Unknown	*Unknown*			223-225
1846	2	100MEDIA	10/1/2023	Swamp Wallaby	*Wallabia bicolor*			239-259
1846	2	100MEDIA	10/4/2023	Swamp Wallaby	*Wallabia bicolor*			331-336
1846	2	100MEDIA	10/6/2023	Mouse	*Mus musculus*			368-369
1846	2	100MEDIA	10/7/2023	Mouse	*Mus musculus*			418-420
1847	2	100MEDIA	9/25/2023	Fallow Deer	*Dama dama*			346-360
1847	2	100MEDIA	9/26/2023	Fallow Deer	*Dama dama*			388-393
1847	2	100MEDIA	10/13/2023	Fallow Deer	*Dama dama*			679-681
1847	2	100MEDIA	10/22/2023	Fallow Deer	*Dama dama*			1432
1847	2	100MEDIA	10/1/2023	Eastern Grey Kangaroo	*Macropus giganteus*			418-420
1847	2	100MEDIA	10/2/2023	Eastern Grey Kangaroo	*Macropus giganteus*			424-459
1847	2	100MEDIA	10/12/2023	Eastern Grey Kangaroo	*Macropus giganteus*			613-636
1847	2	100MEDIA	10/13/2023	Eastern Grey Kangaroo	*Macropus giganteus*			676
1847	2	100MEDIA	10/14/2023	Eastern Grey Kangaroo	*Macropus giganteus*			575
1847	2	100MEDIA	10/17/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1354-1356
1847	2	100MEDIA	10/20/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1375
1847	2	100MEDIA	9/23/2023	Common Wallaroo	*Macropus robustus*			298-306
1847	2	100MEDIA	9/25/2023	Common Wallaroo	*Macropus robustus*			364-380
1847	2	100MEDIA	9/26/2023	Common Wallaroo	*Macropus robustus*			385-387

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1847	2	100MEDIA	10/3/2023	Common Wallaroo	*Macropus robustus*			460
1847	2	100MEDIA	10/3/2023	Common Wallaroo	*Macropus robustus*			463-514
1847	2	100MEDIA	10/4/2023	Common Wallaroo	*Macropus robustus*			523-552
1847	2	100MEDIA	10/4/2023	Common Wallaroo	*Macropus robustus*			553-554
1847	2	100MEDIA	10/11/2023	Common Wallaroo	*Macropus robustus*			589-609
1847	2	100MEDIA	10/12/2023	Common Wallaroo	*Macropus robustus*			637-649
1847	2	100MEDIA	10/21/2023	Common Wallaroo	*Macropus robustus*			1396-1428
1847	2	100MEDIA	9/24/2023	Unknown	*Unknown*			310-344
1847	2	100MEDIA	9/21/2023	Swamp Wallaby	*Wallabia bicolor*			55-78
1849	2	100MEDIA	10/20/2023	Fallow Deer	*Dama dama*			473-502
1849	2	100MEDIA	10/3/2023	Fallow Deer	*Dama dama*			401
1849	2	100MEDIA	10/6/2023	Fallow Deer	*Dama dama*			
1849	2	100MEDIA	10/3/2023	Eastern Grey Kangaroo	*Macropus giganteus*			380-382
1849	2	100MEDIA	10/3/2023	Eastern Grey Kangaroo	*Macropus giganteus*			392-399
1849	2	100MEDIA	10/4/2023	Eastern Grey Kangaroo	*Macropus giganteus*			404-418
1849	2	100MEDIA	10/13/2023	Eastern Grey Kangaroo	*Macropus giganteus*			434-436
1849	2	100MEDIA	10/20/2023	Eastern Grey Kangaroo	*Macropus giganteus*			503- 505
1849	2	100MEDIA	9/23/2023	Eastern Grey Kangaroo with Juvenile	*Macropus giganteus*			286-322
1849	2	100MEDIA	9/26/2023	Feral Pig	*Sus scrofa*			347-350
1849	2	100MEDIA	10/2/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			372-373
1849	2	100MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			437-441

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1849	2	100MEDIA	10/23/2023	Common Brushtail Possum	*Trichosurus vulpecula*			536-538
1849	2	100MEDIA	9/27/2023	Unknown	*Unknown*			356-358
1849	2	100MEDIA	9/25/2023	Unknown	*Unknown*			326-334
1849	2	100MEDIA	10/1/2023	Unknown Possum sp.	*Unknown*			368
1849	2	100MEDIA	10/20/2023	Swamp Wallaby	*Wallabia bicolor*			473-502
1852	3	100MEDIA	9/23/2023	Cow	*Bos taurus*			358-503
1852	3	100MEDIA	9/25/2023	Cow	*Bos taurus*			580-655
1852	3	100MEDIA	9/24/2023	Currawong sp.	*Corvus sp.*			508-513
1852	3	100MEDIA	9/21/2023	Feral Cat	*Felis catus*			337-339
1852	3	100MEDIA	9/26/2023	Feral Cat	*Felis catus*			697-702
1852	3	100MEDIA	10/6/2023	Feral Cat	*Felis catus*			982-987
1852	3	100MEDIA	10/8/2023	Feral Cat	*Felis catus*			1003-1005
1852	3	100MEDIA	10/9/2023	Feral Cat	*Felis catus*			1057-1061
1852	3	100MEDIA	10/10/2023	Feral Cat	*Felis catus*			1180-1184
1852	3	100MEDIA	10/12/2023	Feral Cat	*Felis catus*			1282-1287
1852	3	100MEDIA	10/12/2023	Feral Cat	*Felis catus*			1291-1292
1852	3	100MEDIA	10/12/2023	Feral Cat	*Felis catus*			1297-1299
1852	3	100MEDIA	10/12/2023	Feral Cat	*Felis catus*			1297-1302
1852	3	100MEDIA	10/18/2023	Feral Cat	*Felis catus*			1411-1413
1852	3	100MEDIA	10/20/2023	Australian Magpie	*Gymnorhina tibicen*			1594-1608
1852	3	100MEDIA	10/22/2023	Australian Magpie	*Gymnorhina tibicen*			1639-1650

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1852	3	100MEDIA	9/23/2023	Eastern Grey Kangaroo	*Macropus giganteus*			505-507
1852	3	100MEDIA	9/24/2023	Eastern Grey Kangaroo	*Macropus giganteus*			538-571
1852	3	100MEDIA	9/25/2023	Eastern Grey Kangaroo	*Macropus giganteus*			574
1852	3	100MEDIA	9/26/2023	Eastern Grey Kangaroo	*Macropus giganteus*			712-723
1852	3	100MEDIA	9/28/2023	Eastern Grey Kangaroo	*Macropus giganteus*			742-780
1852	3	100MEDIA	9/29/2023	Eastern Grey Kangaroo	*Macropus giganteus*			796-826
1852	3	100MEDIA	10/1/2023	Eastern Grey Kangaroo	*Macropus giganteus*			844-867
1852	3	100MEDIA	10/8/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1030-1053
1852	3	100MEDIA	10/9/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1063-1138
1852	3	100MEDIA	10/9/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1153-1171
1852	3	100MEDIA	10/11/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1192-1196
1852	3	100MEDIA	10/11/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1219-1279
1852	3	100MEDIA	10/14/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1327-1332
1852	3	100MEDIA	10/18/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1414
1852	3	100MEDIA	10/18/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1417
1852	3	100MEDIA	10/19/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1423-1428
1852	3	100MEDIA	10/19/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1477-1575
1852	3	100MEDIA	10/21/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1615-1620
1852	3	100MEDIA	10/22/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1684
1852	3	100MEDIA	10/24/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1696-1701
1852	3	100MEDIA	10/24/2023	Eastern Grey Kangaroo	*Macropus giganteus*			1705-1728

Camera	Site	Folder	Date	Common Name	Species Name	BC Act Status	EPBC Act Status	Photo number
1852	3	100MEDIA	10/9/2023	Red-necked Wallaby	*Macropus rufogriseus*			1144-1152
1852	3	100MEDIA	9/25/2023	Crimson Rosella	*Platycercus elegans*			685-686
1852	3	100MEDIA	10/19/2023	Crimson Rosella	*Platycercus elegans*			1432-1449
1852	3	100MEDIA	9/26/2023	Tawny Frogmouth	*Podargus strigoides*			694-696
1852	3	100MEDIA	10/11/2023	Short-beaked Echidna	*Tachyglossus aculeatus*			1213-1218
1852	3	100MEDIA	9/28/2023	Common Brushtail Possum	*Trichosurus vulpecula*			730-732
1852	3	100MEDIA	10/8/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1000-1002
1852	3	100MEDIA	10/10/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1186-1188
1852	3	100MEDIA	10/11/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1198-1203
1852	3	100MEDIA	10/14/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1321-1323
1852	3	100MEDIA	10/20/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1576-1578
1852	3	100MEDIA	10/24/2023	Common Brushtail Possum	*Trichosurus vulpecula*			1702-1704
1852	3	100MEDIA	10/20/2023	Unknown Owl sp.	*Unknown*			1612-1614
1852	3	100MEDIA	10/19/2023	Common Wombat	*Vombatus ursinus*			1429-1431
1852	3	100MEDIA	10/3/2023	Swamp Wallaby	*Wallabia bicolor*			925-928



Prepared for ERM

Survey Technical Memo

Winterbourne Targeted Flora & BAM Plots Jan/Feb 2024

February 2024

Project Number: 230247

Document verification

Project Title:	Winterbourne Targeted Flora & BAM Plots Jan/Feb 2024
Project Number:	230247
Project File Name:	230247 Winterbourne Survey Memo Jan Targeted BAM Plots Final V1.0.docx

Revision	Date	Prepared by	Reviewed by	Approved by
Final	21/02/2024	J. Hagan, S. O'Dwyer Tom Fletcher	Bianca Heinze	Bianca Heinze
Final	19/9/2024	J.Lambert (no changes from draft version)		

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

Table of contents

1. Methods 1

1.1. BAM Plots 1

1.2. Targeted Threatened Flora Survey 1

1.2.1. Grid Point Method 1

1.2.2. Walking Transect Method 2

1.2.3. Targeted Species 2

1.3. Threatened Fauna Habitat Assessment 3

1.4. Effort 4

1.5. Weather conditions 5

1.6. Limitations 5

1.7. Survey team 6

2. Results 7

2.1. BAM Plots 7

2.1.1. Condition States & Vegetation Zones 7

2.1.2. Justification of PCT selection 7

2.1.3. Alignment with TECs 7

2.2. Targeted Threatened Flora Survey 8

2.3. Threatened Fauna Habitat Assessment 9

3. References 10

Tables

Table 1-1 Targeted flora species surveyed 2

Table 1-2 Threatened species surveys for candidate flora species on subject land 4

Table 1-3 Survey weather conditions 5

Table 1-1-4 - Survey Team 6

Table 2-1 PCTs determined from BAM Plots and associated TECs 7

Table 2-2 Threatened species targeted and their occurrence during survey 9

Acronyms and abbreviations

AWS	Automatic weather station
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BCD	Biodiversity and Conservation Division
BOM	Australian Bureau of Meteorology
CE	Critically endangered
Cwth	Commonwealth
E	Endangered
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
ha	hectares
km	kilometres
LGA	Local government area
m	metres
PCT	Plant Community Type
TEC	Threatened ecological community
V	Vulnerable

1. Methods

1.1. BAM Plots

The BAM plot survey effort was a combination of plots to determine whether land mapped as Category 1 (Cat 1) was Cat 1 land (leftover from December 2023 survey effort), and BAM Plots in areas of vegetation that were unable to be assigned a PCT based on rapid assessment data taken in December. The total BAM plot survey effort was 27: 7 plots were to determine PCT; 20 plots were to determine Cat 1 status.

BAM Plots were completed in teams of two, using the "BAM Plot" form in MerginMaps to record their completion and using a BAM Data Sheet to record the data.

1.2. Targeted Threatened Flora Survey

Targeted flora surveys were undertaken for the following eight threatened species:

- Austral Toadflax (*Thesium austral)*
- Bluegrass (*Dichanthium setosum)*
- Dungowan Starbush (*Asterolasia beckersii)* SAII species
- *Euphrasia arguta*
- Narrow-leaved Black Peppermint (*Eucalyptus nicholii)*
- Pygmy Cypress-pine (*Callitris oblonga)*
- Rainforest Senna (Senna acclinis)
- Small-fruited Mountain Gum (*Eucalyptus oresbia*)

Targeted flora surveys were conducted only in PCTs mapped within the development footprint that were associated to the threatened species listed above. These PCTs included:

- **PCT 565** - Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
- **PCT 568** - Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- **PCT 766** - Carex sedgeland of the slopes and tablelands
- **PCT 934** - Messmate open forest of the tableland edge of the NSW North Coast Bioregion and New England Tableland Bioregion
- **PCT 970** - Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

In alignment with the Threated Flora Survey Guidelines (2020), there were two survey methods used for targeted flora surveys. The grid point method was used in PCTs that occurred over more than 50ha across the site (PCT 565, 568, 766, 970). Walking transects were undertaken in PCTs that occurred over less than 50ha across the site (PCT 934).

1.2.1. Grid Point Method

Using QGIS, grid points were overlayed the project area in a 100x100m grid pattern. These grid points were clipped to the relevant PCTs that the threatened flora were associated with (listed above). Each grid point

was buffered by 20m creating a 40m diameter circle which was used as the survey area. There were a total of 204 grid points.

Surveys were completed in pairs, where parallel traverses were conducted within this circle at a separation distance of 10 metres, at the recommendation of the Biodiversity and Conservation Division (BCD) described in Section 1.2.3.

Within MerginMaps, completion of grid points was recorded with "Flora Fauna Survey Locations" point. Presence of a targeted threatened species was recorded depending on whether it was an area or count species (three count species & five area species were surveyed for). Area species were mapped to their full extent with "Threatened Flora Fauna Incidental Sightings Polygon", and count species were recorded with "Threatened Flora Fauna Incidental Sightings" points.

1.2.2. Walking Transect Method

PCT 934 was the only PCT on site that needed to be surveyed for threatened species with a total area less than 50ha. Within PCT 934, parallel transects were mapped 10m apart, totalling 854m of walking transects.

In a team of two, one transect line was walked once by each person at the recommendation of the Biodiversity and Conservation Division (BCD) described in Section 1.2.3.

1.2.3. Targeted Species

Surveying eight species simultaneously deviates from the recommendation of five species per search in Section 5.1 of NSW Survey Guidelines for threatened plants. After consulting with BCD, it was decided upon that the approach of individual observers being limited to searching for a maximum of five species in the same stratum per transect, e.g. five ground layer species only. This approach was implemented into the survey effort by having one person survey for ground/mid stratum and one person survey for canopy species at each grid point or walking transect. Table 1-1 below details the stratum of each targeted flora species, along with their associated PCTs and growth forms.

GIS data and results stored in the following folder. \\10.0.18.1\Active\Projects\2023\230247 Winterbourne BDAR amendments\Fieldwork\Results 2024 surveys\RAW MERGIN DATA do not delete

Table 1-1 Targeted flora species surveyed

PCT	Growth Form	Stratum	Species
565	Herbs and forbs	Ground	*Dichanthium setosum*
565	Herbs and forbs	Ground	*Euphrasia arguta*
565	Herbs and forbs	Ground	*Thesium australe*
568	Herbs and forbs	Ground	*Dichanthium setosum*
568	Herbs and forbs	Ground	*Euphrasia arguta*
568	Herbs and forbs	Ground	*Thesium australe*
766	Herbs and forbs	Ground	*Dichanthium setosum*

PCT	Growth Form	Stratum	Species
766	Herbs and forbs	Ground	*Euphrasia arguta*
766	Herbs and forbs	Ground	*Thesium australe*
766	Shrub	Mid	*Callitris oblonga*
766	Tree	Canopy	*Eucalyptus nicholii*
934	Shrub	Mid	*Senna acclinis*
934	Shrub	Mid	*Asterolasia beckersii*
934	Tree	Canopy	*Eucalyptus oresbia*
970	Herbs and forbs	Ground	*Dichanthium setosum*
970	Herbs and forbs	Ground	*Euphrasia arguta*
970	Herbs and forbs	Ground	*Thesium australe*
970	Tree	Canopy	*Eucalyptus nicholii*

1.3. Threatened Fauna Habitat Assessment

Habitat assessment surveys were conducted for two species:

- Sphagnum Frog (*Philoria sphagnicolus*) – NSW – V, Cwth - V
- Stephen's Banded Snake (*Hoplocephalus stephensii*) – NSW - V

Habitat for these species was surveyed for due to their association with PCT 934, which was newly identified during the December 2023 fieldwork.

PCT 934 was searched for the following suitable micro habitat:

- Rocky outcrops with seeps and/or soaks
- Fallen timber, vine thickets
- Moss, seepages, slopes, soil looseness
- Leaf litter, logs
- Moistness

This micro habitat was also surveyed for within a presumed gully identified using Strahler mapping, occurring 63 metres east of PCT 934 outside of the development footprint. The total survey effort covered was 1.09ha of associated habitat.

Two ecologists conducted a random meander of the survey area to assess the presence of the micro habitat for the species (listed above). Rapid Assessment points were taken to document the suitability of microhabitat in the area, whether it was present or absent.

1.4. Effort

Table 1-2 below describes the survey effort and presence of each targeted species. Note that *Dichanthium setosum* and *Eucalyptus nicholii* samples are yet to have their identification confirmed by the Herbarium.

Table 1-2 Threatened species surveys for candidate flora species on subject land

Common name	Scientific name	Threatened species surveys			Present?
		Survey method	Timing	Effort	
Bluegrass	*Dichanthium setosum*	Grid Point Transect	Jan/Feb (Summer)	204 grid points	Potentially
	Euphrasia arguta	Grid Point Transect	Jan/Feb (Summer)	204 grid points	No
Austral Toadflax	*Thesium australe*	Grid Point Transect	Jan/Feb (Summer)	204 grid points	No
Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	Grid Point Transect	Jan/Feb (Summer)	204 grid points	YES
Small-fruited Mountain Gum	*Eucalyptus oresbia*	Walking Transect	Jan/Feb (Summer)	854m	No
Rainforest Cassia	*Senna acclinis*	Walking Transect	Jan/Feb (Summer)	854m	No
Dungowan Starbush	*Asterolasia beckersii*	Walking Transect	Jan/Feb (Summer)	854m	No
Pygmy Cypress Pine	*Callitris oblonga*	Grid Point Transect	Jan/Feb (Summer)	5 grid points	No

1.5. Weather conditions

Weather conditions of the field survey are documented in Table 1-3. Conditions are taken from the town of Walcha and often varied to what was experienced on site (e.g. lower temperature and higher rainfall to what was recorded in Walcha). Conditions also vary onsite depending what area the teams were working in.

Table 1-3 Survey weather conditions

Survey undertaken	Date	Time (24hrs)	Temp. min (C°)	Temp. max (C°)	Wind	Rainfall	Other conditions relevant to species
BAM Plots	29/01/2024	0830- 1800	17.6	27.8	ENE (39km/h)	0.2	N/A
BAM Plots & Targeted Flora	30/01/2024	0830- 1800	19.2	28.2	ESE (41km/h)	43.8	N/A
BAM Plots & Targeted Flora	31/01/2024	0830- 1800	15.9	27.3	E (31km/h)	0	N/A
Targeted Flora & Fauna Habitat Assessment	01/02/2024	0830- 1800	14.2	29.3	ENE (31km/h)	0	N/A
Targeted Flora	02/02/2024	0830- 1900	15.5	31.3	W (41km/h)	0	N/A
Targeted Flora	03/02/2024	0830- 1800	17.7	31.6	E (33km/h)	0	N/A

1.6. Limitations

Limitations to the survey effort include:

- Staff changes during surveys
- Differing experience levels amongst field staff
- Inconsistency between subjective assessments across staff (e.g. measure of % cover)

1.7. Survey team

Table 1-1-4 - Survey Team

Name	Role	Fieldwork Conducted	Survey dates
James Hagan	Ecologist (Team Leader)	Threatened Flora Transects	30 Jan – 3 Feb 2024
Stella O'Dwyer	Biodiversity Consultant (Team Leader)	Threatened Flora Transects	30 Jan – 3 Feb 2024
Tom Fletcher	Ecologist	BAM Plots, Threatened Flora Transects & Threatened Species Habitat Assessment (Sphagnum Frog and Stephen's Banded Snake)	29 Jan – 2 Feb 2024
Ben Sloggett	Ecologist	BAM Plots, Threatened Flora Transects & Threatened Species Habitat Assessment (Sphagnum Frog and Stephen's Banded Snake)	1 – 2 Feb 2024
Dr John Hunter (Hewlett Hunter Pty Ltd)	Director/Principal Ecologist (Team Leader)	BAM Plots	29 – 30 Jan 2024
Damian Licari (Ascent Ecology)	Principal Ecologist (Team Leader)	BAM Plots & Threatened Flora Transects	29 Jan – 2 Feb 2024
Kaelen Were (Ascent Ecology)	Consultant	BAM Plots & Threatened Flora Transects	29 Jan – 2 Feb 2024
Timothy Callaghan (ERM)	Senior Ecologist	Threatened Flora Transects	30 Jan – 2 Feb 2024
Kai Henderson (ERM)	Ecologist	Threatened Flora Transects	30 Jan – 2 Feb 2024

2. Results

2.1. BAM Plots

A total of 27 BAM Plots were conducted during the January 2024 fieldwork. Ten of these BAM Plots were required to determine PCTs in areas where the vegetation was unable to be assigned a PCT based on Rapid Assessment Points taken during the December 2023 survey effort. After analysing the January BAM plot data, it was determined that no new PCTs were found onsite. These BAM plots aligned with pre-existing PCTs mapped during previous fieldtrips. The BAM Plots also contained no threatened flora species. The further 17 BAM Plots were conducted to determine Land Category status. Analysis of these plots is in progress.

2.1.1. Condition States & Vegetation Zones

BAM Plots were conducted within varying conditions of vegetation. The dominant vegetation condition was moderately to heavily grazed, while some areas showed signs of pasture improvement. Pasture management states ranged from recently treated with herbicide to recently seeded or in some cases having a dense cover of pasture species. The condition of vegetation within the BAM Plot was contingent upon the specific landowner, influencing factors such as grazing intensity, pasture management practices, and overall land stewardship.

2.1.2. Justification of PCT selection

Refer to Table 2-1 for PCTs that were determined from the BAM Plots conducted during fieldwork. PCT identification was achieved through an evidence based decision pathway that included the following:

- Referral to current PCT mapping in proximity to the BAM plots
- Analysing suitability of the species composition of existing PCTs to the undetermined areas using *BioNet Vegetation Classification*
    - Aligning key species with highest percent coverage to PCT descriptions
    - Assessing landscape position and geomorphology

PCT identification is to be reviewed by senior ecologist to ensure correctness.

2.1.3. Alignment with TECs

The PCTs determined from the BAM plots are associated with the TEC (Threatened Ecological Communities) detailed in Table 2-1. Further analysis is needed to determine whether the areas align with the TECs, which is in progress.

Table 2-1 PCTs determined from BAM Plots and associated TECs

PCT Name	BC Act TEC	EPBC Act TEC
518 - Heath swamps wetland on leucogranite and granite of the New England Tableland Bioregion	Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions **Endangered**	N/A
	Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion **Endangered**	
526 - Mountain Ribbon Gum - Messmate - Broad-leaved Stringybark open forest on granitic soils of the New England Tableland Bioregion	N/A	N/A
567 - Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions **Critically Endangered**	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland **Critically Endangered**
1194 - Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion **Endangered**	

2.2. Targeted Threatened Flora Survey

The targeted survey resulted in the detection of 46 *Eucalyptus nicholii* individuals in PCTs 568, 766, 970. Seven records of potential *Dichanthium setosum* were also taken; confirmation will be advised in due course as samples have been sent to the Sydney Herbarium for identification. None of the remaining target species

were detected during the surveys. The likelihood of targeted species detection is described below in Table 2-2.

Table 2-2 Threatened species targeted and their occurrence during survey

Scientific name	Common name	Status		Microhabitat constraints and potential occurrence (Moderate, High, Recorded)
		BC Act	EPBC Act	
Thesium austral	Austral Toadflax	V	V	Moderate - Associated with Kangaro Grass *(Themeda australis*), which was present at some locations on site.
Dichanthium setosum	Bluegrass	V	V	High – many associated species found, found in disturbed areas such as cleared woodland and disturbed pasture (alike to study area).
Asterolasia beckersii	Dungowan Starbush	CE (SAII)	CE	Moderate – grows along creekbanks dominated by River Oak or Manna Gum (not present onsite)
Euphrasia arguta		CE	CE	Moderate - Grows in grassy areas near rivers (not present onsite)
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	**RECORDED** – found largely on private property and roadsides (alike to study area)
Callitris oblonga	Pygmy Cypress-pine	V	V	Moderate – usually grows in sand along watercourses (not present onsite)
Senna acclinis	Rainforest Senna	E		Moderate - grows on the margins of subtropical, littoral and dry rainforests (not present onsite)
Eucalyptus oresbia	Small-fruited Mountain Gum	V		Moderate – found in very steep valleys and incised creek lines (not present onsite)

2.3. Threatened Fauna Habitat Assessment

Sphagnum Frog (*Philoria sphagnicolus*)

PCT 934 and the gully to the east do not provide suitable habitat for the Sphagnum Frog (*Philoria sphagnicolus*). Despite the presence of embedded rocks covered in moss, fallen timber, leaf litter and a marginally moist substrate, there was no evidence of permanent water including seeps and soaks or rocky outcrops which are the required breeding habitat for the species (DPE, 2020).

Stephens Banded Snake (*Hoplocephalus stephensii*)

PCT 934 and the gully to the east constitute suitable habitat for Stephen's Banded Snake (*Hoplocephalus stephensii*) due to the high abundance of fallen logs and hollow bearing trees within the area (DPE, 2022). No arboreal vine tangles were observed during the survey – this is a habitat constraint for this species and a justification for exclusion if none occur within 500m. The BDAR will include further analysis. Photos of Habitat to be provided in BDAR.

3. References

DPE. (2020). NSW Survey Guide for Threatened Frogs. Department of Planning and Environment.

DPE. (2022). Threatened reptiles - Biodiversity Assessment Method survey guide. State of NSW and Department of Planning and Environment.

DPE (2020) NSW survey guide for the Biodiversity Assessment Method Surveying threatened plants and their habitats, Department of Planning, Industry and Environment.

NGH Pty Ltd

NSW • ACT • QLD • VIC

ABN 31 124 444 622 ACN 124 444 622

E: ngh@nghconsulting.com.au

GOLD COAST

2B 34 Tallebudgera Creek Road
Burleigh Heads QLD 4220
(PO Box 424 West Burleigh QLD 4219)

T. (07) 3129 7633

SYDNEY REGION

Unit 17, 21 Mary Street
Surry Hills NSW 2010

T. (02) 8202 8333

BEGA

Suite 11, 89-91 Auckland Street
(PO Box 470)
Bega NSW 2550

T. (02) 6492 8333

MELBOURNE

Level 14, 10-16 Queen Street
Melbourne VIC 3000

T: (03) 7031 9123

TOWNSVILLE

Level 4, 67-75 Denham Street
Townsville QLD 4810

T. (07) 4410 9000

BRISBANE

T3, Level 7, 348 Edward Street
Brisbane QLD 4000

T. (07) 3129 7633

NEWCASTLE - HUNTER & NORTH COAST

Level 1, 31-33 Beaumont Street
Hamilton NSW 2303

T. (02) 4929 2301

WAGGA WAGGA - RIVERINA & WESTERN NSW

35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650

T. (02) 6971 9696

CANBERRA

Unit 8, 27 Yallourn Street
(PO Box 62)
Fyshwick ACT 2609

T. (02) 6280 5053

SUNSHINE COAST

Suite 101, Level 2/30 Main Drive
Birtinya QLD 4575

(07) 4410 9000

WODONGA

Unit 2, 83 Hume Street
(PO Box 506)
Wodonga VIC 3690

T. (02) 6067 2533

APPENDIX B BAM FLORISTIC DATA

	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BP08	BP09	BP10	BP12	BP13	BP14	BP15	BP21	BP22	BP23	BP24	BP26	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC
Abildgaardia ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia dealbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia deanei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falciformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia filicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia implexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia leiocalyx	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	2	0
Acacia rubida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia ulicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia venulosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena agnipila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena novae-zelandiae	0	0.2	0.1	0	0	0	0	0	0	0.1	0	0	0	8	0.1	0	0.1	0	0	0	0.1	0	0	0	0.1	0.5	0.5	0	0	1	0	0	0	0	0.1	0.1	2	0
Acaena ovina	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetosella vulgaris	0	0	0	0	0	0	0	1	2	1	2	0.1	1	2	5	0.2	0	0	3	5	0.5	0	0.5	0.1	0	1	0.1	0.1	0.2	2	0.1	0.2	0.1	0.1	0.2	0.2	5
Adiantum aethiopicum	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aira spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ajuga australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Allocasuarina littoralis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alternanthera denticulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amaranthus powellii	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0.2	0	0	0.2	0	0.5	0	0	0	1	0	0	0	0.2	0	0	0.5
Ammi majus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammobium alatum	0.1	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.5	0.5	0	0	0	0	0	0	0	0	0	0
Amyema miquelii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendulum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	0	0	0	0	0	0	0	0	0
Amyema spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Anagallis arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andropogon virginicus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angophora floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthosachne scabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthoxanthum odoratum	0	0	0	0	0	0	20	0	0	0	0	0	0	15	0	0	15	30	1	0	1	5	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida jerichoensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida personata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida ramosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida spp.	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida vagans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropodium milleflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asperula conferta	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Asplenium flabellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asplenium flavellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa bigeniculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0
Austrostipa densiflora	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa nodosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa rudis	0.1	0	0.1	0	0	0.1	0	0	0	15	0	0	3	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa scabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	1	0
Avena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0
Axonopus fissifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baloskion stenocoleum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bidens pilosa	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Billardiera scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blechnum cartilagineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa decipiens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa macra	0	0.1	25	0.1	0	0.1	0	0	15	0	0	0	0	20	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3	0	0.2	0	0	0
Brachyloma daphnoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome diversifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome graminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome multifida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome scapigera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spathulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brassica rapa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Briza minor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus brevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus catharticus	0	0	0	0	0.2	0	0	10	0	0	0	0	0	0	0	20	0	0	5	0	30	2	5	1	0	40	0	1	0	10	0	0	10	10.5	0	0	0	0
Bromus diandrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus inermis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulbine bulbosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Bursaria longisepala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0.1	0.5	0	0	0	0
Bursaria spinosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caesia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caladenia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis lappulacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capillipedium parviflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursapastoris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursa-pastoris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine hirsuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine lilacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carduus nutans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0	0.2	0.1	0	0	0	0	0	0	5	0
Carex appressa	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex echinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BP08	BP09	BP10	BP12	BP13	BP14	BP15	BP21	BP22	BP23	BP24	BP26	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC
Carex gaudichaudiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex inversa	0	0.1	0	0	0	0	5	0	1	0	1	5	3	0	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Cassinia leptocephala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia quinquefaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus ciliaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus purpurascens	0	0	0	0.1	0	0	0.1	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Centaurea spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium erythraea	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centella asiatica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centipeda cunninghamii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium balearicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium glomeratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Cheilanthes sieberi	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenopodium album	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0
Chenopodium carinatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloris truncata	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Choretrum pauciflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum apiculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum semipappos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cichorium intybus	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium arvense	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium vulgare	0.1	0.1	0.1	0	0	0	0	1	1	5	2	0	0	0.1	20	10	1	0.5	0	0	5	0	0	0.5	0.5	0.5	1	2	1	5	0.5	0.1	1	1	0.2	0	10
Clematis aristata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Clematis microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conium maculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Convolvulus erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Conyza bonariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza parva	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza spp.	0	0	0	0.1	0.1	0	0	0	0.1	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0	0.2	0.1	0.1	0.2	0	0.1	0	0	0.5
Cotula australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Craspedia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Craspedia variabilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Crassula sieberiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Crataegus monogyna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crepis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptandra amara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclospermum leptophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbonotus lawsonianus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	0	0	0.1	0	0
Cymbopogon refractus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynara cardunculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynodon dactylon	2	20	40	0	0	0	0	3	0	20	0	0	0	0	1	85	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynoglossum australe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.7	0	0	0	0	0	0	0
Cynosurus echinatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus eragrostis	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus exaltatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus gracilis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0
Cyperus sphaeroideus	0	0	0	0	0	5	12	0	0	0	0	0	0	0	2	0	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus vaginatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dactylis glomerata	25	25	0	5	0	0	0	30	0	0	20	40	25	0	0	0	0	3	0	0	0	0	5	0	0.2	0	40	1	0.2	0.1	0.1	0.2	5	1	0.1	0	5
Datura stramonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus carota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus glochidiatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia genistifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia latifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella caerulea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Dianella longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella revoluta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Dianella spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianthus armeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium sericeum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium setosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne crinita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne micrantha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Dichondra repens	0	0	0.2	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0.2	0	0.5	0.1	0	0	0	0.1	0	0	0	0.1	0.1	0.2	0.1	2
Dichopogon fimbriatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichopogon strictus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera peltata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera spatulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania carinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania pumilio	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon caespitosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon ovatus	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Einadia hastata	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia nutans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Einadia polygonoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia trigonos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.5	0	0	0	0	0	0	0
Eleocharis acuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis atricha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine spp.	0	0	0	0.1	0	0.1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0
Eleusine tristachya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elymus scaber	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epilobium billardierianum	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Eragrostis brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0.1	0	0
Eragrostis curvula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BP08	BP09	BP10	BP12	BP13	BP14	BP15	BP21	BP22	BP23	BP24	BP26	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC
Eragrostis lacunaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptocarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptostachya	0	0.1	0	15	0	0	3	2	2	0	0	1	0	0	0	0	10	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis spp.	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis trachycarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium cicutarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium moschatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus acaciiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus andrewsii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus blakelyi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus bridgesiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus calidissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus caliginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0
Eucalyptus campanulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus dalrympleana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	5	0	0	0	0	0	0	0
Eucalyptus elliptica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus fastigata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus laevopinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0
Eucalyptus malacoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus melliodora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus michaeliana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nicholii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nobilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1	0	0	0	0	30	0	0	0	0	0	0	0
Eucalyptus nova-anglica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus obliqua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	10	0	0	0	0	0	0	0	2	0	0	0	0
Eucalyptus pauciflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata subsp. se	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	25	0	20	40	0	0	0	0	0	0	40	50	0	0	30
Eucalyptus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus stellulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus viminalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus williamsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Eucalyptus youmanii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton involucratus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton sphaericus	0	0.1	0	0.1	0.2	0.1	2	0	0.1	0	0	0	0	2	0	0	0	4	0	0	0	0	0.5	0	0	0	0	0	0	0	0.5	0.5	0.1	0.1	0.1	0	0
Euphorbia prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos cupressiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca arundinacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca nigrescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca spp.	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0.1	0	0.1	0.1	0	0	0	0
Fimbristylis dichotoma	0	0.1	0	0.1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Gahnia sieberiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium binifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	0	0	0	0	0	0	0
Galium gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leiocarpum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leptogonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Galium murale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium propinquum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Gamochaeta coarctata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gamochaeta spp.	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0.1	0	0.2	1	0	0.1	0	0	0	0
Geranium molle subsp. molle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium solanderi	0.1	0.1	0	0.1	0	0.1	0	0	0	1	0.1	0	1	2	1	0	0	0	1	2	1	0	0	2	0	1	0.2	1	4	5	0.1	0.1	0	1	0.1	1	5
Glycine clandestina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycine microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycine tabacina	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0.4	0	0	0	0	0	0	0.1	0	0
Gomphrena celosioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0
Gonocarpus elatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus tetragynus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus teucrioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia bellidifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia heteromera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia rotundifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grona varians	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0.1	0	0.1	0.1	0	0	0.1	0	0	0	0.1	0	0.1	0	0	0
Hainardia cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0.2	0	0	0	0	0
Haloragis aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis heterophylla	0	0	0	10	0	0.5	1	0	0.1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0
Haloragis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
Heliotropium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemarthria uncinata	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia obtusifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia riparia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holcus lanatus	0	0	0	2	0	0	15	0	5	0.1	3	15	20	3	0	0	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.2	0	0	0	0	0
Hordeum leporinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
hordeum vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hybanthus monopetalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle laxiflora	0	0	0.1	0	0	0	0.1	0	0	2	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0.5	0.3	2	0.1	0	0	0.1	0.2	0.1	0
Hydrocotyle pedicellosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Hydrocotyle sibthorpioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum gramineum	0	0	0.1	0	0	0.1	8	0	0	0	0	0	0	2	0	0	2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Hypericum japonicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum perforatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris glabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris radicata	0.1	0.1	0.1	0.2	0.4	0.2	8	2	20	1	1	0.2	1	5	0.1	0	0.1	6	1	0	0.1	0.5	0.5	0.5	0.1	0.1	0	0.1	0.1	0	0.2	0.2	1	0.5	0.2	0.2	0.1

	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BP08	BP09	BP10	BP12	BP13	BP14	BP15	BP21	BP22	BP23	BP24	BP26	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC
Hypoxis exilis	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Indigofera australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isolepis hookeriana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus alexandri	0.1	0.1	0	0.2	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus australis	0	0.1	0	0	0	0	25	0	30	2	0	12	0	0.1	0	0.1	10	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus brevibracteus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus cognatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0
Juncus filicaulis	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.2	0	0	0	0	0
Juncus fockei	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus holoschoenus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus pauciflorus	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus remotiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus subsecundus	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus usitatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis aemula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis filiformis	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lactuca serriola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Lagenophora stipitata	0	0	0	0	0	0	0	0.5	0.1	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lamium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemna spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leontodon saxatilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0
Lepidium bonariense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0.2	0.5	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptorhynchos squamatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptospermum gregarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
leptospermum polygalifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea subsp. ser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon lanceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lissanthe strigosa	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Lolium perenne	0	0	0	0	20	0	0	40	0	0	30	5	10	0	0	5	0	3	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0
Lomandra briggsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra filiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Lomandra longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0.5	0	2	0.1	1	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0
Lomandra multiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0
Lomandra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomatia fraseri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luzula flaccida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lysimachia arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Lythrum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva neglecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marrubium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago minima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago polymorpha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	2	0	0.5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus procumbens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus urceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha diemenica	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha satureioides	0	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0
Micrantheum ericoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microlaena stipoides	0	1	20	10	0	10	0	3	10	40	30	0	25	10	80	1	0	20	50	60	30	30	60	30	90	0	10	60	35	20	60	75	40	40	10	30	70	
Microseris lanceolata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Modiola caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	2	0	0.5	0	0	0	0	0	0	0	0	0	0
Moenchia erecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myoporum montanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myosotis discolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nassella trichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia alpicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia argophylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia oppositifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Olearia viscidula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onopordum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia diphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia hispida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreomyrrhis eriopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Oxalis exilis	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis perennans	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0.1	0	0.1	0	0	0.1	0	1	0	0	0.1	2	0.1	0.1	0	0.1	0.1	0	0
Oxalis spp.	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum decompositum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum effusum	0	0.1	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0	0	0	0	0	0
Panicum simile	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum spp.	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paronychia brasiliana	0	0.1	0.1	0	0	0.1	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.4	0	0	0.1	0	0	0.1	0	0	0
Paspalidium distans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paspalum dilatatum	0	0.1	0	0.2	5	0	0	0	20	0	0	10	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.2	0	0	0	0	0	0
Paspalum distichum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BP08	BP09	BP10	BP12	BP13	BP14	BP15	BP21	BP22	BP23	BP24	BP26	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC
Pellaea calidirupium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Pennisetum clandestinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	5	0	0	0
Persicaria hydropiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petrorhagia nanteuilii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0
Phalaris aquatica	0	0	0	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Phyllanthus virgatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phytolacca octandra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea curviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Pimelea linifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea simplex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea strigosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0
Plantago debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0	0	0	0	1	0	0	0	0	0	0	0.5	0.5	0	0
Plantago gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago lanceolata	0.1	0.1	0.1	0.2	0.3	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0
Plantago varia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectranthus graveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa annua	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	10	10	5	0	20	5	0	0	0	0	0.5	0	0	0	0	0	0	0
Poa labillardierei var. labillar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa pratensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa sieberiana	0	0	0	0.1	0	3	0.1	0	0	1	0	0	0	1	0	0	5	0	10	10	20	30	0	10	5	0	0	2	5	30	0	0	25	15	52	70	0
Polygonum aviculare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Polygonum plebeium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poranthera microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	2	0	0	0	0	0	0	0	0	0	0
Portulaca filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulala olearae	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pratia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prunella vulgaris	0	0	0	0	0	0	0	0	0.1	0	0	0	0	4	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Pteridium esculentum	0	0.1	0.1	0	0	0	0	0	0.1	35	6	0	0	20	0	0	0	0.1	3	0	0.1	0.5	5	2	0	0.1	0	0	0	0.2	0	0	5	0.5	10	10	0.2
Pterostylis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea subspicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pyrrosia rupestris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus inundatus	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Rapistrum rugosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Romulea rosea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rorippa laciniata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa rubiginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rostellularia adscendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Rubus anglocandicans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Rubus parvifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0.1	0	0	0	0.1	0.5	0.1	0	0	0.2	1	0	0	0	0.1	0	0.1	0.1	0.1
Rumex acetosella	0.1	0.1	0.2	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rumex brownii	0	0.1	0.1	0	0	0.1	0	0.1	0.1	0	0	0	0	0	0.1	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rumex crispus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma caespitosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma indutum	0	0	0	0	0	0	0.1	0	0	1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma laeve	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma pilosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma racemosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma richardsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma spp.	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.5	0	0	0	0	0	0	0.1	0	0	0
Rytidosperma tenuius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Sanguisorba minor subsp. m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scaevola hookeri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus validus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenus apogon	0	0	0	0	0	0	2	0	0	0	0	10	0.1	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus biflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0.1	0	0	0	0.2	0	0
Scleranthus sp. Fitzs Hill	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus spp.	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scutellaria humilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Secale cereale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio bipinnatisectus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Senecio diaschides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio lautus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio madagascariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio minimus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio prenanthoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio quadridentatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.1	0	0	0	0	0	0	0	0	0
Senecio spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria parviflora	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0
Setaria pumila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BAMPI	BP08	BP09	BP10	BP12	BP13	BP14	BP15	BP21	BP22	BP23	BP24	BP26	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC
Sigesbeckia orientalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silene spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Silybum marianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium rosulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium sp. A	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smilax australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.1	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum amblymerum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum americanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum neoanglicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum nigrum	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0.8	0.1	0	0	0	0	0	0	0
Solanum opacum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum prinophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.8	0	0.1	0	0	0	0	0	0
Solanum pungetium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0
Solanum semiarmatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum vicinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenogyne bellioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenogyne gunnii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Soliva sessilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	5	0	0	0	2	0	0	0	0	0	0	0
Sonchus asper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus oleraceus	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorghum leiocladum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Sporobolus creber	0	0.2	0.1	3	0.3	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0
Stachys arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stackhousia viminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria angustifolia	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria media	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	0	0	0	0	0.1	0	1	0.1	0	0.5	0	0.1	0	5	0	0	0.2	0	0.1	0	0.1
Stellaria pungens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.1	2	0
Stellaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stylidium graminifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swainsona galegifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tagetes minuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taraxacum officinale	0	0	0	0	0	0	0	3	0	1	0	0	0	2	2	0	0	2	0	0.2	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0.1	0	0.1	0	0
Themeda triandra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Thysanotus tuberosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tragopogon porrifolius subsp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribulus micrococcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium spp.	0.1	0.2	0	0.2	0.3	0.2	5	18	1	1	17	8	35	3	0.1	0.5	2	5	2	5	3	0.2	5	0	0.1	4	40	0.7	45	1	5	5	5	1	0.2	1	1
Tripogon loliiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica incisa	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	1	0	0	0	0.1	20	0	2	0	0	0	0	0	0	0	0	0	0
Urtica urens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum thapsus	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0.2	0	0	0	0	0.2	0	0	0	0	0.2	0	0	0	0	0	0	0	0.1	0	0	0.5
Verbascum virgatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbena bonariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Verbena spp.	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica calycina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Veronica derwentiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica plebeia	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viburnum tinus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
Vicia sativa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia villosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola betonicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0	0.5	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0	0
Viola hederacea	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia cuneata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia muelleri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Vittadinia sulcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia myuros	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0
Vulpia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0
Wahlenbergia communis	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.8	0	0	0	0	0	0	0	0
Wahlenbergia gracilenta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilis	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia luteola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia multicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Wahlenbergia planiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0
Wahlenbergia stricta	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wurmbea dioica subsp. dioic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthium occidentale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea johnsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthosia pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xerochrysum bracteatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0

	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWF1	WWF1	WWF1	WWF1
Abildgaardia ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia dealbata	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.5	2	0
Acacia deanei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falciformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia filicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia implexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0
Acacia leiocalyx	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia rubida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia ulicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0
Acacia venulosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena agnipila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena novae-zelandiae	0	0	0	0.1	1	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Acaena ovina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Acaena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetosella vulgaris	0	0	0.1	0.1	0	1	0	0	0	0	0.5	0	0.1	0.1	0	0.1	0	0	0	0	5	1	0.1	0.1	0	0	2	0	0.1	0.1	0	0.1	0	0	0.1	2	0.2	0	2	0	5	0.1	1	0	0.1
Adiantum aethiopicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aira spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ajuga australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocasuarina littoralis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Alternanthera denticulata	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amaranthus powellii	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammi majus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammobium alatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema miquelii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendulum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0
Amyema spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anagallis arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andropogon virginicus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angophora floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthosachne scabra	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	5	0	0	0
Anthoxanthum odoratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0.5	0	0	0	0	0	0	0
Aristida jerichoensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida personata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida ramosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Aristida spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida vagans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropodium milleflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asperula conferta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.1	0	0	0	0.1	0	0.1	0.1	7	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0.1
Asplenium flabellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asplenium flavellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa bigeniculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0.2	0	0	0	0	0	0	0	0	0	25	0	25	0	5	0.1	0	0	0	0.5	0	0	0	0	0	0
Austrostipa densiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa nodosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.5	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa pubescens	0	0	0.2	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0
Austrostipa rudis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa scabra	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0.2	0.1	0	0	0	0
Austrostipa verticillata	0	0	0	0	0	0	0	0	1	20	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	20	0	2	0	0	0	0	0	0	0	0	2	5	1	0	0
Avena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axonopus fissifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baloskion stenocoleum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bidens pilosa	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Billardiera scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blechnum cartilagineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa decipiens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa macra	0	0	0.1	0.2	0	0	0	0	0.1	0	0	0	0.2	0	0	4	0	15	0	0	0	17	0.1	0	5	0	0	0	20	2	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Brachyloma daphnoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome diversifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome graminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome multifida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome scapigera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spathulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Brassica rapa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Briza minor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus brevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus catharticus	1	0	0	0	0	0.5	1	15	11	0.1	0	0.5	0.1	0	0	0	0	0	0.2	0	0	0	0	0	0	0	5	0.2	0	0	0	0	9	0	0	10	0	0	0	0	0	0	0.1	0
Bromus diandrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus inermis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulbine bulbosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Bursaria longisepala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria spinosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caesia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caladenia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0.1	0
Calotis cuneifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis lappulacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capillipedium parviflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursapastoris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWF1	WWF1	WWF1	WWF1
Carex gaudichaudiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex inversa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	50	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.5	0.1	0	0	0
Carex spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia leptocephala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia quinquefaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus ciliaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus purpurascens	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurea spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium erythraea	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0.5	5	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centella asiatica	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centipeda cunninghamii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium balearicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium glomeratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilanthes sieberi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	0	0	0	0	0
Chenopodium album	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenopodium carinatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloris truncata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.4
Choretrum pauciflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum apiculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum semipappos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cichorium intybus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium arvense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium vulgare	1	5	0.1	1	0	0	1	15	1	0.1	0.1	0	0.1	0	0.1	0	0.2	0	0.5	0.1	0.1	0	0	0	0	0	0	0.1	0.1	0.1	0	0.2	0	0	10	0.1	0	0.1	0	0.1	0.1	0.1	0.2	0	0.1	0.1
Clematis aristata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clematis microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conium maculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Convolvulus erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Conyza bonariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza parva	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza spp.	0	0	0.1	0.1	0	0	0.1	0	0	0	1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Cotula australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0.1	0	0	0	0	0	0	0
Craspedia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Craspedia variabilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crassula sieberiana	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	5	10	0	0	2	0.5	0	0.1	0	0.1	0	0	0.1	0.1	0.2	0	0	0.1
Crataegus monogyna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crepis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptandra amara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclospermum leptophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbonotus lawsonianus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0.1	0	0	0.1	0.2	0.1	0.1	0.1	0.1
Cymbopogon refractus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Cynara cardunculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynodon dactylon	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0.1	0	0	7	0	0	0	0	0	0	20	0	60	0	0	0	0	0	0	0	25	50	0	0	50	10	0	0	0
Cynoglossum australe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0
Cynosurus echinatus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus eragrostis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus exaltatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus sphaeroideus	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Cyperus vaginatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dactylis glomerata	65	0	0.5	2	0	10	30	5	0	0	0.1	0	10	3	0	0	4	0	0	0	0	0	0.1	0	0	60	0	0	0	0	0.1	0	0	0	0	0	0	0	0	20	10	0	0	0	0
Datura stramonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus carota	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus glochidiatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia genistifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia latifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella caerulea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella revoluta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella spp.	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianthus armeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium sericeum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium setosum	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne crinita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0	0	1	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne micrantha	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Dichondra repens	0	0	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.5	0	0	0.1	0.1	0	0	0	0.1	1	0.7	0.1
Dichopogon fimbriatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Dichopogon strictus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera peltata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera spatulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania carinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania pumilio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon caespitosus	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0.2	0	0	0	0	0.5	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.3	0.5
Echinopogon ovatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.1	0	0.3	0	0	0	0	0	0	0
Einadia hastata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia nutans	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	0	0	0.5	0	0	0	0.4	0
Einadia polygonoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia trigonos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWF1	WWF1	WWF1	WWF1
Eragrostis lacunaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptocarpa	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptostachya	0	20	0	0	0.1	20	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	10	10	0	20	0	0	0	10	30	0	0.5	1	10	0	0	0	0
Eragrostis pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis trachycarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium cicutarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0
Erodium moschatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0	0	0.1	0.1	0	0	0	0
Eucalyptus acaciiformis	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus andrewsii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus blakelyi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	20	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	12
Eucalyptus bridgesiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0
Eucalyptus calidissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus caliginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	30	0	2	0	0	0	0	10	5	0	0	0	0	0	0	0	0	0	0	2	0	0	50	0	0
Eucalyptus campanulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus dalrympleana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus elliptica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus fastigata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus laevopinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	14	0	13
Eucalyptus malacoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus melliodora	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	2	0	0	0	6	0	0	0	5	5	0	0	0	0	0	0	0	0	0	5	0	0	0	10	0	18	
Eucalyptus michaeliana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nicholii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nobilis	20	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nova-anglica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus obliqua	0	0	0	0	60	0	10	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus pauciflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata subsp. se	0	0	0	0	10	0	20	0	0	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	10	0	0	0	0	0	0
Eucalyptus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus stellulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus viminalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus williamsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus youmanii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton involucratus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton sphaericus	0	0.1	0	0.1	0	0.1	0	0	0	0	0	0	0.1	0	0	0.1	0	5	0	0	1	8	0.1	0.1	5	0.1	0	0.5	10	0.1	1	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Euphorbia prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos cupressiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca arundinacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca nigrescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca spp.	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0.1	25	0.6	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
Fimbristylis dichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gahnia sieberiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium binifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leiocarpum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leptogonium	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium murale	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium propinquum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gamochaeta coarctata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gamochaeta spp.	0	0	0.1	0.2	0	0	0	0	0.1	0	0	0	0.5	0.1	0	10	0.1	0	0	0	0	0	0.2	0.1	0	0	0	0.1	0	0	0.5	0	0.1	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Geranium molle subsp. molle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0.1	0	0	0	0.1	0	0	0	0	0	0
Geranium solanderi	0	0	0.1	0.1	1	0	0.1	5	1	0	5	1	0	0.1	0	0.1	0.7	0.1	0.1	0.3	0.1	0.1	0.1	0.2	0	0	0.1	0.1	2	0	0.5	0.2	0	0.1	0.1	0	1	1	0.2	0	0	1	4	1	0.6
Glycine clandestina	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2	0	0	0	0	0.5	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Glycine microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycine tabacina	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	2	2	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphrena celosioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus elatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus tetragynus	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus teucrioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia bellidifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia heteromera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia rotundifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grona varians	0	0	0.2	0.1	0.1	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0.2	0	0	0	0	0	0.1	0	0.1	0.1	0	0	0	0.1	0.1	0	0	0	0	0.1	0	0
Hainardia cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Haloragis heterophylla	0	0	0	0.1	0	0	0	0	0	0	0	3	0	10	2	2	0	0	0	0	5	4	15	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heliotropium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemarthria uncinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia obtusifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Hibbertia riparia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holcus lanatus	0	20	0.2	8	0	10	0	0	0	0	0	0	0.5	5	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hordeum leporinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
hordeum vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hybanthus monopetalus	0	0	0	0	0

	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWF1	WWF1	WWF1	WWF1
Hypoxis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigofera australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isolepis hookeriana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus alexandri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus australis	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus brevibracteus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus cognatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus filicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus fockei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus holoschoenus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus pauciflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus remotiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus spp.	0	10	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.5	0	0	0.1	0	0	3	0	0	0	0	0.3	1	0	0	0	0
Juncus subsecundus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus usitatus	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Lachnagrostis aemula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis filiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lactuca serriola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lagenophora stipitata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lamium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemna spp.	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leontodon saxatilis	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium bonariense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptorhynchos squamatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptospermum gregarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
leptospermum polygalifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea subsp. ser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon lanceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lissanthe strigosa	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	0	1	0	0.5	0	0	0	0	0	0	0	0	5	0.5	0.1	2	0	0	2	0	1	0	0	0.5	0.3	0	0.1	0	0.4
Lolium perenne	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra briggsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra filiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0.1	0.1	0	0	0	0	0
Lomandra longifolia	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Lomandra multiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0
Lomatia fraseri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luzula flaccida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lysimachia arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Lythrum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva neglecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.1	0	0	0.1	0	0	0	0	0	0	0	0
Marrubium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Medicago minima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago polymorpha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	2	0	0	0	0	0	0	0	0	0	0.2	0.2	0	0.1
Melichrus procumbens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus urceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha diemenica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha satureioides	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0.1	
Micrantheum ericoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microlaena stipoides	0	0	65	25	20	0	40	0	10	0	80	70	0.1	0	1	70	60	20	5	0	30	0.1	20	2	0	0	20	0	0	0	4	25	0	5	25	0	10	0	10	10	0	60	60	60	50
Microseris lanceolata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Modiola caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moenchia erecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myoporum montanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myosotis discolor	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nassella trichotoma	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia alpicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia argophylla	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia oppositifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia viscidula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	15	0	20	0	2	0	0	0	0	30	1	0	0	0	0	0.5	0	0	5	0	0	0	0	0.1	0	1	0
Onopordum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0	0	0	0	0	0	0	0	0	0
Opercularia diphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia hispida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreomyrrhis eriopoda	0	0	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis perennans	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0.1	0	0.1	0.1	0	0	0.1	0.1	0.1	0.1	0	0.1	0.1	0	0	0.1	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0.1	5	0.1	0	0.1	0.1
Oxalis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum decompositum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Panicum effusum	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.6	0	0.1	0	10	15	0	0	0	0	0	0	0	0	0.1	0	5	0	2	0.1	1	0	0.1	0	0.1	0	0	0.5	1
Panicum simile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paronychia brasiliana	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0.1	0	1	0.1	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0.1	2	0	0.1	0	0.1	0	0	0.6	0.2
Paspalidium distans	0	0	0	0	0	0	0	0	0

	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWF1	WWF1	WWF1	WWF1
Pellaea calidirupium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pennisetum clandestinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria hydropiper	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petrorhagia nanteuilii	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0.2	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phalaris aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0.1	55	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllanthus virgatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phytolacca octandra	0	0	0.1	0	0	0	20	0	0	0	1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	2	0.1	0	0	0	0	0	0	0
Pimelea curviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea linifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea simplex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea strigosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0
Plantago lanceolata	0	0	0.1	0.1	0	0	0	0	0	0	0	5	35	0.1	0.1	0.1	0.2	0.1	0	0.2	0	0.1	0	2	5	2	0	0	2	0.1	0.5	0.2	0.5	0.1	0	0	0.1	0	0.1	0	0.1	0.1	0.2	0	0	0.1
Plantago varia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectranthus graveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa annua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Poa labillardierei var. labillar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa pratensis	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa sieberiana	0	0	1	0.1	50	0	0	10	0	5	0	0	0	0.1	0.4	0.1	0	0	0	0	0	0	0	0	0	0	0	0	50	0	10	0	10	0	5	0	0	20	20	0	25	5	35
Polygonum aviculare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum plebeium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poranthera microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulaca filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulala olearae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pratia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prunella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pteridium esculentum	0	0	0.5	6	5	10	0	0.5	20	0	0	2	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	2	5	0.3	0
Pterostylis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea subspicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pyrrosia rupestris	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus inundatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapistrum rugosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Romulea rosea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rorippa laciniata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa rubiginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	1	0	0	0.2	0	0	0	0
Rostellularia adscendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus anglocandicans	0	0	0.2	0.1	0	0.5	5	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.5	0	0	0	0	0	0	0	0	0
Rubus parvifolius	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Rumex acetosella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rumex brownii	0	0	0.1	0.1	0	0	0	0.1	0	0	0	0	0.1	0	0	0.1	0	0	0.2	0	0	0.1	0	0	0.5	0	0	0	0	0.1	0	0	0.3	0	0.1	0.1	0.1	0.2	0	0	0	0.1	0.1	0.1	0.1
Rumex crispus	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma caespitosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma indutum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma laeve	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma pallidum	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma pilosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma racemosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma richardsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma spp.	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma tenuius	0	10	0	0	0	10	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sanguisorba minor subsp. m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scaevola hookeri	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus validus	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenus apogon	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3	0	2	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus biflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Scleranthus sp. Fitzs Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scutellaria humilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Secale cereale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio bipinnatisectus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio diaschides	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio lautus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio madagascariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio minimus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio prenanthoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio quadridentatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Senecio spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria pumila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWFC	WWF1	WWF1	WWF1	WWF1
Sigesbeckia orientalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silene spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Silybum marianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium rosulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium sp. A	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smilax australis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum amblymerum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum americanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum neoanglicum	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum nigrum	0.1	0	0	0	0	0	0	0	0	0	1	0.1	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0.1	0	0	0.1	0	0
Solanum opacum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum prinophyllum	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	1	0	0.2	0	0.1	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0
Solanum pungetium	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum semiarmatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Solanum vicinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenogyne bellioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.5	0	0	0
Solenogyne gunnii	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soliva sessilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus asper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus oleraceus	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorghum leiocladum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.4	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sporobolus creber	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	25	0	0	0	15	2	0	5	0	0	0	0	0	0.5	0	3	0	0	0	0	0.1	20	10	0	1	0	0.1
Stachys arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Stackhousia viminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.2	0	10	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria angustifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria media	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3	0	0	0	0	0	0	3	0
Stellaria pungens	0	0	0	0	0	0	0	0.5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stylidium graminifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swainsona galegifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tagetes minuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taraxacum officinale	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0.1	0	0.1	1	0.1	0.1	0	0	0.1
Themeda triandra	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thysanotus tuberosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tragopogon porrifolius subsp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribulus micrococcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium spp.	0	5	1	20	0	5	0	0.1	0	0	0	0.1	0.7	0.6	0.1	0.1	2	7	0.9	56	9.6	0.3	4.1	0.4	5	13	0.1	0.1	0.5	0.5	0.2	1.1	30	0.3	23.1	0	10.3	0	0.2	20	5.5	0.5	0.6	0	0
Tripogon loliiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica incisa	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	20	0	0	3	0	0	0	0	0.1	0
Urtica urens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Verbascum thapsus	0	0	0	0	0	0	0	0.1	0	5	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum virgatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Verbena bonariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica calycina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0
Veronica derwentiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica plebeia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viburnum tinus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia sativa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia villosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola betonicifolia	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1
Viola hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia cuneata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Vittadinia muelleri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia sulcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia myuros	0	5	0	0	0	30	0	50	50	10	0	20	0	0.3	12	0	25	0	0	0	0	0	0	0	20	0.1	0	10	0.1	2	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia spp.	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia communis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilenta	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilis	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia luteola	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia multicaulis	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia planiflora	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0
Wahlenbergia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0
Wahlenbergia stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Wurmbea dioica subsp. dioic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthium occidentale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea johnsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthosia pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xerochrysum bracteatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	WWF1	WWF1	WWF1	WWF1	WWF1	JH01	JH02	JH03	JH04	JH05	JH06	JH07	JH08	JH09	JH010	JH011	JH012	JH013	JH014	JH015	JH016	JH017	JH018	JH019	JH020	JH021	JH022	JH023	JH024	JH025	JH026	JH027	JH028	JH029	JH030	JH031	JH032	JH033
Abildgaardia ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia dealbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia deanei	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	30	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falciformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia filicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Acacia implexa	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia leiocalyx	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia rubida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Acacia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia ulicifolia	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia venulosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena agnipila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena novae-zelandiae	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0.1	0	0	0	0.1	0	0.1	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1
Acaena ovina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena spp.	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetosella vulgaris	0.1	0.1	0.1	0.1	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adiantum aethiopicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aira spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ajuga australis	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocasuarina littoralis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alternanthera denticulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amaranthus powellii	0	0	0	0.1	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammi majus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammobium alatum	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Amyema miquelii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendula	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Amyema pendulum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anagallis arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andropogon virginicus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angophora floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthosachne scabra	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthoxanthum odoratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida jerichoensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida personata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.2	0	0	0	0	0	0	0	0	1	0	15	0	0	0	0	0
Aristida ramosa	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida vagans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropodium milleflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asperula conferta	0.1	0	0	4	0.5	0	0	0	0	0	0	0	0	3	0	0	0	0.1	0	0	0	0	0	0.1	0.2	0	0	10	0	0	0.1	0	0.1	0.1	0	0.1	0.2	0.1
Asplenium flabellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asplenium flavellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa bigeniculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa densiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa nodosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa rudis	0	0	0	0	0	0	0	1	0	0.1	0.1	1	1	0	2	0	3	0.1	0.1	0	2	2	1	7	0	0	3	5	15	0	0	0	0	0	0	0	0	2
Austrostipa scabra	0	0	0	0	0	0	0	0.1	0.2	0	0	0	0	0	0	4	0	0	0	0.5	0	0	0	0	0	0	1	0	5	15	0	0	0	0	0	8	0	0
Austrostipa verticillata	0	0	10	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axonopus fissifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baloskion stenocoleum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bidens pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Billardiera scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blechnum cartilagineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa decipiens	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	0	3	20	0	3	15	0.2	0	0	2	10	0	10	0	0	0	0	2	0	10	0
Bothriochloa macra	2	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyloma daphnoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome diversifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome graminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome multifida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome scapigera	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spathulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brassica rapa	0	0	0	0	0	0	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Briza minor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus brevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Bromus catharticus	0.1	0	35	50	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus diandrus	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus inermis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulbine bulbosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria longisepala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria spinosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0
Caesia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caladenia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Calotis lappulacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capillipedium parviflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursapastoris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursa-pastoris	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine hirsuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine lilacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carduus nutans	0	0	0	0	0	0.1	0.1	7	1	0	0	0	0	0	0.1	0.2	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0
Carex appressa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex echinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	WWF1	WWF1	WWF1	WWF1	WWF1	JH01	JH02	JH03	JH04	JH05	JH06	JH07	JH08	JH09	JH010	JH011	JH012	JH013	JH014	JH015	JH016	JH017	JH018	JH019	JH020	JH021	JH022	JH023	JH024	JH025	JH026	JH027	JH028	JH029	JH030	JH031	JH032	JH033
Carex gaudichaudiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex inversa	0	0	0	0	0	1	1	0	0	0	0.5	0	0	0.2	0	0	0	1	0	0	0.2	0	0	0	0.2	0	0.2	1	1	0	0	0	0	1	0	1	0	1
Carex spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia leptocephala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia quinquefaria	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus ciliaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus purpurascens	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurea spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium erythraea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Centella asiatica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centipeda cunninghamii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium balearicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium glomeratum	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilanthes sieberi	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Chenopodium album	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenopodium carinatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloris truncata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Choretrum pauciflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum apiculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum semipappos	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0
Cichorium intybus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium arvense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium vulgare	10	0.2	0.1	0.3	0.1	3	0	3	3	0.1	0.1	0	0	0	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	1	0.2	0.1	0	0	0.1	0	0	0.2	2	2	0.1	0
Clematis aristata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clematis microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conium maculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Convolvulus erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza bonariensis	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0.1	0	0.1	0.1	0	0	0	0.1	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0
Conyza parva	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza spp.	0.3	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotula australis	0	0	0	0	0	6	1	0	1	0.1	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0.2	0	0	1	0	15	15	2	1	0.3
Craspedia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Craspedia variabilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crassula sieberiana	0	0	0.4	0.1	0.5	0	0	0.1	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Crataegus monogyna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crepis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptandra amara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclospermum leptophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbonotus lawsonianus	0	0	0.2	0.1	0.1	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0	0	0.1	0	0.1	0	1	0	0.2	0.1	0	0	0.1	0	0.1	0	0.1	0	0.2	2	2	0.2	0
Cymbopogon refractus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynara cardunculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynodon dactylon	0	0	0	0	0	0	1	0.2	0.2	0	0	0	0	0	0	0	0	0	4	0	0	0	0	3	0.5	0	2	0	5	0	0	0	0	5	15	20	0	0
Cynoglossum australe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynosurus echinatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus eragrostis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus exaltatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus gracilis	0.1	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus sphaeroideus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus vaginatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dactylis glomerata	0	0	0	0	0	5	1	1	0	80	80	0	0.1	7	5	3	40	0	0	0	0	0	0	0	0.1	0	0	0	5	10	0	0	0	0	0	0	0	0	0
Datura stramonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus carota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus glochidiatus	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
Daviesia genistifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	1	1	0	0	0	0	0
Daviesia latifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella caerulea	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella revoluta	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Dianella spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianthus armeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium sericeum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Dichanthium setosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne crinita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne micrantha	0	0	0	0	0	0	0	0	0	0	0	2	0.2	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichondra repens	0	0	0	0	0.1	0.1	0	0	0.2	0.1	0	0.1	0.1	0.1	0.1	0.2	0.2	0	0	0	2	0	0	0	0	1	0.5	0	0	0	0	0.1	0	5	2	3	5	0
Dichopogon fimbriatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichopogon strictus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera peltata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera spatulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania carinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania pumilio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon caespitosus	0	0	0	0	0	0	0	0	0	0	0	5	5	1	0.1	0	0	0	0	0	2	0.2	0	0	0	0	0.1	0	0	1	5	0	0	0	0	0	0	0	0
Echinopogon ovatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia hastata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Einadia nutans	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0.1	0	0.2	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Einadia polygonoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia trigonos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis acuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis atricha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine spp.	0.2	0	1	2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine tristachya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Elymus scaber	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0	0.1	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epilobium billardierianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis brownii	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis curvula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	WWF1	WWF1	WWF1	WWF1	WWF1	JH01	JH02	JH03	JH04	JH05	JH06	JH07	JH08	JH09	JH010	JH011	JH012	JH013	JH014	JH015	JH016	JH017	JH018	JH019	JH020	JH021	JH022	JH023	JH024	JH025	JH026	JH027	JH028	JH029	JH030	JH031	JH032	JH033
Eragrostis lacunaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptocarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptostachya	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	2	0	0	10	0	0	0	0	5	0	0	10	10	0	0	0	0	5	5
Eragrostis pilosa	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis trachycarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium cicutarium	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium moschatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus acaciiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus andrewsii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus blakelyi	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	10	0	0	0	8	0	0	0
Eucalyptus bridgesiana	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus calidissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus caliginosa	0	0	0	0	0	12	15	20	0	0	0	0	0	0	0	0	0	0	15	15	3	15	5	10	0	40	25	0	20	30	0	0	10	5	0	10	0	0
Eucalyptus campanulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus dalrympleana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus elliptica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus fastigata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus laevopinea	0	0	0	0	15	0	0	0	15	15	0	15	40	3	15	0.1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus malacoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus melliodora	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	6	0	0	10	0	0	0	0	0	0	0	0	0	10	0	0	0	0
Eucalyptus michaeliana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nicholii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nobilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nova-anglica	0	0	0	24	0.1	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0
Eucalyptus obliqua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus pauciflora	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata subsp. se	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus stellulata	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus viminalis	0	0	0	0	0	0	1	0	0	0	0	0	0	5	0	15	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus williamsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus youmanii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton involucratus	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton sphaericus	0.2	1	0	0	0	1	0	0	0	0	0.2	0.2	0.2	0.1	0.1	0	0.1	0.1	0	2	0.2	0.2	3	0.2	0	0	0.2	0	0	0	15	20	5	1	1	1	0	3
Euphorbia prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos cupressiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca arundinacea	0	0	0	0	0	70	3	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca nigrescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca spp.	0.2	0.2	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fimbristylis dichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Gahnia sieberiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium binifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leiocarpum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Galium leptogonium	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium murale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium propinquum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gamochaeta coarctata	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	0
Gamochaeta spp.	0.1	0	2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium molle subsp. molle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium solanderi	0.2	0.1	0.1	2	0.1	0	0.2	1	2	0.2	0.5	0	0.2	0.1	0.1	0	0	0.1	0.1	0	0	0.1	0.1	0.1	0	0.2	0	0	0.1	0	0.1	0.1	0	0.2	1	0.2	0	0
Glycine clandestina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0
Glycine microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycine tabacina	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphrena celosioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus elatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus tetragynus	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus teucrioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia bellidifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Goodenia heteromera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia rotundifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grona varians	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0.1	0.1	0	0	0	0.1	0
Hainardia cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis heterophylla	0	0.1	0	0	0	0	0	0	0	0	5	1	0.5	2	0	0	0	0	0.2	0.1	0.1	0	3	0	0	0	0.1	2	0	0	0	0	1	0	0	0.1	1	1
Haloragis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heliotropium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemarthria uncinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia obtusifolia	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia riparia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holcus lanatus	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Hordeum leporinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
hordeum vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hybanthus monopetalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle laxiflora	0	0	0	0	0.1	0	0	2	1	0.1	0	0	0.1	0.2	0.2	1	0.2	0.5	0	0.1	0.1	0.1	0.2	0	0.2	0.1	0	0	0	0	0.1	0.1	0	0	0.1	0	0	0
Hydrocotyle pedicellosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle sibthorpioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Hypericum gramineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0.5	0	0.2	0	0	0	0	0.1
Hypericum japonicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum perforatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris glabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris radicata	0.2	0.1	0.1	0	0	0	0.1	0	0	0.1	0.2	0.1	1	0.5	0	0.2	0.2	0.1	2	0.5	1	0.5	0	0.2	0	1	0	2	1	2	1	0	0	0.5	0.2	0	0.2	5

	WWF1	WWF1	WWF1	WWF1	WWF1	JH01	JH02	JH03	JH04	JH05	JH06	JH07	JH08	JH09	JH010	JH011	JH012	JH013	JH014	JH015	JH016	JH017	JH018	JH019	JH020	JH021	JH022	JH023	JH024	JH025	JH026	JH027	JH028	JH029	JH030	JH031	JH032	JH033
Hypoxis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigofera australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isolepis hookeriana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus alexandri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus australis	0.2	0.1	0	0	0	5	0	0	0.2	0.1	15	0	0	0.1	0	0	0.1	0	30	0.2	0.1	0.1	10	0.1	6	0	0.1	0.1	0.1	0.2	10	0.1	0	0.1	0	2	25	0
Juncus brevibracteus	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus cognatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus filicaulis	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus fockei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus holoschoenus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0
Juncus pauciflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus remotiflorus	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0	0.1	0	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	7	4	0	0	0	0	2	0
Juncus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus subsecundus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus usitatus	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis aemula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis filiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lactuca serriola	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lagenophora stipitata	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0.1	0
Lamium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemna spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leontodon saxatilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium bonariense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium spp.	0.1	0.1	0.1	0.1	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptorhynchos squamatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptospermum gregarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
leptospermum polygalifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea subsp. ser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon lanceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lissanthe strigosa	0	0	0	0	0.3	0	0	0	0	0	0.1	1	0.2	0.1	0.1	0	0.2	0	0.1	3	0.1	0.1	1	0.5	0	0.1	0.2	0	0	8	5	8	15	0	0	0	0	3
Lolium perenne	0.1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Lomandra briggsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra filiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Lomandra longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra multiflora	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0.1	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Lomandra spp.	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomatia fraseri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luzula flaccida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lysimachia arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0
Lythrum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva neglecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marrubium vulgare	0	0	0	0	0	2	0.2	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0
Medicago minima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Medicago polymorpha	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago spp.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus procumbens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus urceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha diemenica	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0.1	0	0	0.1	0	0	0.1	0	0	0.1	0.1	0.1	0	0.1	0	0	0	0	0	0.2	0.1	0.1	0.1	0
Mentha satureioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrantheum ericoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microlaena stipoides	50	58	20	0	40	0.1	25	65	70	5	0	30	50	60	70	80	30	5	0	2	10	40	45	65	0	25	15	75	65	60	0	0	10	60	30	0	15	5
Microseris lanceolata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Modiola caroliniana	0.1	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moenchia erecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myoporum montanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myosotis discolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nassella trichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia alpicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia argophylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia oppositifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia viscidula	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0	0.1	0.2	0	0	0	0.1	2	0	0	0.1	0	8	15	0	0	0	0	0	0	0	0	0	0	0
Onopordum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia diphylla	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia hispida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreomyrrhis eriopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis perennans	0	0.1	0.1	0	0.1	0	0.1	0.1	0	0	0.2	0	0.1	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0.1	0.1	0	0	0
Oxalis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum decompositum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum effusum	3	2	20	10	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum simile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Panicum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paronychia brasiliana	0.2	0.1	0	0.1	0.3	0	0	0	0.1	0.2	0	0	0	0	0.1	0	0.5	0	0	0	0	0	0	0.1	0.1	0.2	2	0	0	0	0	0	0	1	0.2	1	0.2	0
Paspalidium distans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paspalum dilatatum	0.1	0.1	0	0	0	0	0	0	0	0.1	0.5	0	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0.1	0.2	0.1	0.2	0	0	0	0	0	0	0	0	0	0
Paspalum distichum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	WWF1	WWF1	WWF1	WWF1	WWF1	JH01	JH02	JH03	JH04	JH05	JH06	JH07	JH08	JH09	JH010	JH011	JH012	JH013	JH014	JH015	JH016	JH017	JH018	JH019	JH020	JH021	JH022	JH023	JH024	JH025	JH026	JH027	JH028	JH029	JH030	JH031	JH032	JH033
Pellaea calidirupium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pennisetum clandestinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria hydropiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petrorhagia nanteuilii	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phalaris aquatica	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Phyllanthus virgatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phytolacca octandra	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0
Pimelea curviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0.1
Pimelea linifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea simplex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea strigosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Plantago gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago lanceolata	0.5	0.1	0	0.1	0.4	3	0	0	0	0.1	0.2	0.1	0.1	0.2	0	0.2	0.1	0.1	0.5	0.1	0	0	0	0.3	0.2	1	1	0	1	1	0.2	0	0	0	0	0	0	0
Plantago varia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectranthus graveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa annua	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa labillardierei var. labillar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa pratensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa sieberiana	0	0.1	1	3	1	0	0.2	0.1	0.1	0	1	1	7	2	0	0	1	60	15	50	35	25	5	5	2	10	2	3	1	1	0	0	60	0	0	0	2	20
Polygonum aviculare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum plebeium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poranthera microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulaca filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulala olearae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pratia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prunella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pteridium esculentum	0	0	0	0	0	0	0	5	0	0	0	0	0	5	3	2	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pterostylis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea microphylla	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0
Pultenaea subspicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pyrrosia rupestris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus inundatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus lappaceus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapistrum rugosum	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Romulea rosea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rorippa laciniata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa rubiginosa	0	0	0	0	0.2	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rostellularia adscendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus anglocandicans	0	0	0	0	0.7	0	0	0	0	0	0	0	0	20	5	0.1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Rubus parvifolius	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rumex acetosella	0	0	0	0	0	0.5	0	1	0	0.1	1	0	0.1	0.1	0.2	0.2	2	0	0.5	0	0	0.1	2	0.5	3	4	10	0	0	0	1	0	0	0	0	0	0	0
Rumex brownii	0	0.1	0	0	0	0.1	0.1	0	0.1	0.1	0.1	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0.1	0.1	0.1	0.1
Rumex crispus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma caespitosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma indutum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma laeve	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	0	0	0	0	0	0	0	0	0
Rytidosperma pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma pilosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma racemosum	0	0	0	0	0	0	0.1	0	2	0	0	0.1	0	0.1	0.1	0	0	0	0.1	0	0.2	1	0.2	1	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma richardsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma tenuius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sanguisorba minor subsp. m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scaevola hookeri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus spp.	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus validus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenus apogon	0	0	0	0	0	0.2	0.1	0	0	0.1	0.5	0.1	0.2	0	0.1	0	0.3	0	2	0	0	0	2	0	0.1	0	0.5	1	1	0	5	5	1	3	0	0	1	2
Scleranthus biflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus sp. Fitzs Hill	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0.1	0	0	0.2	0	0.1	0.2	0.1	5	0	0	3	0	1	0	0	0	0	0.1	0	0	0	0	0
Scleranthus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scutellaria humilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Secale cereale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio bipinnatisectus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio diaschides	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Senecio lautus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio madagascariensis	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio minimus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio prenanthoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio quadridentatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria pumila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	WWF1	WWF1	WWF1	WWF1	WWF1	JH01	JH02	JH03	JH04	JH05	JH06	JH07	JH08	JH09	JH010	JH011	JH012	JH013	JH014	JH015	JH016	JH017	JH018	JH019	JH020	JH021	JH022	JH023	JH024	JH025	JH026	JH027	JH028	JH029	JH030	JH031	JH032	JH033
Sigesbeckia orientalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Silene spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silybum marianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium rosulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smilax australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum amblymerum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum americanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum neoanglicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum nigrum	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0.1	0.2	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Solanum opacum	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum prinophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum pungetium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum semiarmatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum vicinum	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0.2	0	0	0.1	0.1	0	0.1	0	0	0	0	0	0	0	0	0
Solenogyne bellioides	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenogyne gunnii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soliva sessilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus asper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus oleraceus	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0	0	0	0	0	0.1	0.1	0.1	0	0
Sorghum leiocladum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sporobolus creber	0	15	10	10	12	0	0	0	0	0	0	25	4	0.1	10	0	0	10	8	20	0	0	5	0	10	0	0	5	0	0	30	30	10	0	2	2	25	50
Stachys arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stackhousia viminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria angustifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria media	0	0	0	0	0	0	3	6	5	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	4	3	0	1	0	0	0	0	0	0	0	0	0
Stellaria pungens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stylidium graminifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swainsona galegifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tagetes minuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taraxacum officinale	0.1	0	0	0.2	0.1	2	0	0.1	0.1	0	0	0	0.1	0	0.1	0	0.1	0.1	0	0	0	0	0	0.1	0.1	0	0.1	0	0.1	0.1	0	0	0	0	0.1	0.1	0	0
Themeda triandra	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Thysanotus tuberosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tragopogon porrifolius subsp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribulus micrococcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Trifolium pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium repens	0	0	0	0	0	5	1	0	0	15	3	0	0.1	1	1	1	1	1	1	0.5	0	0	0.1	0	1	0.2	0	0	0	0	10	15	2	0	1	0.1	2	1
Trifolium spp.	5	5	1	7	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tripogon loliiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica incisa	0	0	0	0	0	0	15	10	25	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	2	2	0	0	0	0	0	0	0	0.1	0.1	0	0
Urtica urens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum thapsus	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum virgatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbena bonariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica calycina	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0
Veronica derwentiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica plebeia	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viburnum tinus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia sativa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia villosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola betonicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia cuneata	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia muelleri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia sulcata	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia myuros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia spp.	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia communis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilenta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia luteola	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia multicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia planiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia spp.	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wurmbea dioica subsp. dioic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthium occidentale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea johnsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthosia pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xerochrysum bracteatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH034	JH035	JH036	JH037	JH038	JH039	JH040	JH041	JH042	JH043	JH044	JH045	JH046	JH047	JH048	JH049	JH050	JH051	JH052	JH053	JH054	JH055	JH056	JH057	JH058	JH059	JH060	JH061	JH062	JH063	JH064	JH065	JH066
Abildgaardia ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia dealbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia deanei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falciformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia filicifolia	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia implexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia leiocalyx	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia rubida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia ulicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia venulosa	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena agnipila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena novae-zelandiae	0	0	0	0.1	0	0	1	0.2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena ovina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetosella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adiantum aethiopicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aira spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ajuga australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocasuarina littoralis	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alternanthera denticulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amaranthus powellii	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0
Ammi majus	0	0	0	0.1	0	2	5	0	0	0	0	0	0	0	1	10	1	2	5	10	0	0	0	7	0	0	0	0	0	0	0	0	0
Ammobium alatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	3	0.1	0.1	0	0	0	0.2	0	0
Amyema miquelii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0.1	0
Amyema pendulum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anagallis arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andropogon virginicus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angophora floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthosachne scabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthoxanthum odoratum	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida jerichoensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida personata	0	0	0	20	1	1	0	0	0	0	0	30	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0.1	0	5	0
Aristida ramosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida vagans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropodium milleflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asperula conferta	10	2	0	0	0	0.2	0	0.1	5	4	0	0	10	5	6	3	2	7	0	0	0	0.1	0	2	0	2	1	1	0	0	0	0	0
Asplenium flabellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asplenium flavellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa bigeniculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa densiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa nodosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
Austrostipa ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa rudis	0	0	0	2	0	0	0	0.1	0.2	0	0	7	0	0	0	0	0	0	0	0	0	0	3	0	5	2	0	1	0	0.1	5	0	0
Austrostipa scabra	0	0	0	0.2	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axonopus fissifolius	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baloskion stenocoleum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bidens pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Billardiera scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blechnum cartilagineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa decipiens	0	0	0	0.1	0	0.1	0	2	15	10	0	0	0	0	0	0	0	0	0	0	0	0	3	0	5	3	0	0	0	0	0	0	0
Bothriochloa macra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyloma daphnoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome diversifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome graminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome multifida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome scapigera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spathulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brassica rapa	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Briza minor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus brevis	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus catharticus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus diandrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus inermis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulbine bulbosa	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria longisepala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria spinosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0
Caesia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caladenia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneata	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneifolia	0	0	0	0.1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis lappulacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capillipedium parviflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursapastoris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursa-pastoris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine hirsuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine lilacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carduus nutans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.5	0	0
Carex appressa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex echinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH034	JH035	JH036	JH037	JH038	JH039	JH040	JH041	JH042	JH043	JH044	JH045	JH046	JH047	JH048	JH049	JH050	JH051	JH052	JH053	JH054	JH055	JH056	JH057	JH058	JH059	JH060	JH061	JH062	JH063	JH064	JH065	JH066
Carex gaudichaudiana	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex inversa	1	3	7	0	0	0	5	4	5	0	15	0	10	0	2	0	0	0	0	0	0	0	0	0.1	0	1	0	2	0.1	0.1	1	0.3	1
Carex spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia leptocephala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Cassinia quinquefaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus ciliaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus purpurascens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0
Centaurea spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium erythraea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centella asiatica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centipeda cunninghamii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium balearicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium glomeratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Cerastium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilanthes sieberi	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0
Chenopodium album	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenopodium carinatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloris truncata	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Choretrum pauciflorum	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum apiculatum	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum semipappos	0	0	0	10	0	0.1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0
Cichorium intybus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium arvense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium vulgare	0	7	0.5	0	0	0.1	0.1	0.1	5	1	0	0	1	0	4	0.2	0	0	0	0	0.2	3	0.2	0.1	0	0.1	0	0	2	0.1	0.1	0.2	0.1
Clematis aristata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clematis microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conium maculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Convolvulus erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza bonariensis	0.1	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0
Conyza parva	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotula australis	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	1	1	1	0	5
Craspedia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Craspedia variabilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crassula sieberiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.2
Crataegus monogyna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crepis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptandra amara	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclospermum leptophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbonotus lawsonianus	0	0	0	0	0.1	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0.1	0	0.1	1	2	0.2	0.1	0.1	0.1
Cymbopogon refractus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynara cardunculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynodon dactylon	0	0	0	0	3	0	0	0	2	1	0	0	0	0	0	0	0	5	6	5	0	0	0	0	0	1	0	0	0	15	15	0	0
Cynoglossum australe	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Cynosurus echinatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus eragrostis	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0
Cyperus exaltatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Cyperus sphaeroideus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus vaginatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dactylis glomerata	0	0	0	0.2	2	0.2	10	3	0	0	5	0	15	30	2	80	60	45	0	0	90	0.5	0	2	0.5	70	0.2	0	15	60	0	0.1	60
Datura stramonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus carota	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus glochidiatus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Daviesia genistifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Daviesia latifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella caerulea	0	0	0	0.1	0	0	0	0	0	0	0	1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella revoluta	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianthus armeria	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium sericeum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium setosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne crinita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne micrantha	0	0.2	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichondra repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.1	0	0	0	0
Dichopogon fimbriatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichopogon strictus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera peltata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera spatulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania carinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania pumilio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon caespitosus	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Echinopogon ovatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia hastata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0
Einadia nutans	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0.1	0
Einadia polygonoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia trigonos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis acuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis atricha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine tristachya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0
Elymus scaber	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epilobium billardierianum	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0.1	0	0.1	0	0.1	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Eragrostis brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis curvula	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	80	80	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH034	JH035	JH036	JH037	JH038	JH039	JH040	JH041	JH042	JH043	JH044	JH045	JH046	JH047	JH048	JH049	JH050	JH051	JH052	JH053	JH054	JH055	JH056	JH057	JH058	JH059	JH060	JH061	JH062	JH063	JH064	JH065	JH066
Eragrostis lacunaria	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0
Eragrostis leptocarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptostachya	0	0	0	10	0	0	0	0	3	10	0	5	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	5	0	0	0	5	0
Eragrostis pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis trachycarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium cicutarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium moschatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus acaciiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus andrewsii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus blakelyi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
Eucalyptus bridgesiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus calidissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus caliginosa	0	0	0	0	0	0	0	0	0.1	0	0	5	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	3	0	5	0	0	0
Eucalyptus campanulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus dalrympleana	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus elliptica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Eucalyptus fastigata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus laevopinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus malacoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
Eucalyptus melliodora	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	20	5	12	6	0
Eucalyptus michaeliana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nicholii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nobilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nova-anglica	0	5	0	30	0	0	0	15	0	4	0	0	0	5	20	0	0	0	0	0	0	0	0	15	0	25	0	15	0	10	0	0	0
Eucalyptus obliqua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus pauciflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata subsp. se	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus stellulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
Eucalyptus viminalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus williamsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus youmanii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton involucratus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton sphaericus	3	0	1	0	0.5	0.2	0.1	0	0.1	2	1	0	0	0.1	0	0	0	0	0.1	0	0	0.1	0.1	0	2	0	2	1	0	0	0.1	0.1	0
Euphorbia prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos cupressiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca arundinacea	0	30	0	1	0	0.1	30	3	0	0	10	0	15	10	0.1	5	40	30	0	0	10	0	0	0	0	0	0	0	0	0	0	0	15
Festuca nigrescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fimbristylis dichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gahnia sieberiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium binifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leiocarpum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Galium leptogonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium murale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium propinquum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gamochaeta coarctata	0	0	0	0	0	0.1	0	0	0.1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	1	10
Gamochaeta spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium molle subsp. molle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium solanderi	0.1	0.1	0	0	0.1	0	0.1	0	0.1	0.1	0	0	0	1	0.1	0	0	0	0	0	0	0	0.1	0	0.1	0	0.1	0.1	0.1	0	0.1	0.1	0
Glycine clandestina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycine microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Glycine tabacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphrena celosioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus elatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus tetragynus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus teucrioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia bellidifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia hederacea	0	0	0	0.1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia heteromera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia rotundifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grona varians	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0
Hainardia cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis heterophylla	3	0	3	0	1	1	0	0.2	0	0	2	0	3	0	3	0	0	1	0	0	0.1	0	0.1	1	1	0	1	1	0	0	0	0	0
Haloragis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heliotropium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemarthria uncinata	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia obtusifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Hibbertia riparia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holcus lanatus	0.2	0.5	10	0.1	0	0	0	0	0	0	15	0	2	0	0	0	0	0	0	0	0	0	0	0.2	0.1	0	0	0	0	0	0	0	0
Hordeum leporinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
hordeum vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hybanthus monopetalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle laxiflora	0	0	0	0	0	0	0	15	0.1	0	0	0	0	0	2	0	0	0	0	0	0	3	1	0	0	1	0	0.2	0	0	0	0	0
Hydrocotyle pedicellosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle sibthorpioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum gramineum	0.1	0	0	0	8	0.1	0.2	0.1	0.1	0	0	0	0	0	0.1	0	0	0	0	0.2	0	0	0.1	0.1	2	0	0.1	1	0	0	0	0	0
Hypericum japonicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum perforatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris glabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris radicata	0	0	20	0.1	0.1	2	0	0	0	3	0	1	0	0	0	0	0	1	2	2	0	20	1	0	5	0	2	2	0	1	0.2	1	0

	JH034	JH035	JH036	JH037	JH038	JH039	JH040	JH041	JH042	JH043	JH044	JH045	JH046	JH047	JH048	JH049	JH050	JH051	JH052	JH053	JH054	JH055	JH056	JH057	JH058	JH059	JH060	JH061	JH062	JH063	JH064	JH065	JH066
Hypoxis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigofera australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isolepis hookeriana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus alexandri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus australis	15	1	0.1	0	0	0	0	0	1	0	1	0.1	6	1	0.1	1	0	0	1	0	0	55	0	0	0	0.1	0	0.1	0.1	0.1	0	0.1	35
Juncus brevibracteus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus cognatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus filicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus fockei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus holoschoenus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus pauciflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus remotiflorus	1	0	0	0	1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0.1	0	0	0	0	0.1	3
Juncus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus subsecundus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus usitatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis aemula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis filiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lactuca serriola	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lagenophora stipitata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Lamium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemna spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leontodon saxatilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium bonariense	0	1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.5	0	0
Lepidium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptorhynchos squamatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptospermum gregarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
leptospermum polygalifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea subsp. ser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon lanceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lissanthe strigosa	0	0	0	0.1	0.1	0	0	0.2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0.1	0.1	0	2	0	0	0	0	0
Lolium perenne	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra briggsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra filiformis	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Lomandra longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra multiflora	0	0	0	0.1	0	0	0	0	0.1	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0
Lomandra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomatia fraseri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luzula flaccida	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Lysimachia arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Lythrum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva neglecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marrubium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago minima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago polymorpha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus procumbens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus urceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha diemenica	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0
Mentha satureioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrantheum ericoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microlaena stipoides	0	15	5	15	3	0	0	50	20	3	0	5	0	0	15	0	0	0	0	0	0	20	0	0	0	6	5	10	1	5	65	40	1
Microseris lanceolata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Modiola caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Moenchia erecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myoporum montanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myosotis discolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nassella trichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia alpicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia argophylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia oppositifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia viscidula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	15	0	0
Onopordum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia diphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Opercularia hispida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreomyrrhis eriopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis perennans	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0
Oxalis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum decompositum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum effusum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum simile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.1	0
Panicum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paronychia brasiliana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Paspalidium distans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paspalum dilatatum	20	0	2	0.1	4	15	15	2	2	3	35	0	10	1	15	3	10	5	15	10	0	0	0	15	0.1	0	0.2	0	0	0	0.1	0	0
Paspalum distichum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH034	JH035	JH036	JH037	JH038	JH039	JH040	JH041	JH042	JH043	JH044	JH045	JH046	JH047	JH048	JH049	JH050	JH051	JH052	JH053	JH054	JH055	JH056	JH057	JH058	JH059	JH060	JH061	JH062	JH063	JH064	JH065	JH066
Pellaea calidirupium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pennisetum clandestinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria hydropiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petrorhagia nanteuilii	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phalaris aquatica	0	0.1	0	0	0	0	0	0	0	0	0	0	0	5	0	0	10	20	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllanthus virgatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phytolacca octandra	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0	0
Pimelea curviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea linifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0
Pimelea simplex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Pimelea stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea strigosa	0	0	0	0.1	0	1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago lanceolata	5	3	3	0.2	2	3	2	2	0	1	0	0.1	1	0.5	2	0	2	2	7	2	0	2	0	0.2	0.5	2	3	2	4	2	0.1	0	5
Plantago varia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectranthus graveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa annua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa labillardierei var. labillar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa pratensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa sieberiana	10	0.2	0	1	2	25	10	10	15	10	5	10	25	1	15	1	1	15	0	0	0.1	4	35	70	55	7	30	35	0	0	0	0.1	0
Polygonum aviculare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum plebeium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poranthera microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Portulaca filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulala olearae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pratia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prunella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pteridium esculentum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
Pterostylis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Pultenaea subspicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pyrrosia rupestris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus inundatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus lappaceus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapistrum rugosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Romulea rosea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rorippa laciniata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa rubiginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0
Rostellularia adscendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus anglocandicans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus parvifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rumex acetosella	0	0	0	0	0.1	0	0	0	0	0	3	0	7	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0
Rumex brownii	0.2	0.2	0	0	0	0	0	0	0.1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0.1	0	0.1
Rumex crispus	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma caespitosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma indutum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma laeve	0	0	0	0.1	0.1	0.1	0	0.1	0.2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Rytidosperma pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma pilosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma racemosum	0	0	0	0	0	0	0	0.1	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	3	0	0
Rytidosperma richardsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma tenuius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sanguisorba minor subsp. m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scaevola hookeri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus validus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenus apogon	0	1	1	0.2	1	1	0	1	1	1	0	0.1	0	0	3	1	0	0.5	2	0	0	3	0	0	0.2	1	2	1	0.1	0.1	1	0.2	7
Scleranthus biflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus sp. Fitzs Hill	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	0	0	0.1	0	0	0	0	0
Scleranthus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scutellaria humilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Secale cereale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0
Senecio bipinnatisectus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio diaschides	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio lautus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio madagascariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio minimus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio prenanthoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio quadridentatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria pumila	0	0	10	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH034	JH035	JH036	JH037	JH038	JH039	JH040	JH041	JH042	JH043	JH044	JH045	JH046	JH047	JH048	JH049	JH050	JH051	JH052	JH053	JH054	JH055	JH056	JH057	JH058	JH059	JH060	JH061	JH062	JH063	JH064	JH065	JH066
Sigesbeckia orientalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silene spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silybum marianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium rosulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smilax australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum amblymerum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum americanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum neoanglicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum nigrum	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0
Solanum opacum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum prinophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum pungetium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum semiarmatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum vicinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.2	0	0
Solenogyne bellioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenogyne gunnii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soliva sessilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus asper	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus oleraceus	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0
Sorghum leiocladum	0	0	0	0	0.1	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Sporobolus creber	2	0	50	10	20	20	0	1	20	50	0	10	0	0	0	0.1	1	0	0	0	0.1	0.1	2	0	10	2	50	5	0	5	0	30	0
Stachys arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stackhousia viminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria angustifolia	10	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Stellaria media	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria pungens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stylidium graminifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swainsona galegifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tagetes minuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taraxacum officinale	0	0.5	0	0	0	0	0	0	3	0.1	0	0	0	0.1	0	0.2	0	0	0	0	0	0	0	0.1	0.1	0.5	0.1	0.1	0.2	0	0	0.1	0
Themeda triandra	0	0	0	5	25	30	20	0	5	0.1	0	1	5	0	0	0	0	5	0.2	25	0	0	0	15	2	0	0	5	0	0	0	0.1	0
Thysanotus tuberosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tragopogon porrifolius subsp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribulus micrococcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Trifolium repens	3	6	20	0.1	0	0	1	0.1	0	0	0	0	0	0	0.1	1	1	0	0	0	10	0	0	0.1	1	0.1	0	0.2	15	10	0.1	0	0.1
Trifolium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tripogon loliiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0
Urtica urens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum thapsus	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0	0	0.1	0.1	0
Verbascum virgatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbena bonariensis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Verbena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica calycina	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0
Veronica derwentiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica plebeia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viburnum tinus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia sativa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia villosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola betonicifolia	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0
Viola hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia cuneata	0	0	0	0.1	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Vittadinia muelleri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Vittadinia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia sulcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
Vulpia myuros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia communis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilenta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia luteola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia multicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia planiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wurmbea dioica subsp. dioic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthium occidentale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea johnsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthosia pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xerochrysum bracteatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH067	JH068	JH069	JH070	JH071	JH072	JH073	JH074	JH075	JH076	JH077	JH078	JH079	JH080	JH081	JH082	JH083	JH084	JH085	JH086	JH087	JH088	JH089	JH090	JH091	JH092	JH093	JH094	JH095	JH096	JH097	JH098	JH099	JH100
Abildgaardia ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia dealbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia deanei	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falciformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia filicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia implexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia leiocalyx	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia rubida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia ulicifolia	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia venulosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena agnipila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena novae-zelandiae	0	0	0	0	0.1	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.5
Acaena ovina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetosella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adiantum aethiopicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aira spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ajuga australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocasuarina littoralis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alternanthera denticulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amaranthus powellii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Ammi majus	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	2	0	0.2	0	0	0	0	0
Ammobium alatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0.1	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0	0	0	2	0	0	0
Amyema miquelii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendula	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendulum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anagallis arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andropogon virginicus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angophora floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthosachne scabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthoxanthum odoratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	20	10	0	0	0	0	0	0	0	0	0
Aristida jerichoensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida personata	0.1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida ramosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida vagans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropodium milleflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asperula conferta	0.1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0.1	0.2	0	0	0.1	0	0
Asplenium flabellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asplenium flavellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa bigeniculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa densiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa nodosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa rudis	0	0.1	20	5	6	10	30	0	2	0	65	0	0.1	0	3	0	0	1	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa scabra	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axonopus fissifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Baloskion stenocoleum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bidens pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Billardiera scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Blechnum cartilagineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa decipiens	10	0	5	0	0	0	0	0	0	30	0	0	0	0	1	2	0	0	3	0	0	15	0	0	0	10	0	0	0	0	5	0	0	0
Bothriochloa macra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyloma daphnoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome diversifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome graminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome multifida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome scapigera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spathulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brassica rapa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Briza minor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus brevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus catharticus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus diandrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus inermis	0	3	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulbine bulbosa	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria longisepala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria spinosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caesia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caladenia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis lappulacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capillipedium parviflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursapastoris	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Capsella bursa-pastoris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine hirsuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine lilacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Carduus nutans	0	0	0	0	5	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	2	0	0	0
Carex appressa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex echinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH067	JH068	JH069	JH070	JH071	JH072	JH073	JH074	JH075	JH076	JH077	JH078	JH079	JH080	JH081	JH082	JH083	JH084	JH085	JH086	JH087	JH088	JH089	JH090	JH091	JH092	JH093	JH094	JH095	JH096	JH097	JH098	JH099	JH100
Carex gaudichaudiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex inversa	0	0	0	0	0	1	1	0	0	0	3	0	1	0	2	1	5	0	8	0	0	0	0	0	10	0	0.1	0	0.3	0	0	1	0	1
Carex spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia leptocephala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia quinquefaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus ciliaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus purpurascens	0	0	0	0	0	0	0	0	3	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0
Centaurea spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium erythraea	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centella asiatica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centipeda cunninghamii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium balearicum	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
Cerastium glomeratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilanthes sieberi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenopodium album	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenopodium carinatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloris truncata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Choretrum pauciflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum apiculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum semipappos	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	5	0	0	0	0	0
Cichorium intybus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium arvense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium vulgare	3	3	2	0.1	0	0.1	0.1	7	0	0	0.1	0	0	0.1	0.5	0	0	0	0	0	0	0	0.1	1	0.1	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Clematis aristata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clematis microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conium maculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Convolvulus erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza bonariensis	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0.1
Conyza parva	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Conyza spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotula australis	0.1	2	0	0	0	0	0	0	1	2	0	0	0	0	0.1	1	0	0	0	0	0	0	1	0.2	0	0	0	0	0	0.1	0.1	0	0	0
Craspedia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Craspedia variabilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crassula sieberiana	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0
Crataegus monogyna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.1	0	0	0	0	0
Crepis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptandra amara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclospermum leptophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbonotus lawsonianus	0.1	0	0.1	0.1	0.1	0.2	0.1	0	0.1	0	0.1	0	0	0	0.1	0.5	0	0	0	0	0	0	0.1	0	0.2	0.1	0	0	0	1	1	0	0	0
Cymbopogon refractus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynara cardunculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynodon dactylon	0	0	0	0	0	0	0	0	0	5	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Cynoglossum australe	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Cynosurus echinatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus eragrostis	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0	0	0	0	0	0	0	0.1	0.2	0	0	0	0	0	0.1	0	0	0	0
Cyperus exaltatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Cyperus sphaeroideus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus vaginatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dactylis glomerata	0.1	0	10	15	3	6	2	80	0	0	10	80	50	55	2	10	85	65	15	50	0	0	20	0	0	0.1	10	50	0	10	10	40	0	35
Datura stramonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus carota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus glochidiatus	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Daviesia genistifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia latifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella caerulea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0
Dianella longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella revoluta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0
Dianella spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianthus armeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium sericeum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium setosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne crinita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne micrantha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichondra repens	0	0	0	0	0.1	0.2	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Dichopogon fimbriatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichopogon strictus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera peltata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera spatulata	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania carinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania pumilio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon caespitosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon ovatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia hastata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia nutans	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia polygonoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia trigonos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis acuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis atricha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine tristachya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	8	6	0	0	0
Elymus scaber	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Epilobium billardierianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Eragrostis brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis curvula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0

	JH067	JH068	JH069	JH070	JH071	JH072	JH073	JH074	JH075	JH076	JH077	JH078	JH079	JH080	JH081	JH082	JH083	JH084	JH085	JH086	JH087	JH088	JH089	JH090	JH091	JH092	JH093	JH094	JH095	JH096	JH097	JH098	JH099	JH100
Eragrostis lacunaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptocarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptostachya	0	0	0	0	0	0.1	0	0	10	0	2	0	0	1	0	0	0	0	2	0	5	7	0	0	0	10	0	0	0	2	0	0	0	0
Eragrostis pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis trachycarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium cicutarium	0	3	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0	0	0
Erodium moschatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus acaciiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Eucalyptus andrewsii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus blakelyi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus bridgesiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus calidissima	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus caliginosa	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus campanulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus dalrympleana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	10
Eucalyptus elliptica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus fastigata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus laevopinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus malacoxylon	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus melliodora	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus michaeliana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nicholii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nobilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nova-anglica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0
Eucalyptus obliqua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus pauciflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Eucalyptus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	40
Eucalyptus radiata subsp. se	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus stellulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus viminalis	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
Eucalyptus williamsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Eucalyptus youmanii	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton involucratus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton sphaericus	3	0	0.2	0	0	0	0	0	1	0	0	0	1	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Euphorbia prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos cupressiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca arundinacea	0	8	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	10	70	0	0	0	70	0	0	0	60	5	0
Festuca nigrescens	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fimbristylis dichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gahnia sieberiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium binifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leiocarpum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leptogonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium murale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium propinquum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gamochaeta coarctata	0.1	0	0	0.1	0	0.1	2	0	20	2	0.1	0	3	0	1	2	0	0	0	0	0	0	0.1	0	0	1	0	0	0	0	0	0	0	0
Gamochaeta spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium molle subsp. molle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium solanderi	2	1	1	0.2	2	0.5	1	0	0	2	0	0	0	0	0.1	0.2	0	0	0	0	0	0	1	0.1	0	0	0	0	0.1	0.2	0.2	0	0	0.5
Glycine clandestina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycine microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Glycine tabacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphrena celosioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus elatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus tetragynus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus teucrioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia bellidifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia heteromera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia rotundifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Grona varians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hainardia cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis heterophylla	0	0	0	1	0	0	0	0	0	0	1	0	0.3	2	0.1	3	0	0	10	2	0	0	0	0	15	1	10	0	0	0.2	0	0	0	0
Haloragis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Heliotropium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemarthria uncinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia obtusifolia	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia riparia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holcus lanatus	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	50	1	0.1	0	0	5	0	0	0	0	0	0
Hordeum leporinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
hordeum vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hybanthus monopetalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle laxiflora	0.3	1	0	0.1	1	1	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.1	0	0	0.1	0
Hydrocotyle pedicellosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle sibthorpioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum gramineum	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0.2	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Hypericum japonicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum perforatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
Hypochaeris glabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris radicata	2	2	3	0.5	0	0	0.2	3	3	0	3	0	4	2	0	0.5	0	0	3	0	0	0	1	0.2	0.3	1	2	0	0.2	4	1	1	0.2	1

	JH067	JH068	JH069	JH070	JH071	JH072	JH073	JH074	JH075	JH076	JH077	JH078	JH079	JH080	JH081	JH082	JH083	JH084	JH085	JH086	JH087	JH088	JH089	JH090	JH091	JH092	JH093	JH094	JH095	JH096	JH097	JH098	JH099	JH100
Hypoxis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigofera australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isolepis hookeriana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus alexandri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus australis	1	0	15	1	0	0	0	0	0	0	8	0	4	2	0.3	0	0	0	15	20	0	0	20	5	0.2	2	0	0.1	0	1	0	2	0	0.1
Juncus brevibracteus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus cognatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus filicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus fockei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus holoschoenus	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus pauciflorus	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus remotiflorus	0	0	0	0.1	0	0.1	0	0	0	0	0.5	0	0	0.3	1	0.1	10	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus subsecundus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus usitatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis aemula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis filiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lactuca serriola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lagenophora stipitata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lamium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemna spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leontodon saxatilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium bonariense	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptorhynchos squamatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptospermum gregarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
leptospermum polygalifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea subsp. ser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon lanceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
Lissanthe strigosa	0	0	1	0.1	0	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Lolium perenne	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra briggsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra filiformis	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Lomandra longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra multiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomatia fraseri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Luzula flaccida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Lysimachia arvensis	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Lythrum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva neglecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marrubium vulgare	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago minima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago polymorpha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Medicago spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus procumbens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus urceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha diemenica	0.1	0	0	0	0.2	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha satureioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrantheum ericoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microlaena stipoides	30	40	60	70	70	60	70	0	5	10	30	0	0	0	65	65	0	5	3	8	35	10	15	0	10	40	0	0	0	30	15	0	40	25
Microseris lanceolata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Modiola caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0
Moenchia erecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myoporum montanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myosotis discolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nassella trichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia alpicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia argophylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Olearia oppositifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Olearia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia viscidula	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0
Onopordum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia diphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia hispida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreomyrrhis eriopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis perennans	0.1	0.1	0.1	0.1	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0.1	0	0	0
Oxalis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum decompositum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum effusum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum simile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paronychia brasiliana	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0
Paspalidium distans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paspalum dilatatum	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	35	3	0	0	2	0	0.1	0	0	0	0	0.1	0.2	1	1	1
Paspalum distichum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0

	JH067	JH068	JH069	JH070	JH071	JH072	JH073	JH074	JH075	JH076	JH077	JH078	JH079	JH080	JH081	JH082	JH083	JH084	JH085	JH086	JH087	JH088	JH089	JH090	JH091	JH092	JH093	JH094	JH095	JH096	JH097	JH098	JH099	JH100
Pellaea calidirupium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pennisetum clandestinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria hydropiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petrorhagia nanteuilii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Phalaris aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.1	0	0	0	0	0
Phyllanthus virgatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phytolacca octandra	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
Pimelea curviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea linifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea simplex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea strigosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago gaudichaudii	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago lanceolata	0	0	0.1	1	2	1	0.1	0	0	0	0	0	0	0.2	3	1	0	5	1	0	0	0	0	0.5	1	1	2	0	0	3	1	0	0	0
Plantago varia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectranthus graveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa annua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	2	0	0
Poa labillardierei var. labillar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa pratensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa sieberiana	55	0	10	0	0	2	0	0	2	0	0	0	0.1	0	0	0	0	3	10	0	0	0	0	0	70	1	3	2	25	0	1	0.1	10	5
Polygonum aviculare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum plebeium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poranthera microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulaca filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulala olearae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pratia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prunella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pteridium esculentum	0	0	0	6	3	0	1	0	10	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Pterostylis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea subspicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pyrrosia rupestris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus inundatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus lappaceus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapistrum rugosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Romulea rosea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rorippa laciniata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa rubiginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rostellularia adscendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus anglocandicans	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	3	0
Rubus parvifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	2	0
Rumex acetosella	0.1	0	0.1	0.1	0.1	0	0.1	5	0	2	2	0	0	0.5	1	0.1	0	0	0.2	2	0	0	0.1	1	0.3	0.1	0	0	0	2	8	1	0	0.2
Rumex brownii	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0.1	0	0	0.1	0	0	0.1	0
Rumex crispus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma caespitosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma indutum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma laeve	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma pilosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma racemosum	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma richardsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma tenuius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sanguisorba minor subsp. m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scaevola hookeri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus validus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenus apogon	15	7	10	1	6	0	2	1	5	2	1	0	6	5	2	10	0	0	0	10	0	0	10	3	2	1	1	0	0.1	10	7	2	0	0
Scleranthus biflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus sp. Fitzs Hill	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Scleranthus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scutellaria humilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Secale cereale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio bipinnatisectus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Senecio diaschides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3
Senecio lautus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio madagascariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio minimus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio prenanthoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio quadridentatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria pumila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH067	JH068	JH069	JH070	JH071	JH072	JH073	JH074	JH075	JH076	JH077	JH078	JH079	JH080	JH081	JH082	JH083	JH084	JH085	JH086	JH087	JH088	JH089	JH090	JH091	JH092	JH093	JH094	JH095	JH096	JH097	JH098	JH099	JH100
Sigesbeckia orientalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silene spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silybum marianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium rosulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smilax australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum amblymerum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum americanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum neoanglicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum nigrum	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0
Solanum opacum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum prinophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum pungetium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum semiarmatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum vicinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
Solenogyne bellioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenogyne gunnii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soliva sessilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus asper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus oleraceus	0	3	0	0.1	0	0.1	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorghum leiocladum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Sporobolus creber	0	0	0	0	15	10	5	0.1	40	35	0	0	35	15	20	10	10	0	30	5	15	60	0	0	0	30	0	0	0.2	3	10	0.2	0	0
Stachys arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stackhousia viminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria angustifolia	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria media	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0.1	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0
Stellaria pungens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stylidium graminifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swainsona galegifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tagetes minuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taraxacum officinale	0.1	0.1	0	0	0.1	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	0	0	0	0	2	0	0	0	0
Themeda triandra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	35	0.1	70	0	0	0	0.2	0
Thysanotus tuberosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tragopogon porrifolius subsp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribulus micrococcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium repens	0.2	2	0.1	2	2	0	1	20	0	0	2	10	0	20	0.1	1	0	15	0	0	0	0	15	20	0	0	0	0	0	2	20	3	0	1
Trifolium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tripogon loliiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica incisa	0.1	0.1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0
Urtica urens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum thapsus	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0
Verbascum virgatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Verbena bonariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0
Verbena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica calycina	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica derwentiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Veronica gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica plebeia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viburnum tinus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia sativa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia villosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Viola betonicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	3
Viola hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia cuneata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia muelleri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia sulcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia myuros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia communis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilenta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia luteola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia multicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia planiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wurmbea dioica subsp. dioic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthium occidentale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea johnsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Xanthosia pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xerochrysum bracteatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH101	JH102	JH103	JH104	JH105	JH106	JH107	JH108	JH109	JH110	JH111	JH112	JH113	JH114	JH115	JH116	JH117	JH118	JH119	JH120	JH121	JH122	JH123	JH124	MA01	MA02	MA03	MA04	MA05	MA06	MA07	MA08	MA09	MA10
Abildgaardia ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia dealbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia deanei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	6	30	0	0	0	0	0	0	0	0	0	0
Acacia falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falciformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia filicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia implexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia leiocalyx	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia rubida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia ulicifolia	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia venulosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena agnipila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena novae-zelandiae	0	0.1	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0.1	0	0	0	0	0	0	0.3	2	2	0	0	0.1	0	0	0	0.2	0.2	0	0	0
Acaena ovina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acaena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetosella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adiantum aethiopicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aira spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ajuga australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocasuarina littoralis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Alternanthera denticulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amaranthus powellii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammi majus	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammobium alatum	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0.2	0	4	1	0	0	0	0	0	0	0	0	0	0.1
Amyema miquelii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema pendula	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0
Amyema pendulum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amyema spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anagallis arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0
Andropogon virginicus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0
Angophora floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthosachne scabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthoxanthum odoratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida jerichoensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida personata	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida ramosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida vagans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropodium milleflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asperula conferta	2	2	0	0	0	0	1	0.5	0	0	0.1	0.1	0	0	0	3	0	1	0	0	0.1	0	0	0	0	0	0.1	0	0	0.1	0	0	0.5	0
Asplenium flabellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asplenium flavellifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa bigeniculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa densiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa nodosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa rudis	0	0	20	20	20	0	0	1	0	5	0	0	0	0	0	0	10	0	0	0	0	0	10	25	0	0	0	0	0	0	0	0	0	0
Austrostipa scabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axonopus fissifolius	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baloskion stenocoleum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bidens pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0
Billardiera scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Blechnum cartilagineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa decipiens	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Bothriochloa macra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyloma daphnoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome diversifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome graminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome multifida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome scapigera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spathulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachyscome spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brassica rapa	0	0	0	0	0	0	0	0	0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Briza minor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus brevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus catharticus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Bromus diandrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus inermis	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0
Bulbine bulbosa	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria longisepala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria spinosa	0	0	0.1	2	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caesia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caladenia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis cuneifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis lappulacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capillipedium parviflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursapastoris	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1
Capsella bursa-pastoris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine hirsuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardamine lilacina	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Carduus nutans	0	0	0	0	0	0	0	0	7	6	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Carex appressa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex echinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH101	JH102	JH103	JH104	JH105	JH106	JH107	JH108	JH109	JH110	JH111	JH112	JH113	JH114	JH115	JH116	JH117	JH118	JH119	JH120	JH121	JH122	JH123	JH124	MA01	MA02	MA03	MA04	MA05	MA06	MA07	MA08	MA09	MA10
Carex gaudichaudiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex inversa	10	0	0	0.5	2	3	0.1	1	1	0	0	0	0.2	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0.2	0.2	0.5	0
Carex spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia leptocephala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassinia quinquefaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus ciliaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus purpurascens	0	0	0	0	0	0	0	0	0	0	10	0	0	0.5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurea spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium erythraea	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Centaurium spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centella asiatica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centipeda cunninghamii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium balearicum	0	0	0	0	0	0.2	0	0	0.1	0	0.1	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastium glomeratum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0
Cerastium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilanthes sieberi	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenopodium album	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenopodium carinatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloris truncata	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Choretrum pauciflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum apiculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum semipappos	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Cichorium intybus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium arvense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium vulgare	0.1	0	0.1	0.1	0	1	2	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1	0.2	0.5	0.5	0.5	0.1	0	0.1	0	0	0.2	0.2	0.1	0	0	0.1	0	0.2	0.2	0
Clematis aristata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clematis microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conium maculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0.1
Convolvulus erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza bonariensis	0	0.1	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Conyza parva	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conyza spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotula australis	0	0	0.1	0	0	0.1	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0
Craspedia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Craspedia variabilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crassula sieberiana	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crataegus monogyna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crepis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptandra amara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclospermum leptophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbonotus lawsonianus	0	0	0.5	0	0	0.2	0.1	1	0	0.1	0.1	0	0	0.1	0	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0.5	0.1
Cymbopogon refractus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynara cardunculus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynodon dactylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0
Cynoglossum australe	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.2	0	0	0	0.1	0	0	0	0	0	0	0	0
Cynosurus echinatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus eragrostis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus exaltatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus sphaeroideus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus vaginatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dactylis glomerata	15	0.1	2	0	0	0	20	20	20	3	0	0	3	5	35	3	0.1	0.1	0.1	5	0.1	10	60	40	0	0	60	5	70	0	0	0	0	40
Datura stramonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus carota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daucus glochidiatus	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia genistifolia	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia latifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella caerulea	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianella longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Dianella revoluta	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Dianella spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dianthus armeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium sericeum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium setosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne crinita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichelachne micrantha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichondra repens	0	0.1	0	0.2	0	0	0	0.1	0	0	0	1	1	1	0	0	0.1	0	0.1	0	0	1	0	0	0.1	3	0	0	0	1	0	0	0.5	0
Dichopogon fimbriatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichopogon strictus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera peltata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera spatulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania carinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania pumilio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon caespitosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Echinopogon ovatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia hastata	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.3	0.2	0	0	0	0	0	0	0	0
Einadia nutans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia polygonoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia trigonos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis acuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis atricha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleusine tristachya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elymus scaber	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Epilobium billardierianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis curvula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	10	0	0

	JH101	JH102	JH103	JH104	JH105	JH106	JH107	JH108	JH109	JH110	JH111	JH112	JH113	JH114	JH115	JH116	JH117	JH118	JH119	JH120	JH121	JH122	JH123	JH124	MA01	MA02	MA03	MA04	MA05	MA06	MA07	MA08	MA09	MA10
Eragrostis lacunaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptocarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis leptostachya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Eragrostis pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis trachycarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium cicutarium	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium moschatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus acaciiformis	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	10	0	7	0	0	0	0	0	0	0	0	0	0
Eucalyptus andrewsii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus blakelyi	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
Eucalyptus bridgesiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus calidissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus caliginosa	0	0	0	15	0	0	0	0	0	10	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0
Eucalyptus campanulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus dalrympleana	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	25	0	0	0	0
Eucalyptus elliptica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	0	0	0	0	0	0	0
Eucalyptus fastigata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus laevopinea	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus malacoxylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus melliodora	0	10	0	5	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0
Eucalyptus michaeliana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nicholii	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Eucalyptus nobilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus nova-anglica	0	0	0	0	0	0	10	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus obliqua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus pauciflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus radiata subsp. se	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus stellulata	0	0	0	0	0	0	0	0	0	0	0	20	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus viminalis	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus williamsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus youmanii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton involucratus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton sphaericus	0	0	1	1	1	1	3	0.3	0	0	4	0.2	0.2	0	0	0.1	0	0	0	1	0.1	0	0.2	0	0	0	0	0	0	0	0	0	0	0
Euphorbia prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos cupressiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0
Festuca arundinacea	0	0	0	0	0	0	0	0	30	30	0	6	0	0	0	0	0	0	0	0	0	55	0	5	0	0	5	20	0	0	2	0	0	0
Festuca nigrescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0
Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Festuca spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fimbristylis dichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gahnia sieberiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium binifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium gaudichaudii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leiocarpum	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium leptogonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Galium murale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium propinquum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gamochaeta coarctata	0	0	3	0	0	4	1	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0	0.1	0	0.1	0.2	0
Gamochaeta spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium molle subsp. molle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geranium solanderi	0	0.2	0.1	1	0	0.1	1	0.3	2	1	0	0.2	0.2	0	0	0	2	0	0.2	0	0	0	1	0	0.2	0.2	0	0	0	0	0	0.1	0	0.3
Glycine clandestina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Glycine microphylla	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycine tabacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphrena celosioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus elatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus tetragynus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus teucrioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia bellidifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia heteromera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia rotundifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grona varians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Hainardia cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haloragis heterophylla	8	0.5	0	0.2	0.1	0	0.1	0	0	0	2	0	0.1	0	0	5	0.1	2	0	8	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Haloragis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Heliotropium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemarthria uncinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia obtusifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia riparia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holcus lanatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.2	0	0	0	3	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0
Hordeum leporinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
hordeum vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hybanthus monopetalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle laxiflora	0	0.3	0	0.1	0	1	0.1	0	0	0.3	0	0.1	0	0.2	0	0.2	0.2	0	0.1	0	0	1	0	0	0.2	0.2	0	0	0	3	0	0	0	0
Hydrocotyle pedicellosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle sibthorpioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum gramineum	0.1	0	0	0.1	0.1	0	0	0	0	0	0.1	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum japonicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum perforatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1	0	0	0
Hypochaeris glabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Hypochaeris radicata	0	0.3	0	0	1	2	1	0.1	0	0	0.5	0.2	0.3	1	0	0.1	0	2	0	2	0.3	0	1	5	0	0.2	0.2	2	1	0	0.2	5	1	1

	JH101	JH102	JH103	JH104	JH105	JH106	JH107	JH108	JH109	JH110	JH111	JH112	JH113	JH114	JH115	JH116	JH117	JH118	JH119	JH120	JH121	JH122	JH123	JH124	MA01	MA02	MA03	MA04	MA05	MA06	MA07	MA08	MA09	MA10
Hypoxis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigofera australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isolepis hookeriana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus alexandri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus australis	0.1	0	0	0	0	1	7	0.1	2	0	0	0.1	0.5	0	25	10	0	0.1	0.1	70	0	0	0	0	0.1	0	0.3	0.4	0	0	0.2	0.1	0.3	0
Juncus brevibracteus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus cognatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus filicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus fockei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus holoschoenus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	20	0	0	0	0	0
Juncus pauciflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	30	0
Juncus remotiflorus	0.2	0	0	0	0.1	0.2	0	0	0	0	0.1	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus subsecundus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus usitatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis aemula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis filiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lactuca serriola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lagenophora stipitata	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lamium amplexicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemna spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leontodon saxatilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidium bonariense	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Lepidium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptorhynchos squamatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptospermum gregarium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
leptospermum polygalifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lespedeza juncea subsp. ser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon lanceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lissanthe strigosa	0	3	0.1	0.1	8	0.1	0	0	0	0	0.1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Lolium perenne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0
Lomandra briggsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra filiformis	0	1	0	0	0.1	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra longifolia	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra multiflora	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0
Lomandra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomatia fraseri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luzula flaccida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Lysimachia arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lythrum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva neglecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malva parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marrubium vulgare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Medicago minima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago polymorpha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3
Medicago spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus procumbens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melichrus urceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha diemenica	0	0.3	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mentha satureioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrantheum ericoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microlaena stipoides	10	30	0	40	30	70	30	40	35	60	15	70	70	70	10	25	70	60	20	10	0	50	25	20	85	20	2	0	0	70	0	0	0	0
Microseris lanceolata	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Modiola caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
Moenchia erecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myoporum montanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myosotis discolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nassella trichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia alpicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia argophylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia erubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia oppositifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia viscidula	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	2	0	0	0	0	0	0.1	5	0	0	0	0	0	0	0	0
Onopordum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia diphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia hispida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreomyrrhis eriopoda	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis exilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxalis perennans	0	0.1	0	0.1	0	0.1	0	0	0	0	0	0	0.5	0.5	0	0	0.5	0.1	0.1	0.1	0	0	0	0	0	0.1	0	0	0	0.3	0	0	1	0
Oxalis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum decompositum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum effusum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum simile	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paronychia brasiliana	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Paspalidium distans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paspalum dilatatum	10	0.1	0	0	1	0	5	0	2	0	0	0	0.2	0	2	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	1	1	20	0	0
Paspalum distichum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH101	JH102	JH103	JH104	JH105	JH106	JH107	JH108	JH109	JH110	JH111	JH112	JH113	JH114	JH115	JH116	JH117	JH118	JH119	JH120	JH121	JH122	JH123	JH124	MA01	MA02	MA03	MA04	MA05	MA06	MA07	MA08	MA09	MA10
Pellaea calidirupium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pennisetum clandestinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria hydropiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petrorhagia nanteuilii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Phalaris aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllanthus virgatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phytolacca octandra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0.2	0.1	0	0	0	0	0	0	0	0
Pimelea curviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea linifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea simplex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea strigosa	0	0.1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinus radiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago gaudichaudii	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago lanceolata	1	0.5	1	0	0	1	0	1	0.2	0	0	0	0	0	0	1	0	1	0.2	0	1	0	1	0	0.2	0	0	0.3	0	0.2	0.2	0	0.1	0.3
Plantago varia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectranthus graveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa annua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Poa labillardierei var. labillar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa pratensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa sieberiana	65	50	10	8	10	20	7	7	0	3	10	0	15	20	10	10	0	10	0	0	15	0	5	5	0.2	5	0.2	20	0	0	0	0	5	0
Polygonum aviculare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum plebeium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polygonum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poranthera microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulaca filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portulala olearae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pratia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prunella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pteridium esculentum	0	0	0	0.1	0	0	0	0	0	0.1	0	1	0.5	0.5	0.1	0	6	0	0	0	0	3	12	5	0	0	0	0	0	0	0	0	0	0
Pterostylis spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea subspicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pyrrosia rupestris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus inundatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus lappaceus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapistrum rugosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Romulea rosea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.5	0	0
Rorippa laciniata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa rubiginosa	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0	0	0
Rostellularia adscendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus anglocandicans	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0.5	0	0	0	0	0	10	1	0	0	0	0	0	0	0.2	0	0	0	0
Rubus parvifolius	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0.1	0	0
Rumex acetosella	0	0	0	0.1	0	0	0	1	0	1	0	0.3	0.2	0.3	0	0	0	0.1	0	0	0	0	0.1	0	0	0.1	0.2	0	0	0	0.3	0.1	0	0
Rumex brownii	0	0	0	0	0	0	0.1	0	0.1	0	0.1	0	0	0	0	0.1	0	0.1	0.3	0	0	0	0	0	0.2	0.2	0	0	0	0	0	0	0.1	0
Rumex crispus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0.1	0.1	0	0.1
Rytidosperma caespitosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma indutum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma laeve	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0
Rytidosperma pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Rytidosperma pilosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma racemosum	0	0.1	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma richardsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rytidosperma tenuius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sanguisorba minor subsp. m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scaevola hookeri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenoplectus validus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenus apogon	5	0	15	0	1	3	5	4	1	1	20	0	0	0	10	40	2	6	2	12	0	0	0.1	0.2	0	0	0	0	0	0	0	0	0	0
Scleranthus biflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus sp. Fitzs Hill	0	1	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleranthus spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scutellaria humilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Secale cereale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Senecio bipinnatisectus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio diaschides	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio lautus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio madagascariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio minimus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0
Senecio prenanthoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio quadridentatus	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Setaria pumila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	JH101	JH102	JH103	JH104	JH105	JH106	JH107	JH108	JH109	JH110	JH111	JH112	JH113	JH114	JH115	JH116	JH117	JH118	JH119	JH120	JH121	JH122	JH123	JH124	MA01	MA02	MA03	MA04	MA05	MA06	MA07	MA08	MA09	MA10
Sigesbeckia orientalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silene spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silybum marianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium rosulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sisyrinchium sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smilax australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum amblymerum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Solanum americanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum neoanglicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum nigrum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	2	0	0	0.2	0	0	0	0	0	0	0	0	0
Solanum opacum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum prinophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum pungetium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum semiarmatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum vicinum	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	1	0	0	0.2	0.1	0	0	0	0	0	0	0	0
Solenogyne bellioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenogyne gunnii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soliva sessilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus asper	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonchus oleraceus	0	0.2	0	0	0	0	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Sorghum leiocladum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sporobolus creber	0.2	1	10	3	15	10	10	20	0	1	40	1	5	0	0	0	7	10	1	1	2	0	0	0	0	0	0	0	0	1	0	10	5	0
Stachys arvensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Stackhousia viminea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria angustifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria media	0	0	0	0	0	0	0	0	0.2	0.2	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0
Stellaria pungens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stylidium graminifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swainsona galegifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tagetes minuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taraxacum officinale	0.1	0	0	0.1	0	0	0.1	0	0.1	0.1	0	0	0.1	0	0	0.1	0.1	0.1	0	0	0	0.1	0	0	0	0	0	0.3	0	0	0	0	0	0.2
Themeda triandra	3	10	0	0	0.1	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	75	0	0	0.1	0	0	0	0.3	0	0	0	0	0	0
Thysanotus tuberosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tragopogon porrifolius subsp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribulus micrococcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium repens	0.2	0.2	15	1	0	1	8	10	5	5	3	1	1	5	7	1	0	1	2	7	0	0	2	0	1	0	0	0.2	1	0.1	0	0.2	5	0
Trifolium spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tripogon loliiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica incisa	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica urens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.1	0	0	0	0	0	0	0	0
Verbascum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbascum thapsus	0	0	0.1	0.1	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0.1	0	0	0	0.1	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0
Verbascum virgatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbena bonariensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verbena spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica calycina	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica derwentiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica plebeia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viburnum tinus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia sativa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia villosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
Viola betonicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Viola hederacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia cuneata	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia muelleri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia sulcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia myuros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia communis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilenta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia luteola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia multicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia planiflora	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wahlenbergia stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wurmbea dioica subsp. dioic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthium occidentale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea johnsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthosia pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xerochrysum bracteatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX C BAM PLOT DATA

plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTre	funHollowt	funLitterCo	funLenFalle	funTreeSte	funTreeSte	funTreeSte	funTreeSte	funTreeSte	funTreeReg	funHighThreatExotic
Text[Maxim	Number	Number wit	Number	Text[Letters, numbers, un	[54 or 55 or 56]			Range in [0	Number	Number	Number	Number	Number	Number	Number wit	Number wit	Number wit	Number wit	Number wit	Number wit	Number	Number	Number wit	Number wit	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	Number with 1 decimal point
WWF060	510	1.48	101	DC_woodland	56	380470	6581932	0	2	0	9	14	0	2	7.3	0	67.2	8.4	0	0.2	0	0	32	0	0	0	0	0	1	0
JH029	510	1.48	101	DC_woodland	56	380222	6585723	193	3	0	6	13	0	1	23	0	69.2	22.3	0	5	3	0	3	43	0	0	0	1	0	0	0
WWF136	510	0.49	101	DC_openwoodland	56	355729	6599109	0	1	0	4	5	0	0	13	0	46.1	1.8	0	0	1	0	44	0	1	0	0	0	1	0	2
WWF138	510	0.49	101	DC_openwoodland	56	355964	6599427	0	1	2	7	9	0	2	8	0.3	72	5.4	0	1.1	83	2	26	3	0	0	1	1	0	0	0.9
WWF139	510	0.49	101	DC_openwoodland	56	356040	6599837	0	0	0	5	12	0	1	0	0	39.8	4.3	0	0.1	0	0	44	15	0	0	0	0	0	0	11.1
WWF131	510	13.22	101	DC_mod_grassland	56	355761	6598091	0	0	0	9	3	0	0	0	0	89.9	2.7	0	0	0	0	55	0	0	0	0	0	0	0	0.2
WWF133	510	13.22	101	DC_mod_grassland	56	355742	6598498	0	0	0	8	6	0	0	0	0	88	0.9	0	0	0	0	48	0	0	0	0	0	0	0	0.5
WWF135	510	13.22	101	DC_mod_grassland	56	355732	6599033	180	0	0	7	1	0	0	0	0	41.5	0.1	0	0	0	0	50.2	0	0	0	0	0	0	0	1
JH042	510	5.47	101	LRC_mod_grassland	56	374875	6585092	63	2	0	12	10	0	0	15.1	0	72.5	21.9	0	0	0	0	11.6	0	1	0	0	0	0	0	2
JH050	510	5.47	101	LRC_mod_grassland	56	382032	6579296	156	0	1	2	4	0	0	0	1	1.1	3.2	0	0	0	0	34	0	0	0	0	0	0	0	10.1
JH121	510	5.47	101	LRC_mod_grassland	56	375216	6576728	44	0	1	5	8	1	0	0	0.1	79.1	16	0.1	0	0	0	14	0	0	0	0	0	0	0	0.1
JH037	510	1.35	101	LRC_openwoodland	56	381718	6583497	31	2	4	12	9	0	0	30.1	0.4	63.7	11.7	0	0	0	0	8.8	11.5	1	0	0	1	0	0	0.2
JH106	510	1.35	101	LRC_openwoodland	56	365166	6590881	113	3	1	7	8	0	1	24	0.1	87.3	22.6	0	0.1	1	0	11	3	0	1	1	1	0	0	0
WWF128	510	1.29	101	TL_canopy	56	361791	6593972	325	2	0	4	4	0	0	15	0	40	6.2	0	0	2	2	29	10	0	0	0	1	0	0	5.1
WWF129	510	1.29	101	TL_canopy	56	361433	6593991	0	1	0	9	10	0	0	15	0	62.5	4.2	0	0	1	1	27	25	0	0	0	0	0	0	0.1
WWF130	510	1.29	101	TL_canopy	56	355926	6597869	38	1	0	4	6	0	0	30	0	80	1	0	0	4	3	3.4	73	0	0	1	1	1	0	5
WWF132	510	1.29	101	TL_canopy	56	355834	6598214	0	1	4	12	15	0	0	30	2.7	80.7	9.4	0	0	4	2	39	102	0	0	0	1	1	0	0.1
JH063	510	1.29	101	TL_canopy	56	379638	6582376	9	2	0	8	4	0	1	15	0	25.5	1.4	0	0.1	1	0	17	14.5	0	0	0	1	0	0	0.1
JH108	533	0.06	101	DC_openwoodland	56	370292	6585934	0	1	0	8	8	1	1	15	0	66.3	9.4	0.1	0.1	2	0	3	0	0	0	0	0	0	0	0
WWF112	533	0.49	101	DC_modgrassland	56	370302	6585984	315	0	0	11	5	0	2	0	0	76	1.4	0	0.2	0	0	14	0	0	0	0	0	0	0	0.2
JH107	533	0.08	101	TL_canopy	56	370248	6585899	0	1	0	5	10	0	0	10	0	52.1	12.6	0	0	2	1	3.2	15	0	0	0	1	0	0	5
JH013	534	1.2	101	DC_woodland	56	373305	6583521	193	1	2	6	13	0	0	10	0.2	16.4	61.6	0	0	1	9	14	1	0	0	0	1	0	0	0
JH018	534	1.2	101	DC_woodland	56	370181	6583268	159	2	2	11	12	2	0	7	1.2	88.7	12.1	0.2	0	1	0	2.8	76	0	0	0	0	0	0	0
JH059	534	1.2	101	DC_woodland	56	377165	6583307	349	1	1	8	5	0	0	25	0.1	16.1	10.2	0	0	3	2	21.4	43	1	0	1	1	0	0	0.1
JH061	534	1.2	101	DC_woodland	56	377287	6583195	10	1	5	13	15	1	0	15	9.3	36.3	41	0.1	0	1	1	27	5.5	1	1	1	1	0	0	0
WWF090	534	0.59	101	DC_openwoodland	56	373231	6583396	160	1	0	7	6	0	1	7	0	47.1	5.5	0	0.1	2	0	5.6	1	0	0	0	0	0	1	0
JH047	534	0.59	101	DC_openwoodland	56	369924	6591271	49	1	0	2	5	0	0	5	0	11	57.1	0	0	0	0	21	0	0	0	0	0	0	0	1.1
WWF115	534	13.7	101	DC_mod_grassland	56	370362	6586421	0	0	0	7	5	0	0	0	0	61.3	0.9	0	0	0	0	23	0	0	0	0	0	0	0	0.1
WWF123	534	13.7	101	DC_mod_grassland	56	366844	6592202	0	0	0	4	6	0	0	0	0	75.1	6	0	0	0	0	30	0	0	0	0	0	0	0	0.1
JH060	534	13.7	101	DC_mod_grassland	56	377365	6583228	66	0	0	5	11	0	0	0	0	67.1	34.7	0	0	0	0	3.2	0	0	0	0	0	0	0	0.2
JH052	534	12.37	101	LRC_mod_grassland	56	355680	6606244	181	1	0	5	3	0	0	8	0	9.3	1.2	0	0	0	0	13	0.5	1	1	0	0	0	0	100
JH053	534	12.37	101	LRC_mod_grassland	56	354921	6606460	250	0	0	2	2	0	0	0	0	30	1.2	0	0	0	0	27	0	0	0	0	0	0	0	90
JH101	534	12.37	101	LRC_mod_grassland	56	375991	6579556	67	0	0	7	5	0	0	0	0	28.5	75.2	0	0	0	0	15	0	0	0	0	0	0	0	10
JH103	534	12.37	101	LRC_mod_grassland	56	378760	6579707	351	0	2	3	7	0	0	0	0.2	45	11.9	0	0	0	0	3.8	0	0	0	0	0	0	0	0
JH041	534	3.25	101	LRC_openwoodland	56	374149	6582708	99	2	2	11	13	0	0	35	0.3	59	31.1	0	0	0	3	27	85	1	1	1	1	0	0	2
JH048	534	3.25	101	LRC_openwoodland	56	374225	6581798	92	2	0	7	9	0	0	40	0	23.3	27.4	0	0	2	2	29	80	0	1	1	1	0	0	15.2
JH104	534	3.25	101	LRC_openwoodland	56	379469	6579647	151	2	4	5	14	1	1	20	3.2	63.6	11.5	0.1	0.1	2	0	10.6	3	0	1	1	0	0	0	0
WWF081	534	1.26	101	LRC_canopy	56	377099	6583189	321	1	2	7	13	0	2	20	2.1	47.4	3.3	0	0.2	2	2	54	0	1	1	1	1	1	1	0
WWF117	534	1.26	101	LRC_canopy	56	370434	6587158	0	1	0	6	6	0	0	10	0	68.1	0.8	0	0	1	1	24	4	0	0	0	0	0	1	0.2
WWF118	534	1.26	101	LRC_canopy	56	370490	6587436	0	3	3	7	11	0	0	15.2	0.5	62.4	2	0	0	0	2	21	2	0	0	0	1	0	1	0.6
WWF103	565	2.22	101	DC_woodland	56	367168	6579686	0	2	1	2	9	1	0	39	0.1	65	2.9	2	0	1	1	26	3	0	1	0	0	0	1	1.2
WWF104	565	2.22	101	DC_woodland	56	367110	6580549	0	3	3	5	11	1	1	24.5	0.3	87.2	6.2	5	0.4	1	2	30	5	0	0	0	1	1	1	0
WWF076	565	0.12	101	DC_openwoodland	56	378931	6583753	0	1	0	2	1	0	0	5	0	80	0.1	0	0	1	2	1.2	37	0	0	0	0	1	0	5
JH069	565	3.27	101	DC_mod_grassland	56	367299	6579685	75	0	1	6	9	0	0	0	1	112	16.7	0	0	0	0	6.4	0	0	0	0	0	0	0	0
JH117	565	3.27	101	DC_mod_grassland	56	367086	6580526	358	0	1	5	7	1	0	0	0.1	89.2	3.1	6	0	0	0	6.2	0	0	0	0	0	0	0	0
WWF020	567	12.95	101	DC_woodland	56	386576	6567821	203	3	0	2	7	1	1	26	0	50	10.7	0.2	1	3	1	20	44	1	1	1	1	1	1	2
WWF108	567	12.95	101	DC_woodland	56	370108	6583825	0	2	2	5	9	0	1	27	0.8	100.1	12.2	0	0.3	3	3	42	28	0	0	0	0	1	1	0.1
WWF109	567	12.95	101	DC_woodland	56	369498	6584094	0	2	1	4	15	1	1	52	1	65.8	3.8	0.3	0.1	1	2	31	47	1	1	1	1	1	1	0
WWF013	567	0.71	101	DC_openwoodland	56	387165	6567116	22	0	0	2	9	1	0	0	0	0.2	26.2	0.1	0	1	0	2	15	0	0	0	0	1	0	1.1
WWF062	567	21.65	101	DC_mod_grassland	56	380504	6582085	56	0	2	7	7	0	1	0	2	97.1	5.6	0	0.1	0	0	1	36	0	0	0	0	0	0	0
JH055	567	21.65	101	DC_mod_grassland	56	371822	6582845	201	0	0	6	5	0	0	0	0	78.4	7.3	0	0	0	0	10.6	0	0	0	0	0	0	0	0
JH076	567	21.65	101	DC_mod_grassland	56	369982	6583304	86	0	0	5	5	0	0	0	0	82	9.1	0	0	0	1	2.2	70	0	0	0	0	0	0	0
JH118	567	21.65	101	DC_mod_grassland	56	367570	6580300	8	0	0	5	8	0	0	0	0	86.1	13.5	0	0	0	0	2.4	0	0	0	0	0	0	0	0
JH102	567	0.77	101	LRC_woodland	56	377739	6579995	348	3	3	10	18	1	0	35	3.2	44.6	54.6	0.1	0	3	12	39	12	1	1	1	1	0	1	0.2
JH105	567	3.26	101	LRC_mod_grassland	56	374172	6584237	63	0	2	9	4	0	0	0	8.1	68.4	11.2	0	0	0	0	12	0	0	0	0	0	0	0	1
JH111	567	3.26	101	LRC_mod_grassland	56	380746	6587066	0	0	2	6	9	0	0	0	0.2	75.3	16.6	0	0	0	0	9.6	2	0	0	0	0	0	0	5
WWF110	567	1.49	101	TL_canopy	56	370150	6584877	0	4	1	8	11	0	0	47	0.4	87.2	1.6	0	0	3	2	32	40	1	1	0	0	1	1	0.1
WWF122	567	1.49	101	TL_canopy	56	366984	6592117	0	2	3	11	10	1	1	1	1	45.1	3	0.5	0.1	0	3	32	0	0	0	1	1	0	0	0.3
WWF127	567	1.49	101	TL_canopy	56	365728	6592860	0	2	0	5	9	0	0	20	0	42.8	2.3	0	0	95	1	25	0	0	0	0	1	0	0	1
WWF069	568	6.27	101	DC_openforest	56	382236	6582263	155	4	3	10	15	1	2	30	60.2	13.1	6.8	0.1	0.2	2	3	30	67	0	1	1	1	1	0	0
WWF088	568	6.27	101	DC_openforest	56	375420	6589368	0	4	3	5	16	0	0	30.1	6.5	35.1	6.5	0	0	0	0	17	100	1	1	1	1	1	1	0
WWF092	568	6.27	101	DC_openforest	56	370770	6582759	174	3	5	9	19	3	2	35	8.2	25.9	3.4	0.3	0.2	2	0	28	69	1	1	1	1	1	0	0
JH016	568	6.27	101	DC_openforest	56	371523	6583091	168	2	6	7	10	0	0	9	4.4	12.8	40.8	0	0	2	7	56	31.7	0	0	1	1	0	0	0
JH056	568	6.27	101	DC_openforest	56	371053	6582913	121	3	6	3	11	1	2	25.1	7.4	8	37.8	5	0.2	7	2	63	109.5	0	0	1	1	0	0	0
WWF045	568	30.47	101	DC_woodland	56	387920	6582495	152	2	0	3	3	0	0	35	0	55	6.1	0	0	8	7	36	0	0	0	1	1	1	0	0
WWF052	568	30.47	101	DC_woodland	56	383590	6577150	220	3	7	5	8	1	4	45.1	8.8	40.6	0.8	1	2.3	5	0	71	60	1	1	1	1	1	1	0
WWF064	568	30.47	101	DC_woodland	56	381139	6581920	300	4	1	7	18	0	0	43	5	22.4	13.4	0	0	0	0	15	97	1	1	1	1	0	1	0.2
WWF073	568	30.47	101	DC_woodland	56	380881	6580696	0	1	3	3	10	0	0	7	5.2	46	3	0	0	1	0	9.4	107	0	0	0	1	0	0	0
WWF077	568	30.47	101	DC_woodland	56	378444	6584218	30	5	1	2	12	0	1	22	30	5.5	10.2	0	0.5	2	9	67	92	0	1	1	1	1	0	0.1
WWF089	568	30.47	101	DC_woodland	56	375554	6590111	0	2	3	8	16	1	1	30	6.5	46.7	2.5	1	0.1	0	0	31	62	1	1	1	1	1	1	0
BP23	568	30.47	101	DC_woodland	56	387257	6582913	350	1	0	4	5	0	0	2	0	106.1	6.3	0	0	0	1	9.8	0	0	0	0	1	1	1	0.3
JH017	568	30.47	101	DC_woodland	56	370707	6582873	163	2	3	6	8	1	0	18	0.3	46.3	26.7	0.1	0	3	0	24	18	0	1	1	1	0	0	0
JH021	568	30.47	101	DC_woodland	56	374444	6587166	98	1	4	3	12	0	1	40	8.3	25.3	14	0	0.1	1	8	29	73	1	1	1	1	0	0	0.2
JH022	568	30.47	101	DC_woodland	56	374675	6586645	308	2	3	10	9	0	0	35	15.3	24	5.2	0	0	3	9	10	120	1	1	1	1	0	1	0.1
JH031	568	30.47	101	DC_woodland	56	380422	6585788	54	1	0	6	10	0	0	10	0	33.1	8.7	0	0	0	1	1	33	0	0	0	1	0	0	0
WWF051	568	1.66	101	DC_openwoodland	56	386789	6586469	223	1	0	1	3	1	0	5	0	70	2.1	2	0	0	1	4	12	0	0	0	1	1	0	0
WWF075	568	1.66	101	DC_openwoodland	56	379196	6582956	155	1	0	5	3	0	0	8	0	21.2	1.2	0	0	3	1	30	15	0	0	0	1	1	0	7

plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTre	funHollowt	funLitterCo	funLenFalle	funTreeSte	funTreeSte	funTreeSte	funTreeSte	funTreeSte	funTreeReg	funHighThreatExotic
Text[Maxim	Number	Number wit	Number	Text[Letters, numbers, un	[54 or 55 or 56]			Range in [0	Number	Number	Number	Number	Number	Number	Number wit	Number wit	Number wit	Number wit	Number wit	Number wit	Number	Number	Number wit	Number wit	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	Number with 1 decimal point
WWF059	568	60.95	101	DC_mod_grassland	56	381319	6581010	0	0	1	4	10	1	2	0	0.2	25	3.5	0.4	0.2	1	0	22	1	0	0	0	0	1	1	0.1
JH030	568	60.95	101	DC_mod_grassland	56	380292	6585728	18	0	0	4	11	0	0	0	0	49	21.6	0	0	0	0	5	24	0	0	0	0	0	0	0
JH067	568	60.95	101	DC_mod_grassland	56	368957	6578098	162	0	0	6	11	0	0	0	0	56.2	61	0	0	0	0	6.6	12	0	0	0	0	0	0	0
JH075	568	60.95	101	DC_mod_grassland	56	371201	6583059	326	0	2	7	6	1	0	0	5.1	63.1	6.2	10	0	0	0	2.4	0	0	0	0	0	0	1	0
JH032	568	60.95	101	DC_mod_grassland	56	380479	6585874	58	0	0	7	11	0	0	0	0	83	9.9	0	0	0	0	5	8	0	0	0	0	0	0	0
JH019	568	2.57	101	TL_canopy	56	369708	6582766	243	3	2	8	9	0	0	20.1	0.6	83.4	6	0	0	1	2	15	61	0	0	0	1	0	1	0
JH024	568	2.57	101	TL_canopy	56	375428	6583576	353	1	1	9	6	0	0	20	0.1	93.2	1.7	0	0	3	4	23.4	114	0	0	0	1	0	0	0
JH06	571	10.47	101	DC_openwoodland	56	367584	6579869	59	1	1	6	7	0	0	3	0.1	16.4	7.1	0	0	1	0	10.8	0	1	1	0	0	0	0	0.5
JH09	571	10.47	101	DC_openwoodland	56	368311	6579635	48	2	2	7	12	1	0	8	30.1	64.5	8.2	5	0	0	0	49.4	7.7	0	0	1	1	0	0	3.1
JH010	571	10.47	101	DC_openwoodland	56	368305	6579942	258	1	2	7	9	1	1	15	0.2	82.4	1	3	0.1	1	0	12	1.3	0	1	0	0	0	1	0
JH011	571	10.47	101	DC_openwoodland	56	368459	6580537	231	2	1	4	7	1	1	15.1	0.2	87.1	1.8	2	0.1	5	1	40	23.1	0	0	1	0	0	1	0
JH012	571	10.47	101	DC_openwoodland	56	369700	6579469	35	2	3	4	9	0	0	20	0.4	33.4	2.1	0	0	4	0	27	13	0	0	1	1	0	0	0
BAMPlot5	571	16.07	101	DC_mod_grassland	56	367561	6579749	50	0	0	8	8	0	0	0	0	36.5	1.3	0	0	0	0	13	0	0	0	0	0	0	0	0.6
JH070	571	16.07	101	DC_mod_grassland	56	367534	6580001	90	0	2	6	6	1	0	0	0.2	78.1	1.6	6	0	0	0	2.8	0	0	0	0	0	0	0	0
JH073	571	16.07	101	DC_mod_grassland	56	368367	6580061	252	0	0	5	6	1	0	0	0	108	1.6	1	0	0	0	3.2	0	0	0	0	0	0	0	0
JH116	571	16.07	101	DC_mod_grassland	56	367564	6579573	290	0	0	3	10	0	0	0	0	75	22.7	0	0	0	0	5	0	0	0	0	0	0	0	0.1
WWF120	766	1.18	101	DC_sedgeland	56	369988	6591121	0	0	0	6	8	0	0	0	0	57	2	0	0	0	0	31	0	0	0	0	0	0	0	0
WWF121	766	1.18	101	DC_sedgeland	56	369972	6591255	0	0	0	6	5	0	0	0	0	67	1.1	0	0	0	0	7.8	0	0	0	0	0	0	0	0.2
WWF056	766	0.4	101	LRC_sedgeland	56	382391	6579128	0	0	0	8	4	0	0	0	0	3.1	0.5	0	0	0	0	7.6	0	0	0	0	0	0	0	0.3
JH100	965	2.18	101	DC_openforest	56	387546	6571958	179	2	1	4	6	1	0	50	2	26.2	9.4	1	0	6	2	46	6	1	1	1	1	0	0	1
JH112	965	2.18	101	DC_openforest	56	385788	6576087	0	3	3	3	7	1	0	37	1.2	71.1	1.8	1	0	6	2	17	58	0	1	1	1	0	0	0
WWF001	965	12.82	101	DC_woodland	56	394220	6565000	3	1	2	4	5	1	0	5	1.1	91	1.4	3	0	0	0	3	2.5	0	0	0	0	0	0	3
WWF033	965	12.82	101	DC_woodland	56	386595	6574037	329	2	0	1	0	0	0	20	0	30	0	0	0	5	0	24	0	0	0	0	0	1	0	0
BP22	965	12.82	101	DC_woodland	56	388226	6581676	230	1	0	6	9	0	0	1	0	84.2	8.6	0	0	0	2	13.4	45	0	0	0	0	1	0	5
WWF043	965	0.95	101	DC_shrubland	56	389170	6580558	158	0	1	3	4	1	1	0	5	32	5.7	0.5	1	0	0	0	0	0	0	0	0	0	0	0
WWF038	965	4.29	101	DC_mod_grassland	56	385625	6576150	166	1	1	3	2	1	1	0	1	31	0.2	10	0.1	1	0	4.4	5	0	0	0	1	1	0	1.5
WWF034	965	4.29	101	DC_mod_grassland	56	386968	6574570	103	0	0	3	5	0	0	0	0	40	1.8	0	0	0	0	1	0	0	0	0	0	0	0	0
WWF010	965	0.84	101	LRC_openforest	56	388738	6567772	0	7	3	6	10	1	0	43.1	1.8	1.7	1.2	0.1	0	2	0	84	91	1	1	1	1	1	1	3.1
JH099	965	0.84	101	LRC_openforest	56	389600	6567560	199	4	6	4	10	1	4	72	27.6	40.4	10.9	3	3.3	8	18	70	16	1	1	1	1	0	1	1
JH098	965	0.27	101	LRC_mod_grassland	56	389053	6567628	301	0	0	5	2	0	0	0	0	5.4	0.2	0	0	0	0	5.2	0	0	0	0	0	0	0	1
JH113	965	1.26	101	TL_canopy	56	385788	6576129	0	2	1	4	7	1	0	17	1	75.7	17.1	0.5	0	1	0	16.6	61	0	0	0	1	0	0	0.2
WWF005	970	4.86	101	DC_openforest	56	393308	6565897	69	4	3	6	7	1	3	27.1	0.3	63.2	2.8	0.5	1.6	7	0	61.8	29	0	1	1	1	1	0	0
WWF007	970	4.86	101	DC_openforest	56	392082	6566145	42	4	2	5	14	1	3	31.1	0.6	41.2	4.3	2	0.7	8	4	66.6	45	1	1	1	1	1	1	0.1
WWF008	970	4.86	101	DC_openforest	56	390851	6568047	247	3	2	2	6	0	2	80	0.2	95	1.4	0	0.2	12	13	50	146	0	1	1	1	1	0	0
WWF003	970	11.19	101	DC_openwoodland	56	393629	6565821	235	1	0	4	6	1	1	10	0	56	2.8	0.1	0.1	2	0	10.8	13.5	0	0	0	0	1	0	0.5
WWF026	970	11.19	101	DC_openwoodland	56	391054	6569020	326	1	2	4	9	1	0	50	0.6	60.1	7.1	0.5	0	6	0	29	0	0	0	0	1	1	1	0	0.6
WWF042	970	11.19	101	DC_openwoodland	56	386667	6579424	240	3	0	1	4	1	2	55	0	40	5.3	0.1	0.3	0	5	27	55	0	1	1	1	0	1	0
BP27	970	11.19	101	DC_openwoodland	56	387778	6566804	175	2	1	4	9	1	1	27	0.1	8.1	0.9	1	0.1	0	0	18	0	0	0	0	0	0	0	2.1
WWF028	970	11.19	101	DC_openwoodland	56	390754	6570154	7	1	1	2	7	1	0	2	0.1	100	5.4	10	0	0	0	3.2	0	0	0	0	0	0	0	0.2
WWF047	970	11.19	101	DC_openwoodland	56	384881	6580655	338	3	0	1	5	0	0	50	0	80	15.6	0	0	9	14	82	196	1	1	1	1	1	1	0.5
BP24	970	24.29	101	DC_mod_grassland	56	389867	6569983	95	0	1	9	10	0	0	0	1	89	10.6	0	0	0	0	2.4	0	0	0	0	0	0	0	0
WWF027	970	24.29	101	DC_mod_grassland	56	390954	6569783	264	0	1	10	19	1	2	0	0.1	63.2	2.3	10	0.2	0	0	11	0	0	0	0	0	0	0	0.2
WWF035	970	24.29	101	DC_mod_grassland	56	387065	6575386	31	0	0	12	9	2	2	0	0	67.9	0.9	1.5	0.3	0	0	15.6	0	0	0	0	0	0	0	0.3
JH114	970	24.29	101	DC_mod_grassland	56	386293	6575795	0	0	0	1	6	1	0	0	0	70	21.9	0.5	0	0	0	4.4	0	0	0	0	0	0	0	0
JH124	970	0.4	101	LRC_openwoodland	56	386778	6570327	10	1	1	5	2	1	1	7	30	45.4	6	5	0.1	2	1	17	3	1	1	0	0	0	1	0
JH122	970	0.86	101	LRC_openforest	56	391307	6567663	225	2	4	2	10	1	2	30	23	50.1	16.7	3	2.1	4	6	32	211	1	1	1	1	0	1	0
JH123	970	1.12	101	LRC_mod_grassland	56	386801	6570257	345	0	1	5	5	1	0	0	6	35.3	12.2	12	0	0	0	13	0	0	0	0	0	0	0	0
WWF037	970	0.88	101	TL_canopy	56	386244	6575845	207	3	2	4	10	1	2	71	2.1	71.1	2.8	5	0.2	18	5	89	30	1	1	1	1	1	1	0
WWF084	1192	2.45	101	DC_woodland	56	374123	6588062	0	3	1	3	8	0	1	23	0.5	23	10.9	0	0.1	0	1	19	11	0	1	1	1	1	0	0.6
WWF085	1192	2.45	101	DC_woodland	56	374390	6588420	0	1	1	8	5	1	0	5	2	70.2	0.5	5	0	0	0	8.4	0	0	0	0	0	0	0	2
MA03	1192	0.82	101	LRC_woodland	56	369175.8	6589002	232	2	0	3	2	0	0	30	0	3.3	0.3	0	0	10	0	23	47	0	0	0	1	0	1	0.3
MA06	1192	0.82	101	LRC_woodland	56	363538.9	6571637	16	2	0	3	5	0	0	26	0	76	4.6	0	0	3	1	19	0	1	1	1	1	0	1	1.2
JH094	1192	0.82	101	LRC_woodland	56	367533	6572226	167	3	1	3	2	0	0	25.1	3	0.3	2.1	0	0	1	0	40	0	0	0	1	0	1	0	1	4
WWF015	1194	0.93	101	DC_openwoodland	56	386393	6566596	0	2	0	1	5	0	0	24	0	10	20.8	0	0	0	0	16	12	0	0	0	0	0	0	0.3
WWF018	1194	0.93	101	DC_openwoodland	56	386556	6566197	0	1	1	3	13	0	3	30	1	42	7.6	0	2.2	6	3	8	350	0	0	0	0	1	0	0.2
WWF017	1194	0.93	101	DC_openwoodland	56	386442	6566304	0	1	3	3	11	1	3	25	0.4	63	7.8	0.1	1.1	5	5	23	58	0	1	1	1	1	1	0.1
JH097	1194	3.58	101	DC_low_grassland	56	386487	6566225	252	0	0	4	7	0	0	0	0	37	4.5	0	0	0	0	4.2	0	0	0	0	0	0	0	0.2
JH096	1194	3.58	101	DC_low_grassland	56	386390	6566702	220	0	0	6	7	0	0	0	0	49	1.8	0	0	0	0	2	0	0	0	0	0	0	0	0.2
MA01	501	2.65	101	DC_woodland	56	384443.1	6582654	338	2	2	6	7	0	1	15	0.3	86.9	1.3	0	0.1	3	0	8	37	0	0	1	1	0	0	0.1
WWF087	501	2.65	101	DC_woodland	56	374951	6589052	0	1	4	14	15	1	4	30	3.6	54.6	5.4	0.7	2.5	0	0	41	256	1	1	1	1	0	1	0
JH065	501	2.65	101	DC_woodland	56	384516	6583181	348	2	0	11	6	1	1	11	0	81	0.6	0.1	0.1	1	0	18	0	0	0	0	0	0	0	0
JH119	501	2.65	101	DC_woodland	56	380077	6580497	283	2	3	6	14	1	1	25	82.2	24.2	1.7	0.1	7	3	4	49	72	1	1	1	1	0	0	0
WWF049	501	4.53	101	DC_mod_grassland	56	384526	6582171	148	1	2	7	3	1	1	1	6	111	5.6	10	1	0	0	5	16	0	0	0	0	0	0	2
JH120	501	4.53	101	DC_mod_grassland	56	380156	6580557	135	0	0	4	6	0	0	0	0	93	44.4	0	0	0	0	13	0	0	0	0	0	0	0	0
WWF072	510	45.22	101	low_grassland	56	380097	6582215	207	0	0	6	6	0	0	0	0	36.1	15.4	0	0	0	0	1	0	0	0	0	0	0	0	40
WWF074	510	45.22	101	low_grassland	56	379430	6582422	89	0	0	3	2	0	0	0	0	5.2	0.6	0	0	0	0	4	0	0	0	0	0	0	0	2
JH044	510	45.22	101	low_grassland	56	372999	6587155	128	0	0	3	4	0	0	0	0	18	9	0	0	0	5	8	0	0	0	0	0	0	0	35
JH051	510	45.22	101	low_grassland	56	360045	6594929	100	0	0	4	4	0	0	0	0	10.6	24	0	0	0	0	24	0	0	0	0	0	0	0	10
JH091	510	45.22	101	low_grassland	56	378170	6582866	21	0	0	5	6	0	0	0	0	22.3	90.4	0	0	0	0	0	0	0	0	0	0	0	0	0.1
JH026	510	45.22	101	low_grassland	56	380811	6587385	154	0	2	7	5	0	0	0	5.1	68	15.8	0	0	0	0	1	0	0	0	0	0	0	0	0
JH027	510	45.22	101	low_grassland	56	380628	6587423	178	0	3	6	7	0	0	0	9.1	49.2	21.5	0	0	0	0	3	0	0	0	0	0	0	0	0
JH077	510	45.22	101	low_grassland	56	384351	6579070	190	0	0	9	2	0	0	0	0	112.7	1.1	0	0	0	0	2	0	0	0	0	0	0	0	0.1
JH082	510	45.22	101	low_grassland	56	385646	6584942	107	0	0	7	7	0	0	0	0	88.2	5	0	0	0	0	3.8	0	0	0	0	0	0	0	0
JH083	510	45.22	101	low_grassland	56	385759	6584364	0	0	0	3	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MA07	534	64.51	101	low_grassland	56	356433	6606647	37	0	0	2	2	0	0	0	0	0.4	0.3	0	0	0	0	18	0	0	0	0	0	0	0	81.5
MA08	534	64.51	101	low_grassland	56	356125.6	6606415	49	0	1	5	1	0	0	0	0.1	20.4	0.1	0	0	0	0	2.4	8	0	0	0	0	0	0	30.6
JH039	534	64.51	101	low_grassland	56	376706	6580277	228	0	1	8	8	0	0	0	1	52.4	26.8	0	0	0	0	9.4	0	0	0	0	0	0	0	15

plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTre	funHollowt	funLitterCo	funLenFalle	funTreeSte	funTreeSte	funTreeSte	funTreeSte	funTreeSte	funTreeSte	funTreeReg	funHighThreatExotic
Text[Maxim	Number	Number wit	Number	Text[Letters, numbers, un	[54 or 55 or 56]			Range in [0	Number	Number	Number	Number	Number	Number	Number wit	Number wit	Number wit	Number wit	Number wit	Number wit	Number	Number	Number wit	Number wit	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	Number with 1 decimal point	
JH057	534	64.51	101	low_grassland	56	374314	6581542	0	1	0	4	7	0	0	15	0	15.4	75.3	0	0	0	0	12	7	0	1	1	0	0	0	15	
JH058	534	64.51	101	low_grassland	56	376524	6583394	345	0	1	5	8	0	0	0	0.1	22.2	63.4	0	0	0	0	4	0	0	0	0	0	0	0	0.1	
JH089	565	2.06	101	low_grassland	56	379091	6583803	141	0	0	4	8	0	0	0	0	50	4.4	0	0	0	0	4.2	30	0	0	0	0	0	0	2.2	
JH090	565	2.06	101	low_grassland	56	378898	6583826	313	0	0	2	5	0	0	0	0	8	0.7	0	0	0	0	6.6	5	0	0	0	0	0	0	0.2	
WWF082	567	85.54	101	low_grassland	56	373527	6583679	356	0	0	8	6	0	0	0	0	43.4	8.3	0	0	0	0	1.2	0	0	0	0	0	0	0	0	
WWF113	567	85.54	101	low_grassland	56	370340	6586076	176	2	0	1	2	0	0	0	0	0.1	11	0	0	0	0	11	0	0	0	0	0	0	0	0	
WWF125	567	85.54	101	low_grassland	56	366023	6592628	0	0	0	5	5	0	0	0	0	14.2	2	0	0	0	0	13	13	0	0	0	0	0	0	0.1	
BAMPlot4	567	85.54	101	low_grassland	56	373923	6584066	50	0	0	4	3	0	0	0	0	25.6	0.4	0	0	0	0	18	0	0	0	0	0	0	0	5	
BP11	567	85.54	101	low_grassland	56	387183	6567066	275	0	0	5	4	0	0	0	0	39.2	10.5	0	0	0	0	2.6	0	0	0	0	0	0	0	0	
WWF058	568	112.65	101	low_grassland	56	383338	6580560	264	0	1	13	11	1	1	0	0.1	75.9	3	0.2	0.1	0	0	4.6	0	0	0	0	0	0	0	0.2	
WWF067	568	112.65	101	low_grassland	56	381646	6581347	320	0	0	15	10	0	1	0	0	58.5	10.3	0	0.1	0	0	10.6	0	0	0	0	0	0	0	0.2	
WWF086	568	112.65	101	low_grassland	56	374791	6589215	0	0	0	5	8	0	1	0	0	65.2	20.7	0	0.1	0	0	5.4	0	0	0	0	0	0	0	0.2	
BAMPlot3	568	112.65	101	low_grassland	56	379476	6584245	60	0	0	11	4	0	0	0	0	31.2	10.3	0	0	0	0	10	0	0	0	0	0	0	0	0.3	
JH092	568	112.65	101	low_grassland	56	374568	6586872	92	0	1	6	4	0	0	0	2	93	2.2	0	0	0	0	3.2	0	0	0	0	0	0	0	0	
BAMPlot19	568	112.65	101	low_grassland	56	387162	6586830	17	0	0	11	12	2	1	0	0	22	1.4	0.2	0.1	0	0	11	0	0	0	0	0	0	0	0.3	
WWF095	571	18.92	101	low_grassland	56	370073	6582037	0	0	2	10	4	0	0	0	0.7	62.6	0.5	0	0	0	0	8	0	0	0	0	0	0	0	5	
BAMPlot20	571	18.92	101	low_grassland	56	369851	6581737	19	1	2	10	8	0	0	3	0.2	34.5	5.3	0.1	0	0	0	4.4	1	0	0	0	0	1	0	0.1	
JH054	571	18.92	101	low_grassland	56	369777	6580555	59	0	0	1	3	0	0	0	0	0.1	0.3	0	0	0	0	13	12	0	0	0	1	0	0	0.1	
JH074	571	18.92	101	low_grassland	56	369800	6580251	166	0	0	2	1	0	0	0	0	1.1	0.1	0	0	0	0	2.6	0	0	0	0	0	0	0	0	
WWF044	965	110.41	101	low_grassland	56	388473	6581606	300	0	0	5	1	1	0	0	0	11.3	1	20	0	0	0	0	0	0	0	0	0	0	0	0	10	
BAMPlot16	965	110.41	101	low_grassland	56	385688	6578579	296	0	0	4	4	0	0	0	0	56	0.5	0	0	0	0	7.8	0	0	0	0	0	0	0	0	5	
BP09	965	110.41	101	low_grassland	56	389590	6570151	120	0	0	4	2	0	0	0	0	18	0.6	0	0	0	0	2.4	0	0	0	0	0	0	0	0	1	
BP15	965	110.41	101	low_grassland	56	386982	6573543	340	0	0	4	1	0	0	0	0	31.1	1	0	0	0	0	3.8	0	0	0	0	0	0	0	0	1	
BP21	965	110.41	101	low_grassland	56	388878	6581352	230	0	1	6	10	3	0	0	8	33.2	15.6	24.1	0	0	0	4.4	0	0	0	0	0	0	0	0	2	
JH098	965	110.41	101	low_grassland	56	389053	6567628	301	0	0	5	2	0	0	0	0	5.4	0.2	0	0	0	0	5.2	0	0	0	0	0	0	0	0	1	
WWF002	970	86.65	101	low_grassland	56	393966	6565419	248	0	0	5	5	0	1	0	0	72.6	3.7	0	5	0	0	1.4	0	0	0	0	0	0	0	0	5	
WWF006	970	86.65	101	low_grassland	56	393061	6566056	197	1	1	5	1	1	0	0.1	0.1	60.4	0.5	5	0	0	0	5.2	0	0	0	0	0	0	0	0	0.5	
WWF023	970	86.65	101	low_grassland	56	386889	6569004	246	0	0	8	8	0	0	0	0	76.1	2.1	0	0	0	0	11.8	0	0	0	0	0	0	0	0	0.4	
WWF036	970	86.65	101	low_grassland	56	386624	6575603	302	0	0	11	9	1	2	0	0	26.6	0.9	6	0.2	0	0	6.8	0	0	0	0	0	0	0	0	5.1	
BP10	970	86.65	101	low_grassland	56	388551	6566767	95	0	0	10	5	1	0	0	0	61.3	0.5	0.1	0	0	0	2	0	0	0	0	0	0	0	0	22.1	
MA10	1192	14.07	101	low_grassland	56	363609.5	6571750	11	0	0	0	3	0	0	0	0	0	0.5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
JH095	1192	14.07	101	low_grassland	56	370899	6572823	69	0	0	5	8	0	0	0	0	70.7	30.7	0	0	0	0	23	0	0	0	0	0	0	0	0	10.1	
BAMPlot25	1192	14.07	101	low_grassland	56	374170	6588223	68	0	0	7	12	1	0	0	0	85.4	1.7	0.1	0	0	0	7	12	0	0	0	0	0	0	0	0.2	

APPENDIX D BAT CALL ANALYSIS REPORTS

Microbat Call Identification Report

Prepared for ("Client"):	Nature Advisory
Survey location/project name:	Winterbourne Wind Farm, NSW
Survey dates:	October-November 2020
Client project reference:	
Job no.:	NAD-2102
Report date:	11 March 2021

DISCLAIMER:

© Copyright – Balance! Environmental, ABN 75 795 804 356. This document and its content are copyright and may not be copied, reproduced or distributed (in whole or part) without the prior written permission of Balance! Environmental other than by the Client for the purposes authorised by Balance! Environmental ("Intended Purpose"). To the extent that the Intended Purpose requires the disclosure of this document and/or its content to a third party, the Client must procure such agreements, acknowledgements and undertakings as may be necessary to ensure that the third party does not copy, reproduce, or distribute this document and its content other than for the Intended Purpose. This disclaimer does not limit any rights Balance! Environmental may have under the Copyright Act 1968 (Cth).

The Client acknowledges that the Final Report is intended for the sole use of the Client, and only to be used for the Intended Purpose. Any representation or recommendation contained in the Final Report is made only to the Client. Balance! Environmental will not be liable for any loss or damage whatsoever arising from the use and/or reliance on the Final Report by any third party.

Methods

Data received

Balance! Environmental received 234,887 zero-crossing analysis bat-call sequence files (ZC files), recorded with Song Meter detectors (Wildlife Acoustics, Maynard MA, USA) deployed at eight separate sites in the Winterbourne Wind Farm study area between 5th October and 28th November 2020. Deployment details and detector outputs are summarised in **Table 1.**

Call analysis and identification

Call analyses were performed in *Anabat Insight* (Titley Scientific, Brisbane), with all files passed first through a generic noise filter to exclude files containing only non-bat background noise. Noise filter parameters used in this process are described in **Appendix 1**.

Files that passed the noise filter (i.e., contained bat calls) were then processed with a Decision Tree analysis to group and label detected bat-calls based on a combination of call characteristics derived from zero-crossing analysis metrics, such as characteristic frequency (Fc), time between calls (TBC), and pulse curvature. The preliminary call identities applied by the Decision Tree process were then confirmed or adjusted manually by comparing the call spectrograms and derived metrics with those of regionally relevant reference calls and/or with published call descriptions (e.g., Reinhold et al. 2001; Pennay *et al.* 2004). Consideration was also given to the probability of species' occurrence based on published distribution information (e.g. Churchill 2008; van Dyck et al. 2013) and on-line database records (e.g. **http://www.ala.org.au**).

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003), available on-line at http://www.ausbats.org.au/. Species nomenclature follows Armstrong *et al.* (2020).

Table 1 Bat-detector deployment summary for the Spring 2020 survey at Winterbourne WF.

Detector	Position		Sampling period		Number of detector-nights		No. ZC files recorded	
	Lat	Long	Date installed	Date Collected	Stated total	Nights with bat calls	Total	No. with calls
Bat Recorder (BR) #1	-30.8420	151.6882	5/10	29/11	56	23	840	405
Bat Recorder (BR) #2	-30.8408	151.6295	5/10	29/11	56	55	66759	6892
Bat Recorder (BR) #3	-30.9079	151.6336	6/10	29/11	55	21	2027	1241
Bat Recorder (BR) #4	-30.8814	151.7329	5/10	29/11	56	4	80	28
Bat Recorder (BR) #5	-30.8594	151.8080	5/10	29/11	56	55	42548	6773
Bat Recorder (BR) #6	-30.8756	151.8140	5/10	29/11	56	55	75505	18608
Bat Recorder (BR) #7	-30.9450	151.8148	6/10	29/11	55	54	41537	1869
Bat Recorder (BR) #8	-31.0249	151.8269	6/10	29/11	55	20	5591	1355

Results

The noise filtration process excluded 84% of the recorded files (see **Table 1**). The remaining 37,171 files contained at least 37,327 individual bat calls, 16% (5999) of which were positively identified. The other 31,328 "unresolved" calls each potentially represented two or more species and were allocated to multi-species groups.

Appendix 2 provides a breakdown of call numbers allocated to each species and unresolved group for each site, while **Appendix 3** contains representative call spectrograms for each identified species.

Species detected

At least 10 and up to 15 species were detected across the study area (see **Table 2**). The positively identified calls were allocated to nine individual species plus the undifferentiated species pair of *Nyctophilus geoffroyi/N. gouldi*. Almost half of the positively identified calls were contributed by just two species: *Chalinolobus gouldii*; and *Austronomus australis* (see **Appendix 2**).

Over 99% of the unresolved calls represented seven species that were otherwise positively identified: *Chalinolobus gouldii*; *C. morio*; three *Vespadelus* spp.; *Miniopterus orianae*; and *Ozimops ridei*. The other 84 unresolved calls potentially represented up to five additional species: *Falsistrellus tasmaniensis*; *Scotorepens balstoni*; *S. orion*; and *Ozimops planiceps*.

Figure 1 gives an overview comparison of the species composition at each site based on call detection rates for each positively identified species an unresolved species group.

Almost half of the unresolved calls were recorded by BR #6, which, based on Google Earth imagery, appears to have been located beside two isolated paddock trees, about 80m downstream of a small farm dam. Most (17,082) of these unresolved calls were probably from *Vespadelus vulturnus* and/or *V. regulus* but were labelled either *V. vulturnus/C. morio* or *Vespadelus* sp./*M. orianae*. The calls were largely of a type associated with bats flying in "cluttered" airspace (e.g., in dense vegetation, near a roost or over water) and many files contained calls from multiple individuals. This suggests that the trees next to the detector perhaps contained a maternity roost or that some sort of communal behaviour (e.g., swarming) was occurring at the site.

Where "unresolved" species groups were identified and one or more group members were not also positively identified for a site, those group members are listed as "Possible" in **Table 2**.

Table 2. Bat species recorded during the Winterbourne spring survey, October-November 2020.
♦ = 'definite' - at least one call was attributed unequivocally to the species
□ = 'possible' - calls like those of the species were recorded, but not reliably identified

Detector/site:	BR #1	BR #2	BR #3	BR #4	BR #5	BR #6	BR #7	BR #8
Chalinolobus gouldii	♦	♦	♦		♦	♦	♦	♦
Chalinolobus morio	♦	♦	♦	□	♦	♦	♦	♦
Falsistrellus tasmaniensis		□			□		□	
Nyctophilus geoffroyi / N. gouldi	♦	♦	♦	♦	♦	♦	♦	♦
Scoteanax rueppellii	♦	♦	♦		♦		♦	
Scotorepens balstoni					□			
Vespadelus darlingtoni	♦	♦	♦		♦	♦	♦	♦
Vespadelus regulus	♦	♦	♦		♦	♦	♦	♦
Vespadelus vulturnus	♦	♦	♦	♦	♦	♦	♦	♦
Miniopterus australis					□			
Miniopterus orianae	□	♦	□	□	♦	□	□	□
Austronomus australis	♦	♦	♦		♦	♦	♦	♦
Ozimops ridei	♦	♦	♦		♦	♦	♦	♦
Ozimops planiceps	□	□	□			□	□	

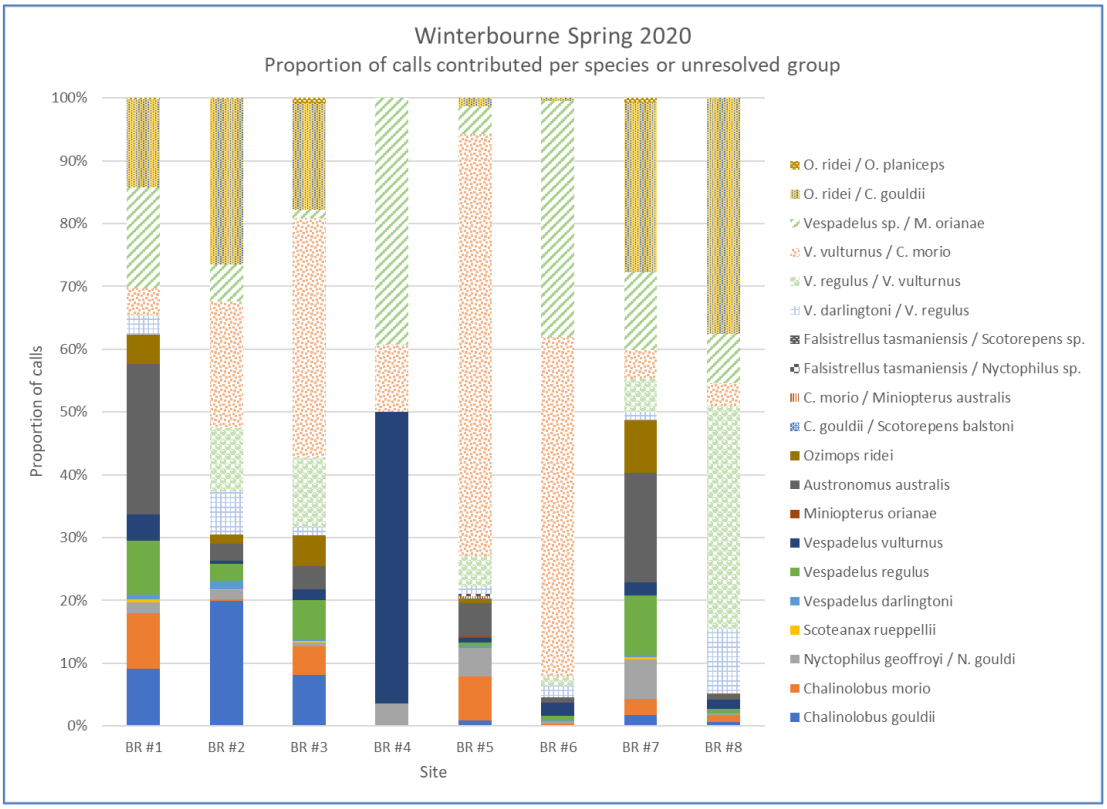


Figure 1. Comparison of bat species composition at eight sites during the spring 2020 survey at Winterbourne Wind Farm.

Call detection rates

Bat activity levels varied considerably at spatial and temporal scales during the spring 2020 survey at Winterbourne.

At site level, the mean bat detection rate ranged from fewer than 10 calls per detector-night (d-n) on BR #4 to over 300 calls/d-n on BR #6, with an overall detection rate across the entire study area of ~130 calls/d-n (see **Figure 2**). As noted above, the relatively high detection rate on BR #6 (more than double the overall mean) was likely due to a single species (probably *V. vulturnus*) congregating around a roost site or other communally significant landscape feature.

Nightly activity levels across the whole study area varied largely in response to daily fluctuations in maximum and minimum temperatures, with greater bat activity following warmer days and on warmer nights (see **Figure 3**). The high detection rate for the unresolved (probable *V. vulturnus*) calls at BR #6 remained relatively constant throughout the survey period (see **Figure 4**) and was sustained throughout the night (see **Figure 5**). These activity patterns recorded on BR #6 further support to the notion that the detector may have been placed near a maternity roost.

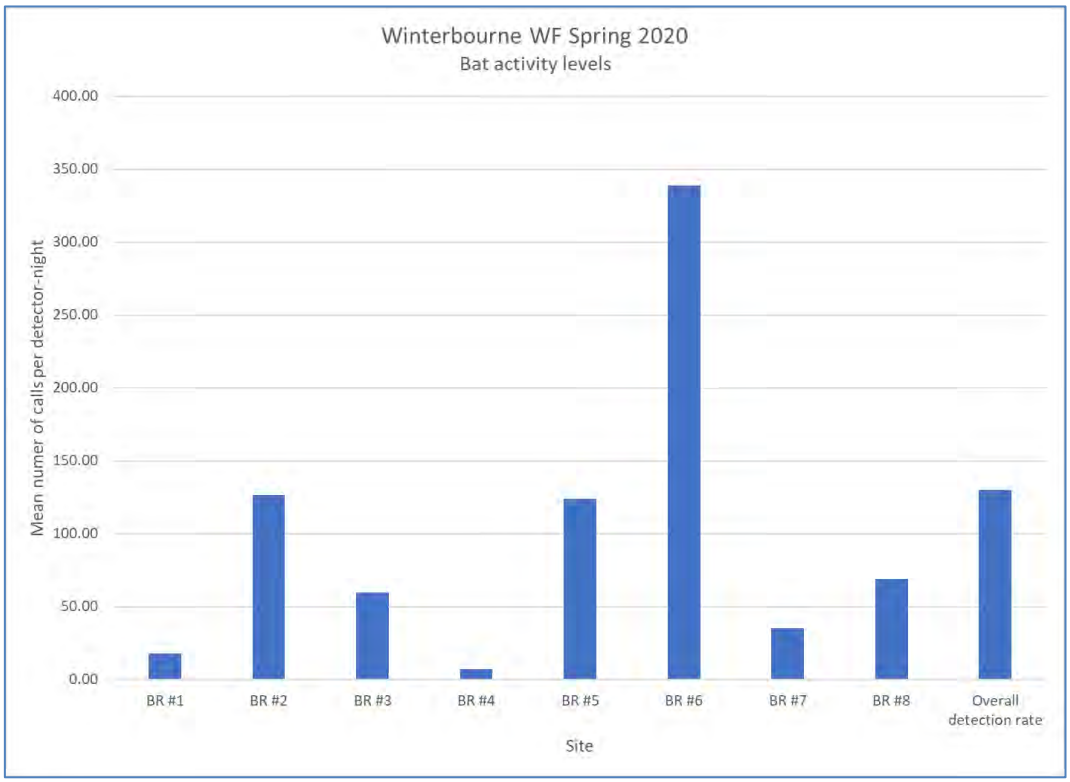


Figure 2. Comparison of bat activity levels at eight sites during the spring 2020 survey at Winterbourne Wind Farm.

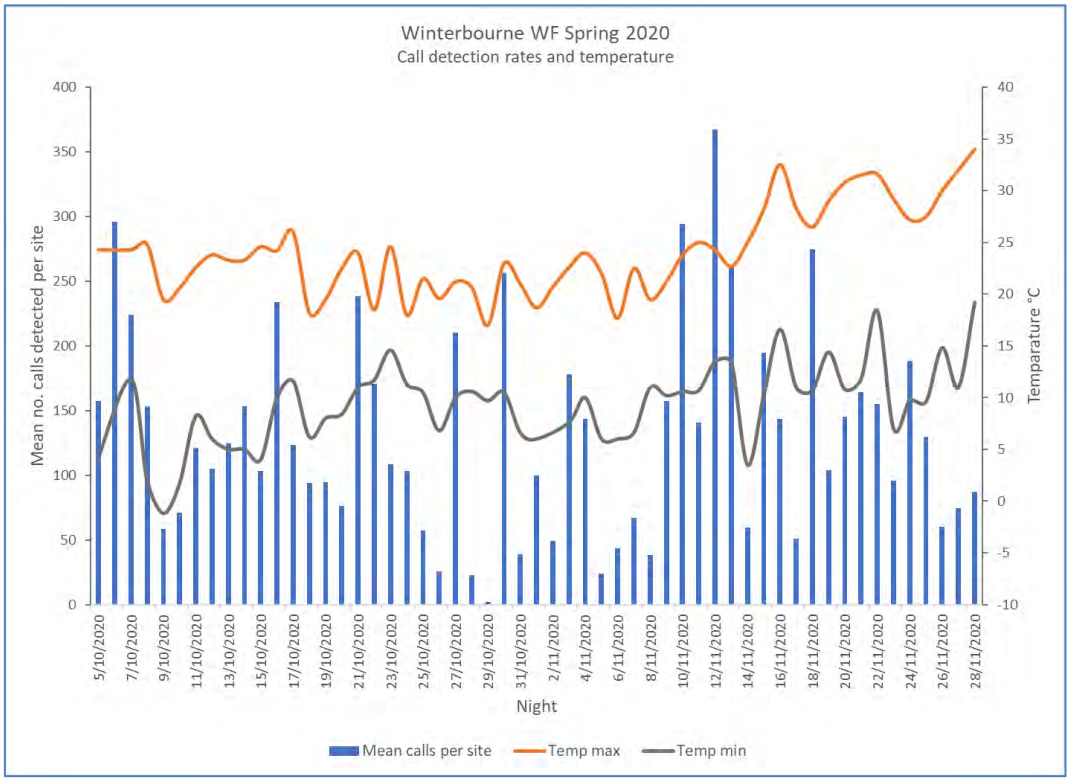


Figure 3. Nightly bat detection rates (mean number of calls per site) during the spring 2020 survey at Winterbourne Wind Farm. Climate data for Woolbrook Road (BoM Station 055136) (http://www.bom.gov.au/climate/data/).

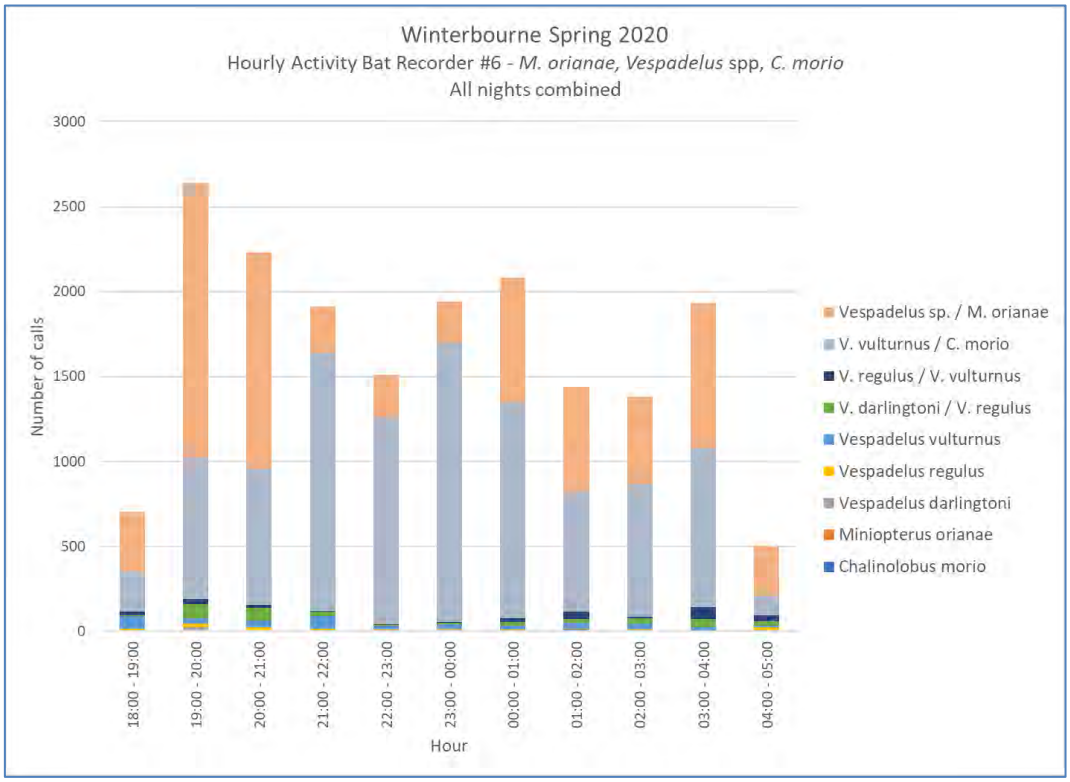


Figure 4. Cumulative hourly detection levels for *Vespadelus* spp., *Miniopterus orianae* and *Chalinolobus morio* on Bat Recorder #6.

Threatened species

Two threatened species were positively identified, albeit from very few calls. *Scoteanax rueppellii* was recorded at five sites, being absent only on BR #4, BR #6 and BR #8. *Miniopterus orianae* calls were reliably identified from only two sites (BR #2 and BR #5), although some of the unresolved calls recorded at the other seven sites could have represented this species.

Another two threatened species – *Falsistrellus tasmaniensis* and *Miniopterus australis* – may also have been present, but none of the relevant calls could be unequivocally allocated to either species.

Miniopterus orianae

Only a small proportion of calls in the frequency range relevant to *M. orianae* (~42-47 kHz) were reliably identified, with *Vespadelus* spp. contributing most of the positively identified calls (see **Figure 5**). As discussed above, in relation to site BR #6, it is highly probable that the majority of the unresolved calls at all sites also belonged to *Vespadelus* spp. (notably *V. vulturnus*).

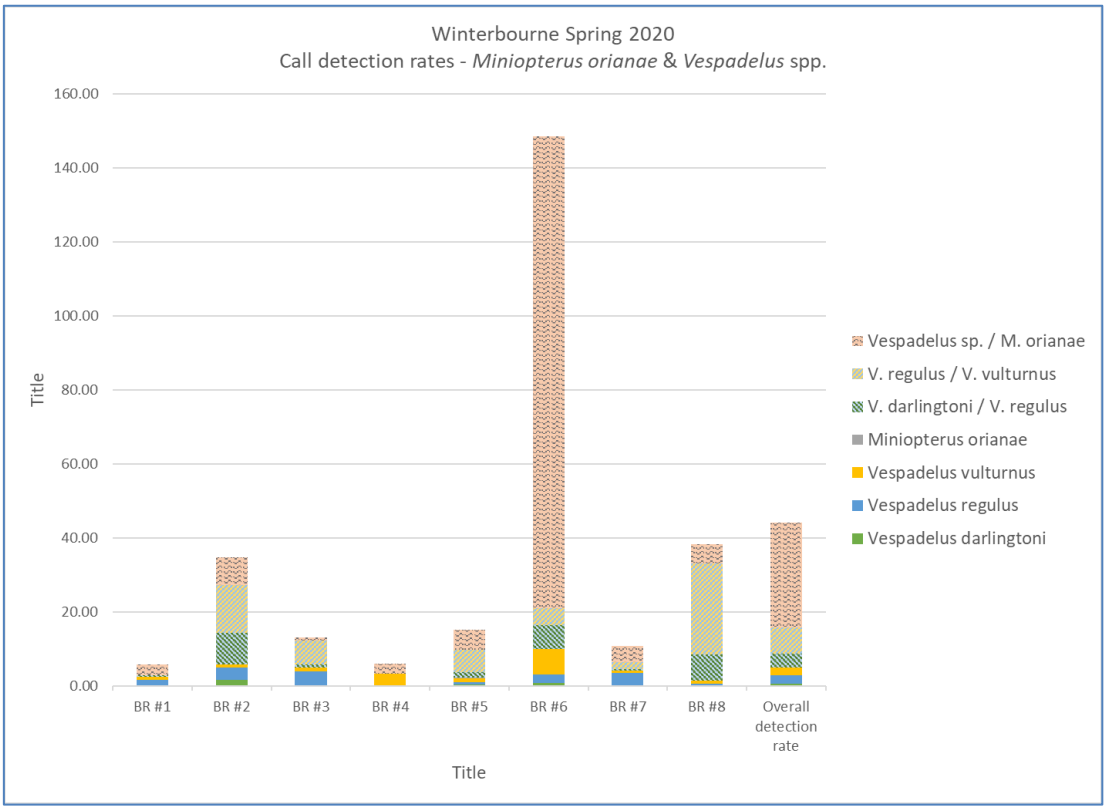


Figure 5. Relative activity levels of *M. orianae* and *Vespadelus* spp. at eight bat-detection sites sampled during spring 2020 in Winterbourne Wind Farm study area.

References

Armstrong, K.N., Reardon, T.B., and Jackson, S.M. (2020). A current taxonomic list of Australian Chiroptera; Version 2020-06-09. Available from Australasian Bat Society. URL: http://ausbats.org.au/species-list/4593775065

Churchill, S. (2008). *Australian Bats*. Jacana Books, Allen & Unwin; Sydney.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

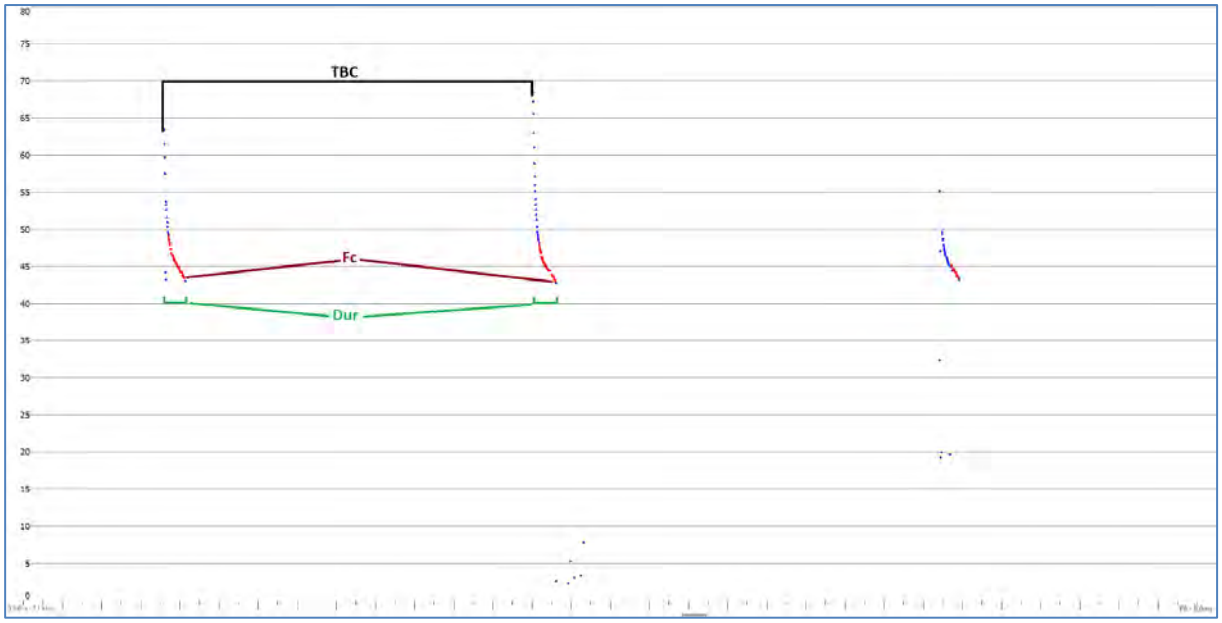
Reardon, T. (2003). Standards in bat detector based surveys. *Australasian Bat Society Newsletter* **20**, 41-43.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

van Dyck, S., Gynther, I. and Baker, A. (ed.) (2013). *Field Companion to the Mammals of Australia*. New Holland; Sydney.

Appendix 1 Noise filter parameters used to filter the raw data to extract files containing bat calls.

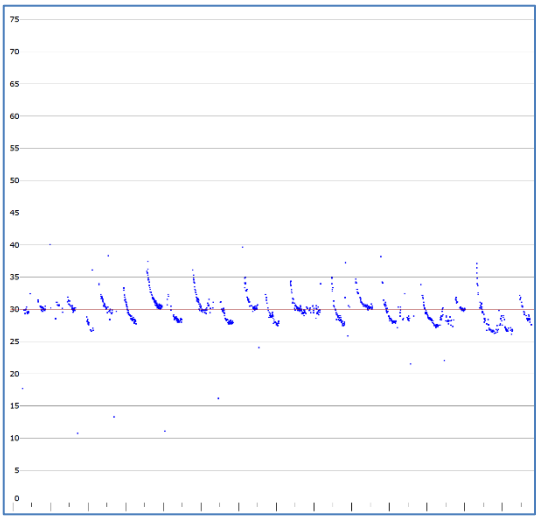
Metric	Description	Filter boundary values	
		Minimum	Maximum
Fc	Characteristic frequency (= frequency at the end of flattest part of a call pulse)	10 kHz	165 kHz
Dur	Call duration (= total time from first dot to last dot in pulse zero-crossing)	2 ms	120 ms
TBC	Time between calls (time between first dot in pulse and first dot in previous pulse)	5 ms	1500 ms



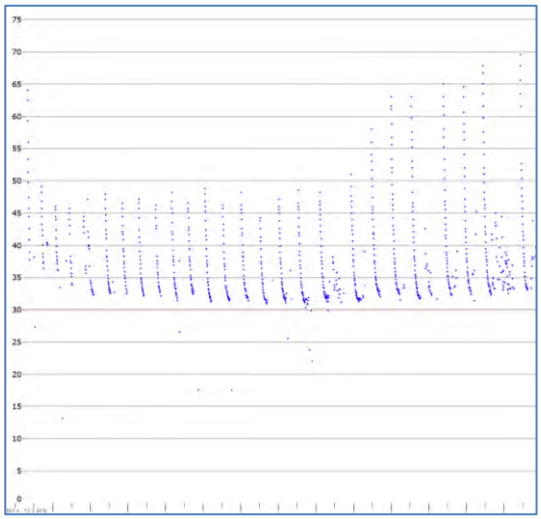
Appendix 2 Number of calls allocated per species and unresolved species group for the Winterbourne spring survey, October-November 2020.

Detector/site:	BR #1	BR #2	BR #3	BR #4	BR #5	BR #6	BR #7	BR #8	Species Total
Positively identified calls									
Chalinolobus gouldii	37	1386	102		58	40	33	9	1665
Chalinolobus morio	36	22	56		478	27	48	15	682
Nyctophilus geoffroyi / N. gouldi	7	95	8	1	309	67	119	4	610
Scoteanax rueppellii	2	15	3		1		8		29
Vespadelus darlingtoni	3	91	4		21	44	4	3	170
Vespadelus regulus	35	185	77		35	123	181	10	646
Vespadelus vulturnus	17	39	23	13	57	387	38	20	594
Miniopterus orianae		3			16				19
Austronomus australis	97	188	45		359	160	329	12	1190
Ozimops ridei	19	95	62		49	9	159	1	394
Unresolved calls									
C. gouldii / Scotorepens balstoni					6				6
C. morio / Miniopterus australis					19				19
Falsistrellus tasmaniensis / Nyctophilus sp.		2			20		1		23
Falsistrellus tasmaniensis / Scotorepens sp.		2							2
V. darlingtoni / V. regulus	12	476	17		80	348	23	137	1093
V. regulus / V. vulturnus	1	705	138		329	259	100	490	2022
V. vulturnus / C. morio	17	1398	476	3	4576	10071	87	49	16677
Vespadelus sp. */ M. orianae*	65	412	16	11	295	7011	233	108	8151
O. ridei / C. gouldii	57	1836	213		93	76	511	515	3301
O. ridei / O. planiceps	1	9	10			1	13		34
Site Total	406	6959	1250	28	6801	18623	1887	1373	37327

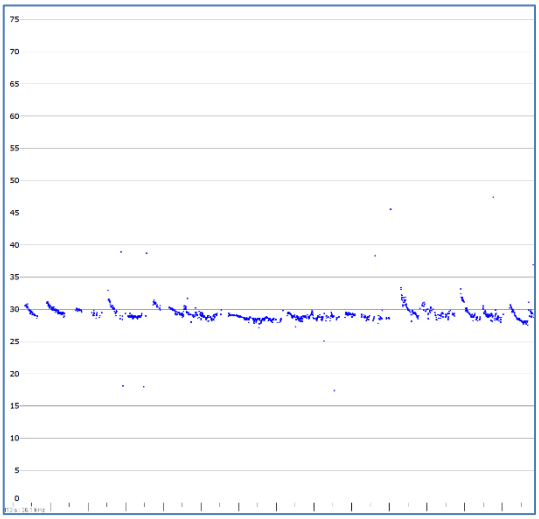
Appendix 3 Representative bat-calls recorded at Winterbourne Wind Farm, Spring 2020. Time between pulses removed; time-scale (*x*-axis) 10ms per tick



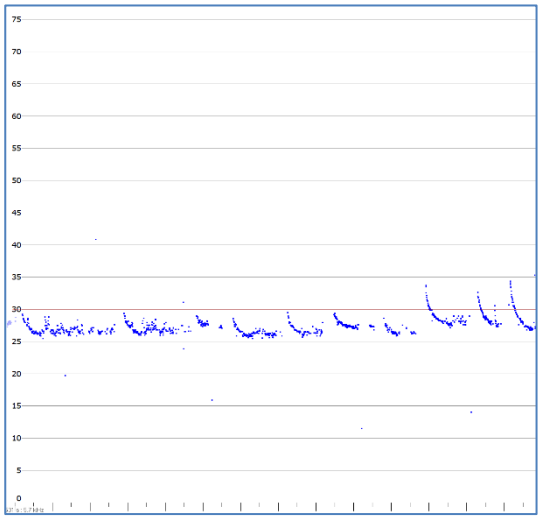
Chalinolobus gouldii



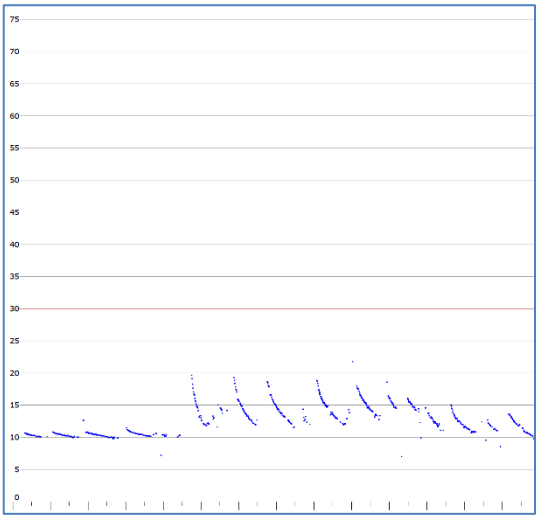
C. gouldii / Scotorepens balstoni



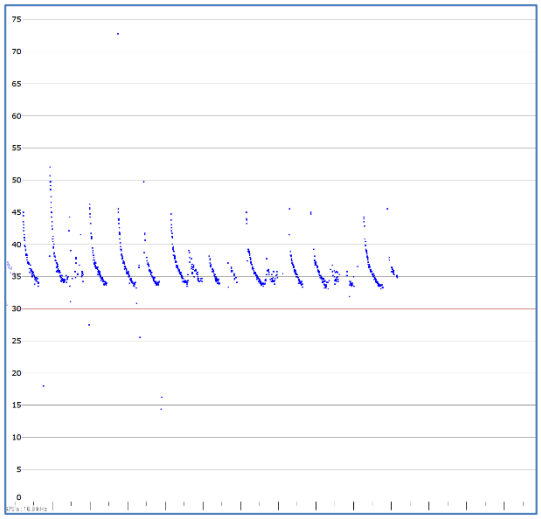
Ozimops ridei



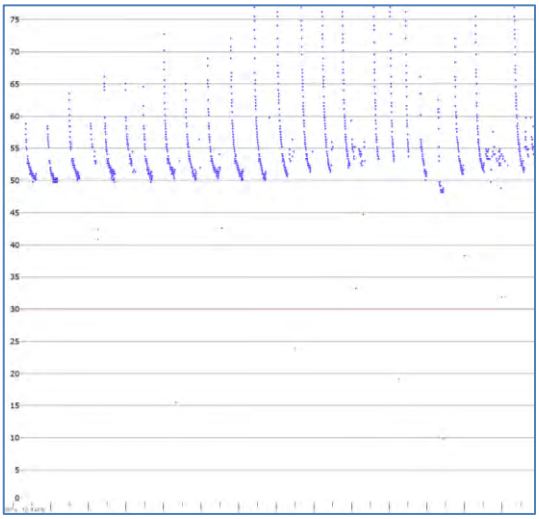
O. ridei / O. planiceps



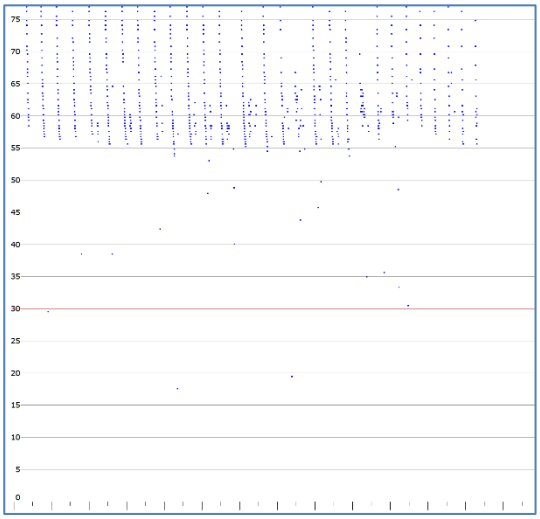
Austronomus australis



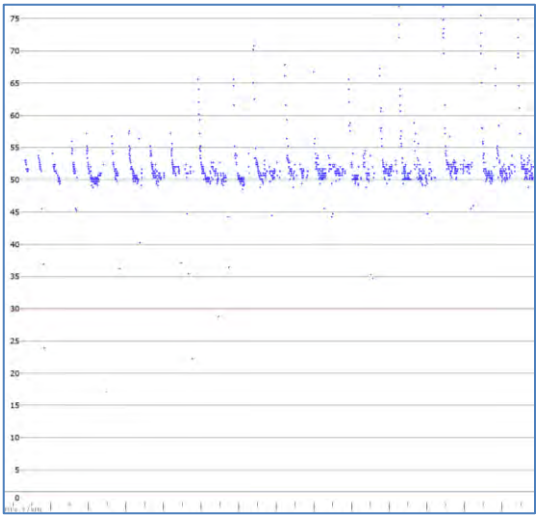
Scoteanax rueppellii



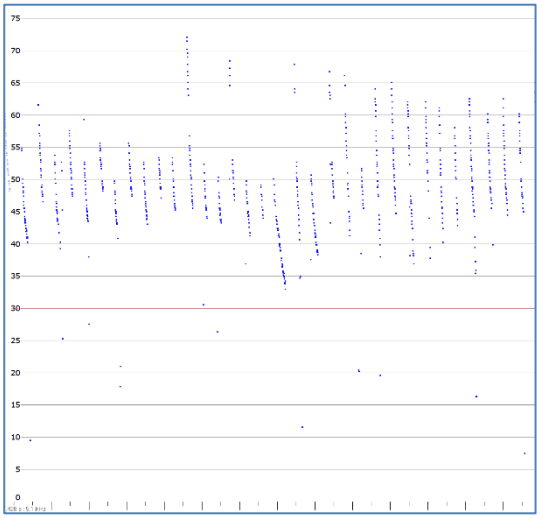
Chalinolobus morio



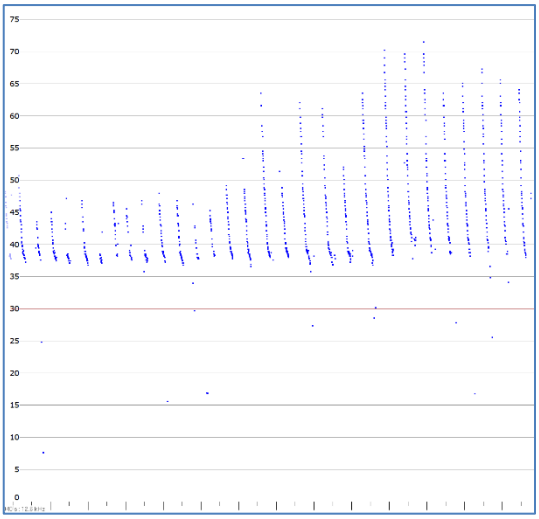
C. morio / Miniopterus australis



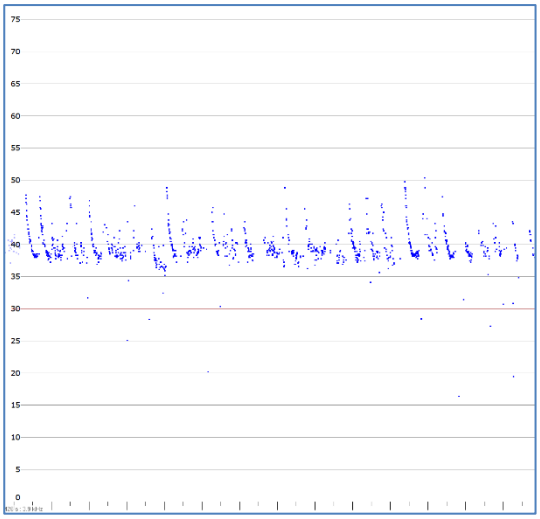
V. vulturnus / C. morio



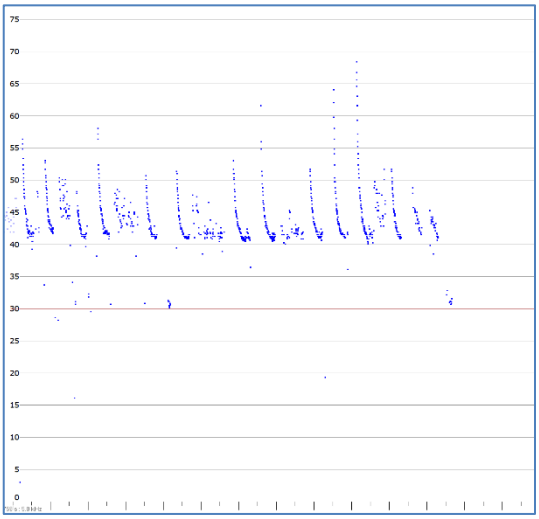
Nyctophilus geoffroyi / N. gouldi



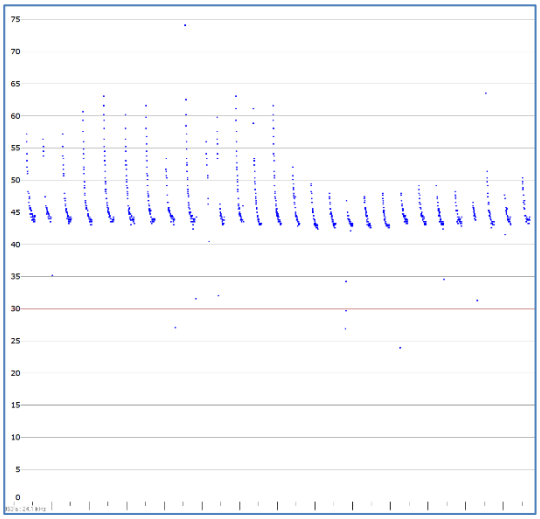
Falsistrellus tasmaniensis / Nyctophilus sp.



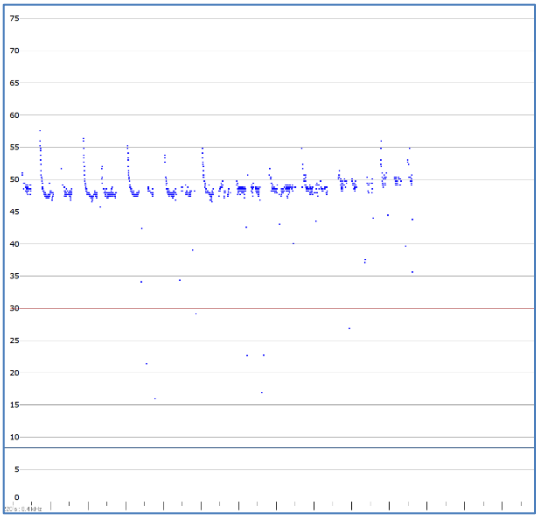
Falsistrellus tasmaniensis / Scotorepens sp.



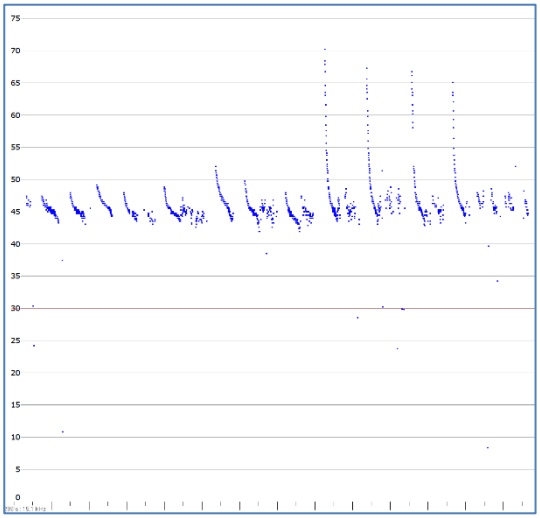
Vespadelus darlingtoni



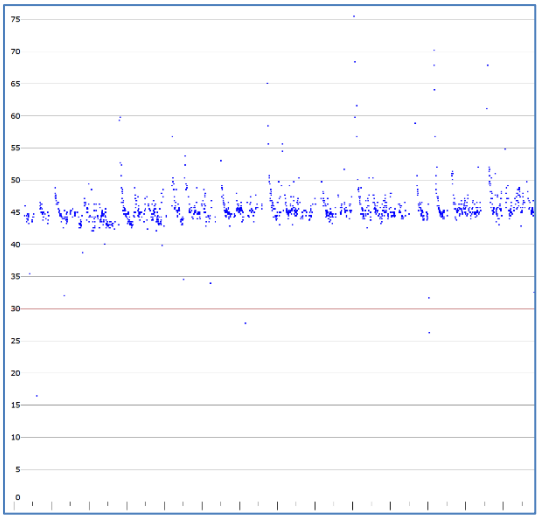
Vespadelus regulus



Vespadelus vulturnus



Miniopterus orianae



Vespadelus sp. / M. orianae

Bat Call Analysis Report

Winterbourne Wind Farm

Prepared for ERM

Prepared by:

Green Tape Solutions / ACN 162 130 627 / ABN 20 162 130 627
PO BOX 416 Rockhampton QLD 4700 / PO BOX 282, Morayfield, QLD, 4506 / www.greentapesolutions.com.au
Telephone: 07 5428 6372 / Email: admin@greentapesolutions.com.au

DISCLAIMER

Apart from fair dealing for the purposes of private study, research, criticism, or review as permitted under the Copyright Act, no part of this report, its attachments or appendices may be reproduced by any process without the written consent of Green Tape Solutions.

Green Tape Solutions has prepared this report for the specific purpose of only for which it is supplied. This report is strictly limited to the purpose and the facts and matters stated in it and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The contents of this report and its appendices may not be used in any form by any party other than the Client. The reproduction, adaptation, use or communication of the information contained within this report may not be used without the written permission of Green Tape Solutions. Neither the author/s nor the company accepts any liability or responsibility for the unauthorised use of any part of this document.

In preparing this report we have assumed that all information and documents provided to us by the Client, or as a result of a specific request or enquiry, were complete, accurate and up-to-date. Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware of any reason why any of the assumptions are incorrect.

This report is presented without the assumption of a duty of care to any other person (other than the Client) ("**Third Party**"). The report may not contain sufficient information for the purposes of a Third Party or for other uses. If a Third Party uses or relies on the facts, content, opinions or subject matter contained in this report with or without the consent of Green Tape Solutions, Green Tape Solutions disclaims all risk and the Third Party assumes all risk and releases and indemnifies and agrees to keep indemnified Green Tape Solutions from any loss, damage, claim or liability arising directly or indirectly from the use of or reliance on this report.

In this note, a reference to loss and damage includes past and prospective economic loss, loss of profits, damage to property, injury to any person (including death) costs and expenses incurred in taking measures to prevent, mitigate or rectify any harm, loss of opportunity, legal costs, compensation, interest and any other direct, indirect, consequential or financial or other loss.

Document Records - Quality

TITLE	Bat Analysis for Winterbourne Wind Farm near Walcha, NSW.
FILED AS	ME21006_Winterbourne Wind Farm

Revision	Date	Prepared by (name/title)	Reviewed by (name/ title)	Approved by (name/title)
Version A	6/3/2024	OA Ecologist	KM Principal Ecologist	ERM

Table of Content

1.0 INTRODUCTION 1
1.1 BACKGROUND 1
1.2 SCOPE OF WORK 1
2.0 METHODOLOGY 2
2.1 CAPTURE TECHNIQUE 2
2.2 CALL IDENTIFICATION 2
2.3 NATIONAL STANDARD 2
3.0 RESULTS 3
3.1 TOTAL SPECIES RECORDED 3
3.2 SAMPLES OF CALLS / SEQUENCES FILES 5
4.0 CONCLUSION 15
5.0 REFERENCES 16

TABLES

Table 1: Summary of bat call analysis 3

FIGURES

Figure 1: *Austronomus australis* 5
Figure 2: *Chalinolobus gouldii* 5
Figure 3: *Chalinolobus morio* 6
Figure 4: *Falsistrellus tasmaniensis* 6
Figure 5: *Micronomus norfolkensis* 7
Figure 6: *Miniopterus orianae oceanensis* 7
Figure 7: *Myotis macropus* 8
Figure 8: *Nyctophilus spp* 8
Figure 9: *Ozimops planiceps* 9
Figure 10: *Ozimops ridei* 9
Figure 11: *Rhinolophus megaphyllus* 10
Figure 12: *Saccolaimus flaviventris* 10
Figure 13: *Scoteanax rueppellii* 10
Figure 15: *Scotorepens orion* 11
Figure 16: *Scotorepens sp.* (Parnaby 1992) 11
Figure 17: *Vespadelus darlingtoni* 12
Figure 18: *Vespadelus regulus* 13
Figure 19: *Vespadelus troughtoni* 13
Figure 20: *Vespadelus vulturnus* 14

1.0 Introduction

1.1 Background

Green Tape Solutions were commissioned to undertake bat call analysis for Winterbourne Wind Farm near Walcha, NSW.

1.2 Scope of Work

The specific scope of works for this report includes the following:

- Outline the methodology used to analyse the microbat call within the subject site; and,
- Present the findings of all of the bat call surveys conducted at the project site.

2.0 Methodology

2.1 Capture Technique

Microbat calls were sampled using seven Anabat Chorus devices and four Anabat Swift devices (Titley Electronics). Passive monitoring was undertaken from 22nd May to 6th June 2023. The original call files display Australian Eastern Standard Time. Data was received on 22nd February 2024. The data was analysed using Anabat Insight.

Monitoring commenced at dusk (approximately 1800 hours) and continued until dawn (approximately 0530 hours). Ultrasonic call monitoring surveys on anabat detectors were conducted using full-spectrum fitted with omnidirectional ultrasonic microphone.

2.2 Call Identification

Anabat recordings were analysed using Anabat software (Anabat Insight). Identifications were made by categorising call shape and frequency, with a species match given in consideration to region, known bat distributions, and habitats present. The focus of the bat surveys was to assess the presence of bat species found within the Project Area, and to assess the potential for rare and threatened species to occur.

Call identification for this dataset was based on call keys and descriptions published for Queensland (Reinhold *et al.*, 2001) and New South Wales (Pennay *et al.*, 2004).

Species' identification was further refined using the probability of occurrence of each species based on their geographic distribution (Churchill, 2008, Van Dyck and Strahan, 2008). Species nomenclature used in this report follows Churchill (2008).

The reliability of identification is as follows:

- **Definite** - one or more calls where there is no doubt about the identification of the species;
- **Probable** - most likely to be the species named, low probability of confusion with species that use similar calls; and,
- **Possible -** call is comparable with the named species, with a moderate to high probability of confusion with species of similar calls.

2.3 National Standard

The format and content of this report complies with the nationally accepted standards for the interpretation and reporting of Anabat and Songmeter data (Reardon, 2003), which is currently available from the Australasian Bat Society at www.ausbats.org.au.

3.0 Results

3.1 Total Species Recorded

The majority of calls were considered to be of medium to good quality calls.

A total of 27,844 sequence files were analysed. A proportion of these files (14,911) in this dataset contained background noise or resulted in poor quality calls that did not provide bat calls for analysis. While some call sequences were recognised as bat calls, the quality was not sufficient to assign species identification.

A summary of the species identified through bat call analysis is provided in **Table 1**. The total number of calls per detector is also given in **Table 1**, this number is indicative of bat activity but may still include some background noise or poor quality calls which were not identifiable.

Table 1: Summary of bat call analysis

Species	Biodiversity Act	EPBC Act	ANA001	AS01A	AS02A	CH3	CH9	CH13	CH16	CH17	CH18	CH22	M27
Total Calls			399	654	6,236	77	445	1,270	2,873	17	14	307	746
Austronomus australis	LC	NOC	Definite		Definite		Definite	Definite	Definite			Definite	
Chalinolobus gouldii	LC	NOC	Definite	Definite	Definite	Definite	Definite	Definite	Definite	Definite	Definite	Definite	Definite
Chalinolobus morio	LC	NOC	Definite	Definite	Definite	Definite	Definite	Definite	Definite		Definite	Definite	Definite
Falsistrellus tasmaniensis	V	NOC	Possible	Possible			Possible	Possible	Probable	Possible			Probable
Micronomus norfolkensis	V	NOC	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible		Possible
Miniopterus orianae oceanensis	V	NOC	Probable	Probable		Definite		Definite	Definite	Definite	Definite	Definite	Definite
Myotis macropus	V	NOC		Possible		Possible	Possible	Possible	Possible	Possible		Possible	Possible
Nyctophilus sp	V	V		Possible		Possible	Possible	Possible	Possible	Possible		Possible	Possible

Ozimops planiceps	LC	NOC	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible		Possible
Ozimops ridei	LC	NOC	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible		Possible
Rhinolophus megaphyllus	LC	NOC						Definite					
Saccolaimus flaviventris	V	NOC							Definite				
Scoteanax rueppellii	V	NOC	Possible	Possible			Possible	Possible	Probable	Possible	Probable	Probable	Probable
Scotorepens orioni	LC	NOC		Probable	Probable		Probable	Probable	Probable	Probable			Probable
Scotorepens orion	LC	NOC			Probable	Probable		Probable	Probable	Probable		Probable	Probable
Scotorepens sp.	LC	NOC	Probable	Probable	Probable	Probable				Probable		Probable	Probable
Vespadelus darlingtoni	LC	NOC	Definite	Definite	Definite	Definite	Definite	Definite	Definite	Definite		Definite	Definite
Vespadelus regulus	LC	NOC	Possible	Possible		Possible		Possible	Probable		Probable	Probable	Probable
Vespadelus troughtoni	V	NOC	Probable	Probable	Possible	Probable			Possible	Probable	Possible	Possible	Possible
Vespadelus vulturnus	LC	NOC						Possible	Possible	Possible			

LC: Least Concern, NOC: Not of Concern, V: Vulnerable

3.2 Samples of Calls / Sequences Files

Samples of call extracted from the dataset for each species identified is provided in the following figures.

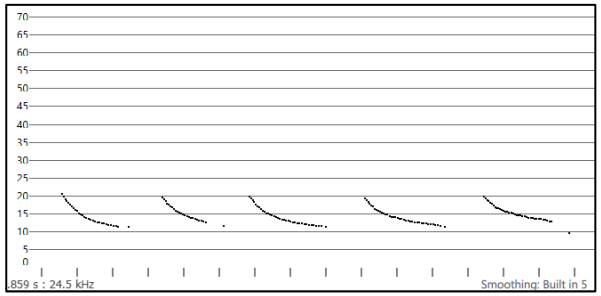
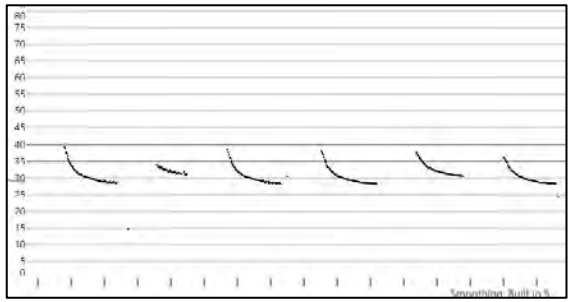
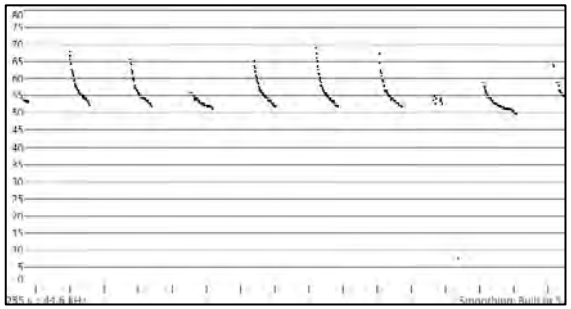
Species	Calls	Known distribution (Extract from Ausbats maps from Australian Bat Society)
Figure 1: *Austronomus australis* Definite Call This bat is easily recognised by its constant frequency calls range in bandwidth from 10.5 to 15 kHz (Pennay *et al.*, 2004).		
Figure 2: *Chalinolobus gouldii* Definite Call. This species has a curved shape call with characteristic frequency 28 to 34kHz. Pulse alternates in frequency and mostly down-sweeping tail or no tail.		

Figure 3: *Chalinolobus morio*

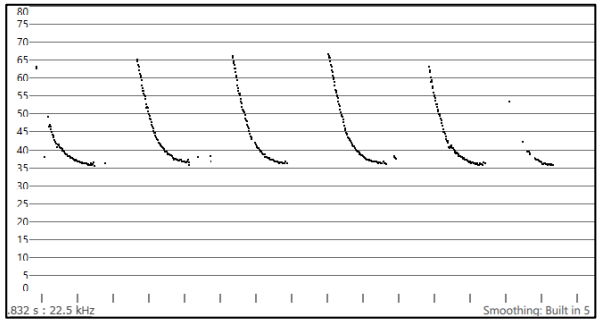




Definite Call.

C. morio has a down-sweeping tail curved pulse with characteristic frequency 47.5 to 53 kHz. It has often a very brief characteristic section. Species that overlap in frequency (*Vespadelus troughtoni, V. pumilus* and *V. vulturnus*) but all have up-sweeping tails.

Figure 4: *Falsistrellus tasmaniensis*



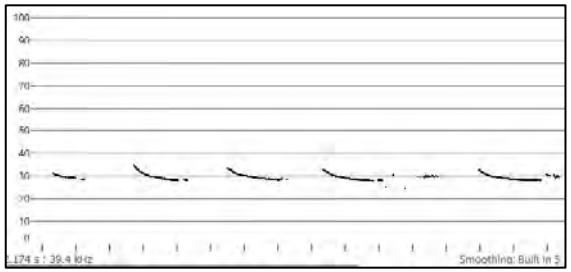


Possible call.

Curved and usually steep, but can be variable in shape, most pulses do not have an up-sweeping tail.

Characteristic frequency 35 to 39.5 kHz (n = 14). Can be separated from *Scotorepens sp.* (Parnaby, 1992) and *S. greyii* by lack of up-sweeping tail on most pulses. Also, most of the time the pre-characteristic section of *F. tasmaniensis* is longer than the characteristic section + tail. Except for when the drop in frequency of the pre-characteristic section is greater than 3 kHz or the characteristic frequency is 38 to 39.5 kHz, cannot be distinguished from *S. orion. F. tasmaniensis* has a shorter pre-characteristic section than *S. rueppellii*, although these two species can be difficult to separate when *F. tasmaniensis* is lower than 36 kHz.

Figure 5: ***Micronomus norfolkensis***



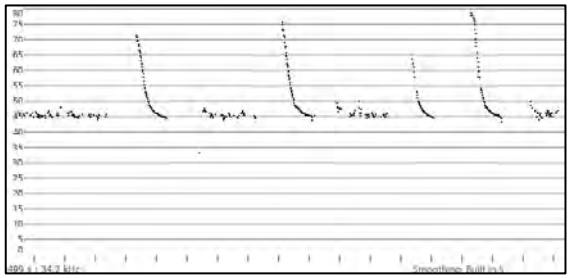


Possible call.

Flat. Characteristic frequency 28.5 to 31 kHz in New South Wales.

Unless calling at above about 33 kHz, indistinguishable from *O. ridei.*

Figure 6: ***Miniopterus orianae oceanensis***





Definite call.

The species call is characterised by its long curved pulse with a small down-sweeping tail and its frequency between 43-47kHz (Reinhold, 2001).

Pulse shape and time between calls usually variable within a sequence.

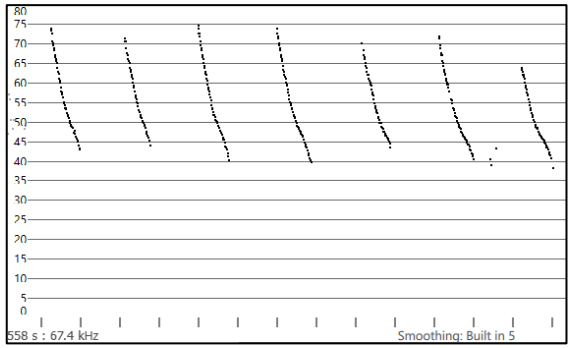
Longer duration with no tail or relatively short up-sweeping tail, cannot be distinguished from *Vespadelus darlingtoni* at the same frequency (Reinhold, 2001).

Shorter duration, can be distinguished from *V. darlingtoni, V. regulus* and *V. vulturnus* by having a longer pre-characteristic section (drop in frequency usually greater than 2 kHz) and most pulses do not have an up-sweeping tail (Reinhold, 2001). Pulse

shape and time between calls can be quite variable within a sequence (Reinhold, 2001).

Figure 7: *Myotis macropus*

Possible call.



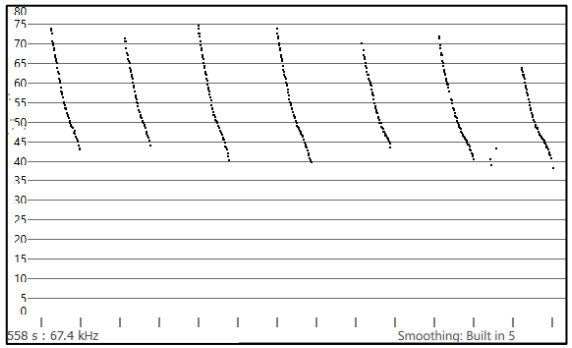
Near-vertical pulse dropping to about 30 to 35-50kHz. *M. macropus* mostly have a pulse interval of less than 75ms and usually have one kink close to the middle so that the second part has a lesser slope than the first (Reinhold, 2001).

This call can be confused with *Nyctophilus spp* calls. The latest have usually a pulse interval greater than 95ms and are slightly more complicated structure with two kinks instead of one.



Figure 8: *Nyctophilus spp*

Possible call.



This species displays a near-vertical pulse, characteristic frequency between 80 and 35KHz (Pennay *et al*, 2004).

The species from this genus cannot be distinguished from each other. There are 3 species that are known to occur in the project area.



N. *Corbeni*



N. geoffroyi



N. gouldi

Figure 9: *Ozimops planiceps*

Possible call.

Cannot be definitively distinguished from *Ozimops ridei*.

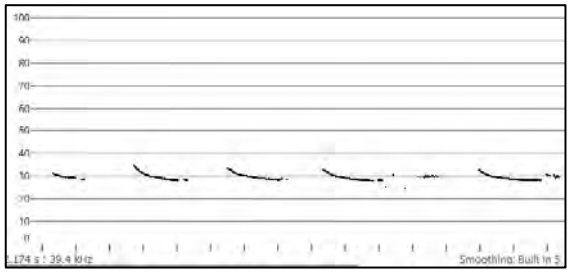




Figure 10: *Ozimops ridei*

Possible call.

O. ridei calls are flat and sometimes a bit curved with frequency a bit lower than 30kHz. Characteristic frequency of this species is between 28 to 36 kHz. Calls in the same frequency range as *Micronomus norfolkensis*, but *O. ridei* calls may jump up to a higher frequency than the surrounding pulses, this does not occur in a regular pattern like in *M. norfolkensis*.

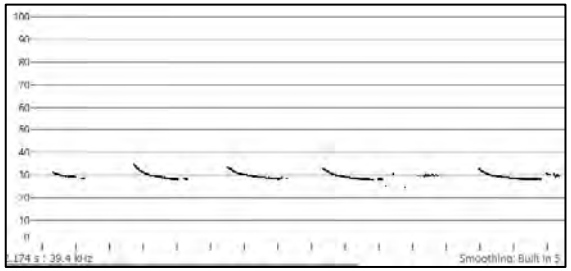
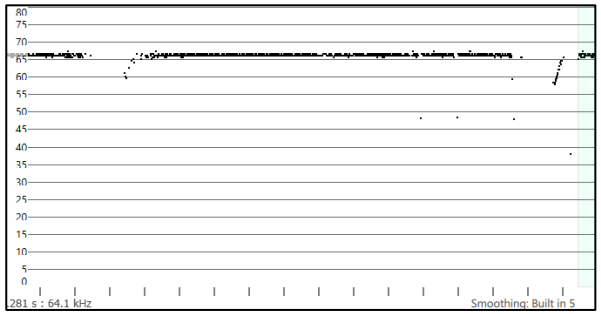




Figure 11: *Rhinolophus megaphyllus*

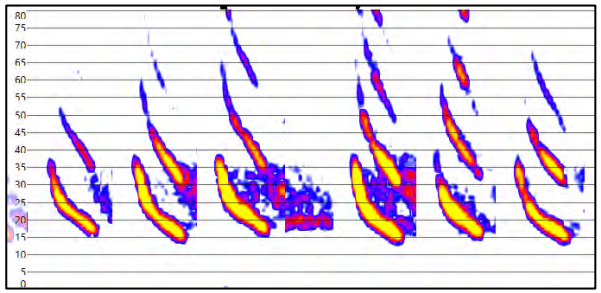




Definite call.

The species call cannot be misidentified with any other species. Pulses have an up-sweeping initial section a perfectly flat, relatively long characteristic section and a down sweeping tail (Reinhold, 2001). Characteristic frequency ranges from 66 to 72 kHz.

Figure 12: *Saccolaimus flaviventris*

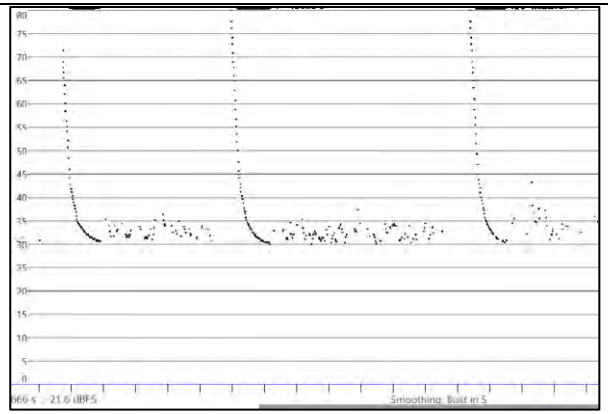




Definite call.

Curved, characteristic frequency 18 to 21.5 kHz. The characteristic frequency does not go above 22 kHz. Other species that could overlap do not occur in this area.

Figure 13: *Scoteanax rueppellii*





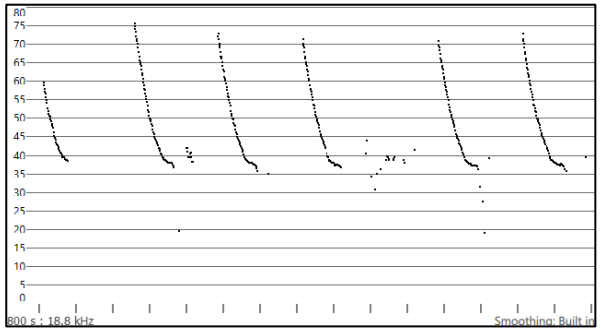
Probable call.

Curved call without tail and a characteristic frequency varying between 33 to 36 kHz. Frequency of the knee higher than 37 kHz. Pre-characteristic section drops over more than 3 kHz. This feature mostly distinguishes it from *Scotorepens spp*.

Some *Falsistrellus tasmaniensis* have a pre-characteristic section drop of greater than 3 kHz, so

for calls higher than 35 kHz characteristic frequency, these two species are difficult to be distinguished. *S. rueppellii* has a longer pre-characteristic section than *F. tasmaniensis.*

Figure 14: *Scotorepens orion*



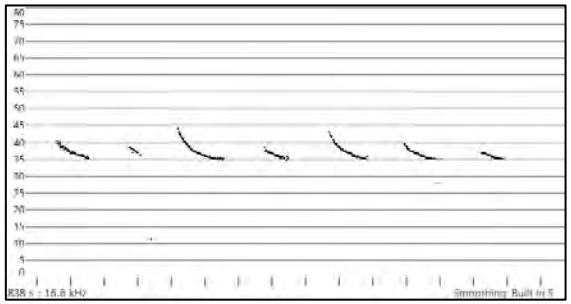


Probable call.

Characteristic frequency between 34.5 and 37.5 kHz with curved, absent tail sometime down-sweeping tail (Reinhold *et al,* 2001). Knee of the pulse is usually lower than 38 kHz.

Calls can be confused with *Scoteanax rueppelli*'s calls but *S. orion* has a longer pre-characteristic section (can be up to 70kHz) which differentiate it from other species.

Figure 15: *Scotorepens sp*. (Parnaby 1992)

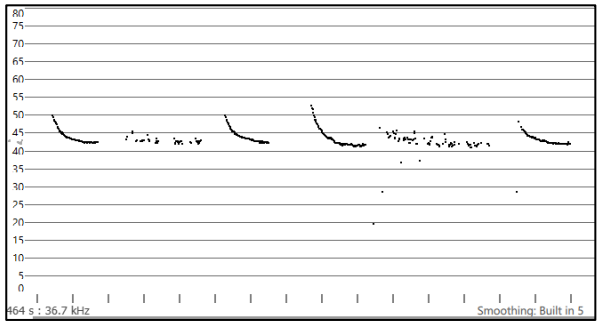




Probable call.

The pulse is curved with an up-sweeping tail. And a characteristic frequency between 36 to 41.5 kHz. The characteristic section and the tail of *S. sp.* takes up about half or less than half the time of the pulse. This distinguishes it from *Chalinolobus nigrogriseus*, which has a relatively longer characteristic section + tail.

Figure 16: ***Vespadelus darlingtoni***



Definite call.

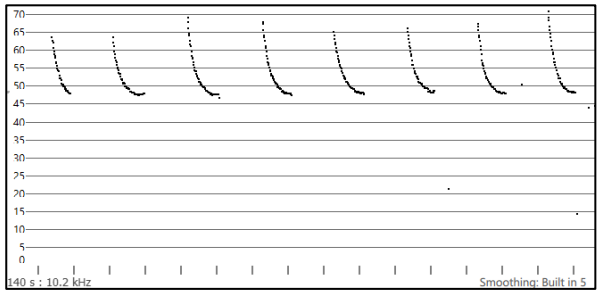
This species call has a curved call with no tail or sometime an up-sweeping tail. The call's characteristic frequency is between 42.5 to 48.5 kHz. Characteristic section is often, but not always, relatively long.

Shorter duration with up-sweeping tails and higher frequencies, cannot be distinguished from *V. regulus* or *V. vulturnus*.

Distinguished from *Miniopterus orianae oceanensis* by having consecutive pulses even, and lacking down-sweeping tails.



Figure 17: *Vespadelus regulus*



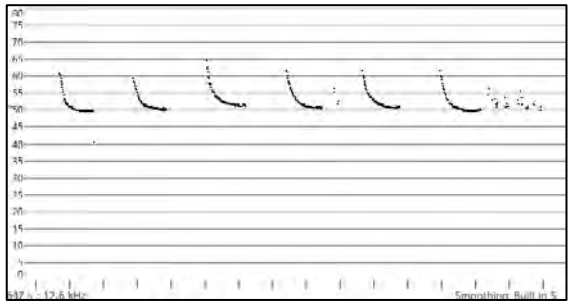


Probable call.

Characteristic frequency varies significantly over distribution from 40 to 55 kHz (n = 95). Call shape also varies between regions (see regional information). Characteristic frequency in NE usually above 47 kHz (n = 19). Curved with up-sweeping tail.

Overlaps entirely in frequency with *Miniopterus orianae oceanensis*, some calls may be identified by even consecutive pulses and up-sweeping tail.

Figure 18: *Vespadelus troughtoni*

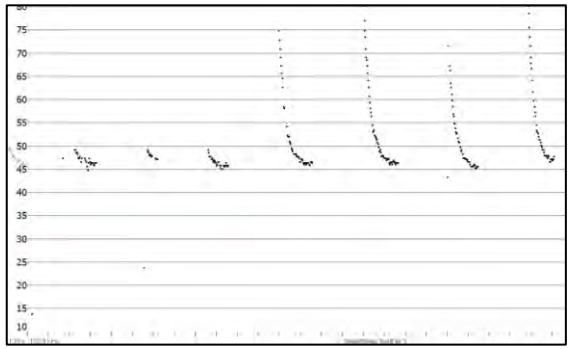




Probable call.

This species displays a curved pulse with not prominent up-sweeping tail. Its characteristic frequency is between 48.5 to 55 kHz (Pennay *et al*, 2004). If the end, frequency is lower than 51 kHz, then the call can be identified to *V. Troughtoni* and be differentiated from *V. pumilus*.

Figure 19: *Vespadelus vulturnus*





Possible call.

Curved and up-sweeping tail calls with characteristic frequency between 45 to 53 kHz.

It cannot be distinguished from *V. regulus*, or some *V. darlingtoni* when up-sweeping tail.

It is distinguished from *Miniopterus orianae oceanensis* by having consecutive pulses even, with mostly up-sweeping tails and drop in frequency of pre-characteristic section mostly less than 2 kHz.

4.0 Conclusion

A total of 19 microbat species were either confirmed ‘definite’, ‘probable’ or ‘possible’ within the Project area. All bats identified on the site were expected to be present within the region.

A total of eight (8) species are listed under the NSW *Biodiversity Act* as Vulnerable.

Calls from *Nyctophilus sp* have been confirmed across the project areas. Three species of *Nyctophilus* possibly occur within the Project Area. *N corbeni* is listed Vulnerable under the EPBC Act and BC Act. The calls of this species cannot be distinguished from each other.

Two of the reliably identified call types were only attributable to genus level due to similarities in call characteristics of the following groups:

- Nyctophilus species
    - ✓ Steep, almost-linear linear (FM) call pulses are distinctive from those of other bat calls but cannot be reliably identified to species
    - ✓ Three species potentially occur in the project area (*N. bifax* and *N. gouldi*)

5.0 References

CHURCHILL, S. 2008. *Australian Bats,* Sydney, Allen and Unwin.

DEWHA 2010. Survey guidelines for Australia's threatened bats. Guidelines for detecting bats listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*. *In:* DEPARTMENT OF THE ENVIRONMENT WATER HERITAGE AND THE ARTS (ed.). Canberra.

PENNAY, M., LAW, B. A. & REINHOLD, L. 2004. Bat calls of New South Wales: Region based guide to the echolocation calls of microchiropteran bats. *In:* NSW DEPARTMENT OF ENVIRONMENT AND CONSERVATION (ed.). Hurstville.

PWCNT 2002. Key to the Bat Calls of the Top End of the Northern Territory. *In:* PARKS AND WILDLIFE COMMISSION OF THE NORTHERN TERRITORY (ed.). Damian J. Milne.

REARDON, T. 2003. Standards in bat detector based surveys. *Australasian Bat Society* Newsletter 20.

REINHOLD, L., LAW, B., FORD, G. A. & PENNAY, M. 2001. *Key to the Bat Calls of South-east Queensland and North-east New South Wales*, Queensland Department of Natural Resources and Mines.

VAN DYCK, S. & STRAHAN, R. 2008. *The Mammals of Australia (Third Edition); ,* Sydney, New Holland.

Lachlan McRae Fauna Services
ABN: 96 905 438 927
Lmcrae.ecology@gmail.com

MICROBAT CALL ANALYSIS REPORT

21 Feb 2024

Job #: 010
Project name: Walcha Microbat Call Analysis
Client: ERM — Sam Sanders and Joanne Woodhouse
Location: -30.997745, 151.855795 (Walcha, NSW).

Table 1 – Summary of the microbat species recorded from seven ultrasonic recorders deployed at Walcha, NSW from September to November 2023.

Common Name	Scientific Name	BC Act	EPBC Act	ID confidence
White-striped Free-tailed Bat	*Austronomus australis*	-	-	Certain
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	Vulnerable	-	Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	Certain
Ride's Free-tailed Bat	*Ozimops ridei*	-	-	High
Eastern Broad-nosed Bat	*Scotorepens orion*	-	-	Moderate
Eastern Broad-nosed Bat, Undescribed Broad-nosed Bat, or Eastern False Pipistrelle	*Scotorepens orion, Scotorepens sp. (Parnaby),* or *Falsistrellus tasmaneinesis.*	Vulnerable (only *F. tasmaniensis*)	-	Species Group
Lesser Long-eared Bat or Goulds Long-eared Bat	Nyctophilus *geoffroyi* or *Nyctophilus gouldi*	-	-	Species Group
Large Bent-winged Bat	*Miniopterus orianae oceansis*	Vulnerable	-	Moderate
Large Forest Bat	*Vespadelus darlingtoni*	-	-	High
Eastern Forest Bat	*Vespadelus regulus*	-	-	Moderate
Little Forest Bat	*Vespadelus vulturnus*	-	-	High
Chocolate Wattled Bat	*Chalinolobus morio*	-	-	High
Eastern Cave Bat	*Vespadelus troughtoni*	Vulnerable	-	High

1. Introduction

1.1 Background/Disclaimer

The author of this report, Lachlan McRae, has been engaged to undertake microbat echolocation call analysis for ERM. The analysis will determine the presence/absence of microbat species on each ultrasonic recording device within the audio data set supplied by ERM.

The data necessary for this analysis was provided to the author on multiple SD cards. The author was not involved in the data collection. As such, the author makes no claim that the data was collected appropriately.

Microbat call identification works on a probabilistic scale due to the wide variety of overlapping call types most species can make, and it can therefore be almost impossible to be 100% certain of a call identification for many species. As such, the author is only presenting their professional opinion as opposed to an objective truth.

2. Methods

2.1 Supplied Data

The author was supplied with 315 nights of ultrasonic audio data from seven ultrasonic recording devices. The recorders were deployed simultaneously from 25th September 2023 to 8th November 2023, totalling 45 nights per recorder.

2.2 Analysis Software

Microbat calls were analysed using Titley Scientific's Anabat Insight (version 2.0.9.0) on MacOS Ventura (version 13.3.1).

2.3 Candidate microbat species

A list of microbat species with potential to occur at the data collection points, based solely on geographic distribution range, was generated using BatMap (Australasian Bat Society, 2024). A radius of 40km from the data collection point was used (Fig. 1)

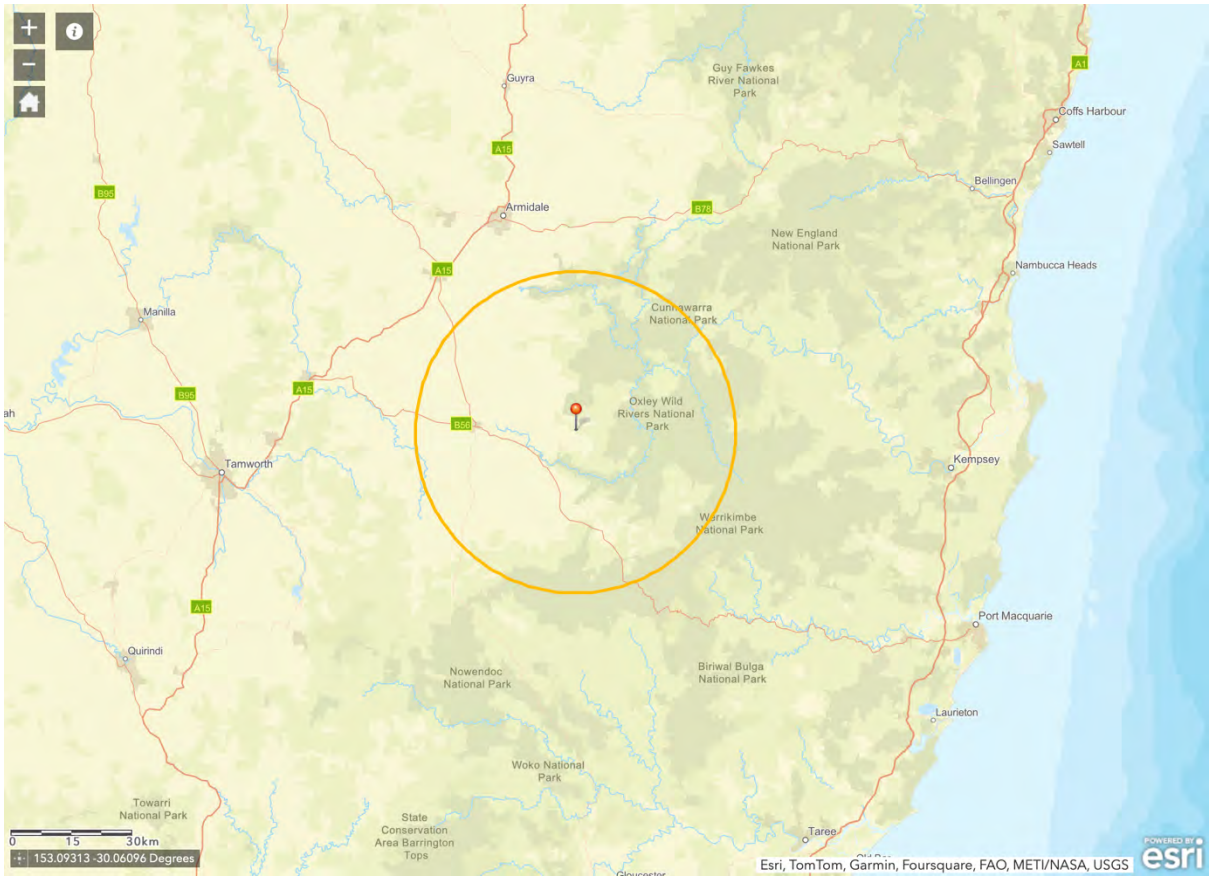


Figure 1 - 40km search distance used to generate a microbat species list with BatMap. Search distance centred on the data collection point at -30.997745, 151.855795 (Walcha, NSW).

A total of 22 possible microbat species were generated from BatMap (Table 2).

Table 2 – The list of candidate microbat species produced by BatMap's search tool, with a 40km radius search distance from the data collection point at -30.997745, 151.855795 (Walcha, NSW).

Common Name	Scientific Name
White-striped Freetail Bat	*Austronomus australis*
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventis*
Large-eared Pied Bat	*Chalinolobus dwyeri*
Gould's Wattled Bat	*Chalinolobus gouldii*
Ride's Free-tailed Bat	*Ozimops ridei*
Greater Broad-nosed Bat	*Scoteanax rueppellii*
Eastern Broad-nosed Bat	*Scotorepens orion*
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*
Southern Myotis	*Myotis macropus*
Lesser Long-eared Bat	*Nyctophilus geoffroyi*
Gould's Long-eared Bat	*Nyctophilus gouldi*
Undescribed Broad-nosed Bat	*Scotorepens sp (Parnaby)*
Large Forest Bat	*Vespadelus darlingtoni*
Large Bent-winged Bat	*Miniopterus orianae oceansis*
Southern Forest Bat	*Vespadelus regulus*
Chocolate Wattled Bat	*Chalinolobus morio*
Little Forest Bat	*Vespadelus vulturnus*
Eastern Cave Bat	*Vespadelus troughtoni*

Eastern Forest Bat	*Vespadelus pumilus*
Little Bent-winged Bat	*Miniopterus australis*
Eastern Horseshoe Bat	*Rhinolophus megaphyllus*
Golden-tipped Bat	*Phoniscus papuensis*

2.4 Call Identification

Calls were identified to one or more of the 22 species listed above (Table 2) based on 1) *Bat Calls of NSW* by Pennay et al. (2004), 2) reference calls personally collected by Lachlan McRae within NSW, 3) *Bat Calls of Central Eastern NSW* by Chris Corben (2009), 4) call metrics and ID features obtained from discussions with recognised bat experts including Michael Pennay, Brad Law, and Chris Corben, and 5) the author's understanding of each species' foraging behaviour and habitat requirements (Churchill 2008, Baker & Gynther 2023).

Each call was assigned to one of the following identification confidence categories:

1) **Certain** — no doubt about the identification of the species. This rating is typically reserved for species that do not overlap in characteristic frequency and/or call shape with other species.
2) **High** — small chance of confusion with another species. This rating is typically given instead of "Certain" if there are other species that can produce somewhat similar calls.
3) **Moderate** —moderate chance of confusion with another species but the chosen species is slightly more likely than the alternative species.
4) **Species Group** — call could more or less equally belong to one of two or more species. This ID category occurs more frequently when recordings contain only high-clutter pulses, only a few pulses, are of poor quality, and/or if recordings are in zero-crossing as opposed to full-spectrum.

3. Results

3.1 Summary of results

A total of ~47,340 files were analysed, of which 2,312 contained bat calls. A total of 11 species and two species groups were identified in the Walcha data set (Table 1 & Fig. 2–13). A summary of the species recorded on each recorder is provided below (Table 3–9).

Table 3 – Summary of the results from the Walcha, NSW recorder located at -30.997705, 151.855783.

Common Name	Scientific Name	BC Act	EPBC Act	ID confidence
White-striped Free-tailed Bat	*Austronomus australis*	-	-	Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	High
Ride's Free-tailed Bat	*Ozimops ridei*	-	-	High
Eastern Broad-nosed Bat	*Scotorepens orion*	-	-	Moderate

Eastern Broad-nosed Bat, Undescribed Broad-nosed Bat, or Eastern False Pipistrelle	*Scotorepens orion, Falsistrellus tasmaneinesis,* or *Scotorepens sp. (Parnaby).*	Vulnerable (only *F. tasmaniensis*)	-	Species Group
Lesser Long-eared Bat or Goulds Long-eared Bat	Nyctophilus *geoffroyi* or *Nyctophilus gouldi*	-	-	Species Group
Large Bent-winged Bat	*Miniopterus orianae oceansis*	Vulnerable	-	Moderate
Large Forest Bat	*Vespadelus darlingtoni*	-	-	High
Eastern Forest Bat	*Vespadelus regulus*	-	-	Moderate
Little Forest Bat	*Vespadelus vulturnus*	-	-	High
Eastern Cave Bat	*Vespadelus troughtoni*	Vulnerable	-	High
Chocolate Wattled Bat	*Chalinolobus morio*	-	-	High

Table 4 – Summary of the results from the Walcha, NSW recorder located at -30.863320, 151.747310.

Common Name	Scientific Name	BC Act	EPBC Act	ID confidence
White-striped Free-tailed Bat	*Austronomus australis*	-	-	Certain
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	Vulnerable	-	Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	High
Ride's Free-tailed Bat	*Ozimops ridei*	-	-	High
Lesser Long-eared Bat or Goulds Long-eared Bat	Nyctophilus *geoffroyi* or *Nyctophilus gouldi*	-	-	Species Group
Large Bent-winged Bat	*Miniopterus orianae oceansis*	Vulnerable	-	High
Large Forest Bat	*Vespadelus darlingtoni*	-	-	High
Eastern Cave Bat	*Vespadelus troughtoni*	Vulnerable	-	High

Table 5 – Summary of the results from the Walcha, NSW recorder located at -30.912108, 151.611562.

Common Name	Scientific Name	BC Act	EPBC Act	ID confidence
White-striped Free-tailed Bat	*Austronomus australis*	-	-	Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	High
Ride's Free-tailed Bat	*Ozimops ridei*	-	-	High
Large Forest Bat or Large Bent-winged Bat	*Vespadelus darlingtonia* or *Miniopterus orianae oceansis*	Vulnerable (only *Miniopterus orianae oceanensis*)	-	Species Group
Large Forest Bat	*Vespadelus darlingtoni*	-	-	Moderate
Little Forest Bat	*Vespadelus vulturnus*	-	-	High

Table 6 – Summary of the results from the Walcha, NSW recorder located at -30.863130, 151.747343.

Common Name	Scientific Name	BC Act	EPBC Act	ID confidence
White-striped Free-tailed Bat	*Austronomus australis*	-	-	Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	High
Ride's Free-tailed Bat	*Ozimops ridei*	-	-	High
Eastern Broad-nosed Bat	*Scotorepens orion*	-	-	Moderate
Eastern Broad-nosed Bat, Undescribed Broad-nosed Bat, or Eastern False Pipistrelle	*Scotorepens orion, Falsistrellus tasmaneinesis,* or *Scotorepens sp. (Parnaby).*	Vulnerable (only *F. tasmaniensis*)	-	Species Group
Lesser Long-eared Bat or Goulds Long-eared Bat	Nyctophilus *geoffroyi* or *Nyctophilus gouldi*	-	-	Species Group
Large Bent-winged Bat	*Miniopterus orianae oceansis*	Vulnerable	-	Moderate
Large Forest Bat	*Vespadelus darlingtoni*	-	-	High
Little Forest Bat	*Vespadelus vulturnus*	-	-	High
Eastern Cave Bat	*Vespadelus troughtoni*	Vulnerable	-	High

Table 7 – Summary of the results from the Walcha, NSW recorder located at -30.997690, 151.855785.

Common Name	Scientific Name	BC Act	EPBC Act	ID confidence
White-striped Free-tailed Bat	*Austronomus australis*	-	-	Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	High
Ride's Free-tailed Bat	*Ozimops ridei*	-	-	High
Large Forest Bat or Large Bent-winged Bat	*Vespadelus darlingtonia* or *Miniopterus orianae oceansis*	Vulnerable (only *Miniopterus orianae oceanensis*)	-	Species Group
Large Forest Bat	*Vespadelus darlingtoni*	-	-	High

Table 8 – Summary of the results from the Walcha, NSW recorder located at -30.863355, 151.747300.

Common Name	Scientific Name	BC Act	EPBC Act	ID confidence
White-striped Free-tailed Bat	*Austronomus australis*	-	-	Certain
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	Vulnerable	-	Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	High
Ride's Free-tailed Bat	*Ozimops ridei*	-	-	High
Large Bent-winged Bat	*Miniopterus orianae oceansis*	Vulnerable	-	Moderate
Chocolate Wattled Bat	*Chalinolobus morio*	-	-	Moderate

Table 9 – Summary of the results from the Walcha, NSW recorder located at -30.911978, 151.611582.

Common Name	Scientific Name	BC Act	EPBC Act	ID confidence
White-striped Free-tailed Bat	*Austronomus australis*	-	-	Certain
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	Vulnerable	-	High
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	High
Lesser Long-eared Bat or Goulds Long-eared Bat	Nyctophilus *geoffroyi* or *Nyctophilus gouldi*	-	-	Species Group
Large Forest Bat	*Vespadelus darlingtoni*	-	-	High

Eastern Forest Bat	*Vespadelus regulus*	-	-	Moderate
Little Forest Bat	*Vespadelus vulturnus*	-	-	High
Chocolate Wattled Bat	*Chalinolobus morio*	-	-	High

3.2 Supporting call ID evidence

An example call from each recorded species/species group is shown below in compressed mode. Full spectrum and zero-crossing views are both shown on the same spectrogram. Calls are typically displayed in "F7-10ms" time-scale.

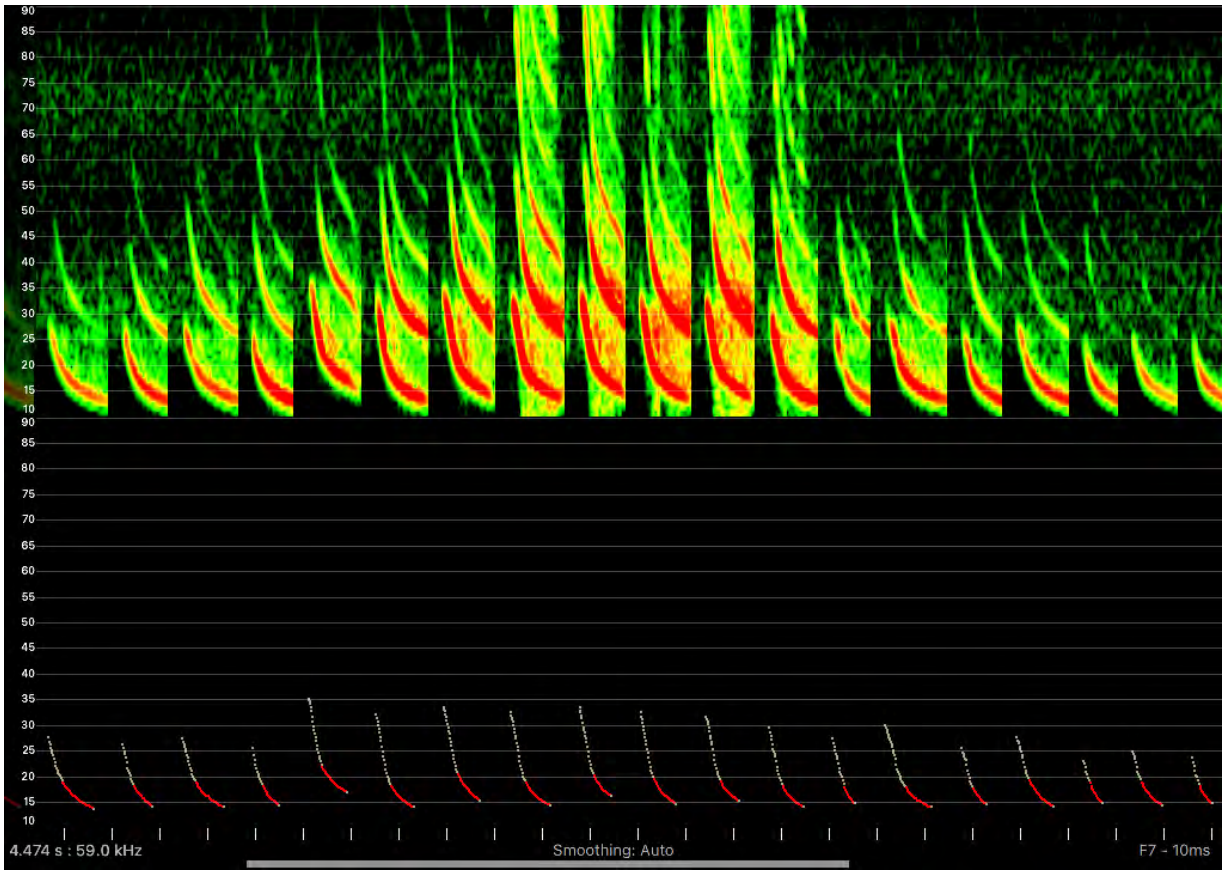


Figure 2 – Austronomus australis.

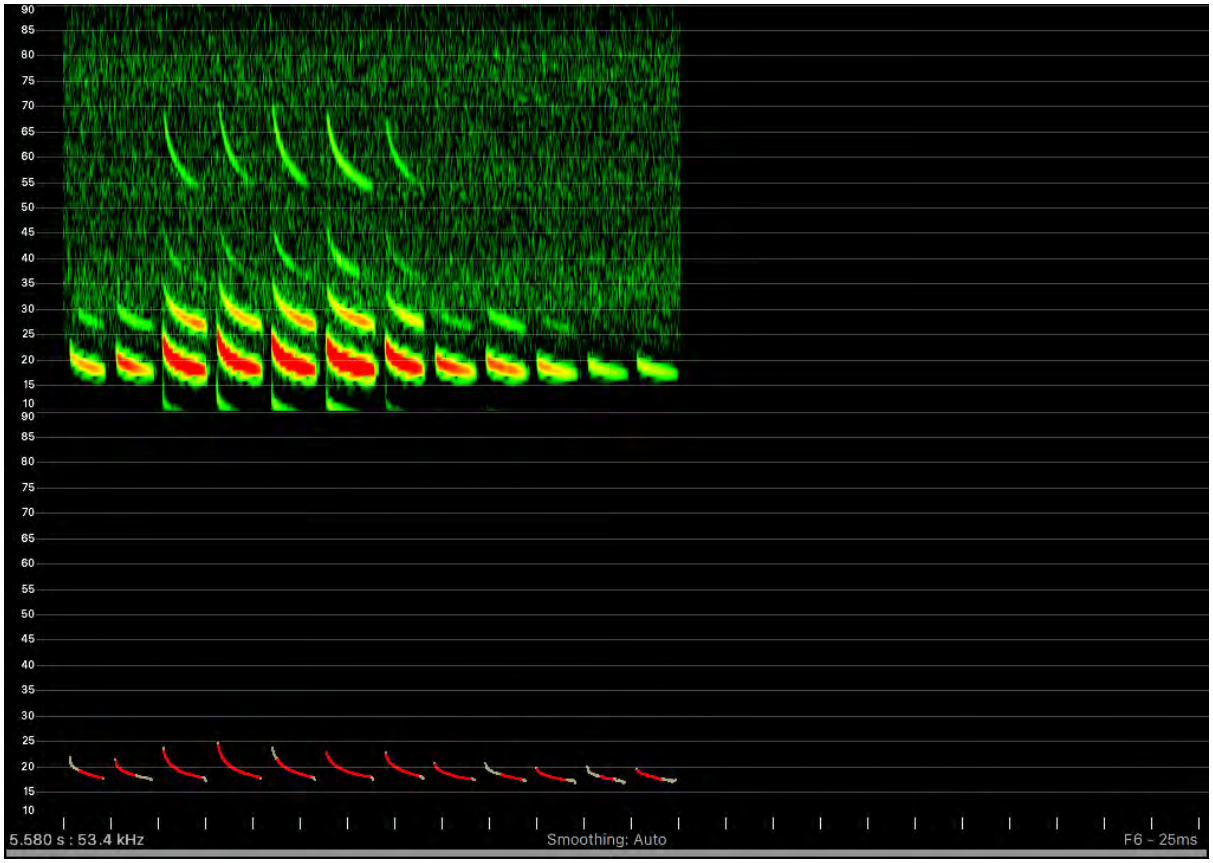


Figure 3 – Saccolaimus flaviventris.

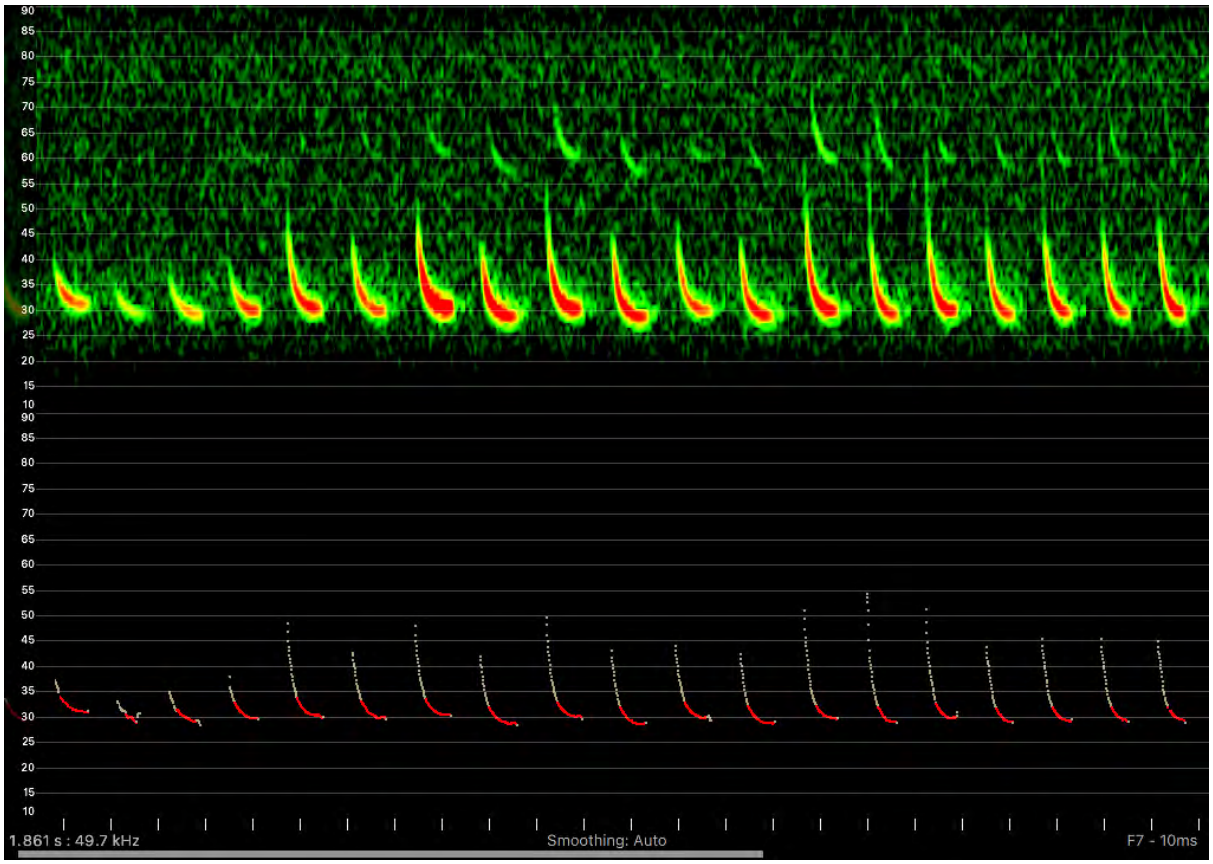


Figure 4 – Chalinolobus gouldii.

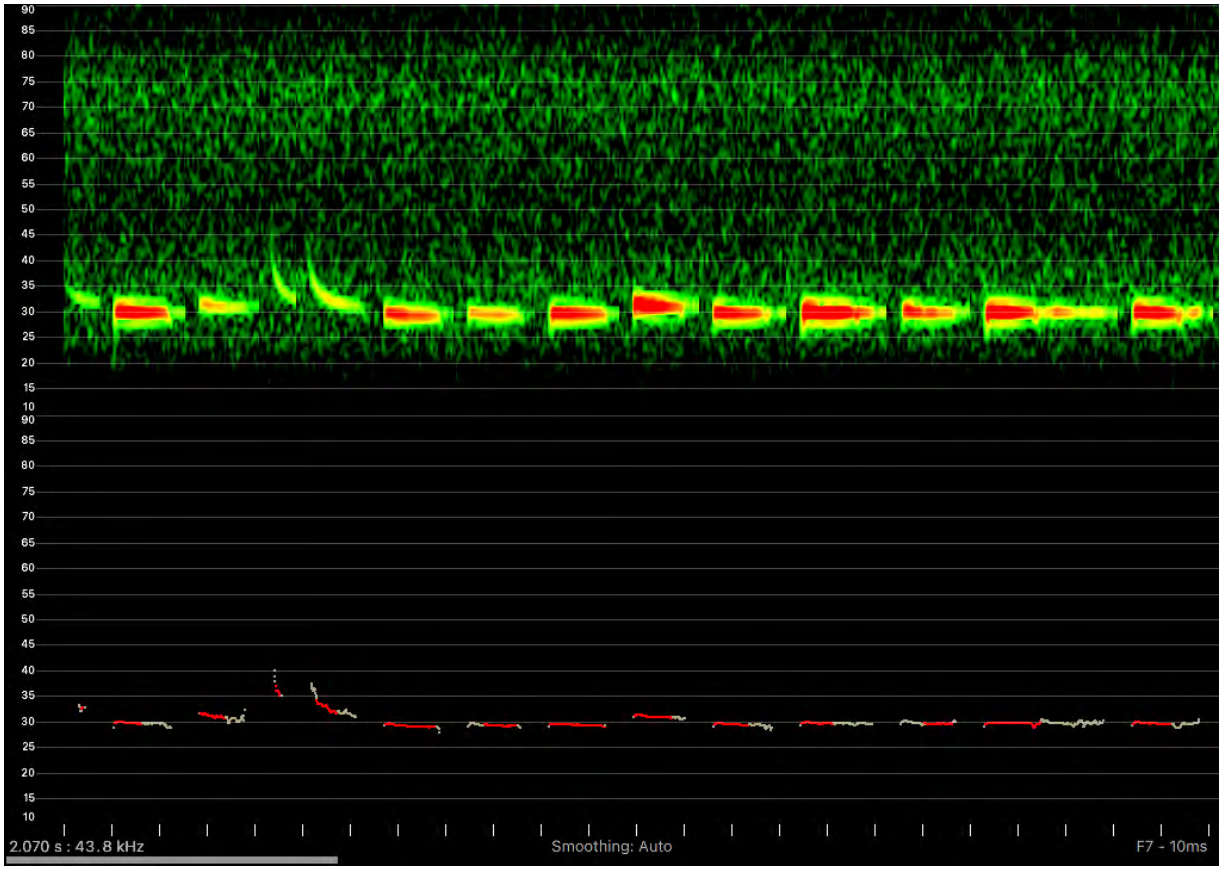


Figure 5 – Ozimops planiceps.

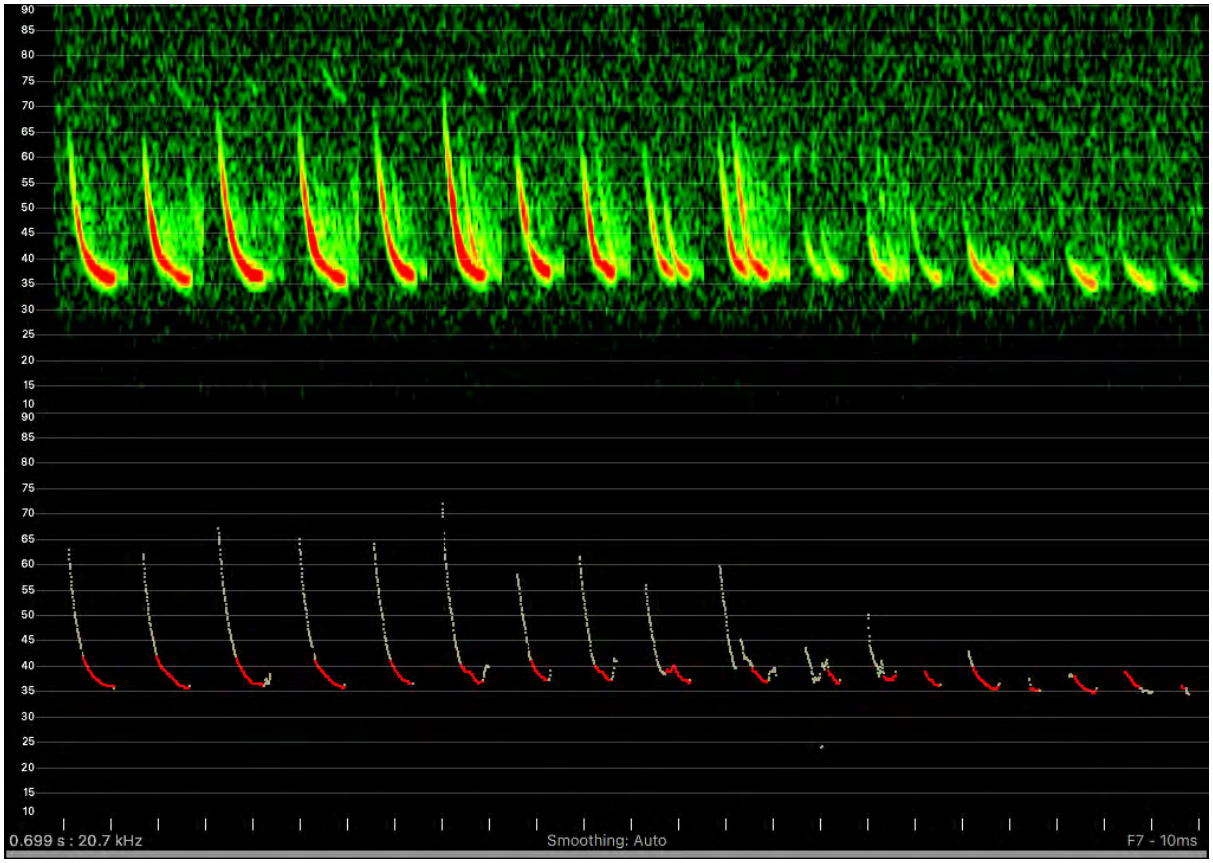


Figure 6 – Scotorepens orion, Scotorepens sp. (parnaby), or Falsistrellus tasmaniensis.

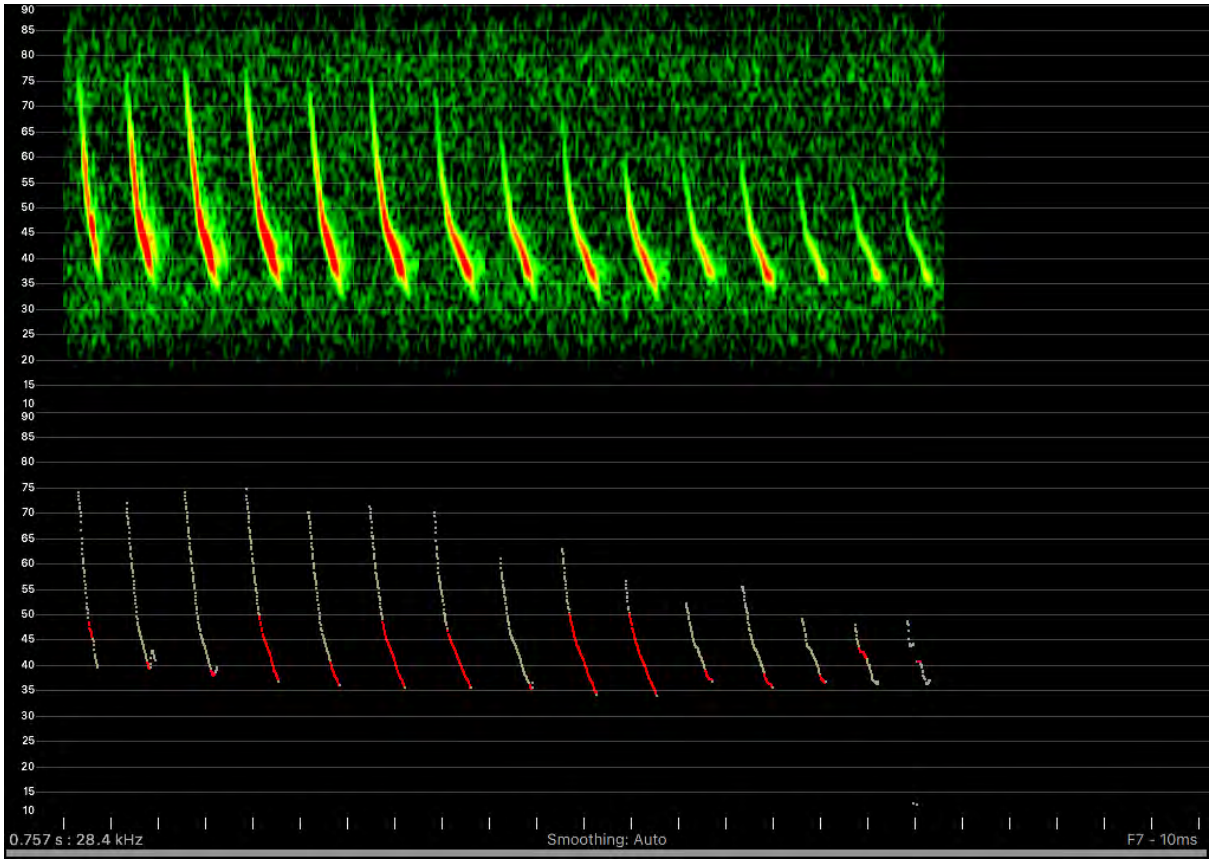


Figure 7 – Nyctophilus sp.

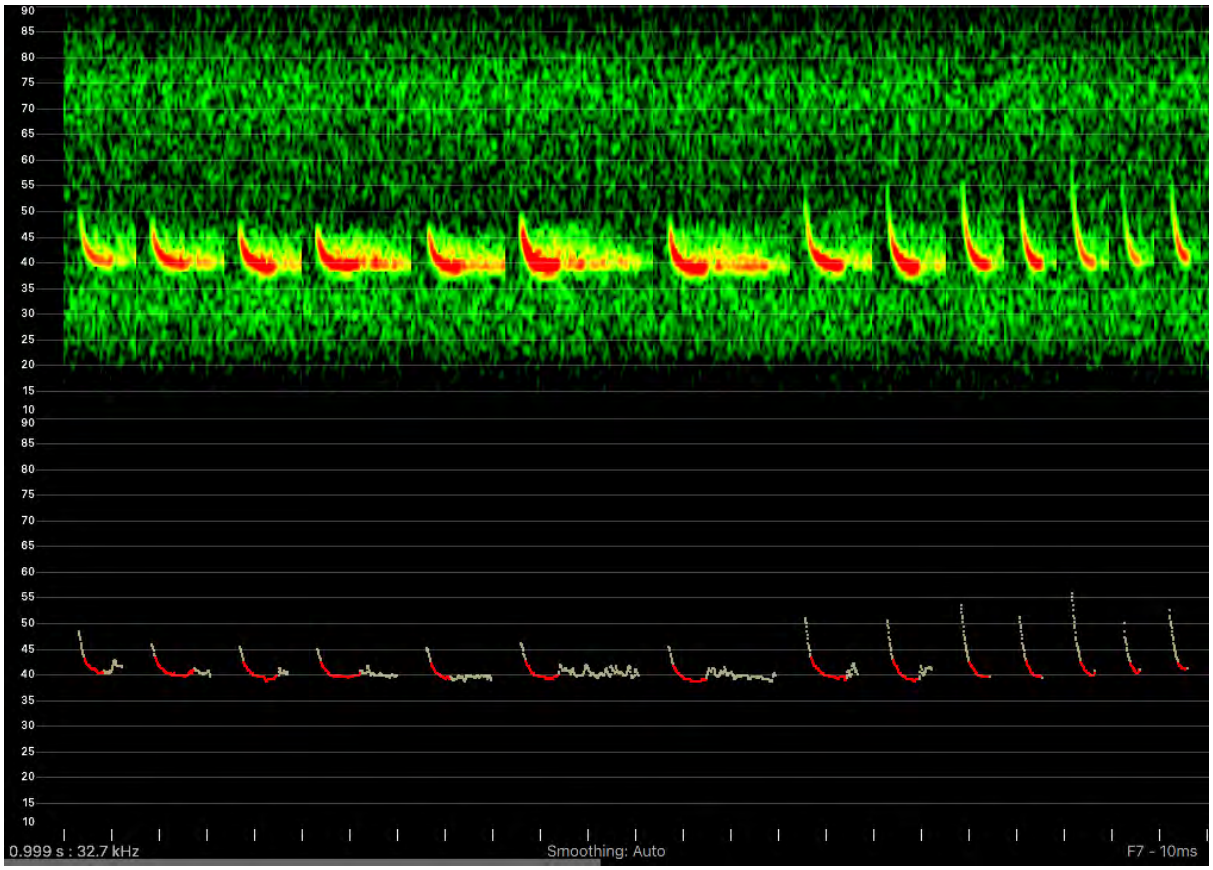


Figure 8 – Vespadelus darlingtoni.

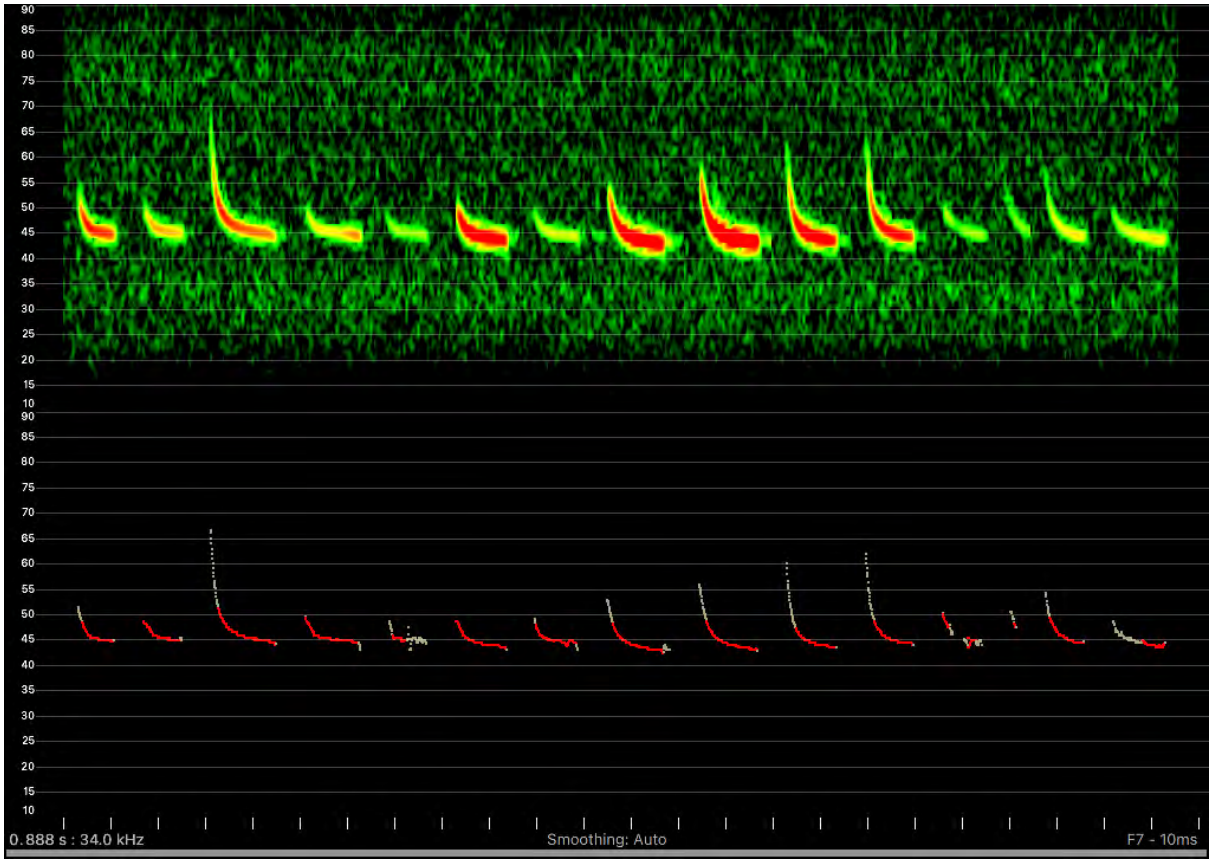


Figure 9 – Miniopterus orianae oceanensis.

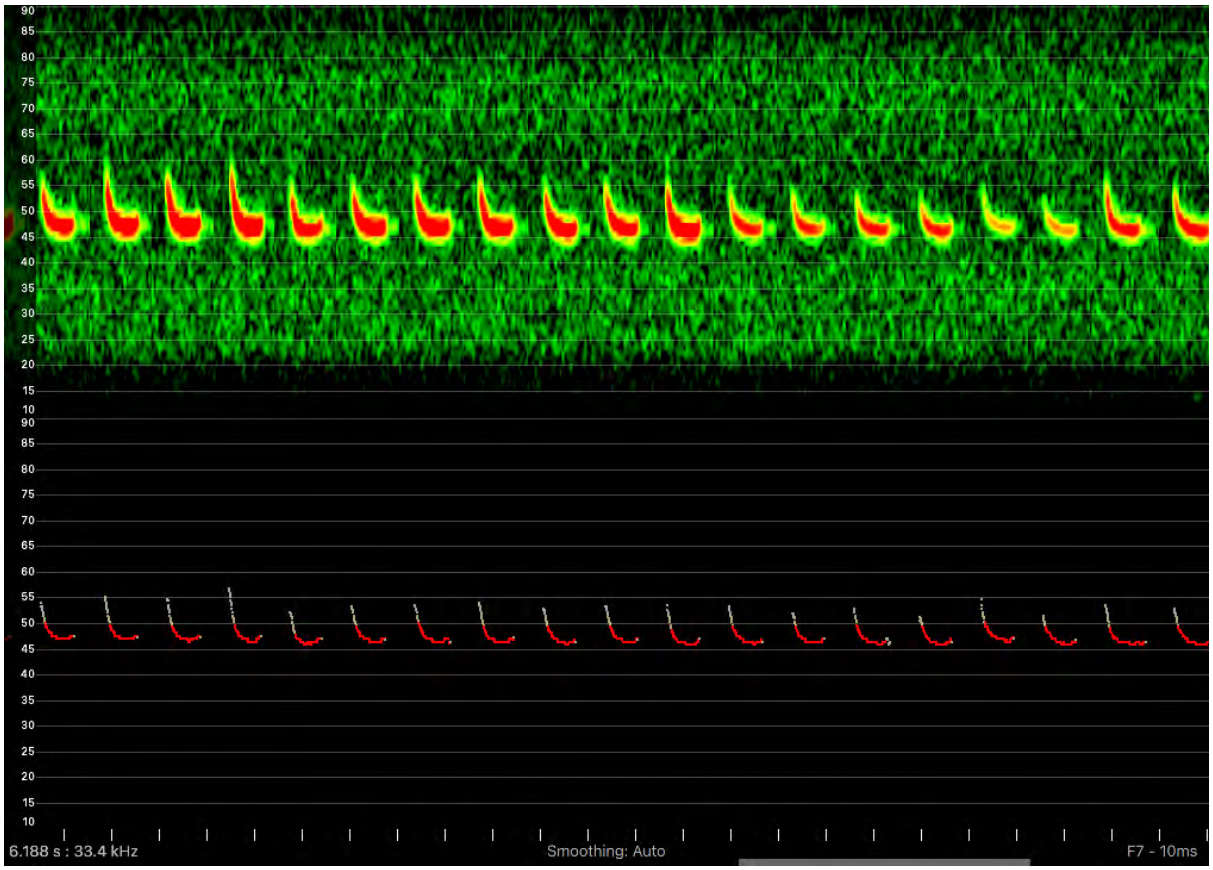


Figure 10 – Vespadelus vulturnus.

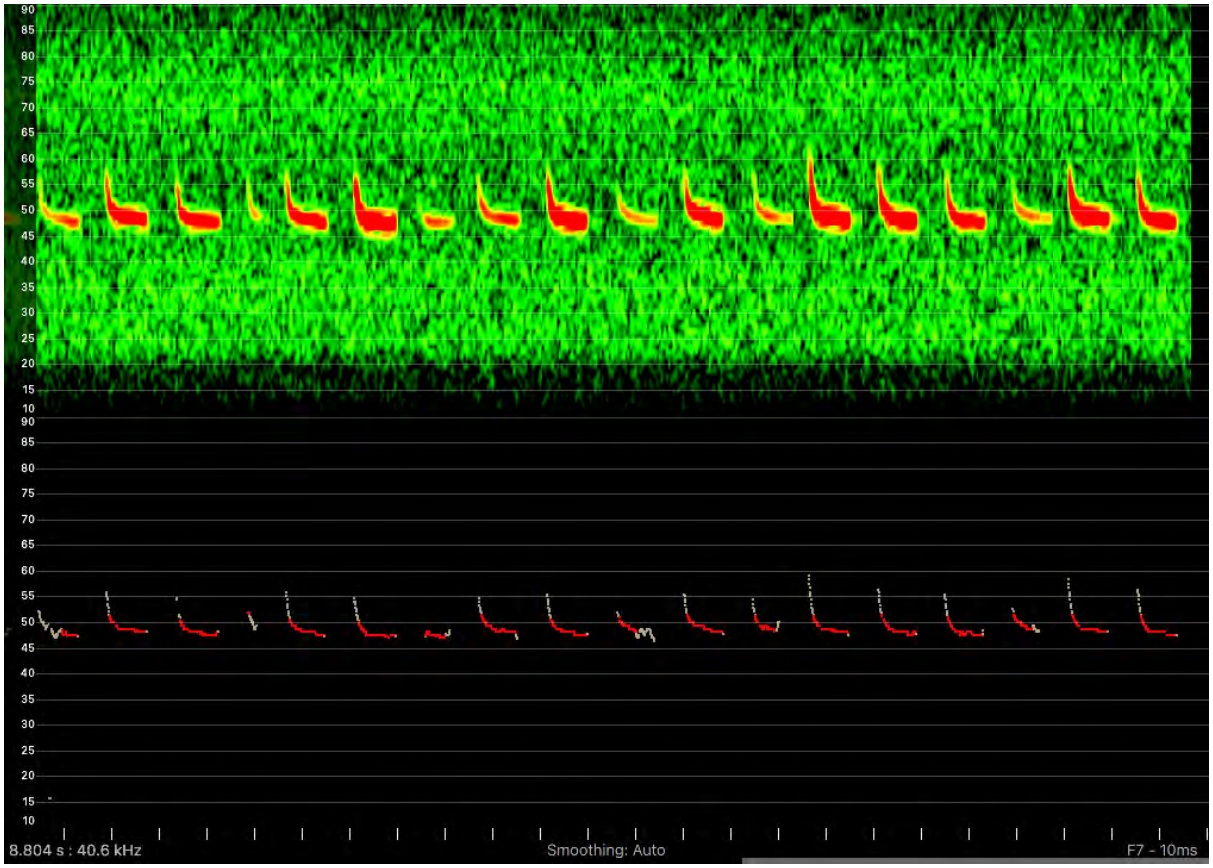


Figure 11 – Vespadelus regulus.

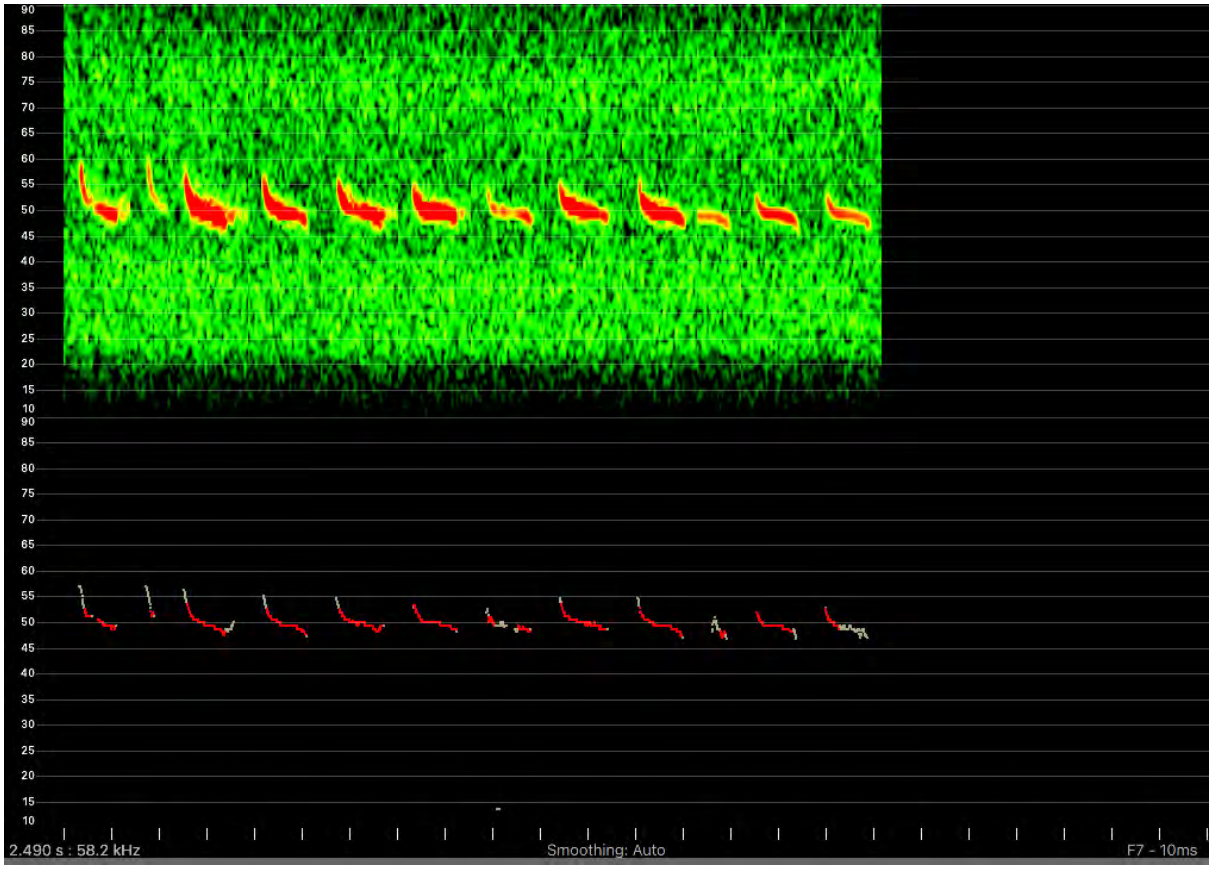


Figure 12 – Chalinolobus morio.

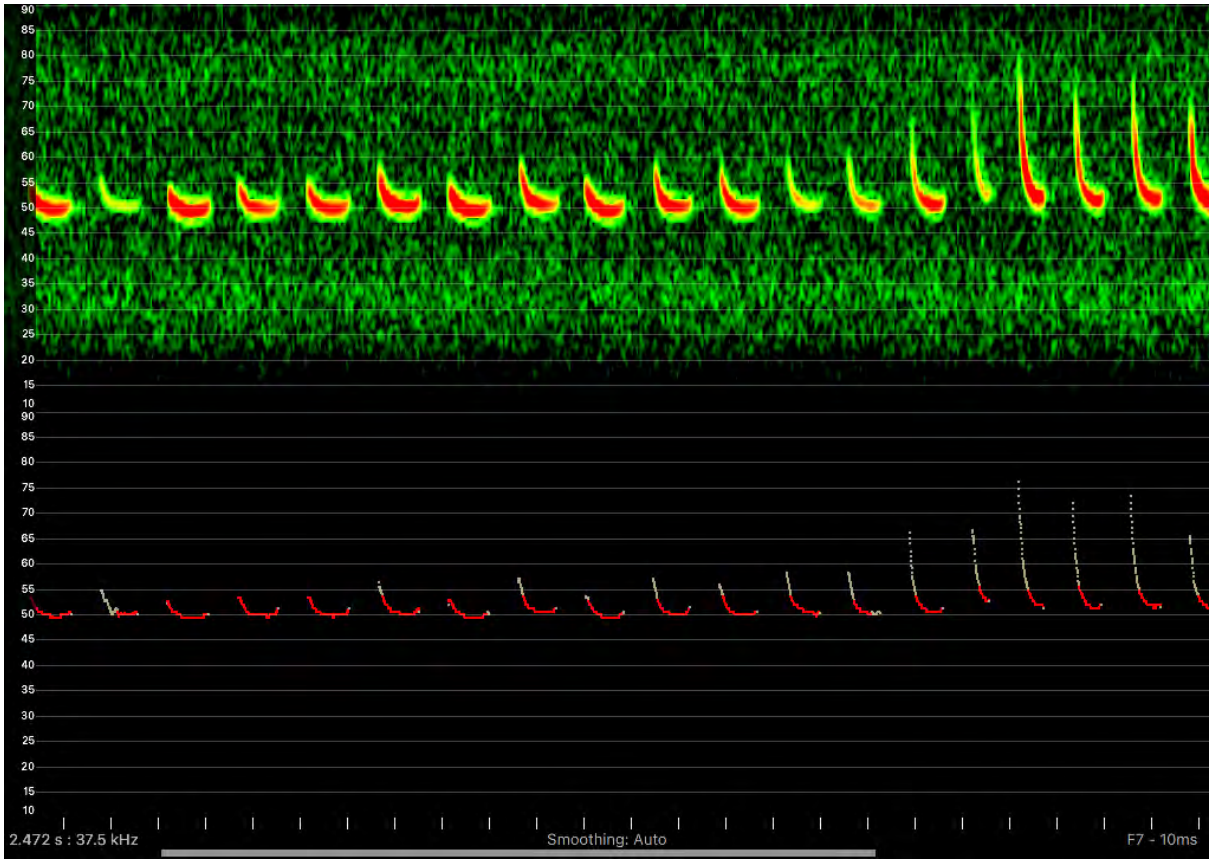


Figure 13 – Vespadelus troughtoni.

4. References

Australasian Bat Society - *BatMap*. http://ausbats.org.au/batmap. Accessed 28/01/2024.

Baker, A. and Gynther, I. (ed.) (2023). *The Mammals of Australia* (Fourth Edition); Reed New Holland; Sydney.

Churchill, S. (2008). *Australian Bats*. Jacana Books, Allen & Unwin; Sydney.

Corben, C. (2009). *Bat Calls of Central Eastern NSW*. Titley Scientific, Smiths Lake.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales. Department of Natural Resources and Mines, Brisbane*.

5. Appendix

5.1 Analyst experience

The author and analyst, Lachlan McRae, has collected hundreds of microbat reference calls throughout NSW. Hundreds of hours have been spent processing and extracting call metrics from those reference calls to determine identification features for each species. These reference calls now form part of his personal NSW reference call library, which is used to significantly increase the accuracy of microbat call analysis within NSW. Official qualifications/completed-courses relevant to microbat call analysis are listed below:

- PhD that involves microbat reference call collection, microbat call identification, and understanding microbat species' habitat preferences in NSW & QLD (in progress).
- Anabat Insight Advanced Workshop – Titley Scientific.
- Kaleidoscope Pro Advanced Training – Wildlife Acoustics.
- Worked as a Fauna Ecologist within the NSW Biodiversity Offset Scheme since 2019.
- Bachelor of Environmental Science and Management HONOURS (1st Class).

In addition to the above, Lachlan has gone on to have multiple one-on-one trainings with Dave Roberts from Wildlife Acoustics, Julie Dawson (formerly Broken-Brow) from Titley Scientific, and Brad Law from NSW DPI to further validate his analysis skills and discuss advanced concepts beyond the scope of the courses. Lachlan is in regular communication with recognised bat experts such as Brad Law, Chris Corben, and Michael Pennay to ensure he remains at the forefront of the latest techniques and knowledge to identify bat calls.

APPENDIX E EXPERT REPORT FOR *LITORIA CASTANEA*

Winterbourne Windfarm Yellow-spotted Tree Frog Expert Report

ERM

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	**Winterbourne Wind Farm project Yellow-spotted Bell Frog Expert Report**
Project Number	**23**NEW7180
Project Manager	Frank Lemckert
Prepared by	Frank Lemckert
Reviewed by	**Meredith Henderson**
Approved by	Frank Lemckert
Status	**Draft**
Version Number	**v0**
Last saved on	**23 February 2024**

This report should be cited as 'Eco Logical Australia 2023. *Winterbourne Windfarm Yellow-spotted Tree Frog Expert Report*. Prepared for ERM.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from ERM

Disclaimer
This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and ERM. The scope of services was defined in consultation with ERM, by time and budgetary constraints imposed by the client, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.

Template 2.8.1

Contents

1. Introduction 1

1.1 Background 1
1.2 Project infrastructure 1
1.3 Purpose of the expert report 2
1.4 Impact assessment area 2
1.5 Reasons for use of an expert report 6

2. Species information 9

2.1 Species description 9
2.2 Life cycle 10
2.3 Distribution and abundance 10

2.3.1 Distribution 10
2.3.2 Abundance 11

2.4 Habitat requirements 11

2.4.1 Breeding Habitat 11
2.4.2 Non-breeding habitat 12
2.4.3 Overwintering habitat 13
2.4.4 Connectivity requirements 13

2.5 Diet 13
2.6 Metapopulation dynamics 13

2.6.1 Vegetation associations 14
2.6.2 Threats 15
2.6.3 Habitat fragmentation by roads 16
2.6.4 Variables determining Yellow-spotted Tree Frog presence 16

3. Description of the Project Site 18

3.1 Landscape features 21

3.1.1 Bioregions 21
The bioregion includes parts of the MacIntyre, Clarence, Gwydir, Macleay, Namoi and Manning River catchments. 21
Subregions 21
3.1.2 NSW (Mitchell) Landscape 22
3.1.3 Native vegetation 23
3.1.4 Rivers, streams and ponds 25

3.2 Connectivity features 33

3.2.1 Areas of geological significance 33
3.2.2 Climate 33

3.3 Land use history 33

4. Assessment of GGBF to be present on the Development Site 36

4.1 Yellow-spotted Tree Frogs in the region 36
4.2 Subject land as potential habitat 36
4.2.1 Breeding habitats 36
4.2.2 Sheltering and foraging habitat 37
4.2.3 Dispersal habitat 37

5. Assessment of species presence 39

5.1 Suitability of habitat on the subject land 39
5.2 Historic distribution 39
5.3 Importance of the subject land to the Green and Golden Bell Frog 39

6. References 41
7. Appendix A Dr Frank Lemckert CV 45

List of Figures

Figure 1. Location of the Project Site within the region 3
Figure 2. Project Site with mapped vegetation. 4
Figure 3. Records of the Yellow-spotted Tree Frog from the New England Tableland relative to the Project Site – note all records are pre-1980. 5
Figure 4. Development footprint 20
Figure 5. Location of mapped water bodies associated with the Project Site 32
Figure 6: Records of the Yellow-spotted Tree Frog within 10 km of the survey corridor 35
Figure 7: PCTS present within survey corridor and also within 200 m of mapped water bodies 38

List of Tables

Table 1. Description of the subregions covering the Project Site (from NSW NPWS 2003). 21
Table 2: Climatic statistics for Armidale and Guyra (data from the Bureau of Meteorology) 33

List of Plates

Plate 1: Yellow-spotted Bell Frog images (Photo 1: David Hunter, NSW Office of Environment and Heritage) 9
Plate 2: Cleared paddock, small sealed road and pond environment typical of habitat found within the study area 19
Plate 3: Retained trees on hillside, fencing, paddocks and dirt track typical of study area 19
Plate 4: Dry stream bed leading to pool under bridge 26
Plate 5: Dry stream bed with no aquatic vegetation to act as emergents 26
Plate 6: Isolated pools on creek lines with some emergent vegetation 27
Plate 7: Pools on stream with emergent vegetation and open water – good habitat for Yellow-spotted Tree Frogs 28

© ECO LOGICAL AUSTRALIA PTY LTD

Plate 8: Rocky creek in northern part of study area (flowing water not preferred by the species).....28
Plate 9: Isolated farm dams in study area showing very limited surrounding vegetation or emergent vegetation 29
Plate 10: Another isolated farm dams in study area noting minimal to no aquatic vegetation or surrounding native vegetation.....30
Plate 11. Relatively uncommon situation of a dam located adjacent to disturbed retained native vegetation 30
Plate 12: Isolated dams with emergent aquatic vegetation 31

1. Introduction

1.1 Background

The Winterbourne Wind Farm is a proposed renewable energy project in the Northern Tablelands of New South Wales. The wind farm will deliver renewable, low-cost energy to the National Electricity Market (NEM). The origins of the project date back to 2001, with construction expected to start in 2025. The proposed Project Area extends over approximately 22,000 hectares, of which less than 1,000 hectares is expected to be disturbed during construction. The Winterbourne Wind Farm project will include approximately 50 km of new 330kV transmission line.

It is located within the proposed a Renewable Energy Zone (REZ) for the New England region that provides a coordinated effort to plan new transmission lines to accommodate up to 8,000 MW of renewable energy projects. Whilst the project site is within the proposed New England REZ, the Winterbourne Wind Farm project will connect into the existing TransGrid network via a proposed new 330 kV switchyard, to be built approximately 7 km south of Uralla, NSW. The proposed wind farm will be designed to minimise potential visual and noise impacts to landowners and tenants in the area. Much of the project area is currently used for livestock grazing and has been cleared of trees and other vegetation, meaning the potential for impacts to flora and fauna is greatly reduced.

One species needing consideration as part of the proposed development is *Litoria castanea* (Yellow-spotted Tree Frog or Yellow-spotted Bell Frog) that is listed as a threatened species under both the NSW *Biodiversity Conservation Act 2016* and *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*. This species is predicted to have suitable habitat within the locality of the Project Area, although there are not historic records within the locality. Surveys as required under the BAM guidelines (DPE 2020) have not been completed for this species for this study due to land access restrictions and the very large size of the Project Site. Therefore, the presence and any need for offsets have not been able to be established as part of the BDAR. This expert report has been written to be included as a component of the BDAR to adequately assess the offset requirements for this species. The Project Site consists of the footprint of all the development sites and a surrounding 200 m buffer that represents the range that the Yellow-spotted Tree Frog is considered likely to move away from any breeding habitat (DPE 2020).

Consideration is also required to include minimum 50 m wide corridors of native and non-native vegetated areas to link breeding habitats, if reasonable to do so.

1.2 Project infrastructure

As described on the project website (Winterbourne Wind Farm - Generating a better tomorrow) The project will consist of up to 119 wind turbines, each with a maximum blade tip height of 230 m and a combined maximum capacity of around 700 MW. The project is expected to generate approximately 2,100,000 megawatt hours (MWh) per year of clean, renewable energy — enough to power more than 375,000 average NSW homes for a year.

The Project will involve the construction, maintenance and operation of wind turbines, a battery storage system, together with ancillary facilities such as operation and maintenance buildings, civil works and electrical

© ECO LOGICAL AUSTRALIA PTY LTD

infrastructure required to connect it into the existing transmission network. The current proposed location of this infrastructure is provided in Figure 1 and Figure 2.

1.3 Purpose of the expert report

Section 6.5.2 of the Biodiversity Assessment Method sets out the following essential requirements for the preparation of an expert report:

- Identify the relevant species or population.
- Justify the use of an expert report.
- Indicate and justify the likelihood of presence of the species or population.
- Estimate the number of individuals or area of habitat (whichever unit of measurement applies to the species/individual) for the biodiversity certification assessment area, including a description of how the estimate was made.
- Demonstrate what information was considered, rejected and discounted in relation to the determination made in the expert report.
- Identify the expert and provide evidence of their expert credentials.

The report needs to determine whether:

- The target species is unlikely to be present, in which case no further assessment is required, or
- The target species is likely to be present in which case the expert report must provide estimates of habitat area within the impact assessment area.

1.4 Impact assessment area

The location in NSW of the proposed Winterbourne Windfarm is provided in Figure 1 and the vegetation and water bodies mapped within the Project Site provided in Figures 2 and 3 respectively. The closest available records of the Yellow-spotted Bell Frog from within the Project Site are depicted in Figure 4. Information for the Project Site encompassed by this infrastructure and a further buffer zone of 10 km around the infrastructure was obtained from a range of data layers including:

- Native vegetation: provided by ERM
- Waterbodies: NSW LPI
- Yellow-spotted Tree Frog Records: NSW BioNet and the Atlas of Living Australia.

Additional information will be provided on the finalisation of the development works and footprint.

© ECO LOGICAL AUSTRALIA PTY LTD



Figure 1. Location of the Project Site within the region

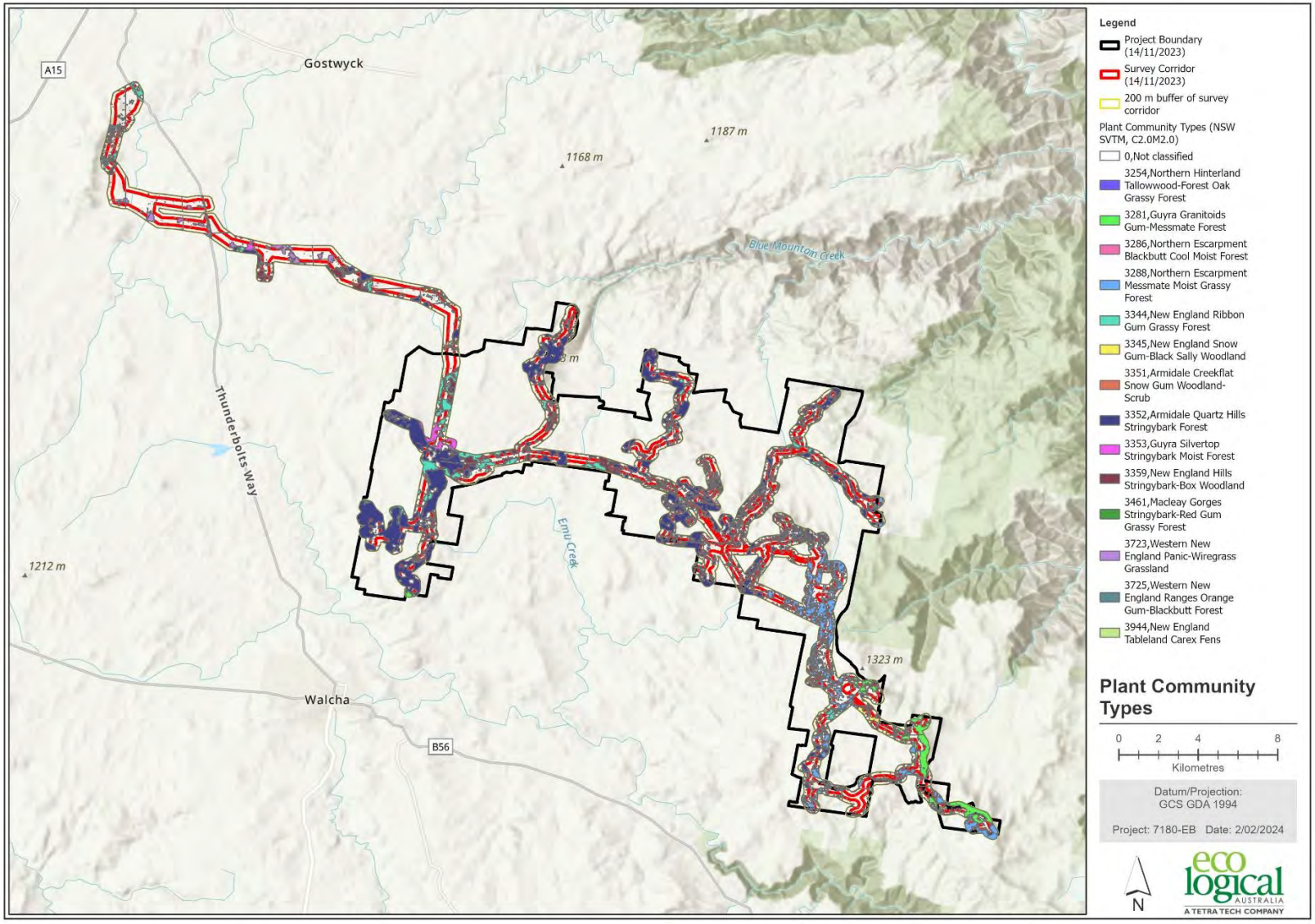


Figure 2. Project Site with mapped vegetation.

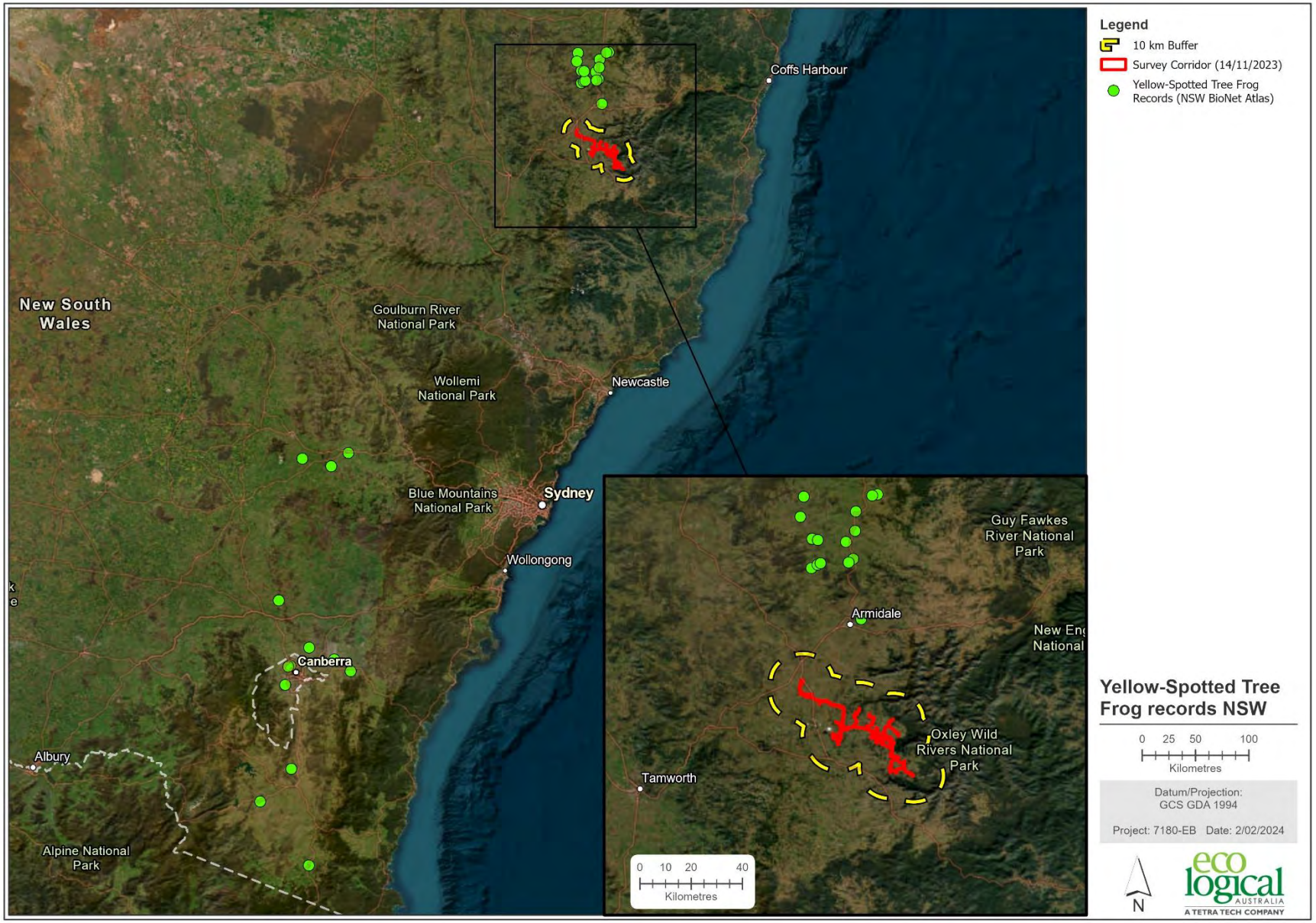


Figure 3. Records of the Yellow-spotted Tree Frog from the New England Tableland relative to the Project Site – note all records are pre-1980.

1.5 Reasons for use of an expert report

Section 6.5.2.8 b of the Biodiversity Assessment Method (OEH 2017) places two specific requirements for where an expert report can be used instead of surveys:

- An expert report can only be used instead of a survey for species to which species credits apply.
- An expert report may be obtained instead of undertaking a species survey at a development site, clearing site, land to be biodiversity certified or a biodiversity stewardship site.

The Yellow-spotted Tree Frog meets the first criteria, being a species credit species under the *Biodiversity Conservation Act 2016* (BC Act).

The Yellow-spotted Tree Frog is known to inhabit the Plant Community Types and types of water bodies present within the impact assessment area of the proposed Winterbourne Windfarm and the species is predicted to occur in the broad region in the NSW DPE Profile for the species (OEH 2022). However, I note that there are no records of the species from the locality (nearest is > 50 km to the north of the project site; Figure 3) and that all records from the New England Tableland were all obtained prior to 1980. The decline of the species to potential extinction is considered to have been completed in the region by the early 1980s at the latest (Osborne et. al. 1996). The only potentially extant population known anywhere is located somewhere near Yass (in southern NSW; OEH 2022). An expert report to assess potential presence, impacts and required offsets for the species has been completed recognising the absence of the species from the region, but in consideration of the predicted historic presence in the species profile presented by the NSW Department of Planning and Environment (OEH 2022).

CREDENTIALS OF EXPERT

Dr Lemckert is an Ecologist that has been undertaking studies into the ecology and management of frogs since 1986 and has been a principal ecological consultant since 2011. His skills include survey design/ implementation/ targeted species surveys, data handling, analysis and interpretation and the production of high level reports including papers published in international peer-reviewed journals and technical reports and recovery plans for the Commonwealth and NSW Governments. He has also been an expert witness for the assessment of the impacts of alleged illegal clearing for the Commonwealth, NSW and Local Governments (Hornsby Council) and provided expert advice to NSW DPI for legal considerations over the potential for forestry operations to impact on rock outcrop dependent species. Dr Lemckert represented Forests NSW (now Forestry Corporation NSW) as a reptile and amphibian expert in the Comprehensive Regional Assessments and Regional Forest Agreement Process carried out between 2000 and 2002 and as an expert in fauna management for negotiations over a new Threatened Species License for harvesting operations in 2014. He provided an expert review of the developed assessment process for impacts on Matters of National Environmental Significance for two proposed Coal Seam Gas Developments in Queensland and has completed two rounds of expert review of the status of Australia's amphibians for the IUCN.

Dr Lemckert is an acknowledged expert on eastern Australian frogs having completed his MSc and PhD on the ecology and management of frogs in this region and has published over 70 papers (or book chapters) in Australian and International peer-reviewed journals. He has been used by both the NSW and Commonwealth Governments as an expert witness in court cases assessing the impacts of land clearing on threatened frogs. He is a member of the Amphibian Specialist Group of the IUCN, secretary of the NSW Declining Frog Working Group of NSW and past president of the Australian Society of Herpetologists. He co-supervised two PhD students, a Master of Applied Science Student and three Bachelor of Science (Honours) students who

completed theses addressing issues of frog biology and conservation. He is listed as an accredited expert by the NSW Department of Planning, Industry and Environment (DPIE) to provide expert reports under the Biodiversity Assessment Method (BAM). Dr Lemckert wrote the survey guidelines for NSW threatened frog species to be used in assessments under the Biodiversity Assessment Method (BAM) (for the NSW Department of Planning and Environment). He was engaged by NSW DPE to assess if *Litoria raniformis* (Southern Bell Frog) should be re-listed under the NSW BC Act and advised on the design and development of a cross-tenure amphibian monitoring program for forests in coastal NSW as part of a team engaged by the NSW Natural Resources Commission.

Dr Lemckert has worked on members of the Bell Frog species complex through multiple projects commencing in the mid-1980s. This has included work for his Master of Science degree trying to locate the presence of Bell Frogs across NSW, the ACT and Victoria, assessing the habitat requirements of *Litoria aurea* (Green and Golden Bell Frog) in coastal NSW, documenting calling phenology for Bell Frogs in NSW and developing monitoring strategies for the Green and Golden Bell Frog. He has been part of multiple assessments of the conservation status of the species that have been used both by the Australian Government and the IUCN (for its Redlist) to set the conservation status of this species. He has also contributed to two recent assessments of the impacts of the 2019/2020 megafires on this and other species of frogs, both stemming from the need to understand the longer term impacts that major bushfires are likely to have on this group of vertebrates.

Additional experience and use of his expertise include:

- Engagement by RPS to conduct targeted expert surveys in the Newnes Plateau as part of assessments of impacts of mining at the Centennial Colliery (2021).
- Completion of surveys and an expert report (under the Framework for Biodiversity Assessment) for the Warragamba Dam Raising project for SMEC (2019).
- Engagement by the NSW Office of Environment and Heritage to be part of the expert panel determining the categorisation of this species under the SOS program and in determining the populations requiring specific management actions (2016/17 & 2020/21).
- Providing expert opinion on the status of this species during assessments undertaken for the IUCN in 2001 and 2016.
- Provided expert opinion on the habitat requirements, sub-population status and reservation requirements for the Yellow-spotted Tree Frog during the NSW Government's Comprehensive Regional Assessment program completed in 2000-2001.

Dr Lemckert publications and reports that deal specifically with Yellow-spotted Tree Frog are:

a. Mahony, M.J., Hines, H.B., **Lemckert, F.**, Newell, D., Roberts, J.D., Rowley, J.J.L., Scheele, B.C., & West, M. (In Press). The impacts of the 2019-20 wildfires on Australian frogs. In Australia's 2019-20 megafires: biodiversity impacts and lessons for the future. S. Legge (Ed.).
b. Mahony, M., Gould, J., Beranek, C., Callen, A., Clulow, J., Clulow, S., Klop-Toker, K., Mahony, S., Wallace, S., Stock, S., Garnham, J., **Lemckert, F.**, Thumm, K., Moses, B. & Pickett, E. (In Press). A trait-based analysis for predicting impact of wildfires on frogs. Australian Zoologist 42(2): 326-351.
c. Geyle, H.M, Hoskin, C.J., Bower, D.S., Catullo, R., Clulow, S., Driessen, M., Daniels, K., Garnett, S., Gilbert, D., Heard, G.W., Hero, J-M., Hines, H.B., Hoffmann, E.P., Hollis, G. Hunter, D.A. **Lemckert, F.L.**, Mahony, M., Marantelli, G., McDonald, K.R., Mitchell, N.J., Newell, D., Roberts, J.D., Scheele, B.C., Scroggie, M., Vanderduys, E., Wassens, S., West, M., Woinarski, J.S.C. & Gillespie, G.R. (2021). Red hot

frogs: identifying the Australian frogs most at risk of extinction. Pacific Conservation Biology. https://doi.org/10.1071/PC21019.

d. Gillespie, G.R., Roberts, J.D., Hunter, D., Hoskin, C.J., Alford, R.A., Heard, G.W., Hines, H. **Lemckert, F.**, Newell, D. & Scheele, B.C. 2020. Status and Priority Conservation Actions for Australian Frog Species. Biological Conservation 247, 108543. https://doi.org/10.1016/j.biocon.2020.108543.
e. **Lemckert, F.L.**, & Mahony, M.J. 2018. The status of Decline and Conservation of Frogs in Temperate Coastal South-eastern Australia. **Pp 59-72** In: *Amphibian Biology Volume 11 - Conservation and Decline of Amphibians: Eastern Hemisphere (Australia, New Zealand and Pacific Islands)*. H. Heatwole and J. Rowley (Eds.). CSIRO Publishing, Melbourne.
f. Mahony, M.J., Hamer, A.J., Pickett, E.J., McKenzie, D.J., Stockwell, M.P., Garnham, J.I., Keely, C.C., Deboo, M., O'Meara, J., Pollard, C.J., Clulow, S., Lemckert, F.L., Bower, D.S., & Clulow, J. 2013. Identifying conservation and research priorities in the face of uncertainty: a review of the threatened bell frog complex in eastern Australia. Herpetological Conservation and Biology 8:519-538.
g. Lemckert, F.L. & Penman, T. 2012. Climate Change and Australia's frogs: how much do we need to worry? Pp 92-98 In: Wildlife and Climate Change: towards robust conservation strategies for Australian fauna. D. Lunney & P. Hutchings (Eds.). Royal Zoological Society of NSW, Mosman, NSW, Australia.
h. Penman, T. D. and Lemckert, F. L. 2010. Predicted impact of climate change on threatened amphibians. Unpublished report to the Department of the Environment, Climate Change and Water, Hurstville.
i. Lemckert, F.L. & Mahony, M.J. 2008. Core calling periods of the frogs of temperate New South Wales, Australia. Herpetological Conservation and Biology 3:71-76.
j. Hero, J-M, Richards, S, Alford, R., Allison, A., Bishop, P., Gunther, R., Iskandar, D., Kraus, F., Lemckert, F., Menzies, J., Roberts, D. & Tyler, M. 2008. Amphibians of the Australasian Realm. Pp 65-73 In: Threatened Amphibians of the World. S.N. Stuart, M. Hoffman, J.S., Chanson, N.A. Cox, R.J. Berridge, P.J. Ramani & B.E. Young (Eds.). Lynx Edicions, Barcelona.
k. Hero, J-M., Hines, H., Lemckert, F., & Roberston, P. 2008. *Litoria castanea*. Pp 257 In: Threatened Amphibians of the World. S. N. Stuart, M. Hoffman, J. S., Chanson, N. A. Cox, R. J. Berridge, P. J. Ramani & B. E. Young (Eds). Lynx Edicions, Barcelona, Spain.

Dr Lemckert's full CV is provided as Appendix A of this report.

2. Species information

2.1 Species description

The Yellow-spotted Tree Frog is an endemic Australian tree frog that is a member of the Australian frog family Hylidae and forms one member of the Bell Frog species group. It is a large, long-snouted terrestrial species reaching an average adult snout to vent length of 53-83 mm (Cogger, 2014; NSW NPWS 2001), although the species can grow to 100 mm. It is dull olive to bright green on the back (colour can brighten at night), with scattered black spots and varying amounts of irregular bronze spotting and blotches. A pale green strip typically runs down the back. The groin and hind side of the thighs are blue-green, with large yellow or cream spots that can reach up the flank of the animal and give it its common name. The belly is white, but the throat region of the male is darkened. A narrow black stripe runs dorso-laterally from the nostril, extending over the tympanum and along the top of the flanks (Cogger, 2014). The species has fully webbed toes and noticeable toe discs, but with toe discs are narrower than the toe itself (Robinson, 1996), a feature used to distinguish the Yellow-spotted Bell Frog from other Bell Frogs. The tadpoles are large, growing to about 8 cm long with a pinkish-grey body and yellowish fins (OEH, 2022).

The taxonomic status of the New England Tableland population of the Yellow-spotted Tree Frog remains unclear. The New England population was given the name *Litoria flavipunctata* by Courtice and Grigg (1975) based on genetics and body colouration. The species was synonymised with *L. castanea* by Cogger et. al. (1983) who considered the highland populations along the Great Dividing Range in NSW to represent one separate species. Combining the species based on morphology was supported by Thompson et al. (1996). However, genetic research has recently indicated that there is low genetic difference between *L. castanea* and *L. raniformis* and that *L. castanea* is simply part of the "inland" population of *L. raniformis* (Voros et. al. 2023). Further genetic material and work is required to determine whether the New England Tableland Population is a separate taxonomic unit as suggested by Courtice and Grigg (1975) and may still be a separate species (G. Grigg Pers. Comm.). Unfortunately, no viable DNA has been extracted from specimens from the New England Tablelands (all preserved in formalin) and it remains impossible to establish at this time if this population the distinctness of the population.



Plate 1: Yellow-spotted Bell Frog images (Photo 1: David Hunter, NSW Office of Environment and Heritage)

2.2 Life cycle

The biology of the Yellow-spotted Tree Frog has not been well documented, however it is expected to be similar to that of better studied *L. aurea* and *L. raniformis* (Gillespie et al. 1995). The best information is likely to come from the population study of a frog community near the ACT by Humphries (1979) that included what he clearly identified as the southern highlands form of the Yellow-spotted Tree Frog. This study looked at populations present around a number of farm dams and found that adults are active once the weather warms during spring and summer, and bask on sunny days and forage on grassy banks. They become dormant once colder weather sets in in autumn and adults over-winter in hollow logs and in earth amongst the roots of fallen trees (Courtice and Grigg 1975) and in the base of grass tussocks (Humphries 1979).

According to Hero et al. (2004) males and females likely reach sexual maturity at three years of age, but females almost certainly mature later than males and time to maturity is very likely dependent on the altitude they live at that may limit their growing seasons. Humphries (1979) recorded individuals living for at least 6 years and he estimated that males survived an average of 1.8 breeding seasons and females 3.3 breeding seasons. Generation length would be somewhere between three and five years.

The call of the male is a series of loud, droning grunts made by males floating on the water surface in relatively open water, or sometimes on top of vegetation (Humphries 1979). Calling will likely occur most intensely at night, but can also be expected during the day, especially where conditions are overcast and rainy. Male territoriality and fighting in the breeding chorus was often observed by Humphries (1979).

Breeding is considered to generally occur during or following rain (OEH, 2022). Information on egg laying is lacking, but presumably clutches of eggs would have been laid amongst aquatic vegetation with the eggs sinking after several hours. Clutch size was likely large and up to several thousand eggs, just as for *Litoria raniformis* (Anstis 2013).

Again, information on live tadpoles is not available, but preserved specimens and old records indicate that the tadpoles were large, growing to at least 80 mm with a pinkish-grey body and yellowish fins (Threatened Species Scientific Committee 2017). Development time was likely between 2 and 4 months, depending on the climatic conditions and the site conditions (shallower ponds are warmer and development in those faster)

2.3 Distribution and abundance

2.3.1 Distribution

Historically, this species was recorded mainly in two somewhat separate biogeographical regions in south-eastern Australia: the South Eastern Highlands Bioregion centred around Lake George – Canberra and Bombala – Delegate and a New England Tableland Bioregion population known from around Guyra and Armidale, which is the population covered in this study (Figure 3). However, there were frogs that were identifiable as Yellow-spotted Tree Frogs also recorded from the Bathurst Region (White and Pyke 1999) and so the population may have been more widespread than understood, with other recorded *L. raniformis* potentially being Yellow-spotted Tree Frogs. Based on all available ALA records in NSW, the estimated Extent of Occurrence for the species is 125161 square kilometres and Area of Occupancy for the species is 19656 square kilometres.

The northern populations is known from a relatively restricted distribution on the New England Tablelands, from (Figure 3), which represents an area of occupancy of only (104 km2 – based on ALA data). The records

for this population are also restricted to a relatively narrow altitudinal range of between 1,000 and 1,500 m (Mahony, 1999; Threatened Species Scientific Committee, 2017).

2.3.2 Abundance

The Yellow-spotted Bell Frog was once likely common throughout the highland areas of NSW and the species was even reported to be common enough to be used for the New England Population to be used in biology dissections at the University of New England (G. Grigg Pers. Comm.) and frogs in the Bathurst area to be as a regular food source for snake keepers (White and Pyke 1999). It was also a regularly recorded frog in the studies by Courtice (1972) and Humphries (1979). However, the species underwent a major and rapid decline in the mid to late 1970s (NSW Scientific Committee 2009). The last individual recorded in the southern tablelands was in 1980 (Osborne et al. 1996, Mahony 1999; Mahony et al. 2000) and even earlier for the New England Tableland Bioregion in 1975 (White and Ehmann 1997a). Although White and Pyke (1999), provided information that the species was recorded in the Bathurst area into the 1990s, by 2000 it was considered likely extinct (OEH 2022). Various reasons for the decline were put forward including habitat destruction, introduced fish and pollution, but the most likely cause ultimately appears to have been the amphibian Chytrid fungus (Mahony et al. 2013; Lemckert and Mahony 2018). This was supported by the fact that a number of areas of habitat previously supporting Yellow-spotted Tree Frogs are protected in National Parks and Wildlife Service estate, including Little Llangothlin and Mother of Ducks Lagoon Nature Reserves on the New England Tableland and Namadgi National Park on the South-eastern Highlands (Threatened Species Scientific Committee, 2017).

A population of Yellow-spotted Tree Frogs was rediscovered in the southern tablelands near Yass, north of Canberra in 2009 (Threatened Species Scientific Committee 2017). This population was located on difficult to access private property and its long term status was considered tenuous. Tadpoles were collected to start an ex situ breeding population at Taronga Zoo in Sydney. In autumn of 2018, captive bred individuals were reintroduced to the wild (OEH 2022).

Targeted surveys conducted in the New England Tablelands Bioregion in 2000 and 2016 did not record this species (D. Hunter pers. comm. 2016 in Threatened Species Scientific Committee 2017) and multiple previous other searches within the broader area also failed to detect the species (M. Mahony Pers. Comm.). Given the highly restricted historical range of the New England population, the chances of the species remaining present appear to be very low.

2.4 Habitat requirements

2.4.1 Breeding Habitat

The Yellow-spotted Tree Frog is recorded as occupying a wide variety of water bodies including permanent ponds, swamps, lagoons, farm dams and the still backwaters of rivers usually with tall reeds present (Courtice and Grigg 1975, White and Ehmann 1997a,b). Hence it is not likely restricted to natural water bodies, although the historic sites from the New England Tablelands were mainly large upland swamps (Threatened Species Scientific Committee 2017).

Breeding occurs in still or slowly flowing water bodies during warmer months following reasonable rainfall (Anstis 2013). Frogs lay large egg masses on the water surface, usually attached to emergent vegetation

(Courtice and Grigg 1975) and males are highly likely to call from low emergent vegetation. So emergent vegetation is an important consideration for this frog.

Another likely significant consideration is shading of the water bodies. Work completed for the Green and Golden Bell Frog has indicated a preference for unshaded water that has higher water temperatures (Pyke and White 1996, Pyke et al. 2002). This appears to provide better conditions for both tadpole growth and also allows for basking by the adult frogs. A similar result has been found for the Southern Bell Frog (Wassens et al. 2010) and it can be assumed that the same will be true for the Yellow-spotted Bell Frog. Minimal shading that leads to warmer water may also be important in reducing the impacts of the amphibian chytrid fungus (Penman 1998). Unshaded water bodies appear to be an important consideration in habitat suitability for the Yellow-spotted Tree Frog.

Another factor that likely determines the quality/suitability of a water body as breeding habitat is the presence of fish and particularly introduced fish species. The presence of the Plague Minnow is known to impact on the quality of a water body for the Green and Golden Bell Frog, with success being low in its presence and dependent on the presence of more complex aquatic vegetation, which allows the GGBF to breed successfully (Hamer et. al. 2002). The Plague Minnow is present widely on the New England along with Trout and these fish may be of detriment when considering the likely presence of the Yellow-spotted Tree Frog.

2.4.2 Non-breeding habitat

The Yellow-spotted Tree Frog appears to occupy similar non-breeding habitats recorded for other Bell Frogs based on the information provided by Courtice and Grigg (1975) and Humphries (1979). So unlike most other frog species in Australia, they spend their non-breeding time also around water bodies, although not necessarily in breeding water bodies (Courtice and Grigg 1975, White and Ehmann 1997a,b). This includes pools and ponds with emergent vegetation, but they can also be found in ponds or slow moving streams with overhanging grassy banks in the absence of reed beds (Courtice and Grigg 1975). Hence there is little specialisation in non-breeding habitat.

One unusual behaviour shared by all of the Bell Frog group is their habit of basking, typically within areas of aquatic vegetation, apparently to increase body temperatures. Basking in frogs is unusual, but such activities in ectotherms typically allow for periods of greater activity or faster digestion of food items. Whilst the importance of this activity for its physiological requirements is not known, individual Bell Frogs appear to bask regularly and so it is likely an important activity. Basking on emergent aquatic vegetation likely allows individuals the option to make a rapid escape from diurnal predators by diving into the water. The presence of water bodies that contain emergent vegetation are known important determinants of the presence of GGBF (Pyke and White 1996; Hamer et al. 2002) and is very likely just as important for Yellow-spotted Tree Frogs.

Whilst the species may show a willingness to use a wide variety of water bodies for breeding and non-breeding activities, one important aspect may be the abundance and proximity of multiple water bodies that allows for movements between pools as environmental conditions vary. This has been found to be a very important factor in determining the presence of the Green and Golden Bell Frog and Southern Bell Frog (Mahony et al. 2013). Green and Golden Bell Frogs move along and between different water bodies, particularly as part of migrations to and from breeding sites (Hamer et al. 2002). Hamer et al. (2008) noted that male GGBFs at Kooragang Island often moved > 200 m to reach an ephemeral breeding site, crossing over extended grassland areas and other habitats including disturbed habitats. These movements allow for uses of different water bodies as conditions change, including for breeding depending on circumstances.

The movement habits of the Yellow-spotted Bell Frogs are relatively unknown for the New England population, although Humphries (1979) found that his frogs showed an apparently similar behavioural pattern with frogs sticking to water bodies for most of the year, but changing the water body being used, depending on conditions.

The large lagoons that the species was noted to use historically on the New England Tablelands would have offered a range of environments internally, with permanent pools in the central areas radiating out to more temporary pools towards the edges, allowing the frogs to find a suitable water body at any given time. And the other parts of the swamps would have been well within typical migratory distances for Bell Frogs. Hence connectivity may not have been so critical for frogs in this sort of environment. The development footprint does not have such large swamps and so it appears likely that the relative frequency and connectivity of available smaller water bodies will be the factor determining the quality of habitat for the Yellow-spotted Bell Frog in the study area. Or it may indicate a lack of suitability for the study area if frogs in that region were adapted to life in larger swamps. There is no way to be certain of their habitat preferences.

2.4.3 Overwintering habitat

The species has been recorded to over-winter in the hollow centres of rotting logs and in the earth surrounding the roots of uprooted trees (Courtice and Grigg 1975), and in the base of sedge tussocks that included communal brumation by numbers of individuals that would awaken if weather permitted (Humphries 1979).

2.4.4 Connectivity requirements

Based on the broad body of work on Bell Frogs, the spatial arrangement of permanent wetlands must provide a short enough distance and suitable matrix of intervening habitat for frogs to move between ponds as well as a large enough number and types of wetlands within a 1 km radius to provide multiple interactive breeding sites (Hamer et al. 2002; Hamer & Mahony 2010; Valdez et al. 2015; Hamer 2018). The study area is essentially cleared grazing land or retained native vegetation, both of which should not restrict movements of frogs. Figure 5 shows that there is an extensive area of drainage lines present in the landscape and the site inspection confirmed a large number of farm dams to be present (e.g. Plate 10), as would be expected across this rural landscape. So connectivity would not have been hampered to any degree in the current environment.

2.5 Diet

The diet of the Yellow-spotted Tree Frog has not been investigated in any detail, but adults presumably consume a variety of invertebrates. Furthermore, being a larger frog, they probably will also eat any small vertebrates they can capture and subdue. This includes other frogs as indicated by Humphries (1979) and are likely cannibalistic (Pyke and White 2001; Mahony et al. 2013).

Similarly, the tadpoles show a very standard set of mouth parts (Anstis 2013) and are again likely to eat a broad range of food items during that stage.

Hence there is no expectation of any dietary specialisation and so little likelihood that the species has a specific foraging habitat or method that might provide a limitation on where the species can exist.

2.6 Metapopulation dynamics

A critical consideration in the likely presence/absence of Bell Frogs are metapopulation dynamics. The species group is considered to follow a classical metapopulation structure with the “local” population consisting as a series of patchy populations within the larger single metapopulation. Individuals move regularly between a

mosaic of wetlands across a broad area throughout a single breeding season (Hamer et al. 2008; Hamer & Mahony 2010; Mahony et al. 2013). There is high site-specific population turnover with local extinctions being balanced by colonisations of other ponds or parts of the local area by regularly dispersing individuals, but with the overall metapopulation remaining stable. There are core sites that provide ongoing and regular reproductive success and that maintain long-term populations, but the major part of the population dynamics is driven by inter-year success of breeding at a range of available breeding sites, with years of very good reproductive success leading to opportunities to expand ranges and colonise new sites. In times of poor rainfall, the core sites become the refuges for the species and Valdez et al. (2015) found that probability of occupancy of a site increased at large and permanent wetlands. The work of Humphries (1979) supports this for the Yellow-spotted Tree Frog with one pond being used continuously through his study, but other ponds were used more sporadically, depending on conditions.

2.6.1 Vegetation associations

The OEH profile records the Yellow-spotted Tree Frog to be associated with a range of vegetation formations and classes within the New England Tablelands Interim Biogeographic Region in which the Project Site is located and is geographically restricted to above 1000 m altitude within the region (https://www.environment.nsw.gov.au/threatenedSpeciesApp/profileData.aspx?id=10486&cmaName=New+England+Tablelands). These are:

Dry sclerophyll forests (shrub/grass sub-formation)

- Central Gorge Dry Sclerophyll Forest

Dry sclerophyll forests (shrubby sub-formation)

- South East Dry Sclerophyll Forests
- Southern Tableland Dry Sclerophyll Forests

Forested wetlands

- Eastern Riverine Forests
- Inland Riverine Forests

Freshwater wetlands

- Inland Floodplain Swamps
- Montane Bogs and Fens
- Montane Lakes

Grasslands

- Temperate Montane Grasslands

Grassy woodlands

- Southern Tableland Grassy Woodlands
- Subalpine Woodlands
- Tableland Clay Grassy Woodlands
- Western Slopes Grassy Woodlands

Heathlands

- Northern Montane Heaths

Miscellaneous ecosystems

- Water bodies, rivers, lakes, streams (not wetlands)

Wet sclerophyll forests (grassy sub-formation)

- Southern Tableland Wet Sclerophyll Forests.

The Yellow-spotted Tree Frog is predicted to occur in both wet and dry forest types with both grassy and shrubby/heathy elements and can also be found in woodlands and wetlands and even in relatively cleared environments. The presence of suitable breeding habitat with emergent vegetation is considered to be the best determinant of the likelihood of this species being present in an area.

2.6.2 Threats

The Yellow-spotted Bell Frog is currently Listed as Critically Endangered under the BC Act and Endangered under the EPBC Act (OEH, 2022). It is currently listed as Critically Endangered (possibly extinct) under the IUCN Redlist criteria (IUCN, 2023).

The Office of Environment and Heritage profile for this species lists the following threats to the Yellow-spotted Bell Frog:

- Loss or modification of wetlands, swamps and slow-flowing creeks and the adjacent vegetation.
- Changes to natural water flows and water quality.
- Removal of fallen timber, rocks or other debris used as shelter.
- Application of herbicides or pesticides in or adjacent to habitat.
- Disease - chytrid fungus.
- Predation of eggs and tadpoles by introduced fish, including Carp, Redfin and Gambusia
- Predation of frogs by foxes and cats.
- Restricted in-situ distribution / population size.
- Lack of knowledge of additional populations, extent of suitable habitat or distribution of the species in the surrounding area.
- Tussock and gorse encroaching on suitable habitat, limits availability of open space habitat used by the frogs.
- Domestic stock; direct disturbance from cattle and sheep.

(see: https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10486)

The IUCN Redlist profile states:

"Listed as Critically Endangered (Possibly Extinct) because its population size in the wild is currently estimated to be zero as the one known subpopulation was recently reintroduced and is not yet established and stabilised. There is a chance that it may occur elsewhere in its historical range as yet undetected, but further surveys are needed. Furthermore, there is ongoing decline in the quality and extent of its habitat due to climatic changes. These are causing unprecedented and severe weather events, which further threaten a species that has been decimated by chytridiomycosis and the negative effects of past and current agricultural practices".

Even the one population noted above is present in southern NSW and so there are still no extant populations on the New England Tablelands.

that the cause for declines for this species are unclear (Gillespie et al. 1995), however lists two major threats:

- Chytrid Fungus; "…chytridiomycosis infection, and similar declines have been observed in the co-occurring species *Litoria aurea* and *L. raniformis*" (IUCN, 2023).
- Agricultural Impacts; It is suggested that chemical use together with "modification and loss of wetland habitats extraction of surface water, alteration of stream flow and the removal of stream side vegetation" (IUCN, 2023).

In consideration of the above listed threats, it should be noted that little is known about the decline of this species, and much of the predicted threats are based on closely related members of the Bell Frog complex (Mahony et al. 2013). But its rapid decline (<10 years) from a very common frog to likely extinct in the Bioregion strongly indicates a novel disease, the chytrid fungus, was the primary cause.

In regard to the Project Site, the majority of these threats would already be in place and not significantly added to by the proposed development. The following are considered to be of relevance as the proposed development may significantly add to already existing threats:

- Loss of streamside vegetation through clearing or frequent burning.
- Changes to natural water flows and water quality.
- Predation of eggs and tadpoles by introduced fish.
- Infection by amphibian chytrid fungus.
- Intense wildfire resulting in destruction of habitat.

2.6.3 Habitat fragmentation by roads

Hamer (2016) found that extinctions of GGBF were significantly more likely to occur at ponds in areas with higher densities of roads. Similar findings have been obtained for pond occupancy by frogs in the United States (Marsh et al. 2017). A high density of roads and the presence of larger roads with high volumes of traffic provides a negative environment for the GGBF. Their habit of migrating between water bodies to maintain a metapopulation requires free movement to allow populations to remain connected, allow new breeding sites to be colonised and allow local extinctions to be repopulated by dispersing individuals. Large roads represent barriers in both distances that frogs must cover in exposed conditions and the typically heavier volumes of traffic prohibit the successful crossing by frogs. Numerous smaller roads provide the same effect. Rural areas generally have a low density of roads and so provide what would be expected to still be a relatively suitable environment for the Yellow-spotted Tree Frog where there are water bodies present. The study area and surrounds have only one larger road occasionally dissecting it and relatively few smaller roads with minimal traffic use. So roads currently are unlikely to result in the isolation or fragmentation of any local population of frogs except potentially where the one large road is adjacent to ponds or streams.

2.6.4 Variables determining Yellow-spotted Tree Frog presence

This information provides the following important points when trying to assess the potential presence of the Yellow-spotted Tree Frog in any area:

- The Yellow-spotted Tree Frog requires the presence of permanent and semi-permanent water bodies with emergent vegetation for it to be present within a landscape.
- The Yellow-spotted Tree Frog is much more likely to inhabit an area where there are multiple (preferably dozens) suitable water bodies connected or within close enough proximity (maximum of 500 m) such that the species will be to be able to move easily and regularly enough between sites to maintain a metapopulation.
- The Yellow-spotted Tree Frog is more likely to be present at a location when there are other Yellow-spotted Tree Frog occupied ponds in close proximity.
- The Yellow-spotted Tree Frog is unlikely to be present within areas containing a large number of introduced fish and especially *Gambusia sp*. (Plague Minnow).

© ECO LOGICAL AUSTRALIA PTY LTD

3. Description of the Project Site

The footprint of the Winterbourne Wind Farm in provided in Figure 4Figure 4. The development is located is located approximately north-west of Armidale and north and east of Walcha (approximately 400 km north of Sydney) in the New England Tablelands region of north-eastern NSW (Figure 1). It is roughly bounded by Thunderbolts Way and the Oxley Highway to the west, the Oxley Wild Rivers National Park to the south and east, and the Salisbury Plains to the north. The project area extends over approximately 22,000 ha, with less than 1,000 ha expected to be disturbed during construction. The project area is located at approximately 1,100m-1,300m elevation and is comprised of hills and ridgelines rising out of the Walcha Plateau. The project area is dissected by Winterbourne Creek, Toms Creek, and Two Mile Water.

The project area falls within the Armidale Regional Local Government Area (LGA). The preliminary survey corridor comprises approximately 5000 ha zoned as RU1 Primary Production within the Armidale Dumaresq Local Environment Plan (LEP) 2012. Surrounding land is also primarily zoned RU1 except for the Winterbourne Nature Reserve (C1 National Parks and Nature reserves) which is located directly adjacent north-east of the survey corridor.

The project will be constructed primarily on freehold land within the Walcha and Uralla Local Government Areas. Land to be used for the project will be secured under lease arrangements with local landholders. The land area is broadly cleared and has many low peaks and ridgelines that provide locations for wind turbines. Ther there are several existing access roads to and within the site (Figure 4). Some of the existing roads may need to be upgraded and several new access roads will be constructed within the site as part of the proposed project. The location of these roads and the final position of turbines will be determined based on the environmental assessment outcomes.

The proposed wind farm will be designed to minimise potential visual and noise impacts to landowners and tenants in the area. Much of the Project Area is currently used for livestock grazing and has been mostly cleared of trees and other vegetation, leaving cleared paddocks and infrastructure with patches of retained trees across the landscape (Plate 2, Plate 3).

© ECO LOGICAL AUSTRALIA PTY LTD



Plate 2: Cleared paddock, small sealed road and pond environment typical of habitat found within the study area



Plate 3: Retained trees on hillside, fencing, paddocks and dirt track typical of study area

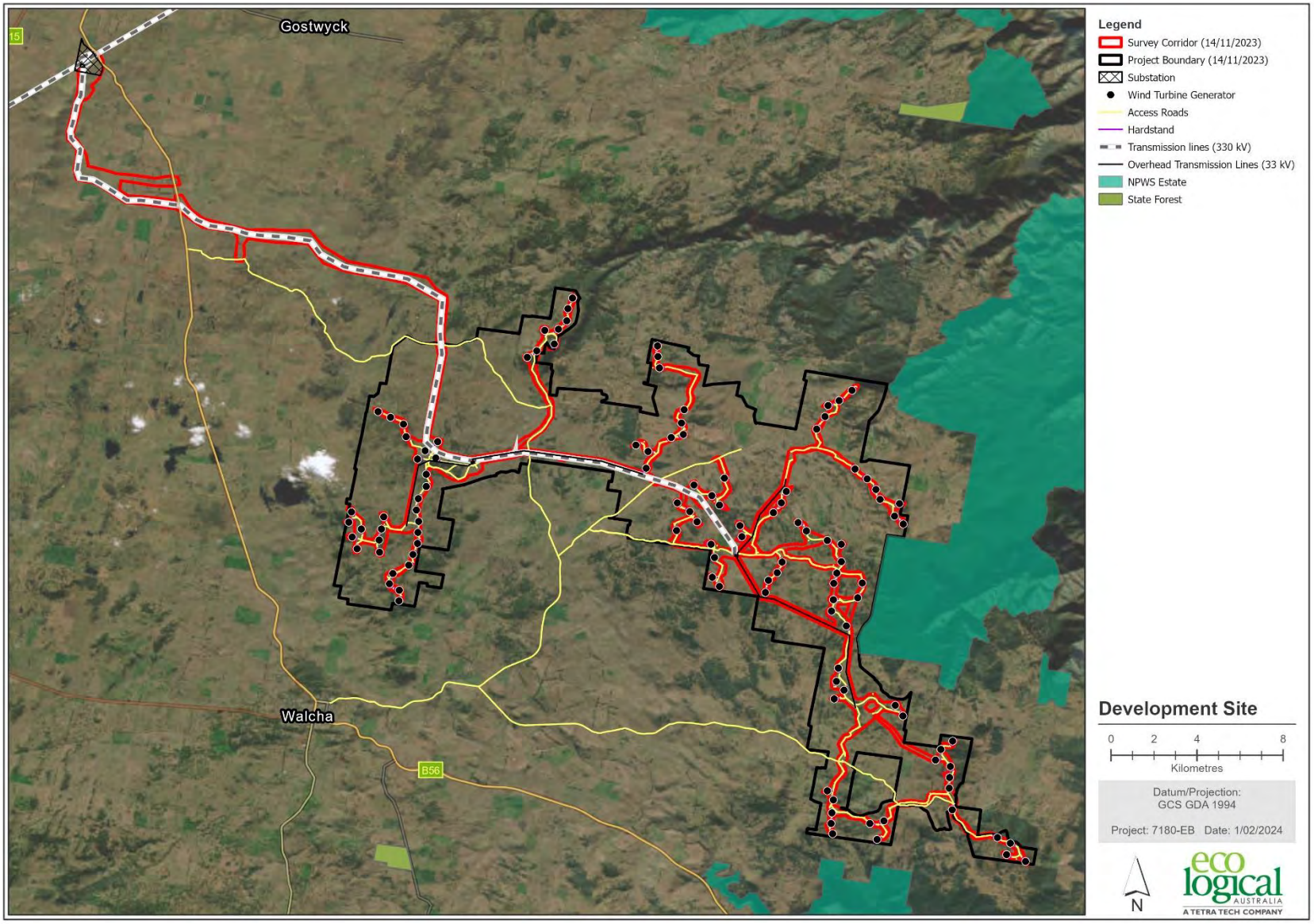


Figure 4. Development footprint

3.1 Landscape features

The following landscape features, as defined by the BAM, are relevant to the project.

3.1.1 Bioregions

The Project Site is located within the New England Tablelands Interim Biogeographic Regionalisation for Australia (IBRA) Region. The following description for the region is taken from NSW NPWS (2003) The Bioregions of New South Wales: their biodiversity, conservation and history:

The New England Tableland Bioregion has an area of 3,004,202 ha of which 2,860,758 ha or 95.23% of the bioregion lies within NSW. This bioregion is one of the smaller bioregions in NSW, occupying 3.57% of the state. The bioregion lies between the North Coast and Nandewar bioregions in northeast NSW, extending north just into Queensland. In NSW, the bioregional boundary extends from north of Tenterfield to south of Walcha and includes towns such as Armidale and Guyra, with Inverell just outside the boundary.

The bioregion includes parts of the MacIntyre, Clarence, Gwydir, Macleay, Namoi and Manning River catchments.

Subregions

The Project Site is located within three IBRA subregions – Moredun Volcanics, Bundarra Downs and Armidale Plateau (Figure 1). Details on these subregions are also taken from NSW NPWS (2003) and provided in Table 1.

Table 1. Description of the subregions covering the Project Site (from NSW NPWS 2003).

Subregion	Geology	Characteristic landforms	Typical Soils	Vegetation
Moredun Volcanics	Lower Permian acid volcanics with minor granite and Tertiary basalts.	Undulating plateau at 1100 m with steep western slope and rugged hills falling to 850 m.	Harsh yellow texture contrast soils with stony brown loams on basalts.	Open forest and woodland of snow gum, black sallee, New England stringybark, McKie's stringybark, silver-top stringybark, ribbon gum, yellow box, and some black cypress pine on the plateau. Mugga, Caley's ironbark, tumbledown gum, white box, yellow box and Youman's stringybark on western slopes
Bundarra Downs	Lower Carboniferous mudstones, lithic sandstones and conglomerates.	Upper catchment of the Gwydir River undulating to low hilly country with dendritic drainage pattern. Hills rise to the east on granite metamorphic contact ridges.	Harsh texture contrast soils, generally yellow, thinner and stonier on steep slopes. Some areas of slightly saline soils.	In the west: white box, grey box, yellow box and Blakely's red gum with mugga on stony ridges and river red gum along streams. In the east: broad-leaved stringybark, Youman's stringybark, tumble down gum, white box, yellow box, black cypress pine and kurrajong
Armidale Plateau	Fine grained Permo-Carboniferous	Undulating to hilly plateau at 1100 m.	Texture contrast soils on sedimentary rocks and	Open ribbon gum forest and woodland with snow gum and

Subregion	Geology	Characteristic landforms	Typical Soils	Vegetation
	Sedimentary rocks, granites and multiple Tertiary basalt flows.	Stepped landscape across basalt flows, broad valleys, steepening to the east at the head of Great Escarpment gorges.	granite, mellow (soft and friable) and well drained on upper slopes, harsh and poorly drained on lower slopes. Variable stony loams to deep black earths in valley floors on basalt. Deep, dark loamy alluvium in swampy valleys.	black sallee on basalt. Cold air drainage influence inverts the tree patterns in wide valleys. Yellow box, Blakely's red gum, rough-barked apple, apple box on sedimentary rocks. Silver-top stringybark, New England stringybark on dry aspects, Blakely's red gum, yellow box and apple box on moist, well-drained slopes, and New England peppermint with ribbon gum on flats.

3.1.2 NSW (Mitchell) Landscape

The Project Site covers four different Mitchell Landscape Types. The following description of each is taken directly from DECC (2002).

Dingo Spur Metasediments

Steep ranges and hills intersected by a dendritic drainage pattern leading into deep gorges with high waterfalls on the Great Escarpment, extends west onto the tablelands. Gorges incised into faulted, steep dipping Devonian quartzose sandstone, greywacke, massive argillite and slate. Tablelands area on Permo-Carboniferous mudstone, lithic sandstone, tuff, slate, hornfels and some schist. General elevation 300 to 1400m, local relief 600m. Shallow stony loam on steep scree slopes with moderate organic content. Shallow gradational loam and sandy loam elsewhere with deeper uniform profiles in low valleys. A very complex vegetation environment encompassing coastal closed forests, dry hardwood forests and cold high plateau components. Open forest of New England Blackbutt (*Eucalyptus andrewsii ssp. campanulata*), Messmate (*Eucalyptus obliqua*), Silvertop Stringybark (*Eucalyptus laevopinea*) with New England Peppermint (*Eucalyptus cinerea*), Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*Eucalyptus stellulata*) in high cool environments. Dry closed forest species such as; Shatterwood (*Backhousia sciadophora*), Giant Stinging Tree (*Dendrocnide excelsa*), Shiny-leaved Stinging Tree (*Dendrocnide photinophylla*), and Yellow Tulip (*Drypetes australasica*) in lower moister environments and in patches on scree slopes where protected from fire. River Oak (*Casuarina cunninghamiana*) along all streams and dry hardwood forests of; Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyii*), Broad-leaved Stringybark (*Eucalyptus caliginosa*) and Cabbage gGum (*Eucalyptus amplifolia*) on valley floors.

Moonbi-Walcha Granites

Complex of steep ranges, plateau and rounded peaks with abundant large tors and rock domes on Permian granite, granodiorite and porphyry, general elevation 500 to 1320 m, local relief 100 to 300 m with the plateau at an average of 1000 to 1150 m. Soils vary with rock type, depth of alteration and topographic position. Thin gritty loams near rock outcrop on crests, uniform to gradational earths on gentle slopes and red and yellow texture-contrast profiles in valleys. Vegetation also varies and includes open forest and woodland of; White Cypress Pine (*Callitris glaucophylla*), White Box (*Eucalyptus albens*), Caley's Ironbark (*Eucalyptus caleyi*), Tumbledown Red Gum (*Eucalyptus dealbata*), Silver-leaved Ironbark (*Eucalyptus melanophloia*), Yellow Box

(*Eucalyptus melliodora*), Orange Gum (*Eucalyptus prava*), Silvertop Stringybark (*Eucalyptus laevopinea*), Western Golden Wattle (*Acacia decora*), Lightwood (*Acacia implexa*), Kangaroo Thorn (*Acacia paradoxa*), and Hickory Wattle (*Acacia obliquinervia*) on lower western slopes. *Prostanthera nivea - Acacia viscidula* shrubland adjacent to rock outcrop with; Orange Gum, Black Cypress Pine (*Callitris endlicheri*), Tumbledown Red Gum, Kurrajong (*Brachychiton populneus*), and Port Jackson Fig (*Ficus rubiginosa*).

Uralla Basalts and Sands

Undulating stepped high plateau on Tertiary basalt with underlying fluvial sand and gravel resting on an exhumed landscape of Permian granites. General elevation 950 to 1250 m, local relief 150 m. Red structured loams on ridges, brown structured gradational clay loams on slopes, dark self-mulching clays in valleys and red or yellow earth on sands and exposed granite. Open forest or woodland of Manna Gum (*Eucalyptus viminalis*) with some Rough-barked Apple (*Angophora floribunda*). Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*Eucalyptus stellulata*) on cold valley floors and exposed peaks. Silvertop Stringybark (*Eucalyptus laevopinea*), Yellow Box (*Eucalyptus melliodora*) and Blakely's Red Gum (*Eucalyptus blakelyii*) on lower elevations in the west.

Guyra Tops Granite

Undulating stepped high plateau on Tertiary basalt with underlying fluvial sand and gravel resting on an exhumed landscape of Permian granites. General elevation 950 to 1250 m, local relief 150 m. Red structured loams on ridges, brown structured gradational clay loams on slopes, dark self-mulching clays in valleys and red or yellow earth on sands and exposed granite. Open forest or woodland of Manna Gum (*Eucalyptus viminalis*) with some Rough Barked Apple (*Angophora floribunda*). Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*Eucalyptus stellulata*) on cold valley floors and exposed peaks. Silvertop Stringybark (*Eucalyptus laevopinea*), Yellow Box (*Eucalyptus melliodora*) and Blakely's Red Gum (*Eucalyptus blakelyii*) on lower elevations in the west.

3.1.3 Native vegetation

NSW NPWS (2003) provide a broad assessment of vegetation communities across the New England Tableland:

Granitic soils derived from the prominent New England batholith support a variety of open forests and woodlands. These mainly consist of Silver-top Stringybark (Eucalyptus laevopinea), Blakely's Red Gum (Eucalyptus blakelyi), Youman's Stringybark (Eucalyptus youmanii), Yellow Box (Eucalyptus melliodora), Apple Box (Eucalyptus bridgesiana), Rough-barked Apple (Angophora floribunda), Black Cypress Pine (Callitris endlicheri), Manna Gum (Eucalyptus viminalis) and Snow Gum (Eucalyptus pauciflora).

The western slopes are dominated by Tumbledown Gum (Eucalyptus dealbata), Western New England Blackbutt (Eucalyptus andrewsii), Caley's Ironbark (Eucalyptus caleyi), Red Stringybark (Eucalyptus macrorhynca), McKie's Stringybark (Eucalyptus mckiena), White Cypress Pine (Callitris glaucophylla) and Black Cypress Pine, Rough-barked Apple and Silver-leaved Ironbark (Eucalyptus melanophloia nophloia).

Areas at higher altitudes comprise vegetation communities dominated by Messmate (Eucalyptus obliqua) and Mountain Gum (Eucalyptus dalrympleana ssp. heptantha), with Snow Gum, Black Sallee (Eucalyptus stellulata) and Ribbon Gum (Eucalyptus nobilis). Orange Gum (Eucalyptus prava) and Black Cypress Pine are widespread in rocky outcrops in the north of the bioregion. Protected high rainfall areas near the Great Escarpment display cool temperate rainforest elements, including Beech (Notofagus moorei) forests. River Oak (Casuarina

cunninghamiana) lines rivers and streams in the western part of the bioregion below an elevation of 800 m, with sedgelands found in some of the smaller streams.

Vegetation found on basalt-derived soil consists of open forests and woodlands of Manna Gum, Snow Gum and Black Sallee. Cold-air drainage inverts the tree patterns in wide valleys, as the distribution of these species is largely determined by climate parameters. Vegetation communities growing on basaltic soils consist of New England Stringybark (Eucalyptus calignosa) New England Blackbutt (Eucalyptus campanulata), and Narrow-leaved Peppermint (Eucalyptus radiata) on the hills, with Yellow Box, Wattle-leaved Peppermint (Eucalyptus acaciiformis), New England Peppermint (Eucalyptus nova-anglica), Snow Gum, Black Sallee and Ribbon Gum in the valleys. Open forest of New England Stringybark, Yellow Box, Blakely's Red Gum and Rough-barked Apple occurs on Tertiary sands. Vegetation growing on soils derived from Permian sedimentary rocks in the west is dominated by White Box (Eucalyptus albens), Grey Box (Eucalyptus moluccana), Yellow Box and Blakely's Red Gum, with localised occurrences of Mugga (Eucalyptus sideroxylon) on stony ridges. Youman's Stringybark, Tumble Down Gum and Black Cypress Pine also occur on sediments with Silver-leaved Ironbark, White Cypress Pine and the occasional Kurrajong. Snow Gum and Black Sallee dominate the coldest ridges while Ribbon Gum, Mountain Gum, Silver-top Stringybark, New England Blackbutt and Narrow-leaved Peppermint dominate moist areas on higher ground. New England Stringybark, Ribbon Gum, and cool temperate rainforest elements are found in moist, sheltered gullies.

Table 1 provides descriptions of soils present in the different Mitchell Landscape areas, but which follow closely the above descriptions. Both description sets indicate a broad variety of vegetation types are present where native vegetation has been retained. Given that the Yellow-spotted Tree Frog has no specific habitat limitations, any of these vegetation communities can potentially be used by the species if suitable breeding habitat is present.

ERM have identified 14 plant community types (PCTs) within the study area, 11 of which intersect with the survey corridor and a 200 m buffer around the corridor (buffer for the Yellow-spotted Tree Frog listed in the BAM), only two of which (highlighted in bold) are listed as being associated with the Yellow-spotted Tree Frog:

- PCT 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- ***PCT 518* - Heath swamps wetland on leucogranite and granite of the New England Tableland Bioregion**
- *PCT 526* - Mountain Ribbon Gum - Messmate - Broad-leaved Stringybark open forest on granitic soils of the New England Tableland *Bioregion*
- PCT 534 - New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
- PCT 565 - Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
- PCT 567 - Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
- PCT 568 - Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
- **PCT 766 - Carex sedgeland of the slopes and tablelands**
- PCT 970 - Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
- *PCT 997* - New England stringybarks - peppermint open forest of the New England Tableland Bioregion
- *PCT 1194* - Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion.

© ECO LOGICAL AUSTRALIA PTY LTD

3.1.4 Rivers, streams and ponds

Five significant waterways have been identified as present within the Project Site and are:

- Boorolong Creek.
- Rileys Creek.
- Toms Creek.
- Teatree Creek.
- Tigers Gully Creek.

The location of these creeks and interaction with the Project Site are indicated in Figure 5 and it is evident that there are a network of mapped drainage lines crossing over the footprint. These may form potential breeding and non-breeding habitat for the Yellow-spotted Tree Frog and provide migratory corridors for the species to move around the landscape. However, these creeks generally are highly disturbed by stock and often lacked even semi-permanent pools along parts of their lengths and contain little or no emergent vegetation that the species would use for shelter (Plate 4,

Plate 5, Plate 6). The streams also were not permanent flowing streams when in cleared farmlands and often had few pools that were highly disturbed by stock. So their suitability as habitat is rated as typically poor, but there remain some points where habitat was good (see Plate 7). One rocky creek was observed (Plate 8), but its flowing water and smaller pools would not suit the species.

Farm dams are located regularly and consistently across the study area and range in size and quality from small dams with no emergent vegetation to large dams with significant areas of emergent vegetation (see Plates 9 to 13). Typically they were located in very open locations with no real connection to native vegetation and lacked shelter sites around the dams such as logs or rocks or the base of trees. The ponds provide a range of potential habitats of highly variable quality that the species could sometimes use for breeding and shelter and, along with the streams, provide connectivity and stepping stones to allow metapopulation processes to proceed.

Of significance was that few of the isolated water bodies appeared to have any introduced fish present. The Plage Minnow (*Gambusia holbrooki*) was seen at a couple of points on the more permanent sections of creeks and is assumed likely to be in or to be able to penetrate most of the larger drainage lines. However it appears not to be reaching the majority of isolated dams and so is not reducing their potential to be suitable breeding habitat. Trout may be present on the rocky creek areas noted in the northern end of the survey footprint.

The Project Site does not contain any water bodies listed on the Directory of Important Wetlands in Australia or that are classified as a Ramsar wetland (see (https://www.awe.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands). This may be of some importance given that the New England records for the Yellow-spotted Tree Frog were mainly associated with several large upland swamps. If these sorts of swamps were the core habitat for this frog in the region and they did not commonly inhabit farm dams, then this would significantly reduce the potential for the species to use water bodies present in the study area.

© ECO LOGICAL AUSTRALIA PTY LTD



Plate 4: Dry stream bed leading to pool under bridge



Plate 5: Dry stream bed with no aquatic vegetation to act as emergents





Plate 6: Isolated pools on creek lines with some emergent vegetation



Plate 7: Pools on stream with emergent vegetation and open water – good habitat for Yellow-spotted Tree Frogs



Plate 8: Rocky creek in northern part of study area (flowing water not preferred by the species)





Plate 9: Isolated farm dams in study area showing very limited surrounding vegetation or emergent vegetation



Plate 10: Another isolated farm dams in study area noting minimal to no aquatic vegetation or surrounding native vegetation



Plate 11. Relatively uncommon situation of a dam located adjacent to disturbed retained native vegetation





Plate 12: Isolated dams with emergent aquatic vegetation

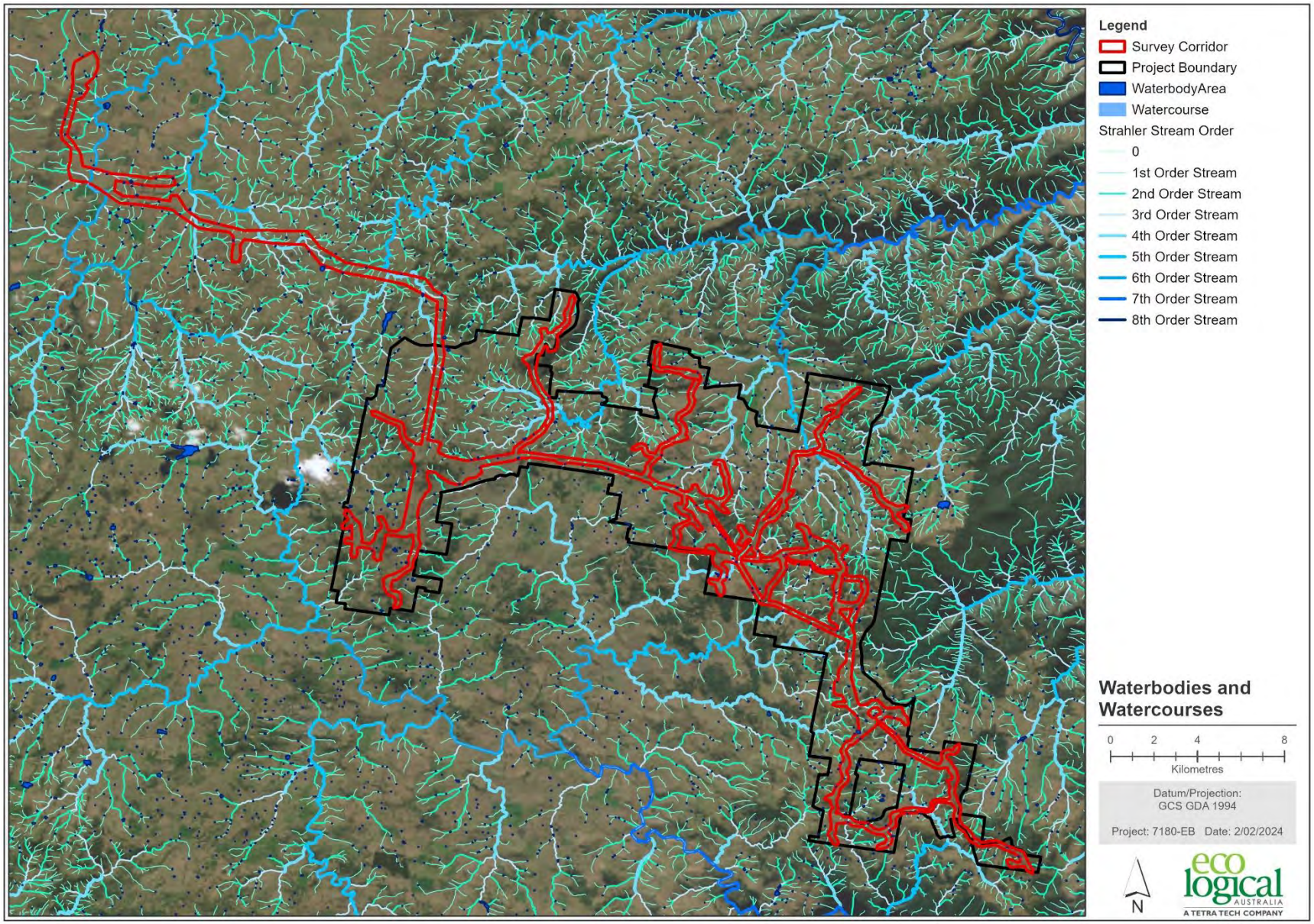


Figure 5. Location of mapped water bodies associated with the Project Site

3.2 Connectivity features

Habitat connectivity is moderate through the survey corridor due to the presence of the network of drainage lines and farm dams. These can be used by the species as a network of lines or stepping stones to move across the landscape when conditions are dryer. The intervening habitats are mostly cleared grazing lands with little cover outside of the patches of retained trees and sometimes remaining grass tussocks and downed timber. Most ponds are likely to be within 200 m of another pond or drainage line, although many of these would be dry or offer very limited protection during the day. So permanent pools or ponds with emergent vegetation and/or surrounding vegetation and cover would be critical resources within this environment and places frogs retreat to when conditions dry out, as was the case in the study by Humphries (1979). The Yellow-spotted Tree Frog can probably easily enough cross the grazing lands during wet periods.

The absence of an extensive road network in the study areas is a positive for maintaining connectivity and it appears unlikely that this will change in any significant way even with the proposed infrastructure for the windfarm as the roads are likely to remain little trafficked.

3.2.1 Areas of geological significance

No important karsts or crevices located within the preliminary survey corridor.

3.2.2 Climate

Key climate statistics for the weather stations located for the Project Site is provided in Table 2. This demonstrates that the Project Site receives moderate rainfall and has a relatively cool climate compared to coastal NSW. This reflects the higher altitude of the Project Site and the colder conditions likely lead to a relatively shorter breeding season and activity period for the species compared to Bell Frogs from more lowland and coastal areas.

Table 2: Climatic statistics for Armidale and Guyra (data from the Bureau of Meteorology)

Rainfall station	Mean total rainfall (mm)	Mean January maximum (°C)	Mean January	Mean July	Mean July
Armidale	1005.9	24.3	13.5	9.6	2.6
Guyra	1062.5	23.0	12.0	8.8	1.7

3.3 Land use history

The Walcha District Historical Society (see https://walchansw.com.au/portfolio/history/) provides the following information on the historic land use in the Walcha area:

The Danggadi people lived in this region for about 6,000 years in the colder months retreated in the gorge country to the east, where fish and animals were plentiful. The tablelands had places for ceremonies and trade of goods, and there are traces of bora grounds near Walcha.

The explorer John Oxley passed through the area in 1818 and named the Apsley River after the secretary of state for the colonies. He also noted the Apsley Falls, the spectacular waterfall where the river begins its descent to the coast. European settlement began in 1832 as squatters moved from the Hunter Valley and from Port Macquarie seeking pastures for their sheep.

The first squatter in the district was a Scot, Hamilton Collins Sempill, who made his base near Oxley's Camp beside a good waterhole on the Apsley River. This became known as Wolka or Walcha. The name perhaps came from an Aboriginal word Wolka. But the spelling and possibly the origins came from the association of the two early pastoral properties- the Walcha run and the Bergen-op-Zoom Run- with places in The Netherlands where the town of Bergen-op-Zoom stands on the Walcheren River. These places were well known to the early settlers because of a major campaign of 1809 called the Walcheren Expedition, fought during the British wars with Napolean.

Other settlers arrived in the 1830s and 1840s, runs were taken up and a town began to appear. In the 1850s and 1860s some of the early squatters were able to start purchasing their runs, and selectors struggled on their smallholdings. The town had its first school and churches established in these years. The population grew in the 1870s with the small gold rushes to Glen Morrison, Tia and Nowendoc. By 1900 the town had almost a thousand people and the surrounding districts another 1600. In Walcha there were four hotels, four blacksmiths, two flour mills and a tannery, as well as over thirty shops.

There was an attempt after disastrous floods in the 1860's to move the town centre up the hill to the west: a former bank, a hotel and some shops stand as witness to this attempt. The town has not changed a lot in the last hundred years: timber has replaced wheat as a major employer, trucking is as prominent an activity as horse and bullock wagons were in the past. The region still relies on fine wool, prime lamb and cattle production, but the pastoral properties employ fewer workers than in the past due to industrial advancements enabling faster, more economical solutions to labour.

Hence, prior to European settlement, the local area would have been covered in native forests and woodlands that were progressively cleared for agriculture, particularly grazing, and with some townships. This still remains the case to this time.

The preliminary survey corridor is zoned as RU1 Primary Production within the Armidale Dumaresq Local Environment Plan (LEP) 2012. The majority of land that surrounds the project site is also zoned RU1 Primary Production, however the Boorolong Nature Reserve (directly north-east and adjacent to the preliminary survey corridor) is zoned as C1 National Parks and Nature Reserves.

The New England Highway is situated approximately 9 km east of the preliminary survey corridor (eastern most extent) and Thunderbolts Way is approximately 7 km south-west of the preliminary survey corridor. Boorolong Road traverses the preliminary survey corridor (north to south direction), intersecting it nearby the township of Dumaresq.

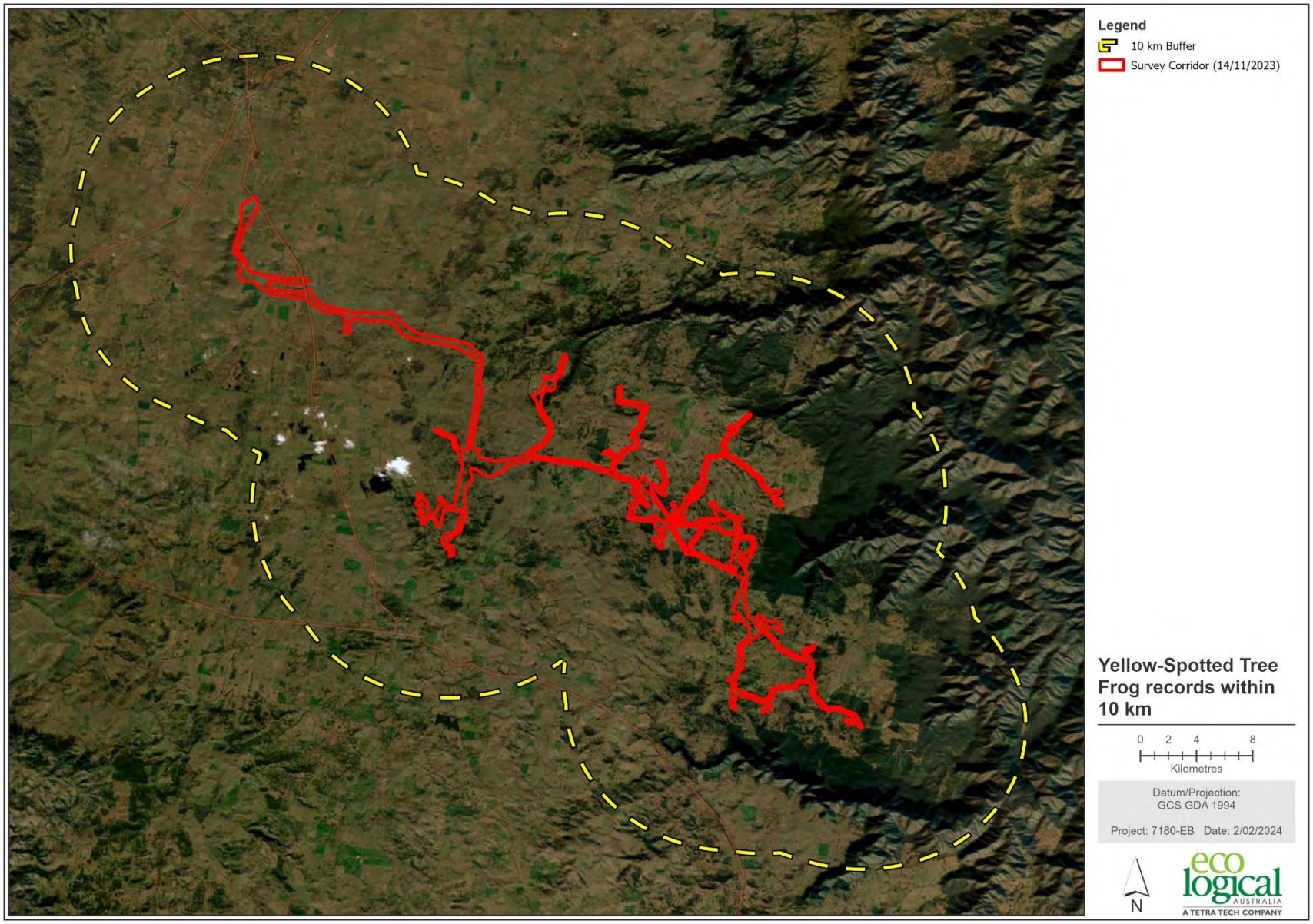


Figure 6: Records of the Yellow-spotted Tree Frog within 10 km of the survey corridor

4. Assessment of GGBF to be present on the Development Site

4.1 Yellow-spotted Tree Frogs in the region

The OEH species profile for the Yellow-spotted Tree Frog indicates that the species is predicted to occur withn the locality of the survey footprint and there are records of the species to the north and to the south. However, those records are all distant (at least 40 km and mostly >100 km) and there has never been an indication of this or any other Bell Frog species being found within or near to the locality. The Yellow-spotted Tree Frog population recorded on the New England Tableland may have been isolated from other populations by a significant geographic gap (Figure 3) and there remains a suggestion that the population may have even potentially been a separate taxa. Given that Bell Frogs are relatively conspicuous frogs and that they were once a common species wherever they occurred, and the lack of success of researchers in finding the species in the area around Walcha (Heatwole et al. 1995), there is reasonably strong evidence to indicate that the Yellow-spotted Bell Frog has never been present in the locality of the proposed Winterbourne Windfarm.

Regardless of the historic range, the ongoing searches for this species across highland areas of norther NSW (e.g. Mahony et al. 2000, D. Hunter pers. comm. 2016 in Threatened Species Scientific Committee 2017, J. Rowley, Pers. Comm.) further indicate the species is absent not just from the study area, but also the New England Tableland broadly. I recognise that the rediscovery of the population near Yass indicates it is still always possible that the species remains somewhere, but the chances appear diminishingly small.

4.2 Subject land as potential habitat

4.2.1 Breeding habitats

There are numerous water bodies present within the development site that form potential breeding habitat, although they were highly variable in quality and nearly all suffer significant and ongoing disturbance from grazing by stock. Aquatic vegetation provides protection from predators for both frogs and tadpoles and also provides a basking location for frogs and so is a very important habitat component. Most sites had little to no fringing sedges or emergent vegetation and so represented what would be relatively poor habitat broadly for the adult frogs as they provided little or no basking or shelter habitat. However, there were a few dams or pools on streams that that were recorded to have moderate (>30%) coverage of emergent vegetation and fringing vegetation. This would be less than 10% of sites based on the site inspection, but these areas could provide core environments that frogs could use most of the time, moving to other aquatic habitats under suitable conditions.

The best temporary flooded habitat would be the overflow and fringes of dams where there were sedges and grasses present that would become emergent vegetation for days to weeks after flooding and so provide protection for eggs and tadpoles. Being shallow, they would also provide warmer waters that tadpoles appear to prefer for development.

Permanent pools along drainage lines are likely to be more useful as foraging, shelter and movement habitat given that fish were seen in some areas and likely will be able to access the streams when they are flowing.

Most ponds would provide potentially suitable habitat for egg deposition and tadpoles, having shallow margins and were little shaded, with likely warm water to aid in tadpole development. As noted, the absence of introduced fish from most isolated water bodies that were observed adds to the belief that they provide

© ECO LOGICAL AUSTRALIA PTY LTD

potential suitable habitat for tadpoles to develop in, even if the adults would not likely use them for any extended periods of time.

4.2.2 Sheltering and foraging habitat

Most dams had little to no fringing vegetation and little evident ground cover (e.g. Plate 9, Plate 10) and drainage lines appeared most likely to form most important shelter habitat, given that they had occasional pools and often had dense grasses and/or sedges growing in the bed adjacent to the pools (Plate 6). These features would allow for the Yellow-spotted Tree Frogs to find some suitable water bodies for their non-breeding activities even without other shelter options such as logs, rocks or in the roots of trees.

Sheltering habitat away from the water bodies is very poor with the site having only occasional scattered down timber or rocks in an otherwise uniform area of low grassy grazing lands. This provides very little in the way of shelter for frogs to use to protect them when moving overland between water bodies and so migratory movements outside of the drainage line may necessarily have to be done in one night to avoid desiccation and predation the following day. These low grassed areas are otherwise considered as favourable migratory pathways for at least the Green and Golden Bell Frog because they are easily traversed (Muir 2008) and Humphries (1979) found Yellow-spotted Bell Frogs migrated each season away from ponds out through grazing lands.

Given the lack of cover in areas adjacent to most water bodies it appears likely that frogs would remain around water bodies to find shelter in the dense vegetation, as recorded by Humphries (1979). This puts them at some risk in winter floods when they are relatively inactive and so vulnerable to being washed out of shelter sites.

Grassy areas are considered to be preferable areas for foraging for the GGBF (Muir, 2008) as they represent open environments where frogs can see prey and easily move to catch them. But the very short cover present and very simple vegetation structure strongly suggests that invertebrate numbers and diversity is very low in this environment and food would be very limited. As for shelter, it is likely the best foraging habitat remains around the water bodies where the tussocks and aquatic environment might provide better habitat for invertebrates and small vertebrates that the frog can eat. And the water bodies have other species of frogs present and the GGBF is well known for eating other frogs (including cannibalising its own species) and so the areas of water would also likely provide favourable foraging along with the fringing vegetation. Hence foraging and shelter habitat looks to be present across the study area, albeit in probably somewhat limited supply.

4.2.3 Dispersal habitat

Assuming that Yellow-spotted Bell Frogs follow similar patterns of movement to those of other Bell Frogs studied, the ponds and drainage lines present within the survey corridor appear to be consistently close enough and extensive enough to allow for regular movements between them by individuals. The drainage line form suitable dispersal habitat, and would be best used after rainfall events when moisture would be retained in the vegetation. The terrain between ponds is easily traversable and this all extends out into the broad locality. Hence the study area and its surrounds broadly provide good dispersal opportunities for the GGBF.

© ECO LOGICAL AUSTRALIA PTY LTD

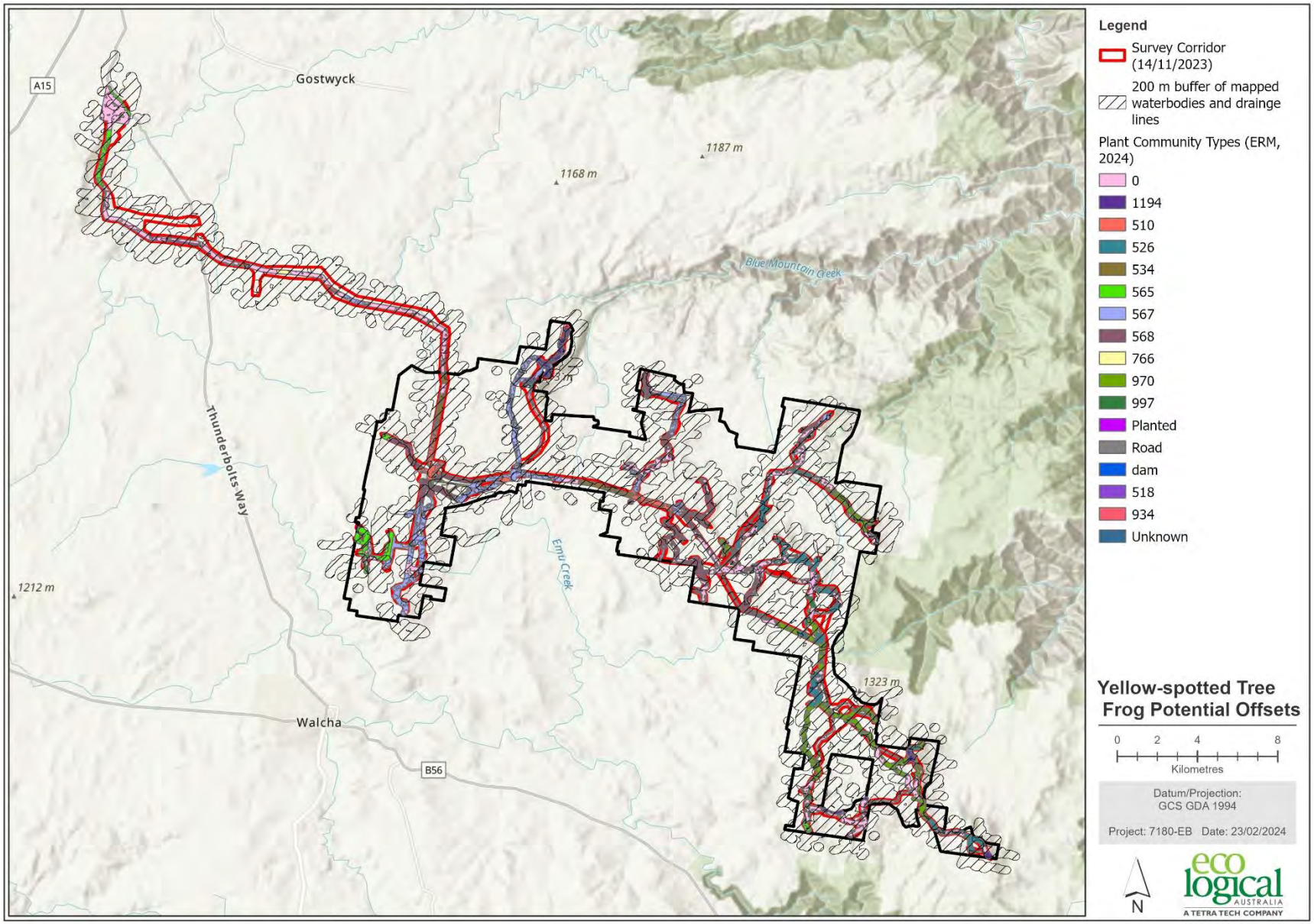


Figure 7: PCTS present within survey corridor and also within 200 m of mapped water bodies

5. Assessment of species presence

5.1 Suitability of habitat on the subject land

The information in Sections 2 and 4 demonstrates the likely ability of the Yellow-spotted Tree Frog to use water bodies located in rural lands and it would appear that sufficient numbers of interconnected pools and ponds are present to provide opportunities for metapopulation processes to take place. Whilst most isolated ponds lack significant emergent or fringing vegetation and surrounding ground cover, there are enough ponds present to likely allow for individuals to use the better sites and still be able to move across the study area and find adequate breeding and shelter opportunities. Thus the environment, whilst not of great quality in the broad sense, still looks potentially useable by the Yellow-spotted Tree Frog. The main issue is the lack of large wetlands that the species was most identified with on the New England Tableland. If the frogs of this region are adapted strongly to living in large and complex wetlands, the current arrangement may be much more marginal, which is supported by the absence of historic records outside of the large swamps near Armidale.

5.2 Historic distribution

In assessing the potential of the Yellow-spotted Tree Frog to be present in the study area, the most significant consideration to me is whether the species was ever present in the locality of the survey corridor? The absence of any records along with the extent of historic and more recent surveys along and the usual ease of detecting Bell Frogs strongly suggests to me that the species was never present within the area around Walcha. Whether this was due to the absence of numbers of larger swamps or some other less obvious factor, the fact remains that the species has not been recorded in the locality and I conclude it was never present.

5.3 Importance of the subject land to the Green and Golden Bell Frog

I conclude that the species was never present within the locality of the survey corridor. Given that, the land would not be important to the species. If it was once present, there is no realistic chance it is now present given all of the efforts to locate it, including the recent efforts of the Australian Museum and people using the FrogID citizen science project to provide a million records of frogs across Australia. The widespread effects of the amphibian Chytrid fungus appears to make it highly unlikely the species could persist given its severe impacts on Bell Frogs (and many other species) throughout the east coast and adjacent ranges where sites are more than 10 km from coastal waters (Mahony et al. 2013).

Broadly speaking, the site contains a sufficient variety of closely located water bodies and drainage lines that it would seem likely that the species would be able to maintain populations if it could colonise the locality. The lands immediately surrounding the survey corridor provide no barrier to dispersal and so a population could move more broadly into and out of the study area if a population could somehow establish. Two PCTs present within the survey corridor are considered to be used by the Yellow-spotted Tree Frog with 0.563 ha of PCT 518 and 33.399 ha of PCT 766 being located both within the survey corridor and within 200 of potential breeding habitat (Figure 7).

Based on the BAM guidelines (DPIE 2020) the following applies when assigning any species polygon for the GGBF:

> *The species polygon boundary should align with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 200 m radius from the top of bank. The polygon should include minimum 50 m wide corridors of native and non-native vegetated areas linking the*

available water bodies, where relevant.

As there are no records for the species in the subject land at any time, and none in the locality, and as I consider that the Yellow-spotted Tree Frog was not ever present within the locality, there is no reason to produce a polygon to protect PCTs within a 200 m radius of the available ponds.

On a final note, if the species was ever to be located in the final footprint of the Winterbourne Windfarm, or for any other location, it is not possible to conceive how an offset could be calculated for the species. There would be no other populations or areas that could be used as an offset and any extant population would be so valuable that it would be essentially impossible to justify its destruction for a development. For a development such as a windfarm, the most logical and simplest answer would be to exclude any development from directly or indirectly impacting the habitat being used by the species.

6. References

Anstis, M. 2013. *Tadpoles and Frogs of Australia*. New Holland Publishers, Sydney.

Cogger, H.G. 2014. *Reptiles and amphibians of Australia*. Seventh Edition. CSIRO Publishing, Collingwood, Victoria.

Cogger, H.G., Cameron, E.E. and Cogger, H.M. 1983. *Zoological Catalogue of Australia. Vol. 1 Amphibia and Reptilia*. Australian Government Publishing Service, Canberra.

Courtice, G. 1972. A taxonomic revision of the *Litoria aurea* complex (Anura: Hylidae). B.Sc. (Hons) Honours Thesis, University of Sydney, Sydney. 48 p.

Courtice G.P. and Grigg, G.C. 1975. A taxonomic revision of the *Litoria aurea* complex (Anura: Hylidae) in southeastern Australia. *Australian Zoologist* 18, 149-163.

Department of Environment and Climate Change (DECC) 2002. *Descriptions for NSW (Mitchell) Landscapes Version 2*. Department of Environment and Climate Change, now Department of Planning and Environment, Sydney.

Department of Planning and Environment (DPE) 2020. NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method. NSW Department of Planning Industry and Environment (now Department of Planning and Environment), Sydney.

Gillespie, G.R., Osborne, W.S. and McElhinney, N.A. 1995. *The conservation status of frogs in the Australian Alps: a review.* A Report to the Australian Alps Liaison Committee.

Hamer, A.J. 2016. Accessible habitat delineated by a highway predicts landscape-scale effects of habitat loss in an amphibian com-munity. Landscape Ecology 31:2259–2274. https://doi.org/10.1007/s10980-016-0398-2

Hamer A.J. 2018. Accessible habitat and wetland structure drive occupancy dynamics of a threatened amphibian across a peri-urban landscape. Landscape and Urban Planning 178: 228-237.

Hamer, A.J. and Mahony, M.J. 2010. Rapid turnover in site occupancy of a pond-breeding frog demonstrates the need for landscape-level management. Wetlands 30: 287-299.

Hamer, A.J., Lane, S.J. and Mahony, M.J. 2002. Management of freshwater wetlands for the endangered green and golden bell frog (*Litoria aurea*): roles of habitat determinants and space. Biological Conservation 106: 413-424.

Hamer, A.J., Lane, S.J. and Mahony, M.J. 2008. Movement patterns of adult green and golden bell frogs *Litoria aurea* and the implications for conservation management. Journal of Herpetology 42: 397– 407.

Heatwole, H., de Bavay, J., Webber, P. and Webb, G. (1995). Faunal survey of New England. IV. The Frogs. Memoirs of the Queensland Museum 38 (1): 229-249.

Hero, J-M., Hines, H., Lemckert, F. and Robertson, P. 2004. *Litoria castanea*. The IUCN Red List of Threatened Species 2004. Viewed on: 5 December 2016. Available on the internet at: http://www.iucnredlist.org/details/12145/

Humphries, R. 1979. *Dynamics of a Breeding Frog Community*. Thesis Submitted for the Degree of Doctor of Philosophy, Australian National University, Canberra.

International Union for Conservation of Nature and Natural Resources (IUCN) (2023). *Litoria castanea* (Yellow-spotted Tree Frog) (iucnredlist.org).

Lemckert, F.L., and Mahony, M.J. 2018. The status of Decline and Conservation of Frogs in Temperate Coastal South-eastern Australia. Pp 59-72 In: *Amphibian Biology Volume 11 - Conservation and Decline of Amphibians: Eastern Hemisphere (Australia, New Zealand and Pacific Islands)*. H. Heatwole and J. Rowley (Eds.). CSIRO Publishing, Melbourne.

Mahony, M. 1999. Review of the declines and disappearances within the bell frog species group (*Litoria aurea* species group) in Australia. In: *Declines and Disappearances of Australian Frogs*. (Ed. A Campbell) pp. 81-93. (Environment Australia: Canberra)

Mahony, M., Hamer, A., Pickett, E., McKenzie, D., Stockwell, M., Garnham, J., Keely, C., Deboo, M., O'Meara, J., Pollard, C., Clulow, S., Lemckert, F., Bower, D., Clulow, J. 2013. Identifying Conservation and Research Priorities in the face of Uncertainty: a review of the threatened bell frog complex In eastern Australia. Herpetological Conservation and Biology 8(3): 519−538.

Mahony, M.J., Lane, S., Hamer, A. and Browne, R. 2000. *Survey for Litoria castanea in the Orange area*. Report prepared for NSW NPWS Western Directorate.

Marsh, D.M., Cosentino, B.J., Jones, K.S., Apodaca, J.J., Beard, K.H., Bell, J.M., Bozarth, C., Carper, D., Charbonnier, J.F., Dantas, A., Forys, E.A., Foster, M., General, J. Genet, K.S., Hanneken, M., Hess, K.R., Hill, S.A., Iqbal, F., Karraker, N.E., Kilpatrick, E.S., Langen, T.A., Langford, J., Lauer, K., McCarthy, A.J., Neale, J., Patel, S., Patton, A., Southwick, C., Stearrett, N., Steijn, N., Tasleem, M., Taylor J.M. and Vonesh, J. 2017. Effects of road and land use on frog distributions across spatial scales and regions in the Eastern and Central United States. Diversity and Distributions. 23(2):158-170. DOI: 10.1111/ddi.12516.

Muir, G. 2008. Design of a movement corridor for the Green and Golden Bell Frog *Litoria aurea* at Sydney Olympic Park. Australian Zoologist 4: 297-302.

NSW National Parks and Wildlife Service (NSW NPWS) 2001. Yellow-spotted Bell Frog (*Litoria castanea*) and Peppered Tree Frog (*Litoria piperata*) recovery plan. National Parks and Wildlife Service, Hurstville, NSW.

NSW National Parks and Wildlife Service (NSW NPWS) 2003. The Bioregions of New South Wales: their biodiversity, conservation and history. NSW National Parks and Wildlife Service, Hurstville.

NSW Scientific Committee 2009. Yellow-spotted Tree Frog (*Litoria castanea*) - critically endangered species listing. NSW Scientific Committee – final determination. NSW Department of Planning and Environment, Sydney.

Office of Environment and Heritage (OEH) 2017. *Biodiversity Assessment Method*. NSW Office of Environment and Heritage, Sydney.

Office of Environment and Heritage (OEH) 2022. Yellow-spotted Tree Frog – Species Profile. https://threatenedspecies.bionet.nsw.gov/profile?id=10486. Accessed 23/02/2024.

Osborne, W.S., Littlejohn, M.J. and Thomson, S.A. 1996. Former distribution and apparent disappearance of the *Litoria aurea* complex from the Southern Tablelands of New South Wales and the Australian Capital Territory. Australian Zoologist 30, 190-198.,

Penman, T.D. 1998. *Natural factors affecting the early life stages of the green and golden bell frog, Litoria aurea: Lesson 1829.* B.Sc. (Hons) thesis, University of New South Wales, Sydney.

Pyke, G.H. and White, A.W. 1996. Habitat requirements for the Green and Golden Bell Frog Litoria aurea (Anura: Hylidae). Aust. Zool. 30: 224-232.

Pyke, G. and White, A. 2001. A review of the biology of the green and golden bell frog Litoria aurea. Australian Zoologist 31: 563–598.

Pyke, G.H., White, A.W., Bishop, P.J. & Waldman, B. 2002. Habitat use by the green and golden bell frog *Litoria aurea* in Australia and New Zealand. Australian Zoologist. 32(1):12–31..

Robinson, M. 1996. *A field guide to frogs of Australia from Port Augusta to Frazer Island including Tasmania*. Reed Books, Australia.

Threatened Species Scientific Committee (2017). *Litoria castanea (Yellow-spotted Tree Frog) Conservation Advice*. Conservation Advice Litoria castanea yellow-spotted tree frog (environment.gov.au)

Thomson, S.A., Littlejohn, M.J., Robinson, W.A. and Osborne, W.S. 1996. Taxonomy of the *Litoria aurea* complex: a re-evaluation of the Southern Tableland populations of the Australian Capital Territory and New South Wales. Australian Zoologist 30(2): 158-69.

Valdez, J.W., Stockwell, M.P., Klop-Toker, K., Clulow, S., Clulow, J., and Mahony, M.J. 2015. Factors driving the distribution of an endangered amphibian toward an industrial landscape in Australia. Biological Conservation 191: 520-528.

Wassens, S., Hall, A. Osbourne, W. and Watts, R.J. 2010. Habitat characteristics predict occupancy patterns of the endangered amphibian *Litoria raniformis* in flow-regulated flood plain wetlands. *Austral Ecology* 35(8): 944–955.

Voros, J., Wassens, S., Price, L., Hunter, D., Myers, S., Armstrong, K., Mahony, M., & Donnellan, S. 2023. Molecular systematic analysis demonstrates that the threatened southern bell frog, *Litoria raniformis* (Anura: Pelodryadidae) of eastern Australia, comprises two sub-species. *Zootaxa*, *5228*(1), 1-43. https://doi.org/10.11646/zootaxa.5228.1.1

White, A. W. & Ehmann, H. (1997a). New England Bell Frog, *Litoria castanea/flavipunctata*. In: *Threatened Frogs of New South Wales: Habitats, Status and Conservation*. (Ed. H Ehmann) pp. 164-169. Frog and Tadpole Study Group of New South Wales, Sydney South.

White, A. W. & Ehmann, H. (1997b). Southern Highlands Bell Frog, *Litoria sp. nov.* In: *Threatened Frogs of New South Wales: Habitats, Status and Conservation*. (Ed. H Ehmann) pp. 170-175. Frog and Tadpole Study Group of New South Wales, Sydney South

White, A.W. and Pyke, G.H. 1999. Past distribution *of Litoria aurea* and *Litoria castanea* in the Bathurst-Orange Area of New South Wales. Herpetofauna 29 (1): 2-9.

7. Appendix A Dr Frank Lemckert CV



Frank Lemckert **PRINCIPAL SCIENTIFIC ECOLOGIST**

Frank has been a professional scientist since 1992, specialising in understanding and managing the ecology and management of threatened species. Frank has conducted ecological work throughout eastern Australia (NSW, Victoria, Queensland), establishing long-term research and monitoring programs into the management of fauna and developing strategies to mitigate the impacts of human disturbances. He has worked extensively with the NSW state and federal Governments on varying issues of fauna and flora management including the preparation of a draft NSW/National recovery plan for the Giant Burrowing Frog (*Heleioporus australiacus*) and recent expert review roles on fauna management plans and monitoring strategies for the NSW Natural Resources Commission. Frank is an accredited expert under the NSW Biodiversity Assessment Method (BAM) for a range of threatened frogs and wrote the BAM survey guidelines for NSW's threatened frogs. Frank has prepared reports on endemism and representation in reserves of flora and fauna for the Commonwealth, represented the NSW Forestry Commission in license negotiations for the Comprehensive Regional Assessment process (2000), been a member of a state regulators advisory group for the management of Cane Toads across Australia and the Taren Point Cane Toad Advisory Group, and provided expert ecological advice on illegal land clearing for the NSW and Commonwealth Governments. He has authored over 90 peer-reviewed publications. Frank is a research associate with the Australian Museum and University of Newcastle and convenor of the NSW Declining Frog Working Group. He is a recognised expert in frog ecology and management, but has completed management related projects and works on a range of terrestrial vertebrate fauna.

Frank's primary role as a consultant has been to use his expertise and experience in technical writing and threatened species legislation to develop and maintain quality assurance in project reporting including:

- Species Impact Statements.
- >100 flora and fauna reports and assessments of significance using the EP&A Act and EPBC Act.
- Biodiversity Assessment Reports for Warragamba Dam Raising, Nowra Bridge, Golden Highway and Eurobodalla Dam.
- Manager for the Oxley Highway to Kempsey and Frederickton to Eungai ecological monitoring program.
- Lead fauna survey design for the HumeLink transmission line project for Snowy Hydro 2.0.
- Complete targeted survey and monitoring works for threatened frog species including Giant Barred Frogs, Wallum Froglets, Green-thighed Frog and Green and Golden Bell Frogs.
- Construction and Environmental Management Plans, Monitoring Plans and Vegetation Management Plans for roads at Port Macquarie, Berry to Bomaderry and South Nowra.
- Nest Box, microbat and Green and Golden Bell Frog management plans for the Berry to Bomaderry and Oxley Highway to Kempsey Highway Upgrades.
- Review of monitoring strategies for the Woolgoolga to Ballina and Warrell Creek to Nambucca Heads programs for the Pacific Highway Upgrade.
- Review of two proposed Coal Seam Gas Impact Assessment methods for Matters of National Environmental Significance (contracted by the Commonwealth Government).
- Provision of species credit species expert reports for the Warragamba Dam raising project and Western Sydney Growth Centres Biocertification.

© ECO LOGICAL AUSTRALIA PTY LTD

- Roadside mapping, survey and management strategies for the Wallum Froglet and Mahony's Toadlet.
- Develop frog and reptile survey guidelines and impact offset guidelines for the Biodiversity Assessment Method.

QUALIFICATIONS

- Bachelor of Science, University of Sydney, 1984 (Terrestrial Ecology and Marine Management)
- Master of Science, University of Sydney, 1991 (Population biology of the Common Froglet)
- PhD, University of Newcastle, 2009 (Management of forest frogs in timber production forests of NSW).

PROJECT EXPERIENCE

ECOLOGICAL IMPACT ASSESSMENT

- MONITORING OF BAT POPULATIONS AND ASSESSMENT OF POTENTIAL IMPACTS OF THE PROPOSED JEREMIAH WINDFARM AT ADJUNGBILLY, NSW (2019-PRESENT).
- MANAGEMENT OF IMPACTS ON GREEN AND GOLDEN BELL FROGS FOR THE KIWEF PROJECT AT KOORAGANG ISLAND, NSW FOR DARACON (2019-PRESENT).
- IMPACT ASSESSMENTS FOR HOUSING DEVELOPMENTS ON KOALAS IN THE CAMPBELLTOWN AREA (PRIVATE DEVELOPMENT AND CAMPBELLTOWN COUNCIL (2019)
- EXPERT REPORT ON THE GREEN AND GOLDEN BELL FROG FOR TWO WESTERN SYDNEY GROWTH AREAS BIOCERTIFICATION PROJECT (2018-PRESENT)
- WARRAGAMBA DAM RAISING PROJECT TARGET SURVEYS, IMPACT ASSESSMENTS, EXPERT REPORTING (SIX SPECIES) AND Q/A FOR WATER NSW (2018-19)
- GRANITE HILLS WINDFARM BIRD AND BAT STRIKE MODELLING AND ECOLOGICAL IMPACT ASSESSMENT, NIMMITABEL, AKUO ENERGY (2018) AND ELYSIAN WINDFARM, NIMMITABEL, AKUO ENERGY (2018)
- VEGETATION REMOVAL AND THREATENED FROG MANAGEMENT STRATEGIES, NEW INTERCITY FLEET MANAGEMENT FACILITY, JOHN HOLLAND GROUP (2018-PRESENT)
- NOWRA BRIDGE EIS ECOLOGICAL ASSESSMENTS, NSW RMS (2018)
- HEATHCOTE ROAD UPGRADE IMPACT ASSESSMENT AND REVIEW OF MITIGATION MEASURES, NSW RMS (2018-2019)
- EUROBODALLA DAM BIODIVERSITY ASSESSMENT REPORT, EUROBODALLA SHIRE COUNCIL (2017-18).

GOVERNMENT REVIEWS/REPORTS

- BIODIVERSITY ASSESSMENT METHOD FROG SURVEY GUIDELINES FOR SPECIES CREDIT SPECIES (2020)
- EXPERT WORKSHOP TO DEVELOP A NSW-WIDE NIL-TENURE FAUNA MONITORING PROGRAM, NSW NATURAL RESOURCES COMMISSION (2020)
- REVIEW OF SPECIES MANAGEMENT PLANS FOR THE YELLOW-BELLIED GLIDER, GIANT BURROWING FROG, EASTERN BRISTLEBIRD AND SOUTHERN BROWN BANDICOOT PREPARED UNDER THE NSW THREATENED SPECIES LICENSE FOR FORESTRY OPERATIONS, NSW NATURAL RESOURCES COMMISSION (2019)
- PROVISION OF INFORMATION AS THE BASIS FOR THE DEVELOPMENT OF SIX THREATENED FLORA SPECIES MANAGEMENT PLANS TO BE PREPARED UNDER THE NSW THREATENED SPECIES LICENSE FOR FORESTRY OPERATIONS, NSW NATURAL RESOURCES COMMISSION (2019)
- EXPERT REVIEW OF BIODIVERSITY IMPACT ASSESSMENT REPORT FOR THE HORNSBY QUARRY REHABILITATION PROJECT (2019)
- HORNSBY COUNCIL EXPERT WITNESS FOR DEVELOPMENT IMPACTS AT DURAL, HORNSBY SHIRE COUNCIL (2016)

- EXPERT ADVICE ON IMPACTS OF ILLEGAL LAND CLEARING AT EVANS HEAD, NSW STATE GOVERNMENT (2016)
- EXPERT ADVICE ON IMPACTS OF ILLEGAL LAND CLEARING AT SOMERSBY, COMMONWEALTH GOVERNMENT (2015)
- REVIEW OF MONITORING STRATEGIES FOR THE WOOLGOOLGA TO BALLINA AND WARRELL CREEK TO NAMBUCCA HEADS PROGRAMS FOR THE PACIFIC HIGHWAY UPGRADE, NSW RMS (2014)
- REVIEW OF IMPACT ASSESSMENT PATHWAYS FOR TWO LPNG PROJECTS, COMMONWEALTH GOVERNMENT (2013)
- REVIEW OF THREATENED SPECIES MODELLING IN FORESTRY AREAS, VIC FORESTS (2012)
- FLORA AND FAUNA REPRESENTATION IN THE AUSTRALIAN RESERVE SYSTEM, COMMONWEALTH GOVERNMENT (2010)
- FLORA AND FAUNA ENDEMISM PATTERNS ACROSS AUSTRALIA, COMMONWEALTH GOVERNMENT (2009)
- REVIEW IMPACTS TO THREATENED REPTILES AND AMPHIBIANS IN THE SOUTHERN BRIGALOW BELT, FOR WPS (2008)
- EXPERT REPRESENTING FORESTS NSW IN THE COMPREHENSIVE REGINAL ASSESSMENT PROGRAM FOR THE REGIONAL FOREST AGREEMENT PROGRAM (1999-2001)
- EXPERT REVIEW OF FAUNA AND FLORA IMPACTS FOR 13 NSW FORESTRY COMMISSION EIS REPORTS (1992-94).

EPBC REFERRALS

- AUSTEN QUARRY (*EUCALYPTUS PULVERULENTA*), HARTLEY, HY-TEC INDUSTRIES (2014-15)
- MARYS MOUNT KOALA (*PHASCOLARCTOS CINEREUS*) REFERRAL, GUNNEDAH QUARRY PRODUCTS (2015)
- GREEN AND GOLDEN BELL FROG (*LITORIA AUREA*) REFERRALS FOR THE PRINCES HIGHWAY UPGRADE AT SOUTH NOWRA, NSW RMS (2011-2012).

MONITORING PROGRAMS

- NIL-TENURE FERAL MANAGEMENT AND MONITORING STRATEGY FOR THE NARRABRI COAL SEAM GAS PROJECT, SANTOS (2019).
- THREATENED FAUNA MONITORING HUME HIGHWAY, KAPOOKA, NSW RMS (2018)
- GREEN AND GOLDEN BELL FROG BASELINE MONITORING PROGRAM AT MEROO LAKES, NSW OEH (2016-17)
- OXLEY HIGHWAY TO KEMPSEY THREATENED BIODIVERSITY MONITORING, NSW RMS (2013-2017)
- FCNSW STATE-WIDE ECOLOGICAL MONITORING PROGRAM, FORESTRY CORPORATION OF NSW (2009-10)

PLANS OF MANAGEMENT / STRATEGIES

- GREEN AND GOLDEN BELL FROG PRE-CLEARING WORKS KOORAGANG ISLAND (DARACON 2016 & CURRENT)
- REVIEW OF SPECIES MANAGEMENT PLANS FOR THE YELLOW-BELLIED GLIDER, GIANT BURROWING FROG, EASTERN BRISTLEBIRD AND SOUTHERN BROWN BANDICOOT PREPARED UNDER THE NSW THREATENED SPECIES LICENSE FOR FORESTRY OPERATIONS, NSW NATURAL RESOURCES COMMISSION (2019)
- PROVISION OF INFORMATION AS THE BASIS FOR THE DEVELOPMENT OF SIX THREATENED FLORA SPECIES MANAGEMENT PLANS TO BE PREPARED UNDER THE NSW THREATENED SPECIES LICENSE FOR FORESTRY OPERATIONS, NSW NATURAL RESOURCES COMMISSION (2019)
- NESTBOX, MICROBAT AND GREEN AND GOLDEN BELL FROG MANAGEMENT PLANS, BERRY TO BOMADERRY UPGRADE OF THE PRINCES HIGHWAY, NSW RMS (2017)
- GREEN AND GOLDEN BELL FROG SURVEYS AND MONITORING, PRINCES HIGHWAY UPGRADES AT SOUTH NOWRA AND BERRY TO BOMADERRY, NSW RMS (2012-2017)
- THREATENED FROG MODELLED HABITAT REQUIREMENTS, HORNSBY SHIRE COUNCIL (2016)
- MICROBAT MANAGEMENT PLAN FOR CLARENCETOWN BRIDGE, NSW RMS (2016)

- EASTERN BENTWING-BAT MANAGEMENT PLAN, GERRINGONG, NSW RMS (2014)
- GREEN AND GOLDEN BELL FROG MANAGEMENT STRATEGY, PRINCES HIGHWAY UPGRADE, NSW RMS (2012-2014)
- EXPERT REVIEW OF THREATENED FROG MANAGEMENT PLAN - WOOLGOOLGA TO BALLINA UPGRADE, NSW RMS (2014)
- THREATENED MICROBAT MANAGEMENT PLAN FOR WARRINGAH MALL, NORTHERN BEACHES COUNCIL (2014)
- COMMONWEALTH/NSW GIANT BURROWING FROG RECOVERY PLAN, DEWHA/DECC (2012)
- NSW DPI REPRESENTATIVE FOR THE NATIONAL ADVISORY GROUP ON CANE TOAD MANAGEMENT (2009-2011)
- TAREN POINT CANE TOAD MANAGEMENT ADVISORY GROUP (2007-2008).

TRAINING

- LEAD INSTRUCTOR > 50 WILDLIFE TRAINING SCHOOLS RUN IN NSW, ACT AND VICTORIA PROVIDING PRESENTATIONS ON THE SURVEY, IDENTIFICATION AND MANAGEMENT OF ALL FLORA AND FAUNA. THIS INCLUDED DETAILED INSTRUCTION ON THE MANAGEMENT OF THREATENED WADING AND AQUATIC BIRDS AND OTHER AQUATIC SPECIES PRESENTED TO QUEENSLAND, VICTORIAN, NSW AND COMMONWEALTH GOVERNMENT STAFF (1993-2017)
- PRIVATE FORESTRY SURVEY REQUIREMENTS, VICTORIAN TIMBER (2016).

PUBLICATIONS

Book Chapters

Hecnar S. J., & Lemckert, F.L. 2012. Habitat Protection: Refuges and Reserves. Pp 3636-3675 In Biology of the Amphibia Volume 10 - Conservation and Decline of Amphibians: Ecology, Effects of Humans, and Management. H. Heatwole (Ed.). Surrey-Beattey and Sons, Sydney.

Lemckert, F.L., & Mahony, M.J. 2018. The status of Decline and Conservation of Frogs in Temperate Coastal South-eastern Australia. Pp 59-72 In Amphibian Biology Volume 11 - Conservation and Decline of Amphibians: Eastern Hemisphere (Australia, New Zealand and Pacific Islands). H. Heatwole and J. Rowley (Eds.). CSIRO Publishing, Melbourne.

Lemckert, F.L., Hecnar S.J., & Pilliod, D.S. 2012. Habitat Destruction and Modification. Pp 3291-3342 In Biology of the Amphibia Volume 10 - Conservation and Decline of Amphibians: Ecology, Effects of Humans, and Management. H. Heatwole (Ed.). Surrey-Beattey and Sons, Sydney.

Lemckert, F.L. & Penman, T. 2012. Climate Change and Australia's frogs: how much do we need to worry? Pp 92-98 In: Wildlife and Climate Change: towards robust conservation strategies for Australian fauna. D. Lunney & P. Hutchings (Eds.). Royal Zoological Society of NSW, Mosman, NSW, Australia.

Hero, J-M, Richards, S, Alford, R., Allison, A., Bishop, P., Gunther, R., Iskandar, D., Kraus, F., Lemckert, F., Menzies, J., Roberts, D. & Tyler, M. 2008. Amphibians of the Australasian Realm. Pp 65-73 In: Threatened Amphibians of the World. S. N. Stuart, M. Hoffman, J. S., Chanson, N. A. Cox, R. J. Berridge, P. J. Ramani & B. E. Young (Eds.). Lynx Edicions, Barcelona.

Green, M., Thompson, M.B. & Lemckert, F.L. 2004. The effects of suspended sediments on the tadpoles of two stream-breeding and forest dwelling frogs, *Mixophyes balbus* and *Heleioporus australiacus*. Pp 713-720 In Conservation of Australia's Forest Fauna, Second Edition. D. Lunney (Ed.). Royal Zoological Society of NSW, Sydney.

Lemckert, F.L. & Slatyer, C. 2004. Herps in forests: schools to educate land managers in their conservation. Pp 1055-1058 In Conservation of Australia's Forest Fauna, Second Edition. D Lunney (Ed.). Royal Zoological Society of NSW, Sydney.

Lemckert, F. & Morse, R. 1999. Frogs in the timber production forests of the Dorrigo escarpment in northern NSW: an inventory of species present and the conservation of threatened species. Pp 72-80 In Declines and Disappearances of Australian Frogs. A. Campbell (Ed.). Environment Australia, Canberra.

Scientific Papers

Mahony, M.J., Penman, T., Bertozzi, T., Lemckert, F., Bilney, R. & Donnellan, S.C. In Review. Taxonomic revision of south-eastern Australian giant burrowing frogs (Anura: Limnodynastidae: Heleioporus Gray). Zootaxa.

Gillespie, G.R., Roberts, J.D., Hunter, D., Hoskin, C.J., Alford, R.A., Heard, G.W., Hines, H. Lemckert, F., Newell, D. & Scheele, B.C. 2020. Status and Priority Conservation Actions for Australian Frog Species. Biological Conservation 247, 108543. https://doi.org/10.1016/j.biocon.2020.108543.

Mahony, M., Moses, B., Mahony, S.V., Lemckert, F.L. & S Donnellan. 2020. A new species of frog in the *Litoria ewingii* species group (Anura: Pelodryadidae) from south-eastern Australia. Zootaxa 4858: 201-230.

Henle, K., Osborne, W., & Lemckert, F. 2014. The herpetofauna of Kioloa, New South Wales: baseline observational data collected 30 years ago and inspired by R. E. Barwick. Australian Journal of Zoology 62:100–107.

Mahony, M.J., Hamer, A.J., Pickett, E.J., McKenzie, D.J., Stockwell, M.P., Garnham, J.I., Keely, C.C., Deboo, M., O'Meara, J., Pollard, C.J., Clulow, S., Lemckert, F.L., Bower, D.S., & Clulow, J. 2013. Identifying conservation and research priorities in the face of uncertainty: a review of the threatened bell frog complex in eastern Australia. Herpetological Conservation and Biology 8:519-538.

Waters, C.M., Penman, T.D., Hacker, R.B., Law, B., Kavanagh, R.P., Lemckert, F. & Alemseged Y. 2013. Balancing trade-offs between biodiversity and production in the re-design of rangeland landscapes. The Rangeland Journal 35:143-154.

Daly, G. and Lemckert, F.L. 2011. Survey of the reptiles and amphibians of the montane forests near Tenterfield on the north coast of New South Wales. Australian Zoologist 35:957-972.

Lemckert, F.L. 2011. Managing pond breeding anurans in the selectively harvested forests of coastal New South Wales, Australia. Forest Ecology and Management 262:1199–1204.

Lemckert, F.L., Penman, T. & Haywood, A. 2011. Adaptive monitoring using the endangered northern corroboree frog (*Pseudophryne pengilleyi*) as a case study. Proceedings of the International Academy of Ecology and Environmental Sciences 1:87-96.

Hamer, R., Lemckert, F.L. & Banks, P.B. 2011. Adult frogs are sensitive to the predation risks of olfactory communication. Biology Letters 7:361-363.

Lemckert, F & Mahony, M.J. 2010. The relationship among multiple-scale habitat variables and pond use by anurans in northern New South Wales, Australia. Herpetological Conservation and Biology 5:537–547.

Lemckert, F.L. 2010. The rich early history of frog research in Sydney. Australian Zoologist 36:102-106.

Lemckert, F. 2010. Habitat relationships and presence of the threatened heath frog *Litoria littlejohni* (Anura: Hylidae) in central New South Wales, Australia. Endangered Species Research 11:271-278.

Lemckert, F. & Grigg, G. 2010. Living in the 80s – seasonality and phenology of frog calling activity at Darkes Forest from 1987-1989. Australian Zoologist 35:245-250.

Lemckert, F., Rosauer D. & Slatyer, C. 2009. A comparison of Australia's anuran records against the reserve system. Biodiversity and Conservation 18:1233-1246.

Penman, T.D., Lemckert, F.L. & Mahony, M.J. 2008. Applied conservation management of a threatened forest dependent frog, *Heleioporus australiacus*. Endangered Species Research 5:45-53.

Penman, T.D, Lemckert, F.L. & Mahony, M.J. 2008. Spatial ecology of the giant burrowing frog (*Heleioporus australiacus*): implications for conservation prescriptions. Australian Journal of Zoology 56:179–186.

Lemckert, F.L. & Mahony, M.J. 2008. Core calling periods of the frogs of temperate New South Wales, Australia. Herpetological Conservation and Biology 3:71-76.

Penman, T. D. & Lemckert F. L. 2008. Monitoring the green and golden bell frog: current problems and an alternative approach. Australian Zoologist 34:373-378.

Penman, T., Mahony, M., Towerton, A. & Lemckert, F. 2007. Spatial models of giant burrowing frog distributions. Endangered Species Research 3:115-124.

Phillot, A.D., Skerratt, L.F., McDonald, K.R., Lemckert, F.L., Hines, H.B., Clarke, J.M., Alford, R.A. & Speare, R. 2007. Toe-clipping as an acceptable method of identifying individual anurans in mark recapture studies. Herpetological Review 38:305-308.

Semeniuk, M., Lemckert, F.L. & Shine, R. 2007. Breeding-site selection by cane toads (*Bufo marinus*) and native frogs in northern New South Wales, Australia. Wildlife Research 34:59-66.

Slatyer, C., Rosauer, D. & Lemckert, F. 2007. An assessment of endemism and species richness patterns in the Australian Anura. Journal of Biogeography 34:583-596.

Hero, J-M., Morrison, C., Gillespie, G., Roberts, J.D., Newell, D., Meyer, E., McDonald, K., Lemckert, F., Mahony, M., Osborne, W., Hines, H., Richards, S., Hoskin, C., Clarke, J., Doak, N. & Shoo, L. 2006. Overview of the conservation status of Australian Frogs. Pacific Conservation Biology 12:313-320.

Lemckert, F., Haywood, A., Brassil, T. & Mahony, M. 2006. Correlations between frogs and pond attributes in central New South Wales, Australia: What makes a good pond? Applied Herpetology 3:67-82.

Lemckert, F., Mahony, M., Brassil, T. & Slatyer, C. 2006. The biology of the threatened Green-thighed Frog *Litoria brevipalmata* (Anura: Hylidae) in the central and mid-north coastal areas of New South Wales. Australian Zoologist 33:337-344.

Lemckert, F., Brassil, T., Kavanagh, R. & Law, B. 2006. Trapping small mammals for research and management: how many die and why? Australian Mammalogy 28:201-208.

Penman, T.D., Lemckert, F.L. & Mahony, M.J. 2006. Meteorological effects on the activity of the giant burrowing frog, *Heleioporus australiacus*, in south-eastern Australia. Wildlife Research 33:35-40.

Penman, T., Lemckert, F. & Mahony, M. 2006. A preliminary investigation into the potential impacts of fire on a forest dependent burrowing frog species. Pacific Conservation Biology 12:78-83.

Penman, T., Lemckert, F., Slade, C. & Mahony, M. 2006. Non-breeding habitat requirements of the giant burrowing frog (*Heleioporus australiacus*) in south-eastern Australia. Australian Zoologist 33:251-257.

Fitzgerald, F., Shine, R., Lemckert, F. & Towerton, A. 2005. Habitat requirements of the threatened snake species *Hoplocephalus stephensii* (Elapidae) in eastern Australia. Austral Ecology 30:465-474.

Lemckert, F.L. 2005. Body size of male common eastern froglets *Crinia signifera* does not appear to influence mating success during explosive breeding events. Acta Zoologica Sinica 51:232-236.

Lemckert, F.L. 2005. Population structure, individual growth and survival of an Australian frog *Crinia signifera* at a pond. Acta Zoologica Sinica 51:393-400.

Penman, T., Mahony, M. & Lemckert, F. 2005. Soil disturbance in integrated logging operations. Applied Herpetology 2:415-424

Penman, T.D., Mahony, M.J., Towerton, A.L. & Lemckert, F.L. 2005. Bioclimatic analysis of disjunct populations of the giant burrowing Frog, *Heleioporus australiacus*. Journal of Biogeography 32:397-405.

Fitzgerald, M., Shine, R. & Lemckert, F. 2004. Life history attributes of a threatened Australian snake *Hoplocephalus stephensii* (Elapidae). Biological Conservation 119:121-128.

Lemckert, F.L. 2004. Variations in anuran movements and habitat use: implications for conservation. Applied Herpetology 1:165-181.

Lemckert, F.L. & Brassil, T. 2004. Movements and habitat use by the giant burrowing frog, *Heleioporus australiacus*. Amphibia-Reptilia 24:207-211.

Lemckert, F.L., Brassil, T. & Haywood, A. 2004. Effects of low intensity fire on pond-breeding anurans in mid-northern New South Wales, Australia. Applied Herpetology 1:183-195.

Penman, T., Lemckert, F. & Mahony, M. 2004. Two hundred and ten years of looking for giant burrowing frog. Australian Zoologist 32:597-604.

Fitzgerald, M., Shine, R. & Lemckert, F. 2003. A reluctant heliotherm: thermal ecology of the arboreal snake *Hoplocephalus stephensii* (Elapidae) in dense forest. Journal of Thermal Biology 28:515-524.

Fitzgerald, M., Shine, R. & Lemckert, F. 2002. Radiotelemetric study of habitat use by the arboreal snake *Hoplocephalus stephensii* (Elapidae) in Eastern Australia. Copeia 2002:321-332.

Fitzgerald, M., Shine, R. & Lemckert, F. 2002. Spatial ecology of arboreal snakes (*Hoplocephalus stephensii*, Elapidae) in an eastern Australian forest. Austral Ecology 27:537-545.

Lemckert, F.L. & Slatyer, C. 2002. Short-term movements and habitat use of the green-thighed frog, *Litoria brevipalmata* (Anura: Hylidae). Australian Zoologist 32:56-61.

Lemckert, F.L. 2001. The influence of micrometeorological factors on the calling activity of the Australian frog *Crinia signifera* (Anura: Myobatrachidae). Australian Zoologist 31:625-631.

Lemckert, F.L. & Brassil, T. 2000. Movements and habitat use of the endangered giant barred river frog, *Mixophyes iteratus*, and the implications for its conservation in timber production forests. Biological Conservation 96:177-184.

Lemckert, F.L. 1999. Impacts of selective logging on frogs in a forested area of northern New South Wales. Biological Conservation 89:321-328.

Lemckert, F.L. 1998. A Survey for threatened herpetofauna of the south-west slopes of New South Wales. Australian Zoologist 30:492-500.

Goldingay, R., Daly, G. & Lemckert, F. 1996. Assessing the impacts of logging on reptiles and frogs in the montane forests of southern New South Wales. Wildlife Research 23:495-510.

Lemckert, F.L. 1996. Surveys for the green and golden bell frog, *Litoria aurea*, by the State Forests of New South Wales. Australian Zoologist 30:208-213.

Lemckert, F.L. 1996. Effects of toe-clipping on the survival and behaviour of the Australian frog *Crinia signifera*. Amphibia:Reptilia 17:287-290.

Lemckert, F.L. & Shine, R. 1992. Costs of reproduction in a population of the frog *Crinia signifera* (Anura: Myobatrachidae) from southeastern Australia. Journal of Herpetology 27:420-425.

Shorter Communications

Hero, J-M., Gillespie, G., Roberston, P., Lemckert, F. & Littlejohni, M. 2008. *Pseudophryne pengilleyi*. Pp 464 In: Threatened Amphibians of the World. S. N. Stuart, M. Hoffman, J. S., Chanson, N. A. Cox, R. J. Berridge, P. J. Ramani & B. E. Young (Eds). Lynx Edicions, Barcelona, Spain.

Lemckert, F. & Shoulder, J. 2007. The diets of three sympatric barred river frogs (Anura: Myobatrachidae) from southeastern Australia. Herpetological Review 38:152-154.

Lemckert, F.L., Brassil, T.E. & Towerton, A. 2005. Native vegetation corridors in exotic pine plantations provide long-term habitat for frogs. Ecological Management and Restoration 6:132-134.

Penman, T., Lemckert, F. and Mahony, M. 2005. A cost-benefit analysis of automated call recorders. Applied Herpetology 2:389-400.

Lemckert F. 2004. The biology and conservation status of the heath frog (*Litoria littlejohni*). Herpetofauna 34:99-104.

Lemckert, F.L. 2000. Observations on the effects of fire on the Hip-pocket Frog, *Assa darlingtoni*. Herpetofauna 30:51-52.

Lemckert, F.L., Brassil, T. & McCray, K. 1998. Recent records of the giant burrowing frog (*Heleioporus australiacus*) from the far south coast of NSW. Herpetofauna 28:32-39.

Lemckert, F., Potter, M., Smith, B. & Bruest, T. (1997). Recent records of the southern barred frog (*Mixophyes balbus*) from the south coast of NSW. Herpetofauna 27:60-62.

Unpublished reports

Lemckert, F. and Brassil, T. 2009. Focusing on the Landscape Biodiversity in Australia's National Reserve System Part A: Fauna. A Report for Caring for Our Country through the Australian Biological Resources Study. Available at http://www.bushblitz.org.au/reports.php.

Lemckert, F. and Brassil, T. 2009. Focusing on the Landscape Biodiversity in Australia's National Reserve System Part B: Flora. A Report for Caring for Our Country through the Australian Biological Resources Study. Available at http://www.bushblitz.org.au/reports.php.

Kavanagh, R., Law, B., Lemckert, F., Stanton, M., Chidel, M., Brassil, T., Towerton, A. and Penman, T. 2010. Conservation value of eucalypt plantations established for wood production and multiple environmental benefits in agricultural landscapes. Final Report for NAP/NHT2 Eucalypt Plantations project, SLA 0013 R3 NAP, NSW Industry and Investment. http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/326847/Kavanagh_Eucalypt-Plantations_Final-Report_vlow_res.pdf

Kavanagh, R., Law, B., Lemckert, F., Stanton, M., Chidel, M., Brassil, T., Towerton, A. & Herring, M. 2004. Biodiversity in eucalypt plantings established to reduce salinity. Report to the Joint Venture Agroforestry Program, RIRDC/Land and Water Australia/FWPRDC/MDBC, Canberra. Published as RIRDC Report No. 05/165. http://www.rirdc.gov.au/reports/AFT/05-165.pdf

Kavanagh, R.P., Law, B., Lemckert, F., Stanton, M., Chidel, M., Towerton, A., 2001. Birds, mammals, reptiles and amphibians in eucalypt plantations near Albury-Wodonga: a pilot study of variables influencing biodiversity. State Forests of New South Wales. Pennant Hills, Sydney.

Lemckert, F.L. 1994. Report on the Wallum Froglet (*Crinia tinnula*) in the Bulahdelah Management Area. Report for Bulahdelah District, State Forests of NSW.

Lemckert, F.L. 1997. Survey report for the red-crowned toadlet at Allambie Heights, NSW. Unpublished report for the CSIRO.

Lemckert, F.L. 1998. Survey report for the green and golden bell frog at Badgerys Creek, NSW. Unpublished report for Umwelt Pty. Ltd.

Lemckert, F.L., M. Mahony, and C. Slatyer. 1997. Biological Study of the Green-thighed Frog in the Bulahdelah Region. Report to the RTA and NSW NPWS.

Lemckert, F.L., J. Shields & E. Kemmerer. 1993. Fauna report on the flora and fauna survey for the proposed Kaluru Seed Orchard. Report for Softwoods region, State Forests of New South Wales.

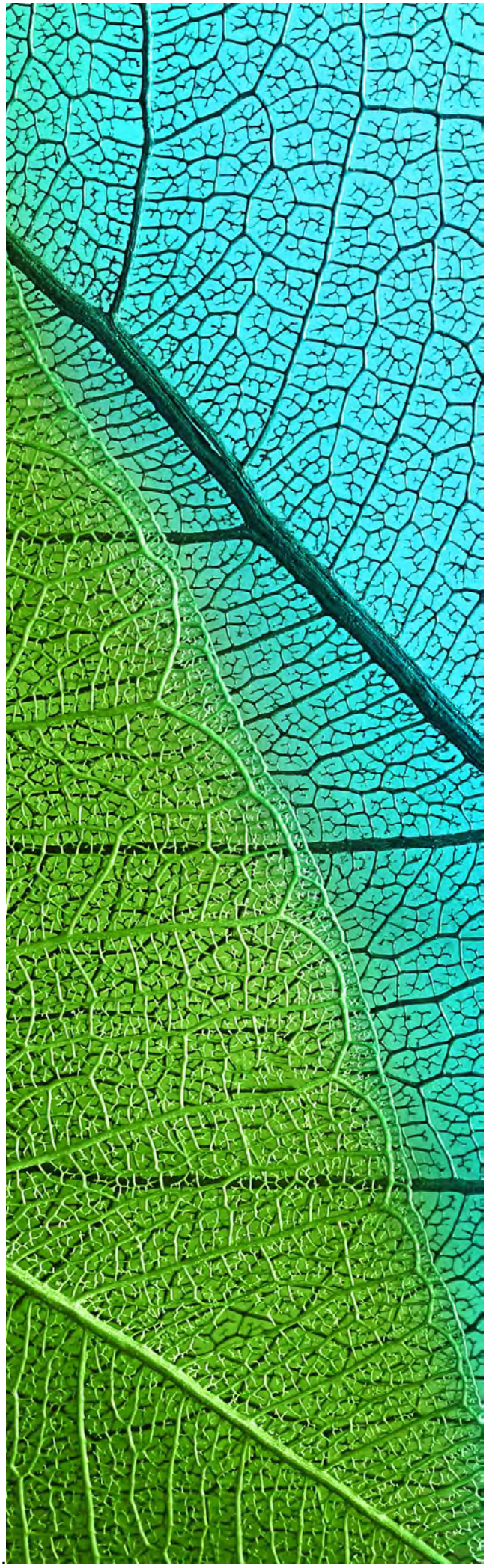
Penman, T. D. and Lemckert, F. L. 2010. Predicted impact of climate change on threatened amphibians. Unpublished report to the Department of the Environment, Climate Change and Water, Hurstville.



eco logical AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

APPENDIX F BIRD UTILISATION AND RAPTOR SURVEYS 2020 – 2022 (NATURE ADVISORY, 2022)



Winterbourne Wind Farm

Bird Utilisation and Raptor Surveys 2020 - 2022

Prepared for NGH consulting

February 2022
Report No. 19180.02 (1.3)

Nature Advisory
(Formerly Brett Lane & Associates Pty Ltd)
5/61-63 Camberwell Road
Hawthorn East, VIC 3123
PO Box 337, Camberwell VIC 3124
(03) 9815 2111
www.natureadvisory.com.au

Contents

1. Introduction 1
2. Bird Utilisation Survey 2
2.1. Methods 2
2.1.1. Fixed-point bird count method 2
2.1.2. Timing of bird surveys 2
2.1.3. Locations of survey points 4
2.1.4. Incidental observations 5
2.1.5. Data preparation and statistical analysis 7
2.1.6. Limitations 7
2.2. Results 7
2.2.1. Survey suitability 7
2.2.2. Species composition 8
2.2.3. Flight height 16
2.2.4. Raptors 17
2.2.5. Waterbirds 18
2.2.6. Threatened Species 18
3. Raptor Survey 21
3.1. Methods 21
3.2. Results 21
4. Conclusions 35
5. References 36

Tables

Table 1: Fixed-point count schedule for each fixed-point bird count survey day (Oct 2020, Mar-Apr 2021, Jan 2022)..... 3

Table 2: Habitat associated with each BUS point at Winterbourne Wind Farm..... 5

Table 3: Summary of the diversity, numbers and height distribution of bird at the impact survey points recorded during three seasons at WWF. 10

Table 4: Summary of the diversity, numbers and height distribution of bird at the reference survey points recorded during three seasons at WWF 14

Table 5: Summary of number of birds recorded at the three flight heights at WWF 16

Table 6: The five most abundant species flying at RSA height at WWF.....17

Table 7: Raptor and waterbird species recorded at impact points during spring, autumn and summer BUS at WWF 18

Figures

Figure 1: Location of bird utilisation survey points at WWF 6

Figure 2: The cumulative number of species of birds recorded during consecutive counts of the Spring (upper), autumn (middle) and summer (lower) BUS at WWF..... 7

Figure 3: The number of birds recorded at three heights (data from table 5) at WWF 16

Figure 4: Location of threatened birds recorded in the study area 20

Figure 5: Raptor flight paths at the proposed Winterbourne Wind Farm 23

Appendices

Appendix 1: Raw data for BUS spring 2020 survey impact points (BUS1-4) at WWF 37

Appendix 2: Raw data for BUS autumn 2021 survey impact points (BUS2-5) at WWF.....40

Appendix 3: Raw data for BUS spring 2020 and autumn 2021 at reference points at WWF.....42

Appendix 4: Raw data for BUS summer 2022 survey impact points (BUS2-5) at WWF.....43

Appendix 5: Raw data for BUS summer 2022 at reference points at WWF.....47

Appendix 6: Raw data for the raptor surveys 48

1. Introduction

NGH Consultants Pty Ltd engaged Nature Advisory Pty Ltd to implement bird and bat surveys for the Winterbourne Wind Farm, 30km east of Walcha in the northern tablelands of NSW. This investigation was commissioned to provide baseline data on the utilisation by birds and bats of the wind farm site. This report presents the methods, results and findings of the bird utilisation and raptor surveys. The results of the bat surveys are presented in another report.

The bird utilisation survey (BUS) was undertaken consistent with the requirements for a "Level One" bird risk assessment in accordance with 'Wind Farms and Birds - Interim Standards for Risk Assessment' issued by the Australian Wind Energy Association (AusWEA 2005) and endorsed by the Clean Energy Council's Best Practice Guidelines for Wind Energy Developments in Australia (2018).

The raptor surveys were undertaken consistent with the requirements of the NSW Office of Environment and Heritage. All observed raptors were recorded and flight paths plotted.

Three pre-construction bird utilisation and raptor surveys were undertaken by experienced zoologists in spring 2020, autumn 2021 and summer 2022 to account for seasonal differences in bird activity and presence of species (due to migration). The dates and surveyors are detailed below.

- **Spring:** October 2020 (Dr Ahmad Barati and Candice Larkin)
- **Autumn:** March and April 2021 (Candice Larkin)
- **Summer**: January 2022 (Dr Ahmad Barati and Peter Lansley).

This report is divided into the following sections.

Section 2 describes the methods used and presents results for the bird utilisation survey

Section 3 describes the methods used and presents the results for the raptor survey

Section 4 provides conclusions in relation to bird activity and observed species of concern.

This investigation was undertaken by a team from Nature Advisory comprising Ahmad Barati (Zoologist), Candice Larkin (Zoologist), Peter Lansley (Senior Zoologist), Curtis Doughty (Senior Zoologist), Bernard O'Callaghan (Project Manager) and Brett Lane (Principal Consultant).

2. Bird Utilisation Survey

2.1. Methods

2.1.1. Fixed-point bird count method

The fixed-point bird count method involved an observer stationed at a survey point for 15 minutes. The adequacy of using 15 minutes as an interval to record the presence of birds during bird utilisation surveys was investigated in an earlier study at another wind farm site (Brett Lane & Associates Pty Ltd, unpublished data). This showed that 82 to 100 percent (average 88 percent) of species actually seen in one hour of surveying were seen in the initial 15 minutes of observation. Based on this result, the period of 15 minutes used in the formal bird utilisation surveys was considered adequate to generate representative data on the bird species in the area during the survey.

During this period of observation, all bird species and numbers of individual birds observed within 200 metres were recorded. The species, the number of birds and the height of the bird when first observed were documented. For species of concern (threatened species, waterbirds and raptors), the minimum and maximum heights were recorded.

Flight height was recorded in 10 metre intervals up to 60 metres, 20 metre intervals up to 120 metres then as 'above 120 metres'. The data are presented as below, at or above rotor swept area (RSA) height.

For Winterbourne Wind Farm (hereafter WWF) these heights are detailed below:

- A = Below RSA (< 40 metres above ground)
- B = At RSA (40 – 150 metres above ground)
- C = Above RSA (> 150 metres above ground).

2.1.2. Timing of bird surveys

The location of Bus points is shown in Figure 1. Table 1 and Table 2 indicate when each point was counted on each survey day. This schedule ensured that all points were visited equally during four different times of day to allow for time-of-day differences in bird movements and activity. The periods were:

- Before 10.00am;
- 10.00am to 12.30pm;
- 12.30 pm to 2.30 pm; and
- After 2.30 pm.

Every survey point (impact and reference) was visited eight times over the survey period

The bird utilisation surveys were undertaken during eight days in October 2020, six days in March-April 2021 and 5 days in January 2022 (Table 1). The timing included suitable periods for surveying birds. The spring survey gathering data on species richness during the breeding season and when spring/ summer migrants visit the wind farm area. The autumn survey covered a period when bird populations are usually at their maximum abundance following summer recruitment.

This schedule ensured that all points were visited at all times of day equally in both seasons, so that no time-of-day or seasonal biases affected the pooled count data.

Table 1: Fixed-point count schedule for each fixed-point bird count survey day (Oct 2020, Mar-Apr 2021, Jan 2022)

	Time/ date	5-Oct	6-Oct	10-Oct-	11-Oct	13-Oct	14-Oct	15 Oct-	16-Oct
Spring 20	8:00				REF1		BUS5	BUS5	
	8:30	BUS3	BUS1	REF1	BUS4	BUS8	BUS6	BUS6	
	9:00	BUS1	BUS3	BUS4		RF2	RF2		
	9:30		BUS2	BUS2		BUS7	BUS8	BUS7	
	10:00				BUS1			BUS8	BUS5
	10:30	BUS4	BUS4	BUS3	BUS2		BUS7	RF2	BUS6
	11:00	REF1	REF1	BUS1			BUS8	BUS7	
	11:30			BUS2	BUS3	BUS5	RF2	BUS6	
	12:00		REF1	BUS1	BUS3				
	12:30		BUS4		BUS1	BUS6	BUS5	BUS5	
	13:00			REF1	BUS2	RF2		BUS8	
	13:30			BUS4		BUS8	BUS7		
	14:00	BUS2	BUS3			BUS7	RF2	BUS6	
	14:30			BUS3	BUS2	RF2	BUS7	BUS5	
	15:00	REF1	BUS1			BUS8	BUS8	BUS6	
	15:30			BUS2			RF2	BUS5	
	16:00	BUS1	BUS3		REF1		BUS7	BUS6	
	16:30			BUS4	BUS4				
Autumn 21	Time/ date	8-Mar-	2-Apr	6-Apr	8-Apr	20-Apr	22-Apr		
	7:30					BUS6			
	8:00		RF2	BUS7	BUS3	RF1			
	8:30		BUS8	BUS9	BUS2	BUS4, RF1	BUS3		
	9:00		BUS9	BUS8	BUS6	BUS5	BUS5		
	9:30		BUS7	RF2		BUS4	BUS2		
	10:00			BUS6	BUS4, RF1	BUS3			
	10:30		BUS2	BUS8	BUS4	BUS5	BUS9		
	11:00		BUS6	BUS9	RF1	BUS3	BUS7		
	11:30	BUS2	RF2	BUS7, BUS8	BUS5				
	12:00		BUS8	RF2	BUS6	RF1			
	12:30	BUS4	RF2	BUS9	BUS2	BUS5	BUS4		
	13:00		BUS7	BUS7					
	13:30		BUS2	BUS9, BUS8		BUS3	RF1, BUS3		
	14:00		BUS6			BUS5			
	14:30	BUS3	RF1		BUS8, RF2	BUS4, BUS6	BUS5		
	15:00		BUS6		BUS7				
	15:30				BUS9	BUS2	BUS3		

	16:00				BUS7, BUS9	BUS5, BUS4			
	16:30				BUS8	RF1			
	17:00				RF2	BUS2			
Summer 22	Time/ Date	3-Jan	4-Jan	5-Jan	6-Jan	7-Jan			
	6:30					BUS 8			
	7:00				BUS2	REF2			
	7:30			BUS3	BUS 7				
	8:00			BUS 13	REF1	BUS 13			
	8:30			REF 2/REF1	BUS 8/BUS4	BUS2			
	9:00			BUS 12		BUS 7			
	9:30		BUS3	BUS4	BUS12/ BUS5	BUS5			
	10:00		BUS 7	BUS 8/BUS3	REF2/R EF1				
	10:30	BUS 8				BUS 12			
	11:00	BUS2	REF1	BUS5	BUS 13/BUS 5	BUS4			
	11:30	BUS2	BUS 13	BUS 7	BUS 12				
	12:00		REF 2/BUS4						
	12:30		BUS 12	BUS13/ BUS3		BUS 8			
	13:00	BUS 7/REF1		REF2/B US2					
	13:30	REF1	BUS8/B US5		BUS 8	BUS7/B US2			
	14:00	BUS4		BUS12/ BUS5	REF 2	BUS3			
	14:30	REF2/B US4	BUS 13			BUS3			
	15:00		REF2/B US2	REF1					
	15:30		BUS 12	BUS4		BUS3			
	16:00	BUS12/ BUS5	BUS3	BUS 7					
	16:30	BUS5	BUS 8	REF1		BUS2			
	17:00	BUS 13			BUS 13	BUS4			
	17:30		BUS 7						

Note: See Figure 1 for survey point locations. The prefix 'RF' refers to reference points and BUS to impact points. See below for explanation of changes in points.

2.1.3. Locations of survey points

Ten fixed survey points were established: eight impact points and two reference points. Impact points were located near proposed turbine sites and reference points were located at least 500 metres away from proposed turbine sites in areas of similar habitat (see Figure 1). In autumn 2021, BUS 1 was replaced by a new BUS 9 point and in summer 2022, BUS 1 and BUS 9 were abandoned and replaced

by BUS 12 and BUS 13. The changes in some of the BUS points was necessitated by change in the basic layout of the turbines and weather-related access constraints.

The survey points were distributed as evenly as possible (subject to access constraints) across the wind farm to sample the various habitat types and maximise coverage in areas where wind turbines are proposed (Figure 1). Impact points were positioned on elevated ground, allowing a clear view in all directions. Table 2 below provides a description of the habitats associated with each impact and reference point.

Table 2: Habitat associated with each BUS point at Winterbourne Wind Farm

Survey Point	Habitat Description
BUS1	Located on the top of the ridge, scattered stringybark with grass understory.
BUS2	Sheep pasture with a few paddock trees, and one riparian strip close by.
BUS3	Scrappy stringybark timbered ridge adjacent to pasture.
BUS4	Stringybark grassland ridge.
BUS5	Sheep pasture with few, small scattered trees, approximately 500m away from woodland patch.
BUS6	Dirt road on side of sloped wooded paddock, with some shrub ground cover.
BUS7	Mid-slope pasture surrounded by open woodland with mature New England Peppermint (*Eucalyptus nova-anglica*) and Blakely's Red Gum - adjacent to large ridge.
BUS8	Pasture surrounded by open woodland with mature New England Peppermint and small tree ferns.
BUS9	Top of ridge in cleared grassland paddock.
BUS12	Cleared mixed native and exotic pasture on a saddle between two hills, scattered paddock eucalypts and some bracken and little or no shrub cover with few fallen branches.
BU13	Ridge line, with cleared pasture, mostly exotic grass and forest block close by to the south-east and degraded understorey.
Ref1	Stringybark grassland gully with stream.
Ref2	Open paddock near roadside with scattered mature New England Peppermint and stringy bark.

2.1.4. Incidental observations

In addition to the observations during fixed-point counts, incidental observations of birds of concern (threatened species, raptors, waterbirds) were made whilst travelling throughout the wind farm site. Notes are also made on woodland birds observed in remnant woodlands and any early morning and evening roosting movements. Emphasis was placed on observing birds that were moving through the site at RSA height.

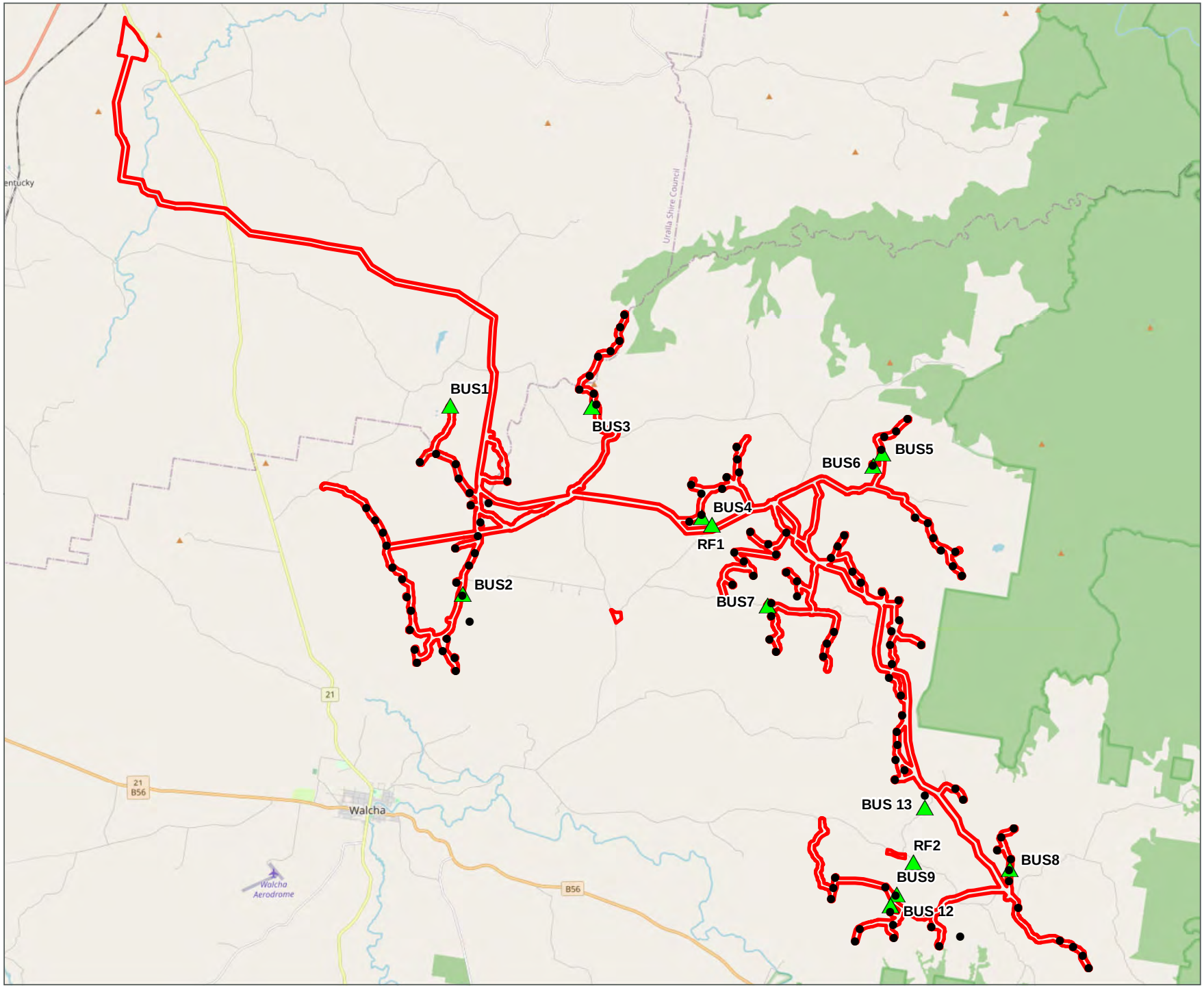


Figure 1: Location of bird utilisation survey sites at WWF

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 17/01/2022

- Winterbourne wind farm boundary
- Proposed turbine
- BUS points

N

Metres
0 2,000 4,000

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

2.1.5. Data preparation and statistical analysis

All observations were recorded in pre-defined data sheets. Raw data were then entered into an Excel spreadsheet, and tables and graphs were extracted. Graphs were generated in Microsoft Excel and R (R Core Team 2018). First, the suitability of the survey method was checked using a cumulative species number graph (Figure 2). Frequency of observation of each species (i.e. the number of surveys in which a species was detected) was determined for impact and reference points separately. The distribution of individuals in height categories was calculated as a percentage for impact and reference points. To investigate the variations of species diversity and abundance between impact and reference points, analysis of variance (ANOVA) was performed, with number of species (termed 'species diversity' here) and abundance as dependent factors and points type (impact/reference) as the predicting parameter. Abundance data were log-transferred to meet normal distribution in ANOVA tests. All statistical analyses were undertaken in R environment (R Core Team 2018).

2.1.6. Limitations

The purpose of the surveys was to collect data on the usage of the site by resident and migratory birds. For these reasons, the utilisation rates and species relative abundances recorded during the current surveys are representative of the site for the period covered as they take into consideration time-of-day and seasonal differences in bird activity and species occurrence. They are therefore considered to provide a valid basis on which to assess the bird risks associated with the WWF.

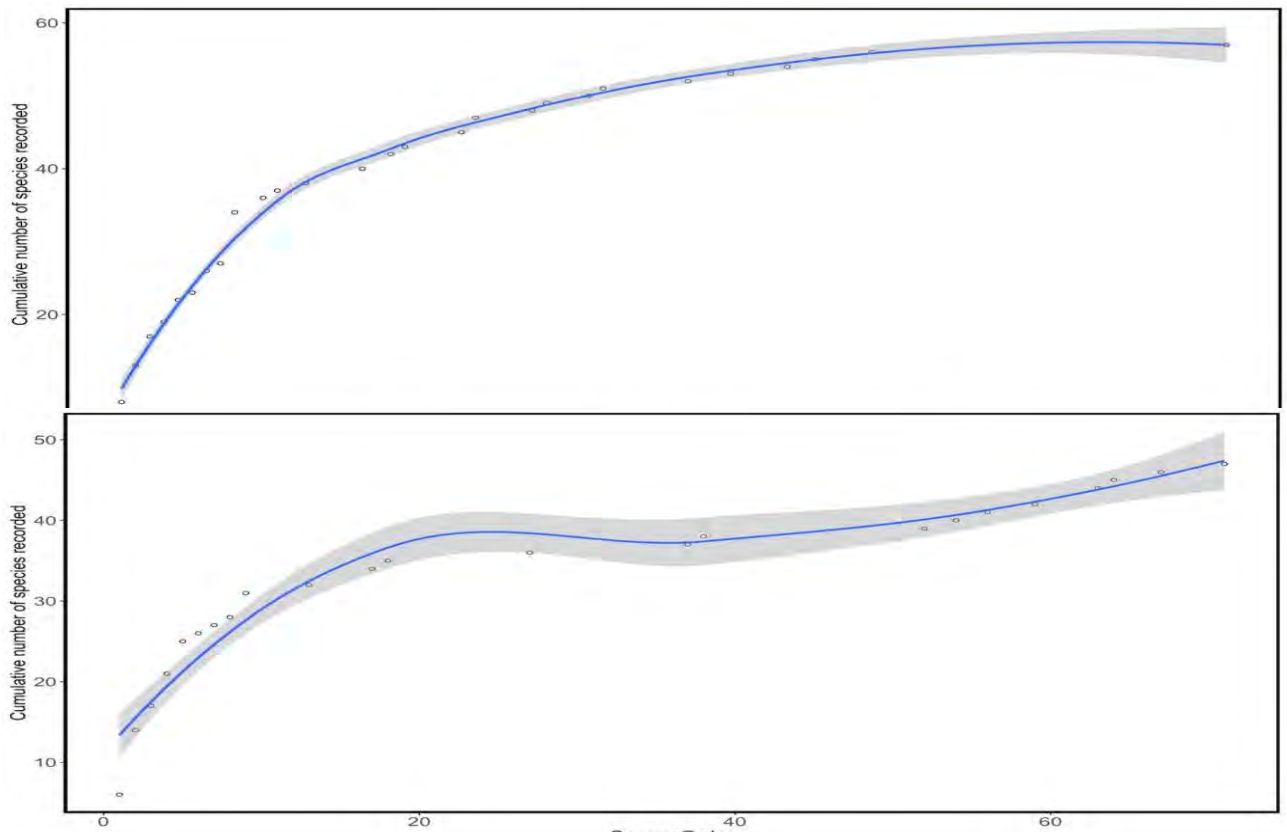
2.2. Results

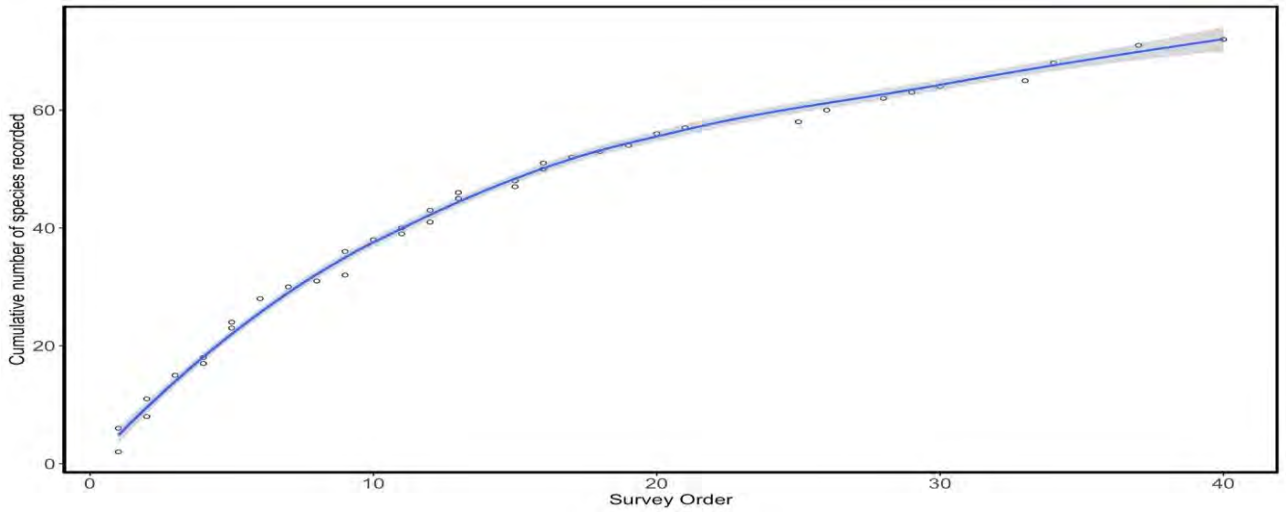
2.2.1. Survey suitability

The cumulative number of species observed from the consecutive fixed-point bird counts conducted at the observation points during the BUS are plotted in Figure 2.

The cumulative species–count sequence curve shows a clear asymptote for the three surveying periods, suggesting that the number of new species added to the diversity levelled off after around 50 counts in the spring and summer BUS and about 30 counts in the autumn BUS, with only a few species added afterwards. This supports the adequacy of using eight replicates to generate representative data on the bird species in the area during the survey period.

Figure 2: The cumulative number of species of birds recorded during consecutive counts of the Spring (upper), autumn (middle) and summer (lower) BUS at WWF





2.2.2. *Species composition*

The number of bird species recorded during BUS was over 90 species. A total 65 bird species were recorded during the spring 2020 and autumn 2021 surveys, and a total of 72 bird species were recorded during the summer 2022 survey. Of all species recorded, 64 species were recorded at the impact points and 35 at the reference points during spring and autumn and 67 and 29 birds respectively at the impact and reference points in summer 2022 (Table 3).

Species recorded were predominantly farmland and bushland species with some records of raptors and waterbirds. Total utilisation (cumulative counts) of each species recorded at the observation point is presented in Table 3 for the impact sites and Table 4 for the reference sites.

Species diversity varied between the three seasons. Diversity was highest in summer and lowest in autumn. Species composition (diversity) differs between months due to seasonal changes in presence and abundance of migratory species, changes in foraging behaviour and seasonal distribution of birds among various habitats.

The five most common species (percent of total birds recorded during the three seasons) at the impact and reference points are presented below.

Impact points	Reference points
1. Australian Magpie (12.5%),	Eastern Rosella (16.3%),
2. Torresian Crow (8.9%),	Torresian Crow (14.5%),
3. Yellow-rumped Thornbill (8,3%),	Noisy Miner (13,2%),
4. Eastern Rosella (7.0%),	Australian Magpie (10.5%),
5. Superb Fairywren (5.8%),	Galah (8.8%).

These five species comprised 42.5% of all birds recorded at the impact points and 63.3% at the reference points. On seasonal basis, the same species were also the dominant forms at the impact and reference points, however, other species such as Galah, Noisy Miner and Common Staling were part of the dominant five in certain seasons.

The number of species, their abundance and flight heights are summarized for each of the three seasons of the survey in Table 3 for the impact sites, and in Table 4 for the reference sites. More details of each observation point at each of the three seasons are detailed in appendix 1 – 5.

Diversity (i.e., number of species recorded per site) varied between the observation points, and was influenced mainly by surrounding habitat, and number of species was usually higher at points surrounded by remnant woodland vegetation, with lower species richness occurring at grazed, open, agricultural land.

Species also differed in terms of their seasonal abundance (i.e., total number of individuals) at both impact (Table 3) and reference points (Table 4). Bird numbers also differed between each of the observation points, but generally there were no indication that the difference was significant and birds, were almost homogenously distributed between the observation points.

Generally, bird abundance was lower in the summer survey compared with both spring and autumn, however, diversity was in reverse, as it was much higher in summer compared to spring and autumn (Table 3).

The pattern of bird numbers and diversity at the reference points was like that of the impact points with the same bird species dominating the counts (Table 4).

Table 3: Summary of the diversity, numbers and height distribution of bird at the impact survey points recorded during three seasons at WWF.

Species	spring 20				autumn 21				Summer 22				Grand Total				% Imp.
	A	B	C	Tot	A	B	C	Tot	A	B	C	Tot.	A	B	C	Tot.	
Australian Magpie	134			134	213			213	100	2		102	447	2		449	12.4
Torresian Crow	109			109	205	2		207	3			3	317	2		319	8.8
Yellow-rumped Thornbill	183			183	53			53	63			63	299			299	8.3
Eastern Rosella	90			90	108			108	55			55	253			253	7
Superb Fairy-wren	115			115	59			59	35			35	209			209	5.8
Noisy Miner	54			54	95			95	54			54	203			203	5.6
Galah	74			74	103	3		106	18			18	195	3		198	5.5
Striated Pardalote	98			98	16			16	32			32	146			146	4
Wedge-tailed Eagle	10	31		41	13	51		64		1	27	28	23	83	27	133	3.7
Common Starling					2			2	80			80	82			82	2.3
Crimson Rosella	22			22	36			36	22			22	80			80	2.2
White-throated Treecreeper	29			29	22			22	27			27	78			78	2.2
Red-rumped Parrot	8			8	60			60	8			8	76			76	2.1
Australian Wood Duck	4			4	58			58	7			7	69			69	1.9
Grey Butcherbird	28			28	17			17	10			10	55			55	1.5
Red Wattlebird	5			5	30			30	16			16	51			51	1.4
White-winged Chough	5			5	13			13	30			30	48			48	1.3
Willie Wagtail	18			18	11			11	18			18	47			47	1.3
Black-faced Cuckoo-shrike	24			24	5			5	14			14	43			43	1.2
Varied Sitella	3			3	23			23	17			17	43			43	1.2
Sulphur-crested Cockatoo	16			16	3			3	17	5		22	36	5		41	1.1
Little Corella	14			14					26			26	40			40	1.1
Pied Currawong	21			21	11			11	4	1		5	36	1		37	1
Noisy Friarbird	24			24	2			2	6			6	32			32	0.9
Nankeen Kestrel	10	3		13	6	1		7	2	6		8	18	10		28	0.8

Species	spring 20				autumn 21				Summer 22				Grand Total				% Imp.
	A	B	C	Tot	A	B	C	Tot	A	B	C	Tot.	A	B	C	Tot.	
Welcome Swallow	2			2	6			6	20			20	28			28	0.8
Laughing Kookaburra	7			7	12			12	7			7	26			26	0.7
Rufous Whistler	12			12	2			2	10			10	24			24	0.7
Striated Thornbill					9			9	15			15	24			24	0.7
Australian Raven	6	3		9					4	8		12	10	11		21	0.6
Dusky Woodswallow									21			21	21			21	0.6
Black-chinned Honeyeater	19			19									19			19	0.5
Rainbow Lorikeet					17			17	2			2	19			19	0.5
White-browed Scrubwren	14			14	2			2	2			2	18			18	0.5
Yellow-faced Honeyeater									17			17	17			17	0.5
Brown-headed Honeyeater									16			16	16			16	0.4
Grey Fantail					6			6	10			10	16			16	0.4
Weebill	16			16									16			16	0.4
Fuscous Honeyeater	14			14					1			1	15			15	0.4
Straw-necked Ibis	14			14									14			14	0.4
Tree Martin	5			5	4			4	5			5	14			14	0.4
Buff-rumped Thornbill									13			13	13			13	0.4
Masked Lapwing	4			4	7			7	2			2	13			13	0.4
Eastern Spinebill									12			12	12			12	0.3
Yellow Thornbill									12			12	12			12	0.3
Australasian Pipit					4			4	7			7	11			11	0.3
Brown Falcon	3			3	2	1		3	1	4		5	6	5		11	0.3
Forest Raven									10	1		11	10	1		11	0.3
White-throated Gerygone	9			9	2			2					11			11	0.3
Magpie-lark	6			6					4			4	10			10	0.3
Australian King Parrot	9			9									9			9	0.2

Species	spring 20				autumn 21				Summer 22				Grand Total				% Imp.
	A	B	C	Tot	A	B	C	Tot	A	B	C	Tot.	A	B	C	Tot.	
Diamond Firetail									9			9	9			9	0.2
Grey Shrike-thrush	8			8	1			1					9			9	0.2
Pied Butcherbird	2			2					6			6	8			8	0.2
Stubble Quail									8			8	8			8	0.2
Leaden Flycatcher	7			7									7			7	0.2
Little Raven									7			7	7			7	0.2
Restless Flycatcher	5			5	2			2					7			7	0.2
Rufous Songlark	2			2					5			5	7			7	0.2
Olive-backed Oriole	4			4	2			2					6			6	0.2
Crested Pigeon	2			2	2			2	1			1	5			5	0.1
Brown Honeyeater									4			4	4			4	0.1
Fairy Martin									4			4	4			4	0.1
Fan-tailed Cuckoo									4			4	4			4	0.1
Little Friarbird	4			4									4			4	0.1
Speckled Warbler					4			4					4			4	0.1
Pallid Cuckoo									3			3	3			3	0.1
Yellow-tailed Black Cockatoo	3			3					0				3			3	0.1
Australian Ibis									2			2	2			2	0.1
Black-shouldered Kite	1			1		1		1					1	1		2	0.1
Brown Goshawk	1			1					1			1	2			2	0.1
Eastern Yellow Robin	2			2									2			2	0.1
Glossy Black Cockatoo					2			2					2			2	0.1
Musk Lorikeet									2			2	2			2	0.1
Spotted Pardalote	2			2									2			2	0.1
White-eared Honeyeater									2			2	2			2	0.1
White-naped Honeyeater									2			2	2			2	0.1

Species	spring 20				autumn 21				Summer 22				Grand Total				% Imp.
	A	B	C	Tot	A	B	C	Tot	A	B	C	Tot.	A	B	C	Tot.	
Australasian Darter		1		1										1		1	0.0
Brown Quail									1			1	1			1	0.0
Jacky Winter	1			1									1			1	0.0
Little Lorikeet									1			1	1			1	0.0
Mistletoebird									1			1	1			1	0.0
Olive-backed Oriole					1			1					1			1	0.0
Pacific Black Duck									1			1	1			1	0.0
Whistling Kite		1		1										1		1	0.0
Grand Total	1282	38	0	1320	1251	59	0	1310	923	29	27	979	3456	126	27	3609	100

Notes: A = below (<40m); B = at (40-150 m); C = over (.150m) RSA heights; Tot = Total; % Imp = percentage impact.

Table 4: Summary of the diversity, numbers and height distribution of bird at the reference survey points recorded during three seasons at WWF

Species	Spring 2020				Autumn 2021				Summer 2022				Combined seasons			
	R1		R2		R1		R2		R1		R2					%
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	Tot,	Imp.
Eastern Rosella	25		32		47		34		19		18		**175**	**0**	**175**	16.3
Torresian Crow	16		48		23		69						**156**	**0**	**156**	14.5
Noisy Miner	15		23		28		20		39		17		**142**	**0**	**142**	13.2
Australian Magpie	13		19		28		30		9		14		**113**	**0**	**113**	10.5
Galah	17		6		63		5		4				**95**	**0**	**95**	8.8
Red-rumped Parrot					83				3		1		**87**	**0**	**87**	8.1
Crimson Rosella	6	2	2		4		17		7				**36**	**2**	**38**	3.5
Striated Pardalote	6		20				6		2		2		**36**	**0**	**36**	3.4
Straw-necked Ibis	5		25										**30**	**0**	**30**	2.8
Grey Butcherbird	2		5		5		8		3				**23**	**0**	**23**	2.1
Sulphur-crested Cockatoo	10				1	2	1		5		2		**19**	**2**	**21**	2
Yellow-rumped Thornbill	17								3				**20**	**0**	**20**	1.9
Black-faced Cuckoo-shrike	8						2		4		3		**17**	**0**	**17**	1.6
Noisy Friarbird	10		1						2				**13**	**0**	**13**	1.2
Wedge-tailed Eagle				2	4	5	1						**5**	**7**	**12**	1.1
Nankeen Kestrel			6		1		1		2	1	1		**11**	**1**	**12**	1.1
Laughing Kookaburra			1						9				**10**	**0**	**10**	0.9
Little Corella	9												**9**	**0**	**9**	0.8
Pied Currawong	2		4								3		**9**	**0**	**9**	0.8
Magpie-lark	2						5						**7**	**0**	**7**	0.7
Common Starling	1								5				**6**	**0**	**6**	0.6
Willie Wagtail	1		1				1		3				**6**	**0**	**6**	0.6
Little Raven											5		**5**	**0**	**5**	0.5
Red Wattlebird							2				2		**4**	**0**	**4**	0.4
Masked Lapwing	3												**3**	**0**	**3**	0.3

Species	Spring 2020				Autumn 2021				Summer 2022				Combined seasons			
	R1		R2		R1		R2		R1		R2					%
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	Tot,	Imp.
Weebill					3								3	0	3	0.3
Tree Martin			3										3	0	3	0.3
Australian Raven									2				2	0	2	0.2
Australian Wood Duck	2												2	0	2	0.2
Pacific Black Duck					2								2	0	2	0.2
Welcome Swallow					2								2	0	2	0.2
Australasian King Parrot									1				1	0	1	0.1
Crested Pigeon									1				1	0	1	0.1
Dollarbird									1				1	0	1	0.1
Grey Shrike-thrush									1				1	0	1	0.1
White-throated Treecreeper					1								1	0	1	0.1
Australasian Pipit							1						1	0	1	0.1
Forest Raven											1		1	0	1	0.1
Olive-backed Oriole							1						1	0	1	0.1
White-throated Gerygone			1										1	0	1	0.1
Totals	170	2	197	2	295	7	204	0	127	1	69	0	1062	12	1074	100

Notes: A = below RSA (<40m); B = at RSA (40-150 m); % Imp. = percentage impact. No birds were recorded over 150m, thus not included in table.

2.2.3. *Flight height*

Bird heights were classified as (A) below RSA (< 40 metres), (B) at RSA (40–150 metres), and (C) above RSA (> 150 metres) heights based on current specifications of proposed operational turbines at WWF. Table 5 present the detailed results of the number of birds recorded at the different flight heights during the three seasonal of surveys. The same data is further summarised in Figure 3.

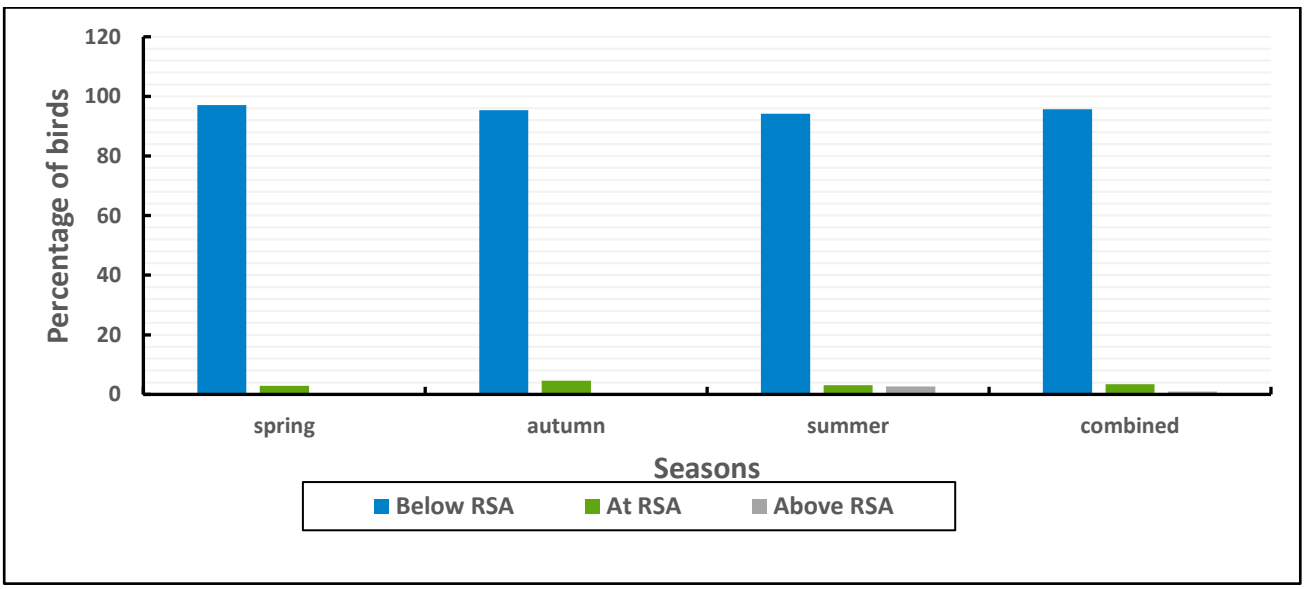
Most birds were recorded below RSA height at impact points with an overall percentage of 95.7, 3.4, and 0.9 below, at and above RSA heights, respectively. These flight heights are very comparable to height distribution of birds at many other wind farms in Australia (Nature Advisory data), Notably, the percentage of birds flying above RSA height was unusually high, comprising 27 individual observations of Wedge-tailed Eagles.

Flight heights at the reference sites was comparable to the impact points; however, the majority were recorded flying below RSA heights (98.5 below; 1.5 at, and 0 Above RSA heights, respectively).

Table 5: Summary of number of birds recorded at the three flight heights at WWF

Flight Height	Impact survey points		Reference survey points	
	Number of birds	Percentage of all birds	Number of birds	Percentage of all birds
A (below RSA)	2533	96.3	867	98.7
B (at RSA)	98	3.7	11	1.3
C (above RSA)	0	0	0	0
Total birds recorded	**2631**		**878**	

Figure 3: The number of birds recorded at three heights (data from table 5) at WWF



A combined three seasons summary of the most abundant species flying at RSA is provided below in Table 6. These accounted for 3.5% of the total birds observed at impact survey points. The Wedge-tailed Eagle was by far the most observed bird flying at RSA height, making up 72.8% of the five most important birds at RSA heights and 62.4% of all observed eagle flights (Table 6). In addition, a considerable number was also observed flying above RSA heights.

Table 6: The five most abundant species flying at RSA height at WWF

The five most dominant species at RSA heights	Number of birds at				% at RSA	% Of imp. sps.	% all birds
	A	B	C	Total			
Wedge-tailed Eagle	23	83	27	133	62.4	72.8	3.7
Australian Raven	10	11	0	21	52.4	9.6	0.6
Nankeen Kestrel	18	10	0	28	35.7	8.8	0.8
Sulphur-crested Cockatoo	36	5	0	41	12.2	4.4	1.1
Brown Falcon	6	5	0	11	45.5	4.4	0.3
Total of five important species	**93**	**114**	**27**	**234**	**48.7**	**100.0**	**6.5**
Total all birds at impact points	**3456**	**126**	**27**	**3609**	**3.5**		**100.0**

RSA heights: Below (,40m), at (40-150m); Above (.150 m).

2.2.4. Raptors

Seven raptor species were recorded during the season surveys at impact points, comprising 179 individual observations (Table 7). Of all raptors counted, 57% of observations were recorded at RSA height. The presence of these raptors varied between the seasons and were recorded in relatively low numbers except the Wedge-tailed Eagle (The raw data are presented in Appendices 1 -3). Two raptors were recorded at the reference sites, namely Wedge-tailed Eagle and Nankeen Kestrel. Both were recorded from 12 observations comprising 1.1% of all birds at the reference sites (Table 4).

Wedge-tailed eagle was the most abundant raptor species at WWF impact sites during the three seasons of BUS. It was seen regularly throughout the study area across all seasons. Numbers observed were particularly high during autumn (64 observations), less in spring (41) and fewer in summer (28) (Table 3). Of the total number of eagles seen (133), 62.4% were observed flying at RSA heights. Similarly, they formed 74.3% of all raptors. And 3.7% of all birds observed during the three seasons of BUS.

Nankeen Kestrel and Brown Falcon were next in abundance but in much lower numbers than the Wedge-tailed Eagle. The remaining four raptors were seen occasionally in very low numbers (Table7).

Raptors are at risk of collision with operating turbines. Based on experience at other wind farms, carcasses of Wedge-tailed Eagles, Nankeen kestrels and Brown Falcons are found consistently under wind turbines (Nature Advisory data).

At the WWF, the number of Wedge-tailed Eagles was noticeably higher compared with other wind farms with similar settings (Nature Advisory data). The utilisation rate of eagles was estimated as 0.66 eagles per hectare per hour, a value higher than the range of observed values (0.01 – 0.44) calculated from ten other wind farms (Nature Advisory data).

No raptor nesting activities within the wind farm was confirmed in the surveys, however Wedge-tailed Eagles were observed performing courtship behaviour, as well as one individual carrying a stick, a behaviour associated with nest building.

2.2.5. Waterbirds

During this survey, six waterbird species were recorded at impact points, comprising a total of 100 observations. The most common waterbird species was the Australian Wood Duck with a total of 69 observations recorded (Table 7). The Australian Wood Duck is a very common farmland waterbird which commonly roosts along the edges of farm dams and forages in open paddocks next to farm dams.

The Straw-necked Ibis is another waterbird species which can regularly be seen flying and foraging in flocks. Like the Australian Wood Duck, it is also regularly seen near farm dams and adjacent pasture. The other four waterbirds were less abundant and were recorded on fewer occasions (Table 7). Only one observation of a waterbird was made at RSA height on one impact points during the three seasonal BUS.

The risk of waterbirds colliding with turbines is considered low.

Table 7: Raptor and waterbird species recorded at impact points during spring, autumn and summer BUS at WWF

Species	Number raptors/waterbirds at				% at RSA	% Of Rap. / waterbirds	% Of all birds
	A	B	C	Tot.			
Wedge-tailed Eagle	23	83	27	133	62.4	74.3	3.7
Nankeen Kestrel	18	10	0	28	35.7	15.6	0.8
Brown Falcon	6	5	0	11	45.5	6.1	0.3
Black-shouldered Kite	1	1	0	2	50.0	1.1	0.1
Brown Goshawk	2	0	0	2	0.0	1.1	0.1
Peregrine Falcon	0	2	0	2	100.0	1.1	0.1
Whistling Kite	0	1	0	1	100.0	0.6	0.0
Total raptors	**50**	**102**	**27**	**179**	**57.0**	**100.0**	**5.0**
Waterbirds							
Australian Wood Duck	69	0	0	69	0.0	69.0	1.9
Straw-necked Ibis	14	0	0	14	0.0	14.0	0.4
Masked Lapwing	13	0	0	13	0.0	13.0	0.4
Australian Ibis	2	0	0	2	0.0	2.0	0.1
Australasian Darter	0	1	0	1	100.0	1.0	0.0
Pacific Black Duck	1	0	0	1	0.0	1.0	0.0
Total waterbirds	**99**	**1**	**0**	**100**	**1.0**	**100.0**	
Total all impact birds	**3456**	**126**	**27**	**3609**			**100.0**

2.2.6. Threatened Species

The majority birds found to utilise the proposed wind farm site were common farmland and woodland bird species. Of all species recorded during the formal bird utilisation surveys, six species were listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act) (Figure 4). These species are considered below. An additional species, the Little Eagle was recorded incidentally.

Diamond Firetail (*Stagonopleura guttata*): Recorded from nine observation during summer BUS. These birds are usually found in small flocks inhabiting grassy undercover underneath open forests or woodlands, and feed exclusively on the ground. Do not fly at RSA height.

Little Lorikeet (*Glossopsitta pusilla*): Recorded from a single observation of one bird during the summer BUS. This species usually congregates in small flocks where they feed on nectar and pollen in the canopy of open eucalyptus forest and woodland. Usually fly at tree canopy height below the RSA height.

Speckled Warbler (*Chthonicola sagittate*): Recorded from four observation during autumn BUS. The species inhabits open eucalyptus woodland with rocky gullies, ridges and tussocky grass. Forage on ground often with other small birds. Do not fly at RSA height.

Varied Sitella (*Daphoenositta chrysoptera*): Recorded from 43 observations during BUS divided almost equal over the three seasons of the survey. Small birds of upper branches often unnoticed with incessant twittering. Forage downward on branches and tree trunks. Do not fly at RSA height.

The above four species are strictly small bush birds and rarely venture outside cover, therefore not exposed to collision with operating turbines.

Dusky Woodswallow (*Artamus cyanopterus cyanopterus*): Recorded on six occasions at BUS point 3 during the summer BUS, likely a summer migrant to the region. Frome three to five birds recorded together. Usually occurring in dry open forest and woodland but can occur in a variety of habitats. This species has a preference of flying from ground level to canopy heights, though is known to fly at RSA heights on some occasions.

Glossy Black-Cockatoo (*Calyptorhynchus lathami*): Recorded from a single observation of a pair of birds during autumn BUS near the Oxley Wild Rivers National Park. The bird occurs at low densities in the New England Region and rarely found away from Allocasuarina or Casuarina (she-oak) trees, which provide their primary food source (Crowley, G. M. & Garnett, S.T. (2001).

Little Eagle (*Hieraaetus morphnoides*): Recorded in the region outside the wind farm and not during formal bird utilisation surveys counts. The Little Eagle is a vulnerable under the BC Act, found across the New England Tablelands, and is at risk of colliding with operating turbines, as they routinely fly at RSA heights. The species may be displaced by the presence of Wedge-tailed Eagle and is unlikely to have occurred at any of the BUS locations due to high Wedge-tailed Eagle densities. The bird was located on Moona Plains Rd, near the intersection of the Emu Creek Road approximately five kilometres from the nearest proposed turbine location. There are historic records of this species breeding at Eastlake a large dam along Jacks Creek, as recently as 2017 (Larkin *et al.,* 2020), a property bordering the proposed wind farm site to the north. This nesting site was recently been overtaken by a pair of White-bellied Sea-Eagle which now nest here each year (Larkin pers.comm)

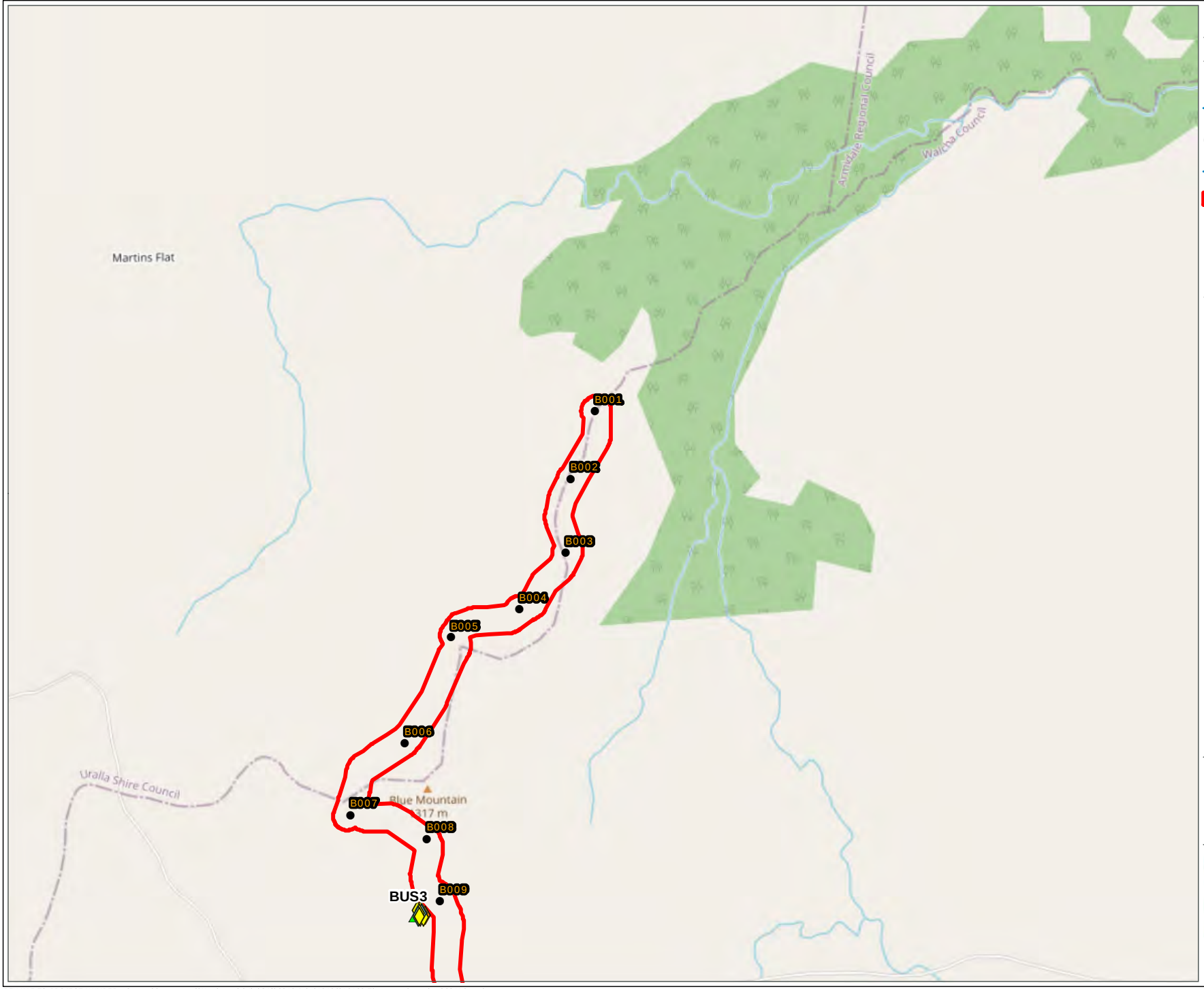


Figure 4: Locations of threatened birds recorded in the study area

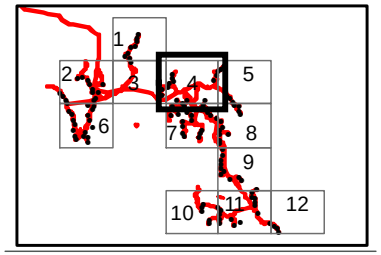
Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

- Proposed turbine
- BUS points

Species name

- Diamond Firetail
- Dusky Woodswallow
- Speckled Warbler
- Varied Sitella



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

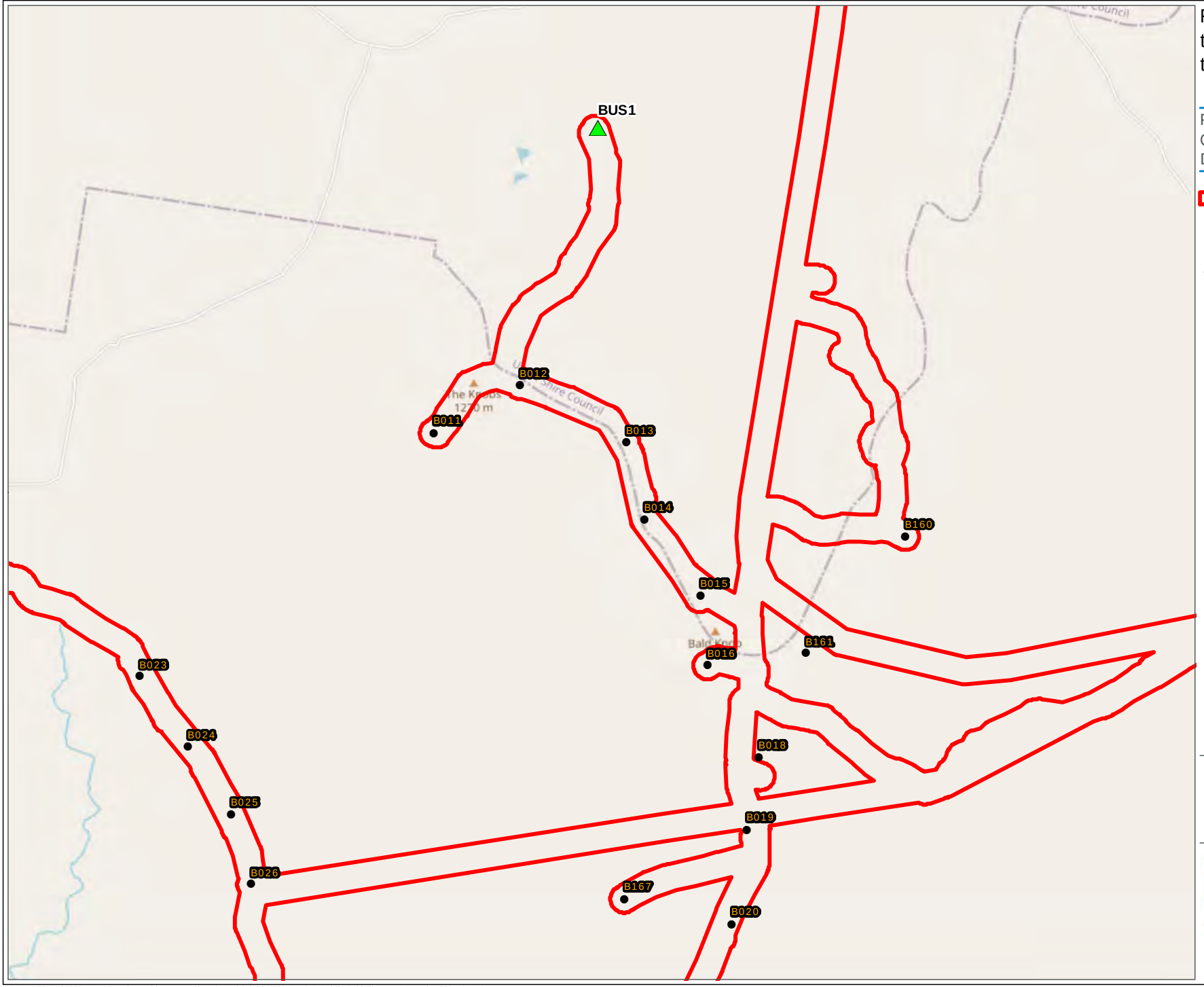


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine

BUS points

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

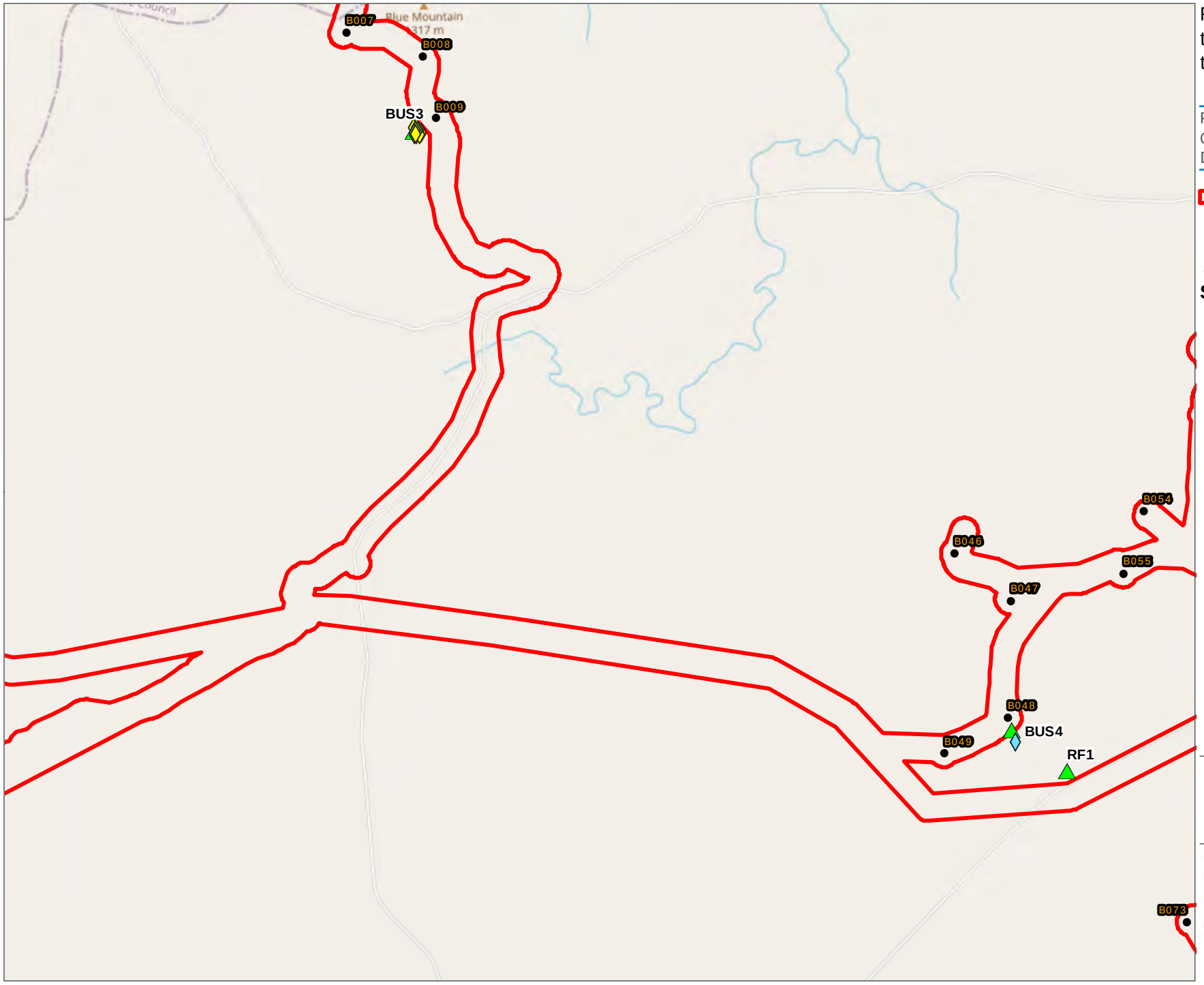


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine

BUS points

Species name

Diamond Firetail

Dusky Woodswallow

Speckled Warbler

Varied Sitella

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

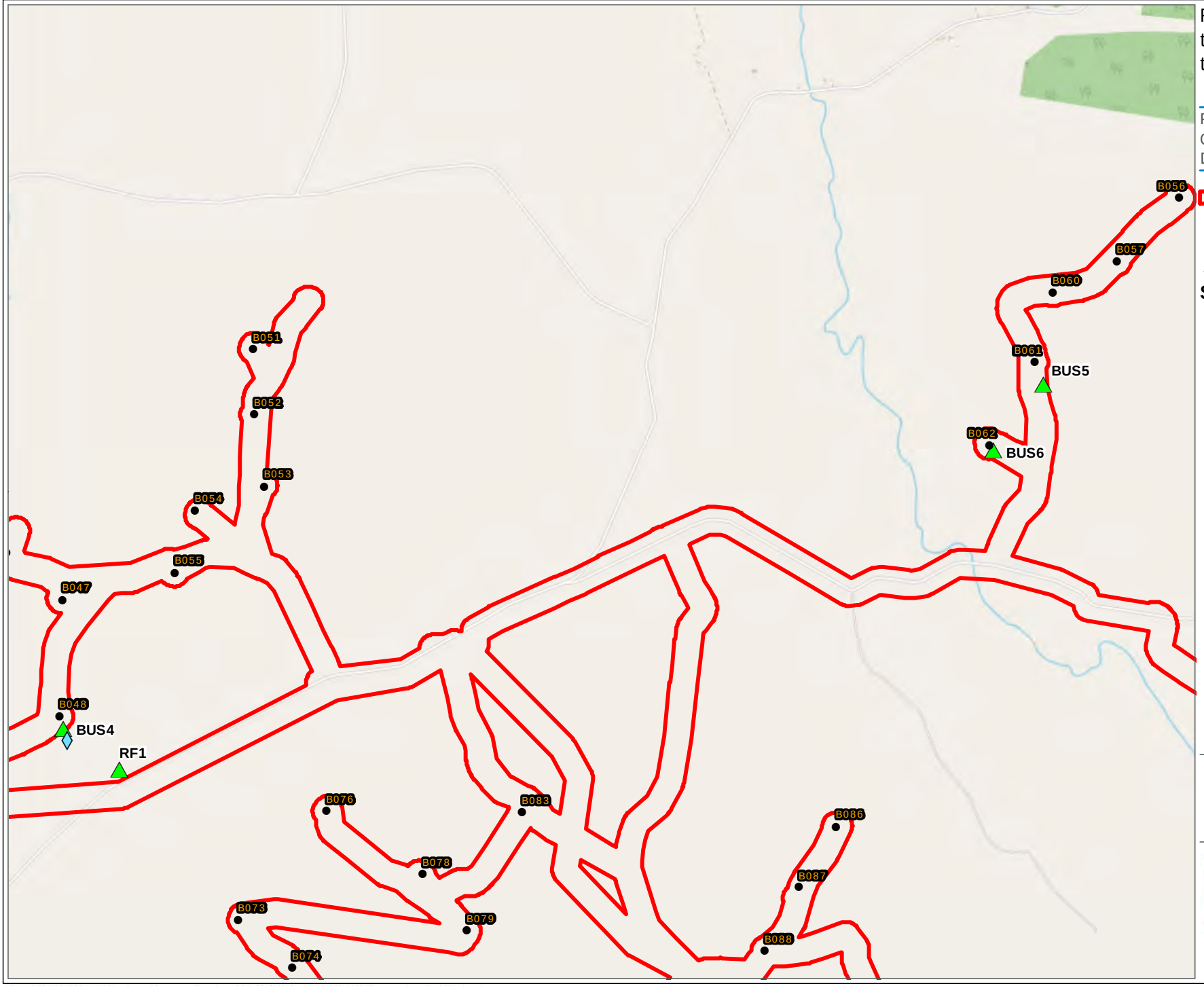


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

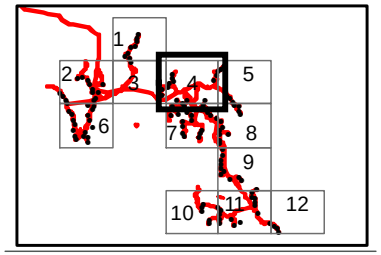
Winterbourne wind farm boundary

Proposed turbine

BUS points

Species name

Diamond Firetail



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

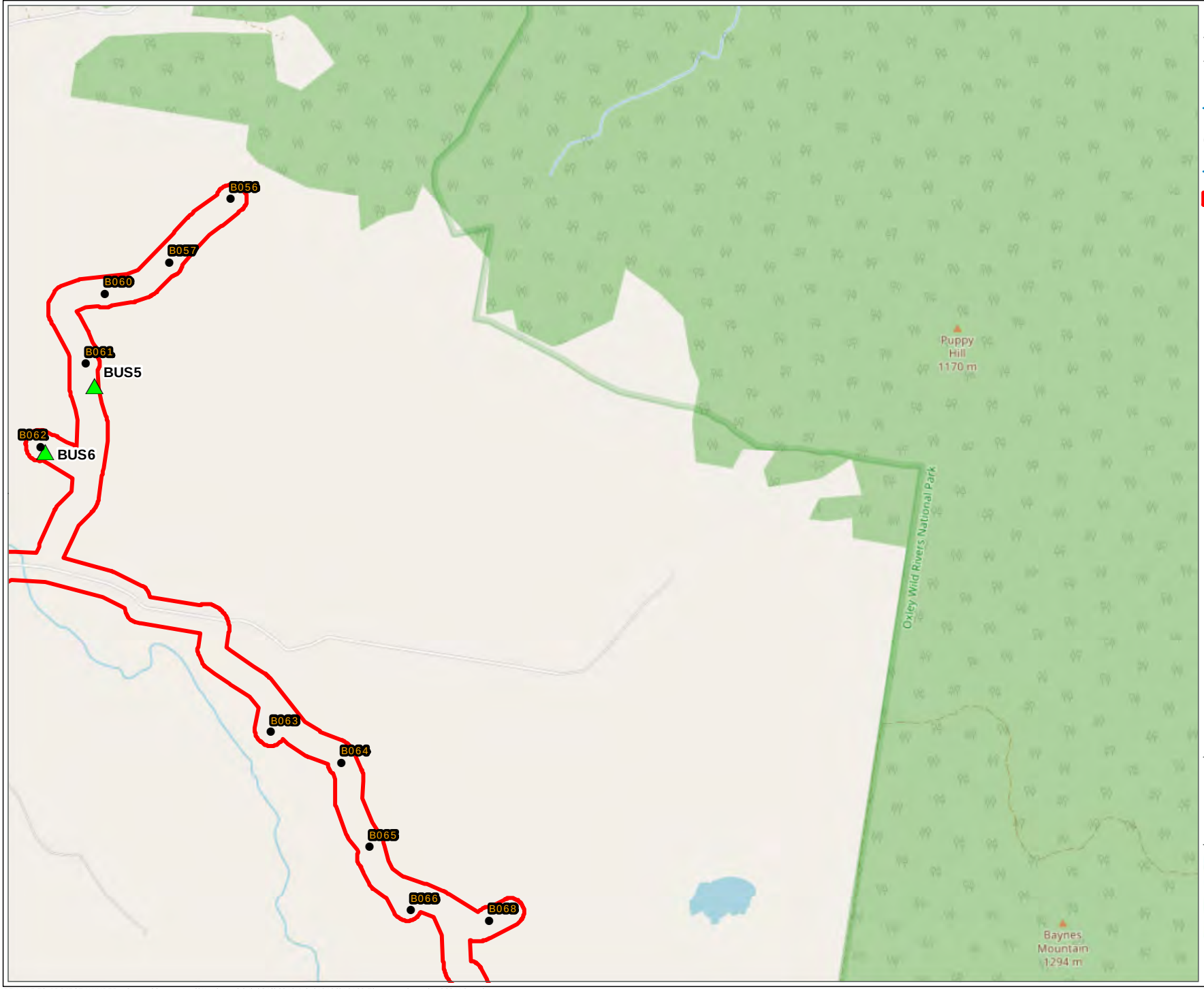
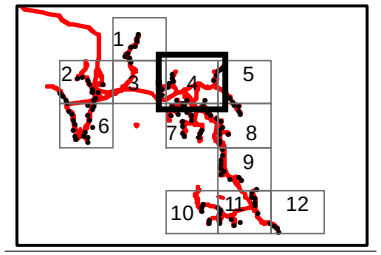


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

- Winterbourne wind farm boundary
- Proposed turbine
- BUS points



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

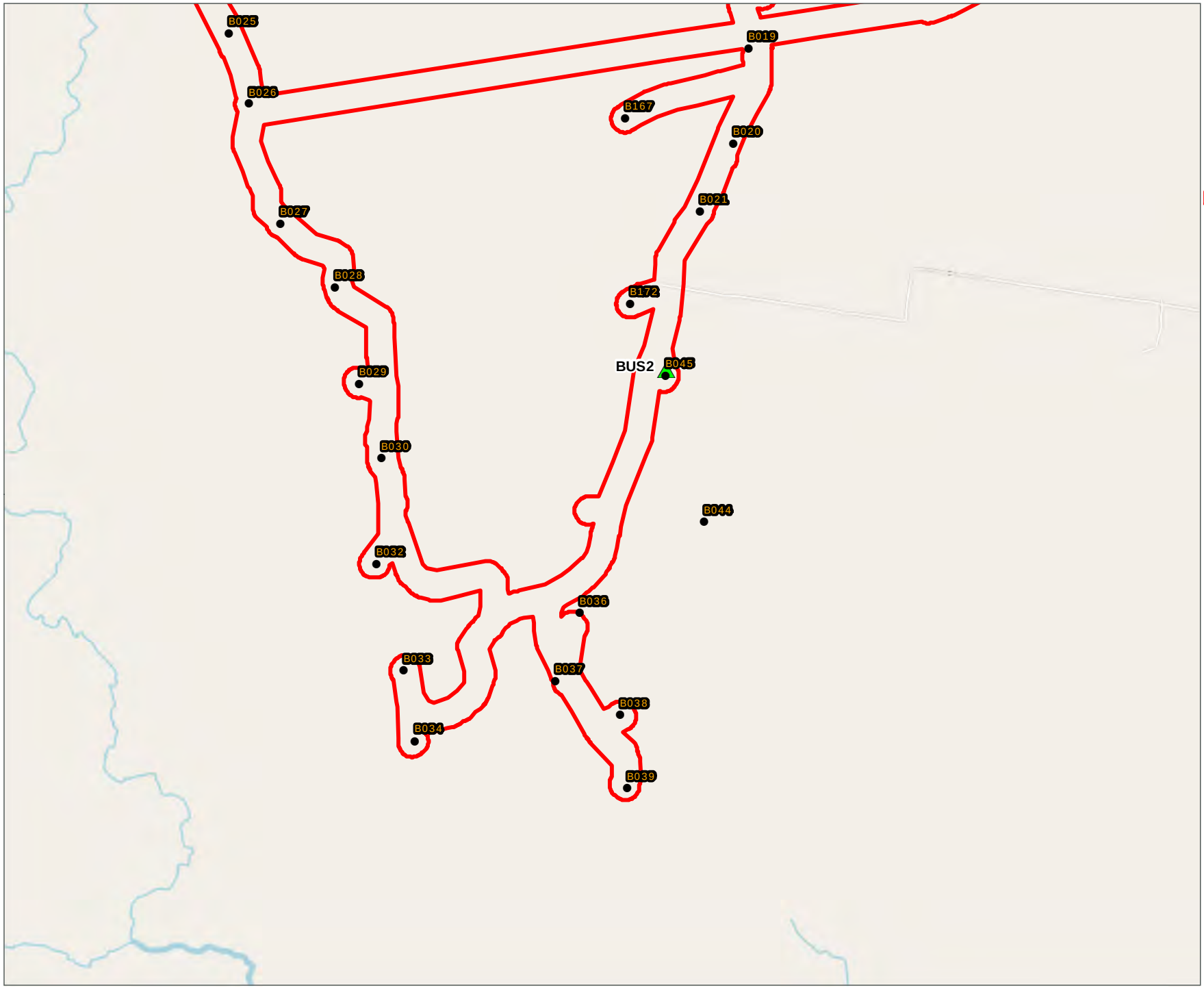


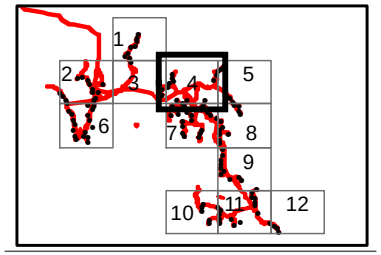
Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine

BUS points



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

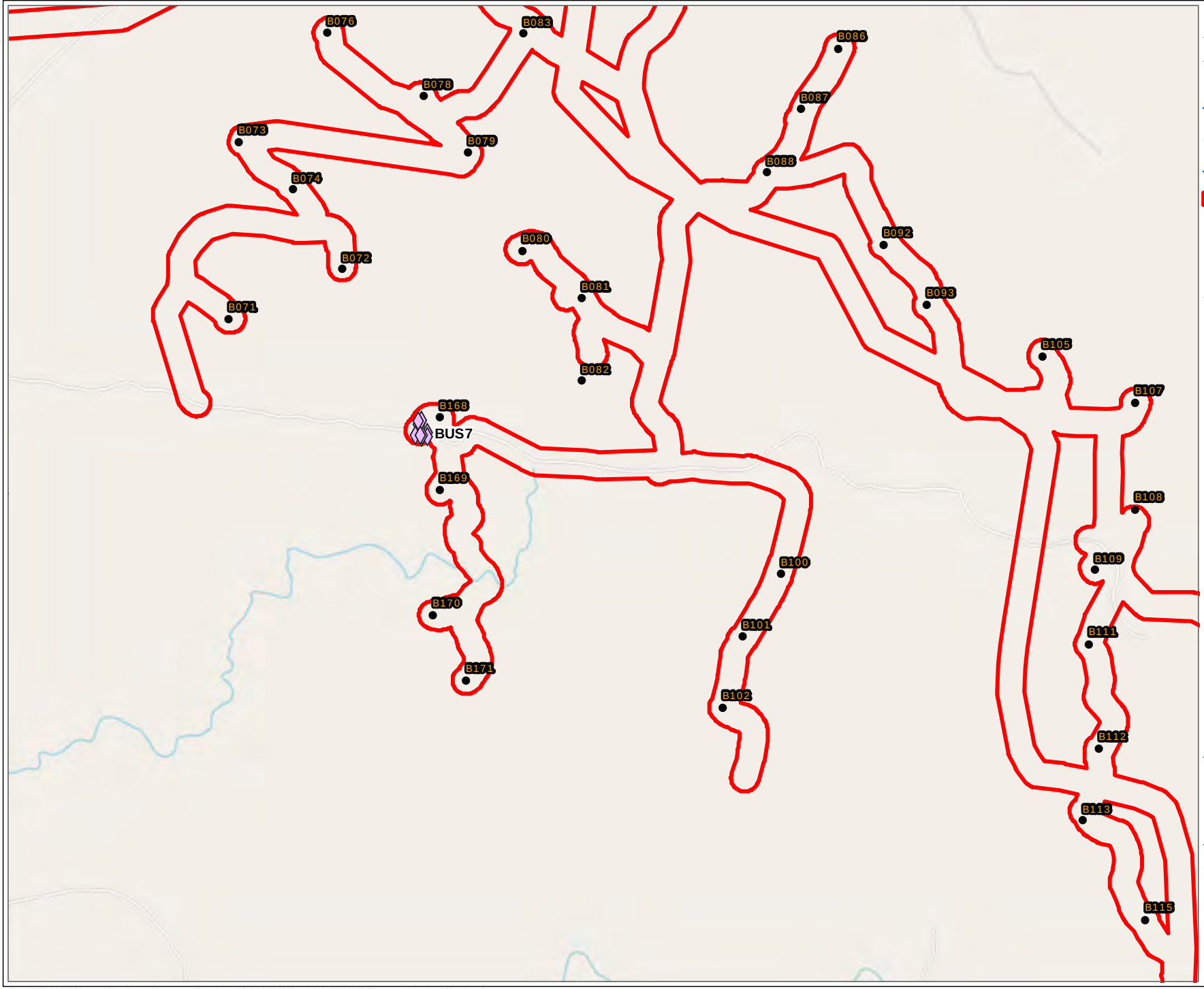


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

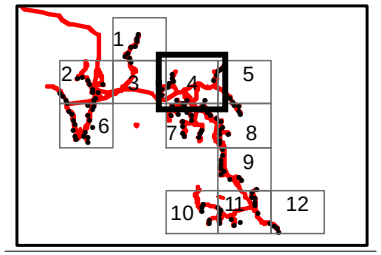
Proposed turbine

BUS points

Species name

Glossy Black Cockatoo

Varied Sitella



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

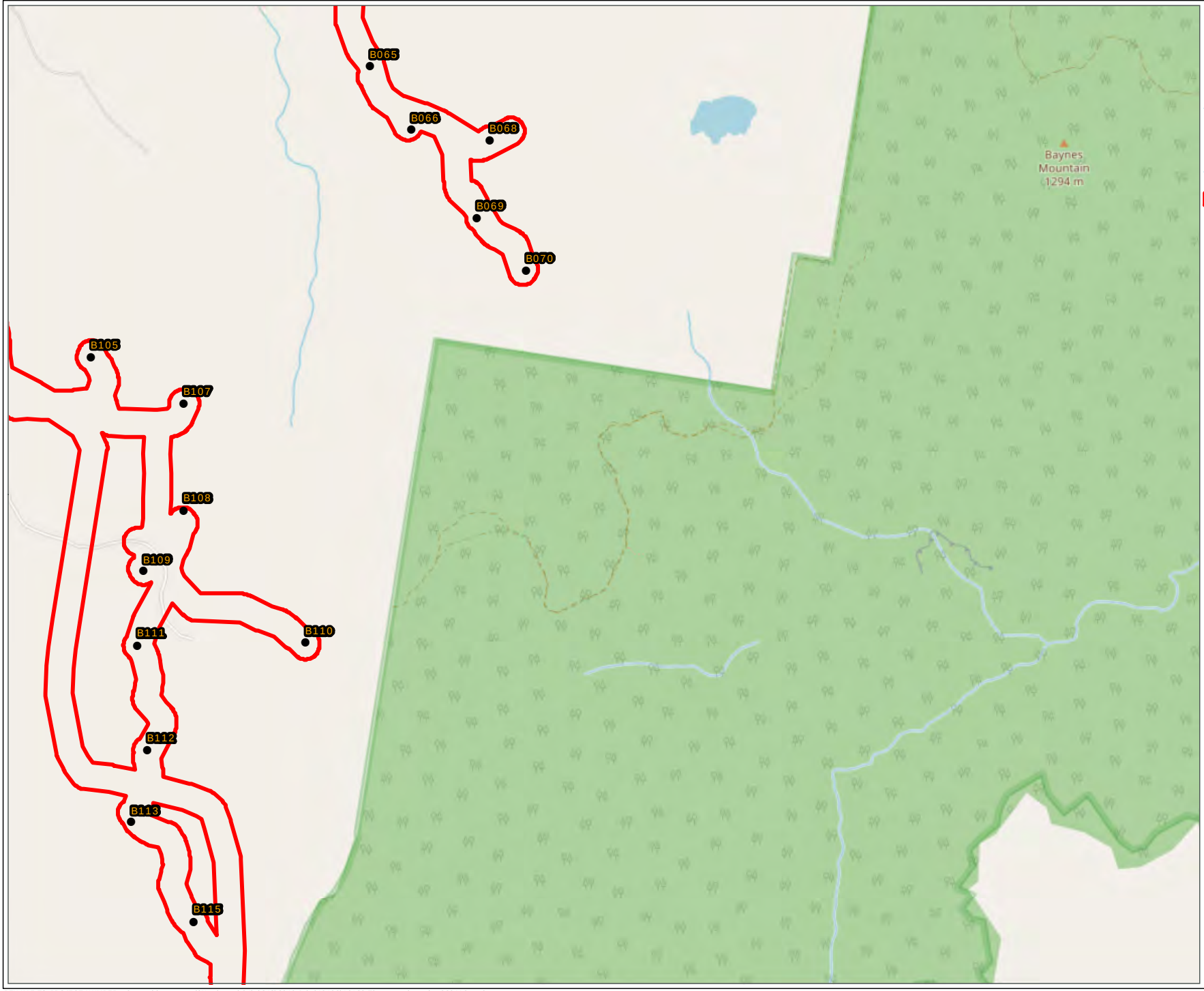
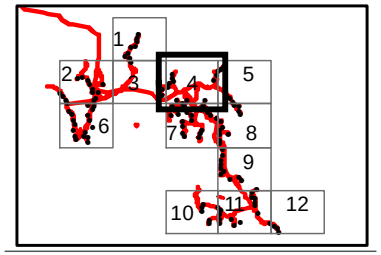


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

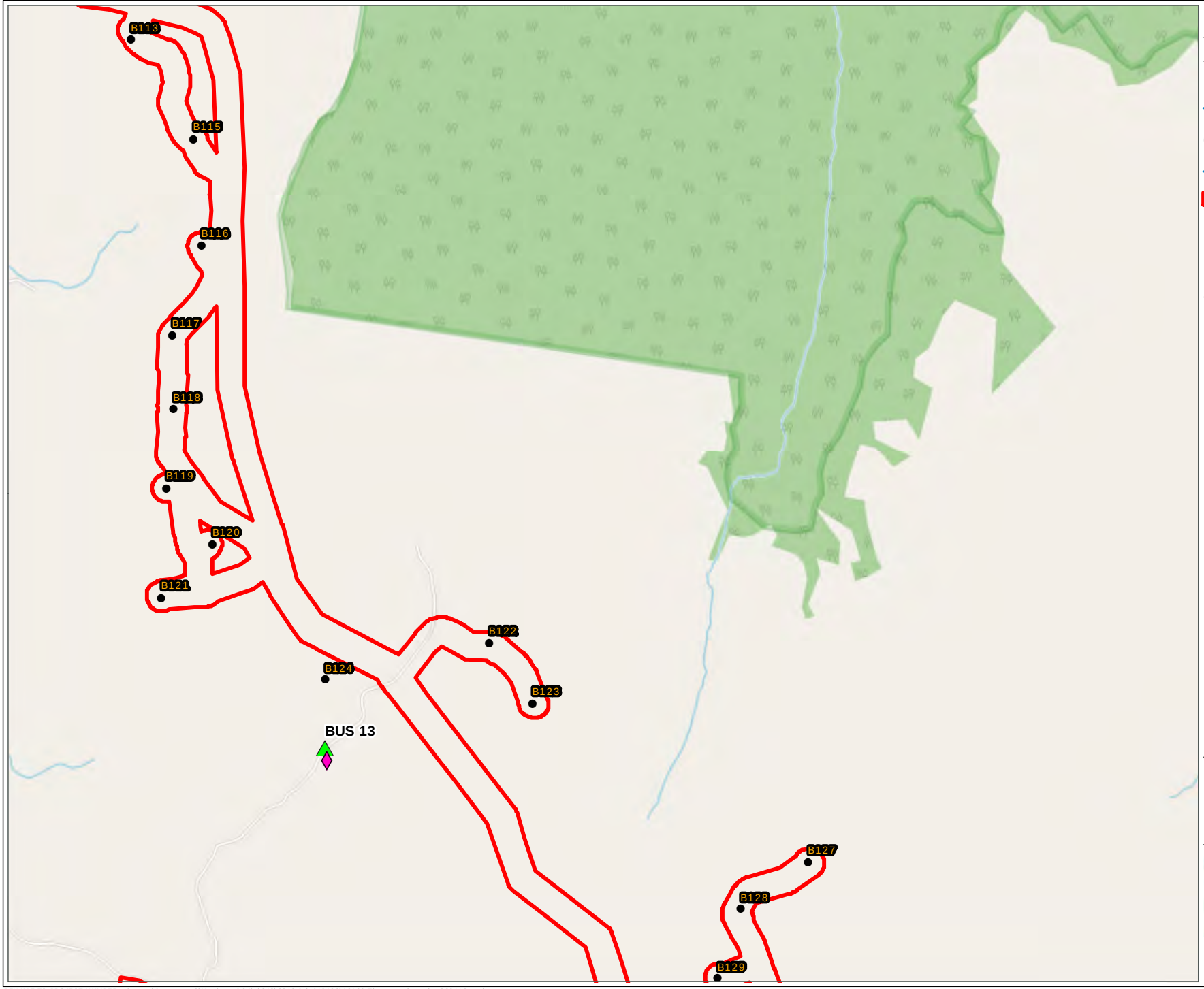


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

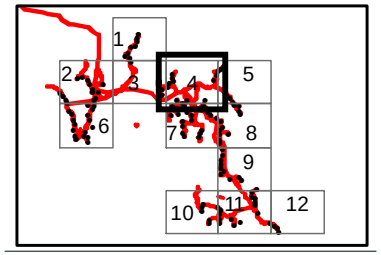
Winterbourne wind farm boundary

Proposed turbine

BUS points

Species name

Little Lorikeet



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

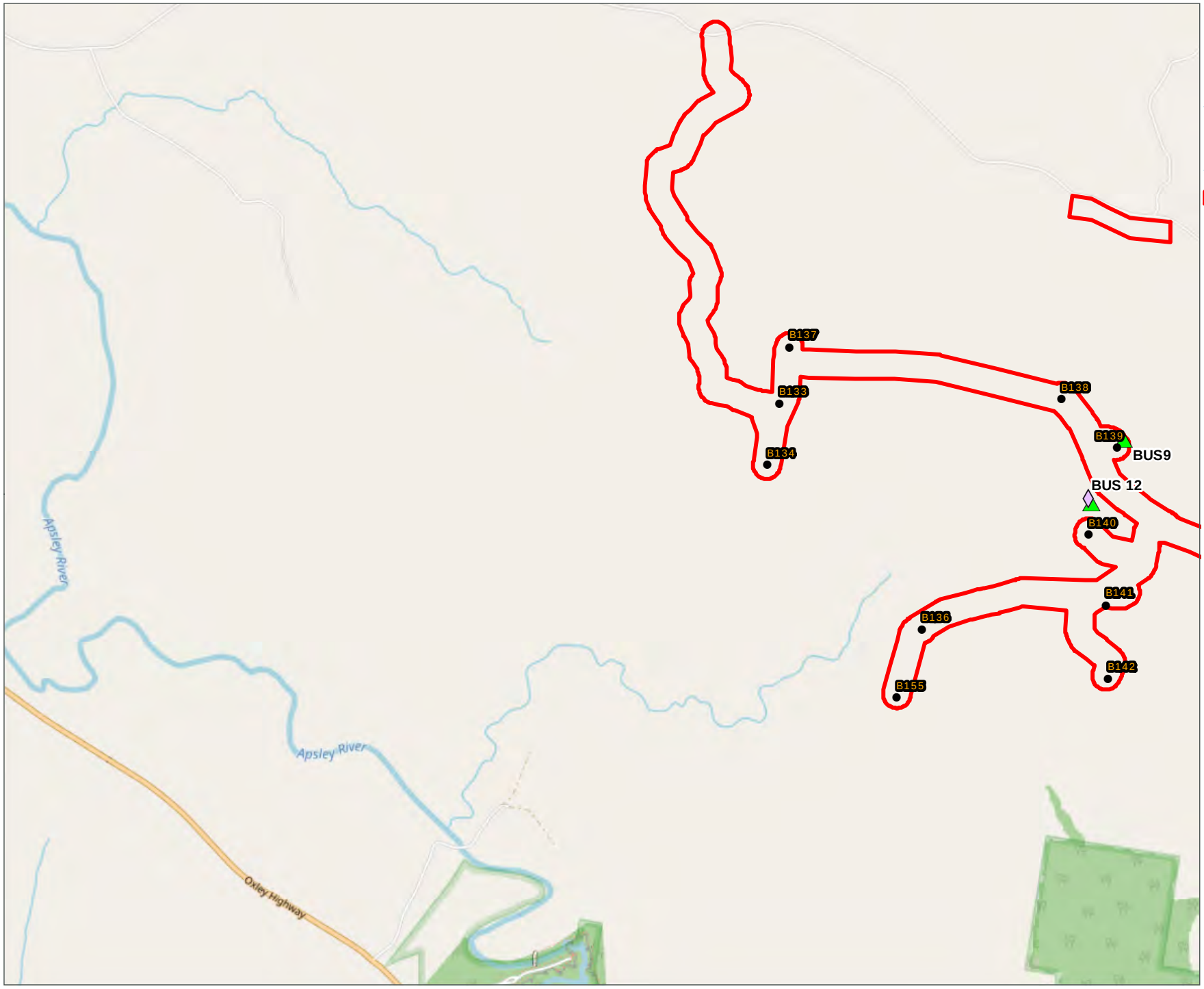


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

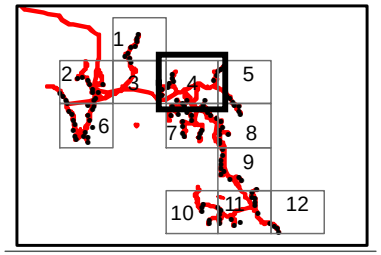
Winterbourne wind farm boundary

Proposed turbine

BUS points

Species name

Varied Sitella



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

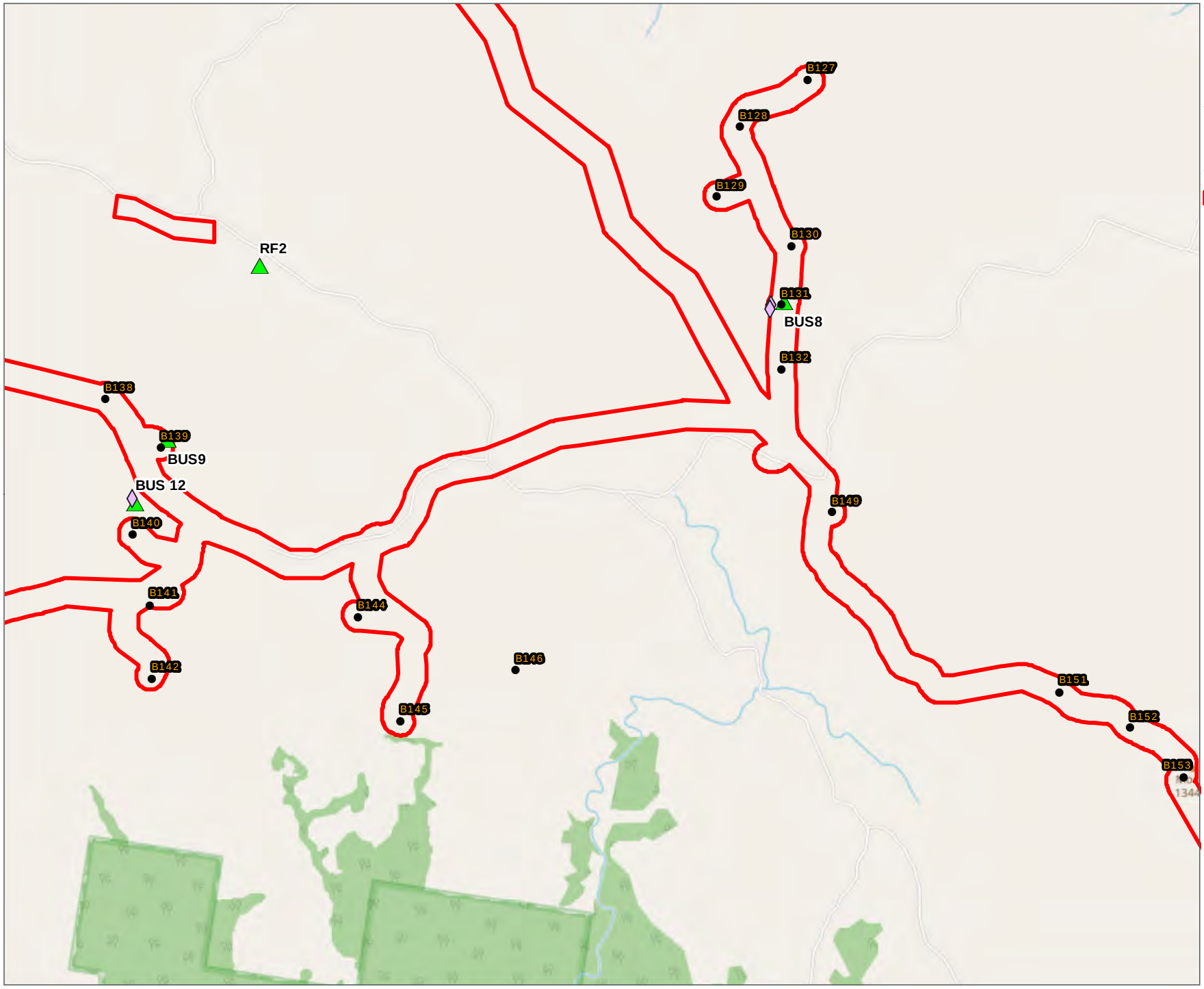


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

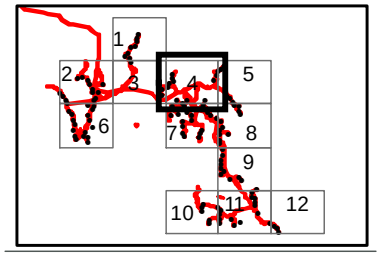
Winterbourne wind farm boundary

Proposed turbine

BUS points

Species name

Varied Sitella



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

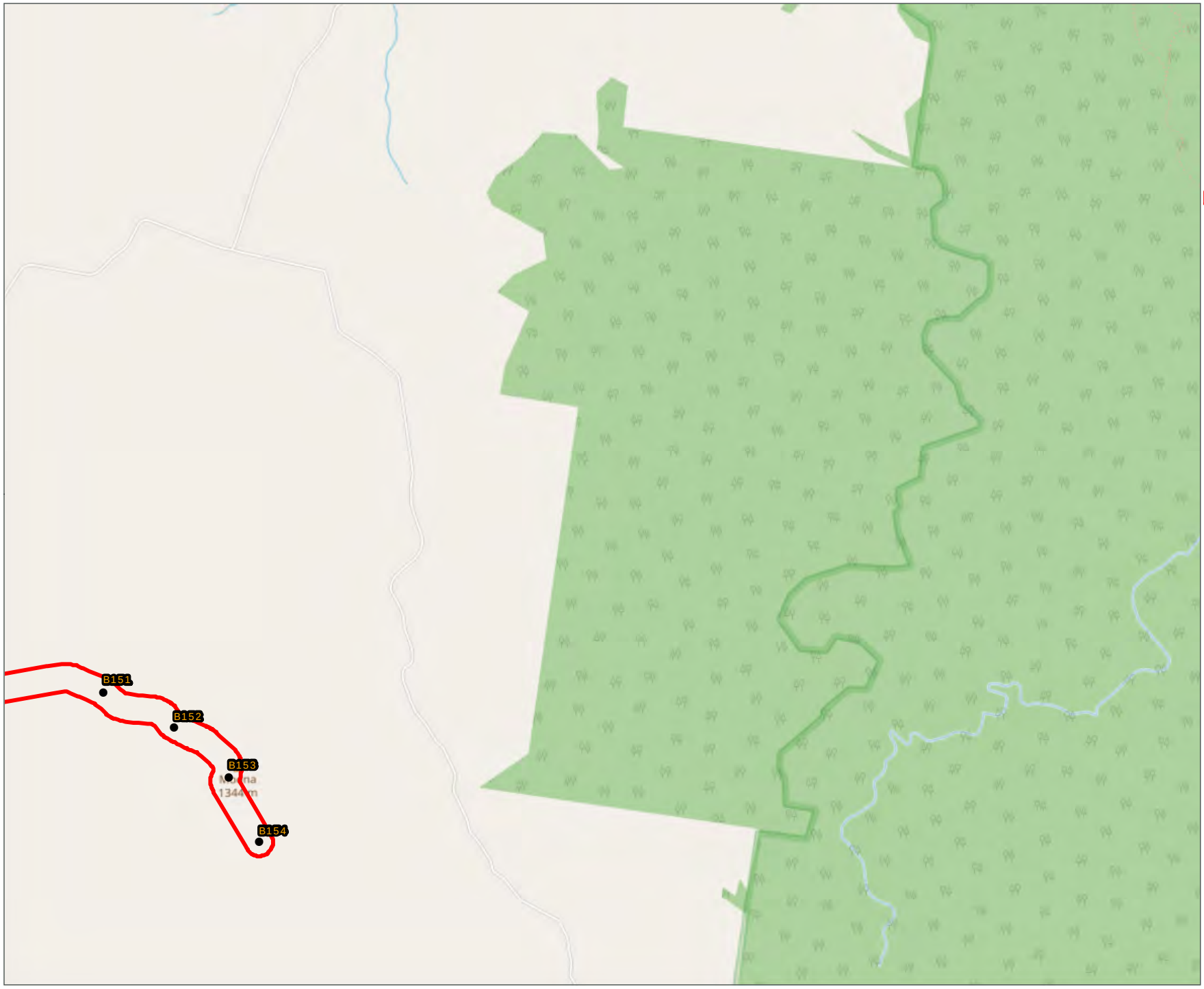
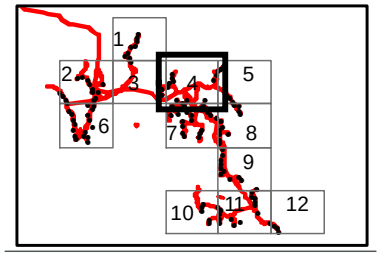


Figure 4: Locations of threatened birds recorded in the study area

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

3. Raptor Survey

3.1. Methods

While undertaking the BUS, White-throated Needletail targeted surveys and traversing across the study area incidental observations of raptors were recorded. When a raptor was observed the following data was documented.

- Species name
- Count of birds
- Time first observed
- Time the bird/s flew out of sight or landed
- Distance and bearing from observer
- The location of the bird (either Air, perched or ground)
- Height of the bird when first observed
- The height range of the bird (minimum and maximum heights)
- Elevation of the fixed point
- The landscape the bird was observed in (either valley, slope or ridge)
- Flight direction (either toward, away, parallel to ridge or circling), and
- Flight behaviour (either soaring, gliding, hovering, flapping, display, resting, mobbing or foraging).

All raw data recorded is presented in Appendix 6. All flight paths were marked onto flight path maps (see Figures 5-1 to 5-12).

3.2. Results

In total, 98 observations were recorded from five raptor species at the proposed Winterbourne Wind Farm during the surveys. The species recorded included the following:

- Brown Falcon
- Brown Goshawk
- Nankeen Kestrel
- Wedge-tailed Eagle.

The Wedge-tailed Eagle was the most abundant and active raptor species at the proposed wind farm site and was recorded throughout. The species accounted for 67% of all raptors observed at the proposed wind farm site (Figures 5-1 to 5-12). The species accounted for 24% of all raptor observations. This species is frequently observed both below and at RSA heights

The Brown Falcon seen very occasionally with only 6 observations recorded consisting of 6% of all observations (Figures 5-1 to 5-12). Two observations were of single birds and two observations were of pairs. The Brown Falcon was observed flying below and at RSA heights.

Very few observations of Brown Goshawk with only three observations recorded consisting of 3% of the total flights plotted. Only single birds reported and all were recorded below RSA heights putting these birds at minimal risk of collision with turbines.

It was difficult to estimate exactly how many Wedge-tailed eagle were utilising the wind farm site. No nesting sites were observed though courtship behaviour and stick carrying was observed which would

indicate that there are resident pairs that are nesting nearby. As reported in the BUS the Wedge-tailed was most active during autumn and was observed flying at RSA height regularly. The Nankeen Kestrel was the second most abundant raptor species recorded at the proposed wind farm site The species accounted for 24% of all raptor observations. This species is frequently observed both below and at RSA heights

The Brown Falcon seen very occasionally with only 6 observations recorded consisting of 6% of all observations. Two observations were of single birds and two observations were of pairs. The Brown Falcon was observed flying below and at RSA heights.

Very few observations of Brown Goshawk with only three observations recorded consisting of 3% of the total flights plotted. Only single birds reported and all were recorded below RSA heights putting these birds at minimal risk of collision with turbines.

No listed species of raptors have been recorded utilising the proposed Winterbourne Wind Farm site. The Little Eagle, listed as vulnerable under the BC Act, has been reported in the surrounding region.

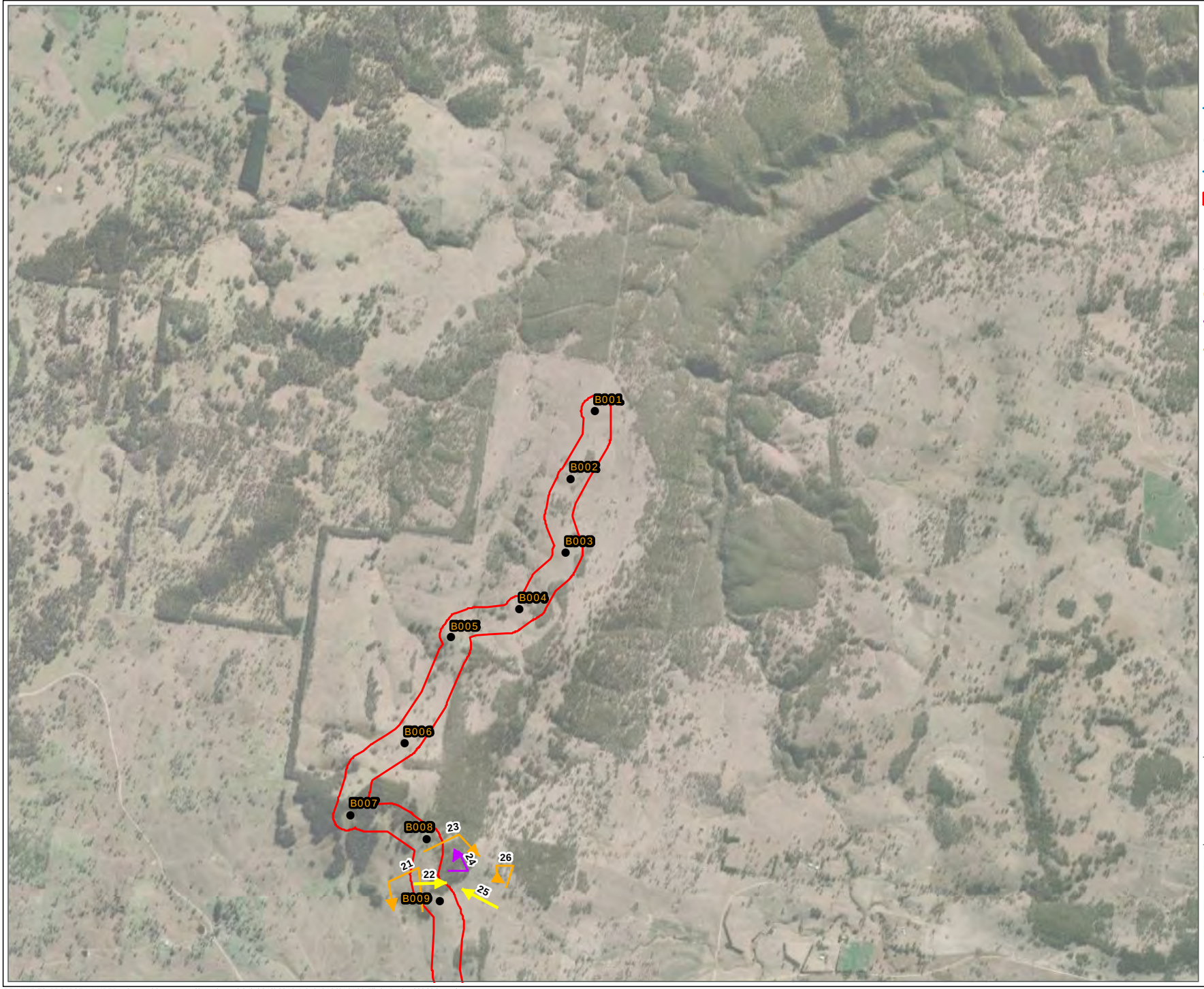


Figure 5-1: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

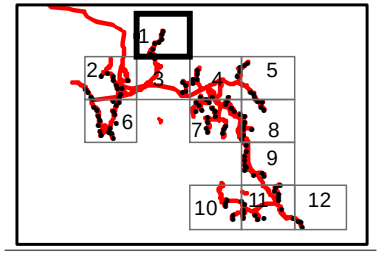
Proposed turbine

Species

Brown Falcon

Nankeen Kestrel

Wedge-tailed Eagle



N

Metres

0 600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

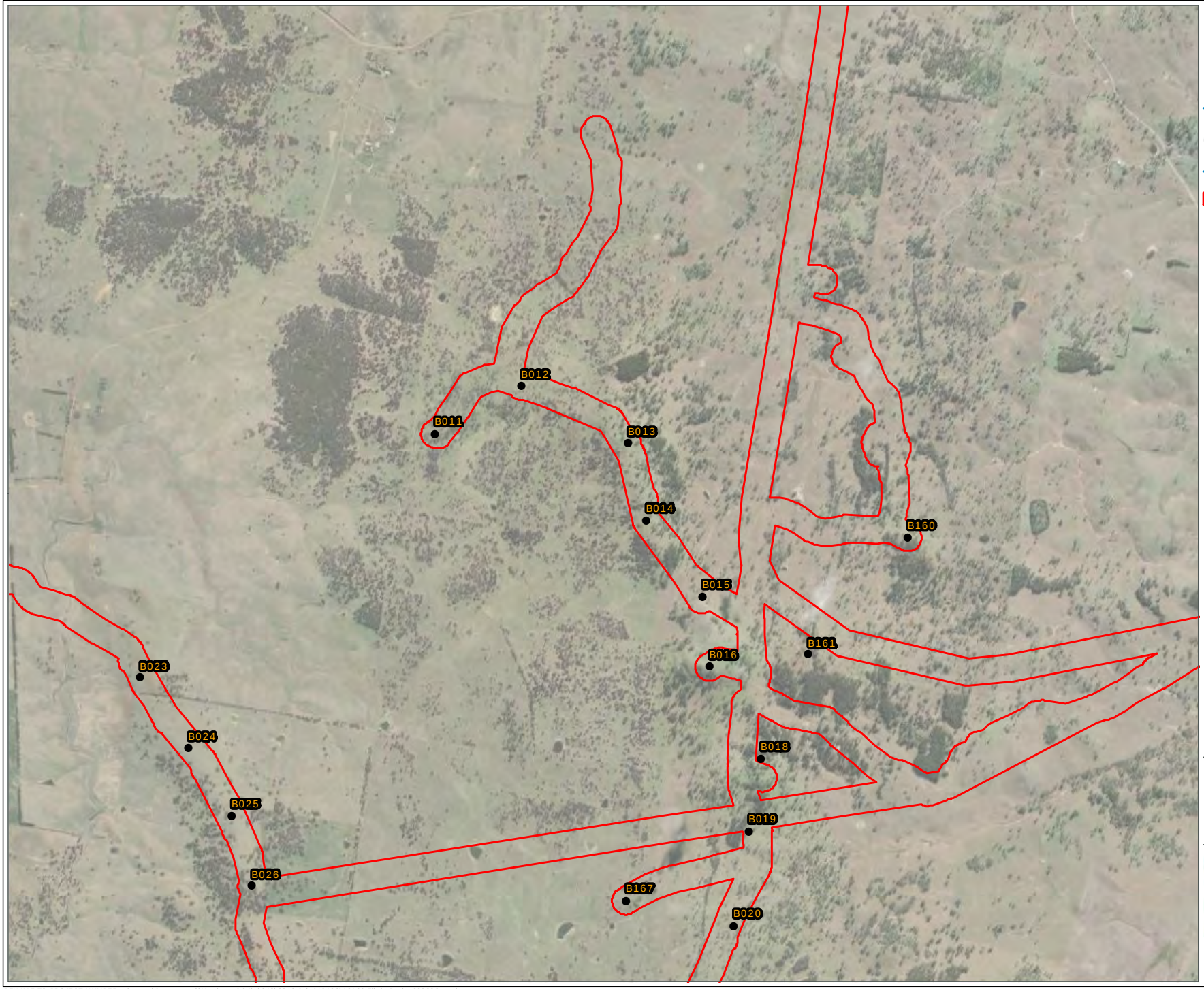
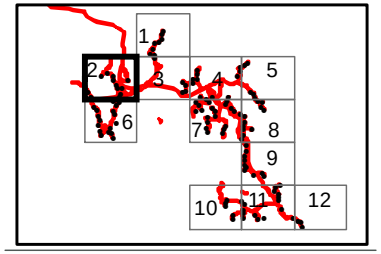


Figure 5-2: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

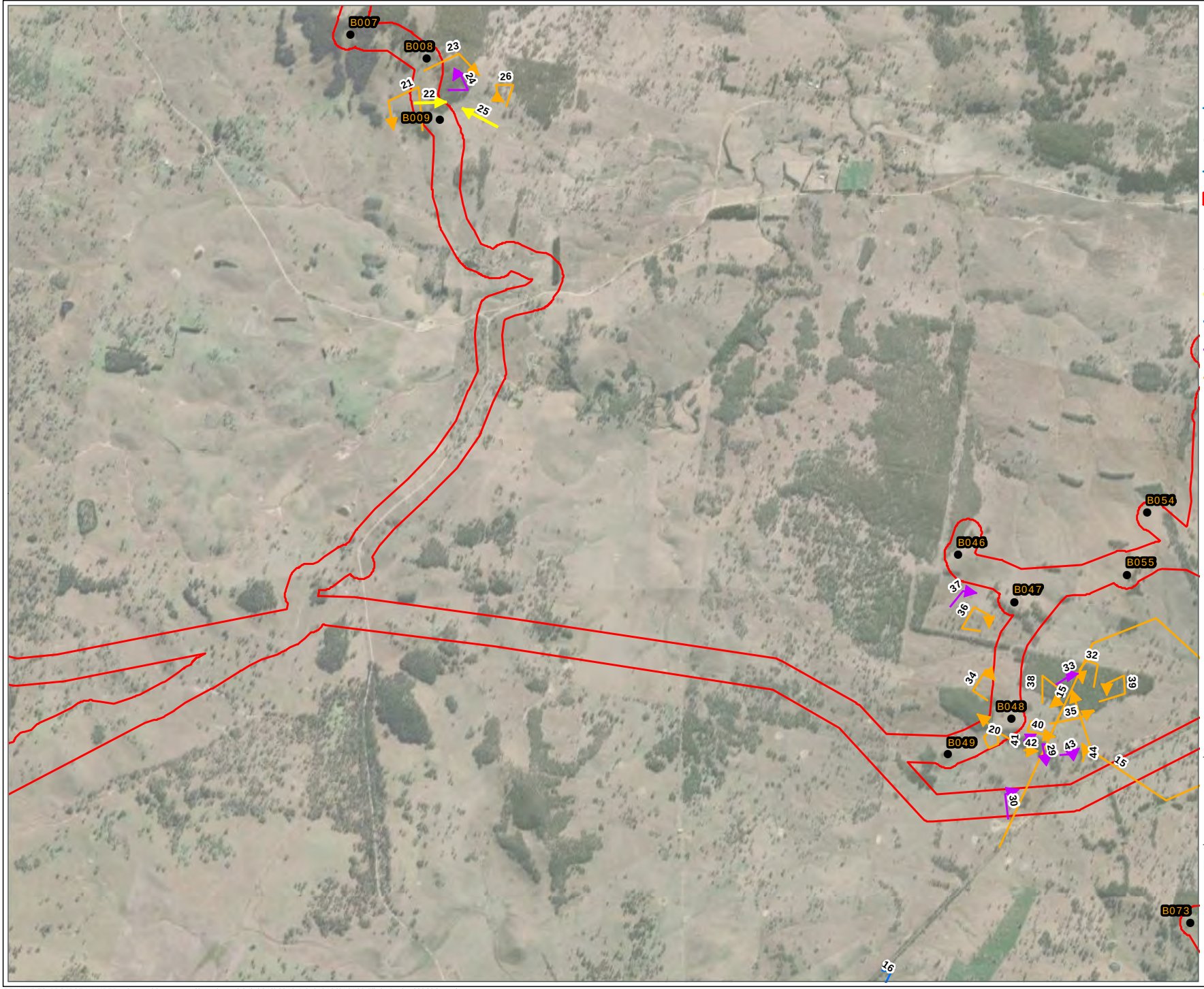


Figure 5-3: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine

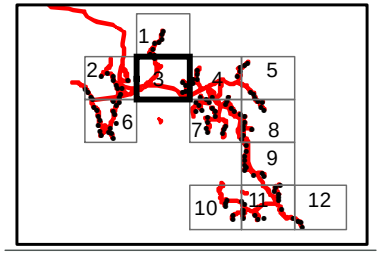
Species

Brown Falcon

Brown Goshawk

Nankeen Kestrel

Wedge-tailed Eagle



N

Metres

0 600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

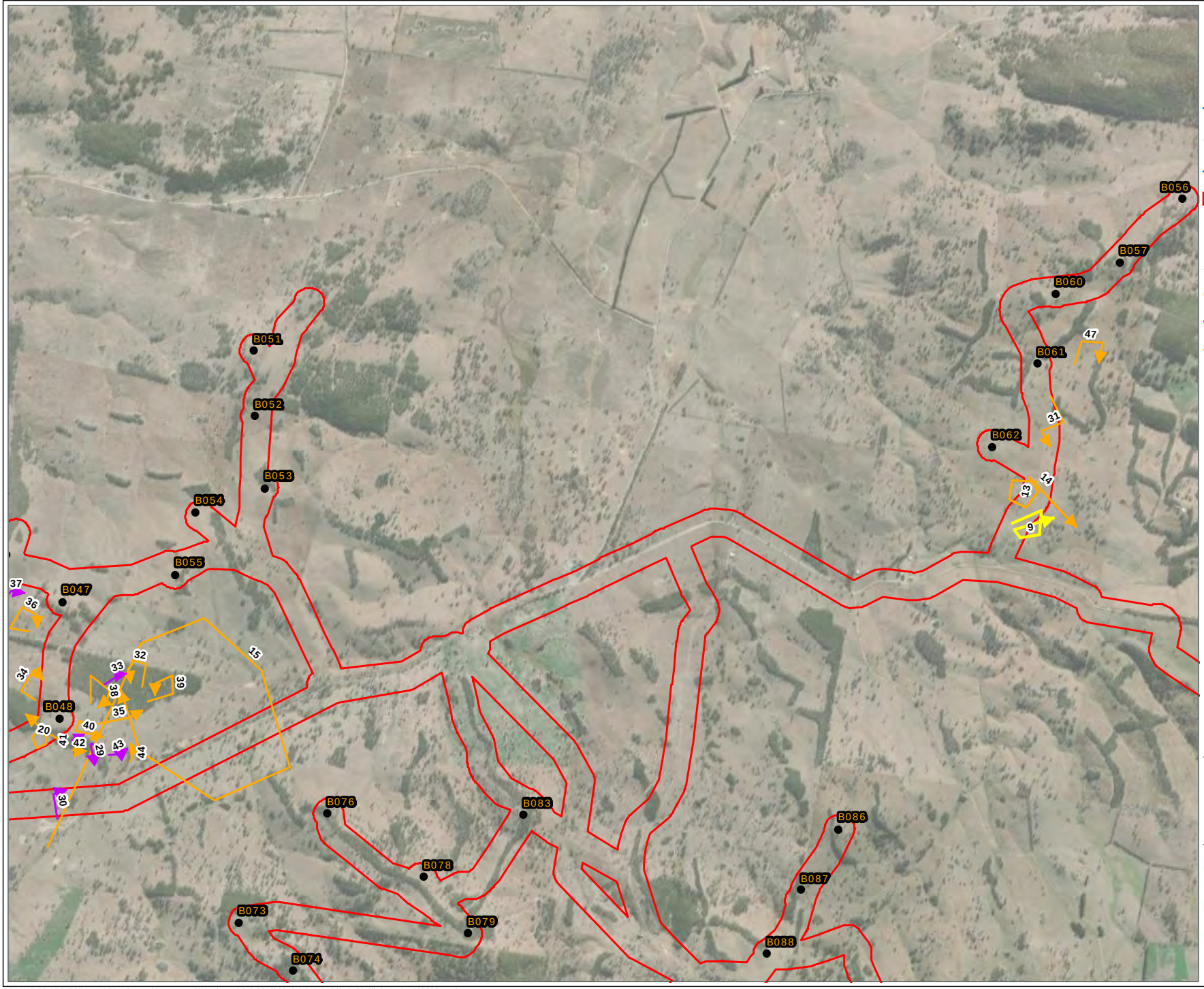


Figure 5-4: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

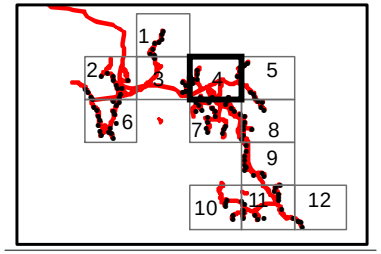
Proposed turbine

Species

Brown Falcon

Nankeen Kestrel

Wedge-tailed Eagle



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

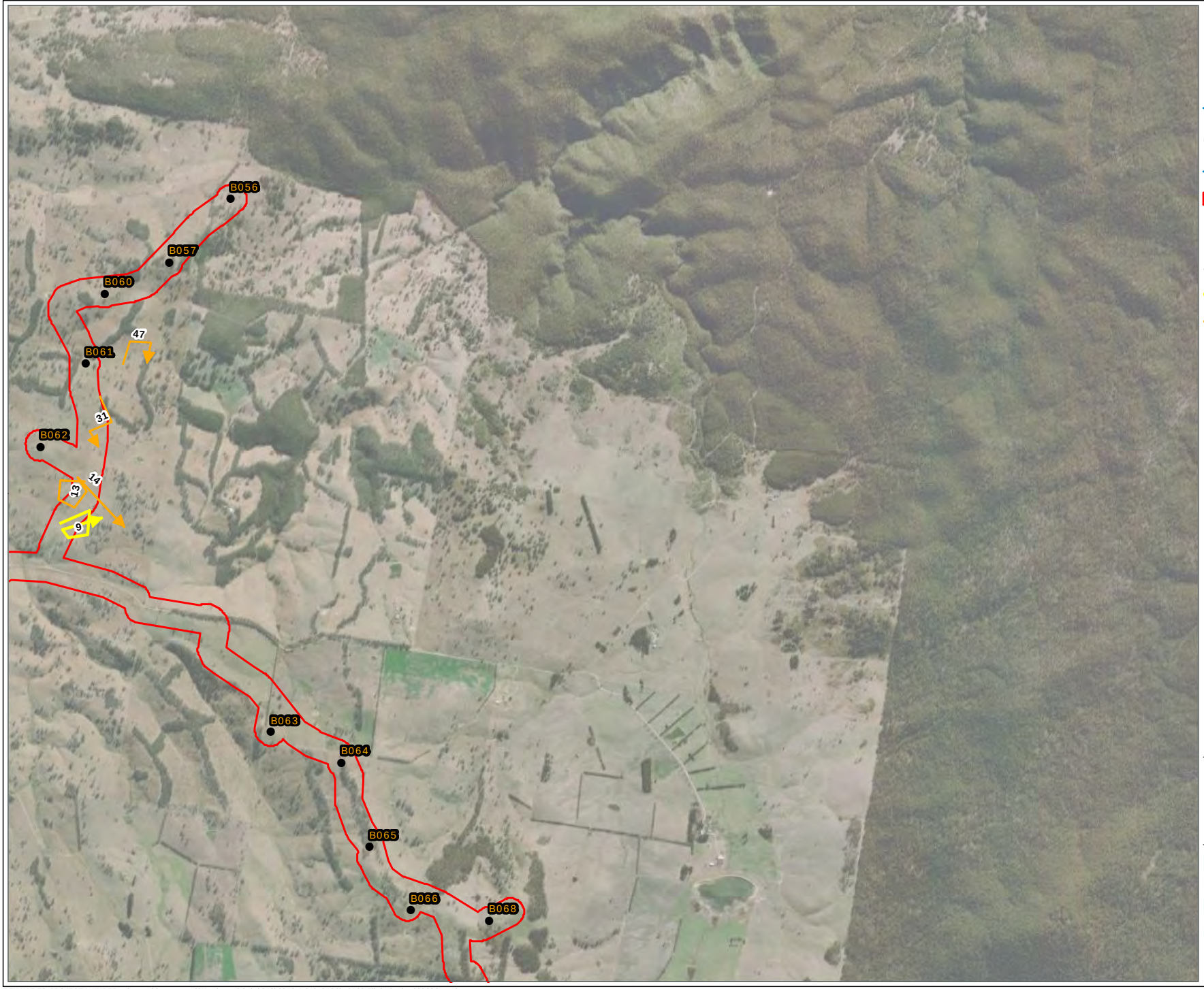


Figure 5-5: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

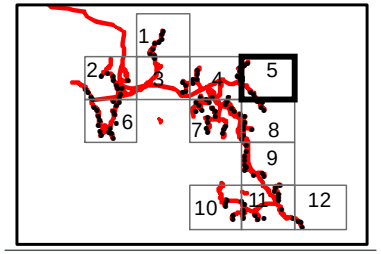
Winterbourne wind farm boundary

Proposed turbine

Species

Brown Falcon

Wedge-tailed Eagle



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

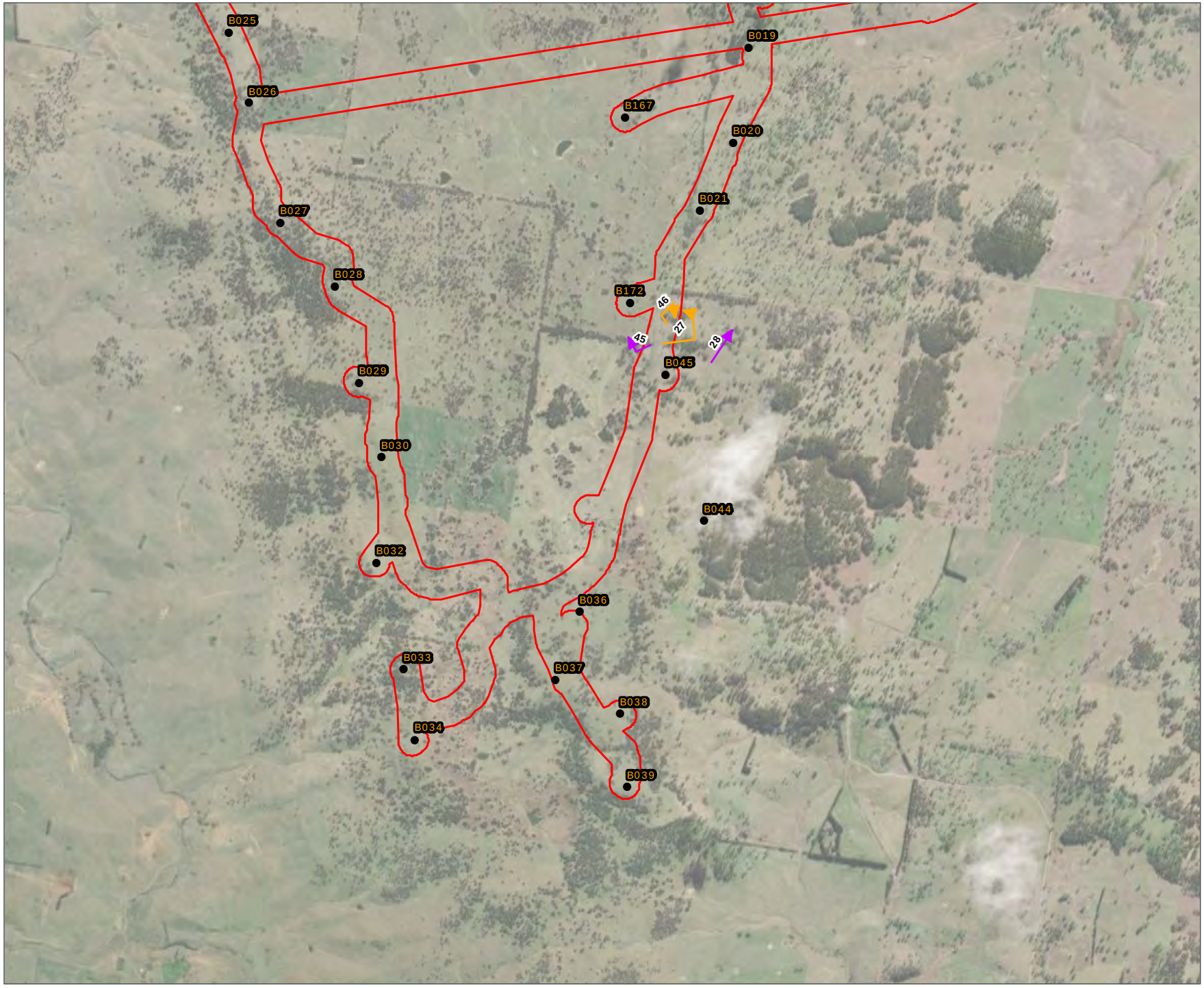


Figure 5-6: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

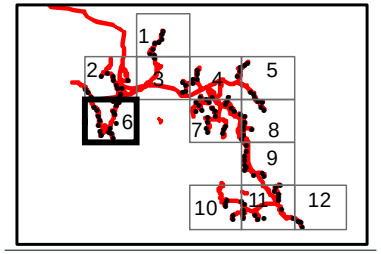
Winterbourne wind farm boundary

Proposed turbine

Species

Nankeen Kestrel

Wedge-tailed Eagle



N

Metres

0 600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

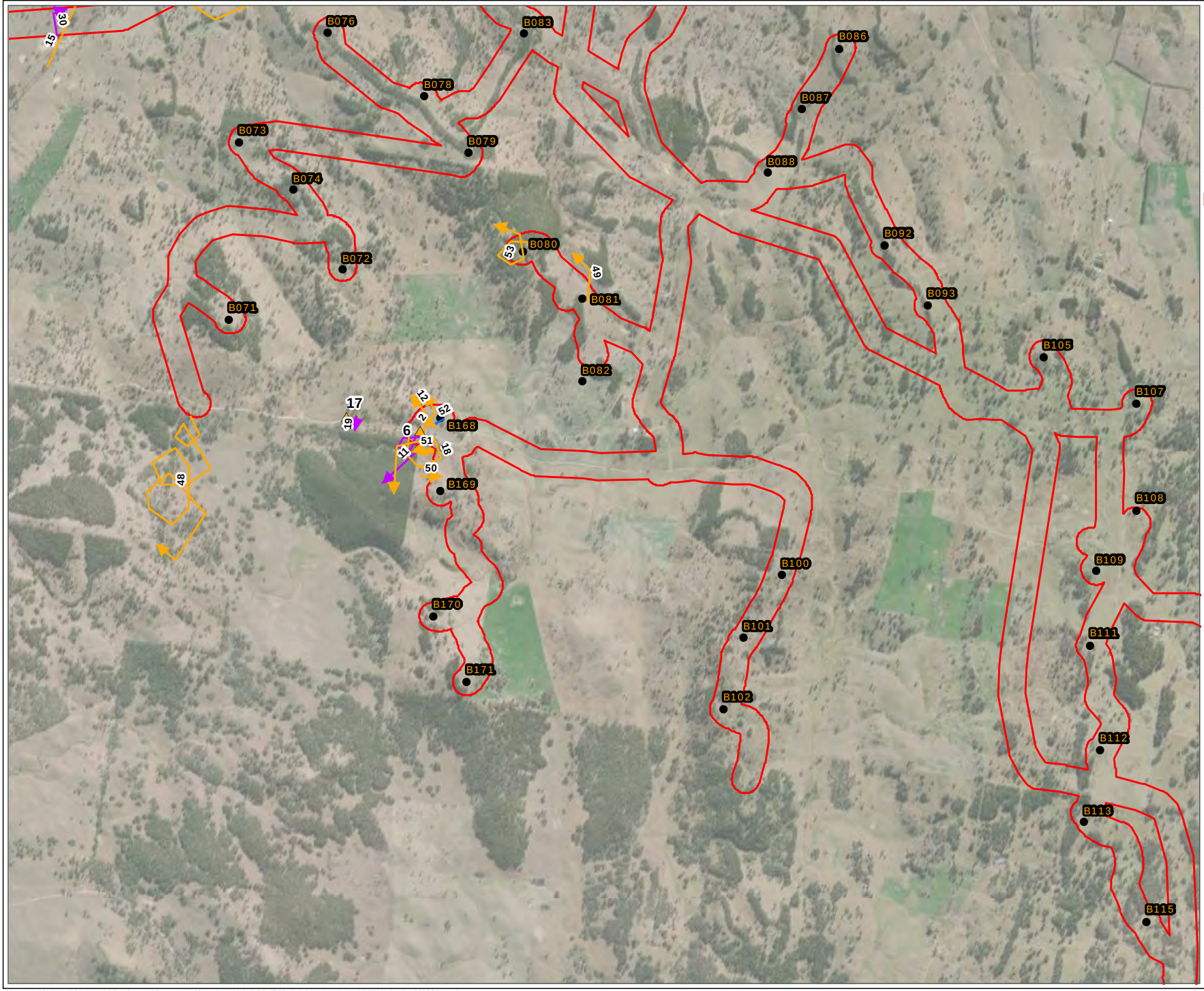


Figure 5-7: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine

Perched

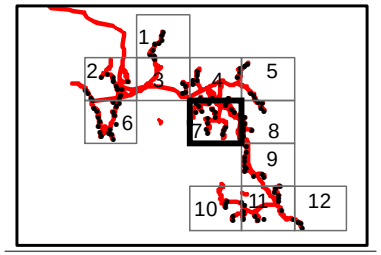
Wedge-tailed Eagle

Species

Brown Goshawk

Nankeen Kestrel

Wedge-tailed Eagle



N

Metres

0 600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

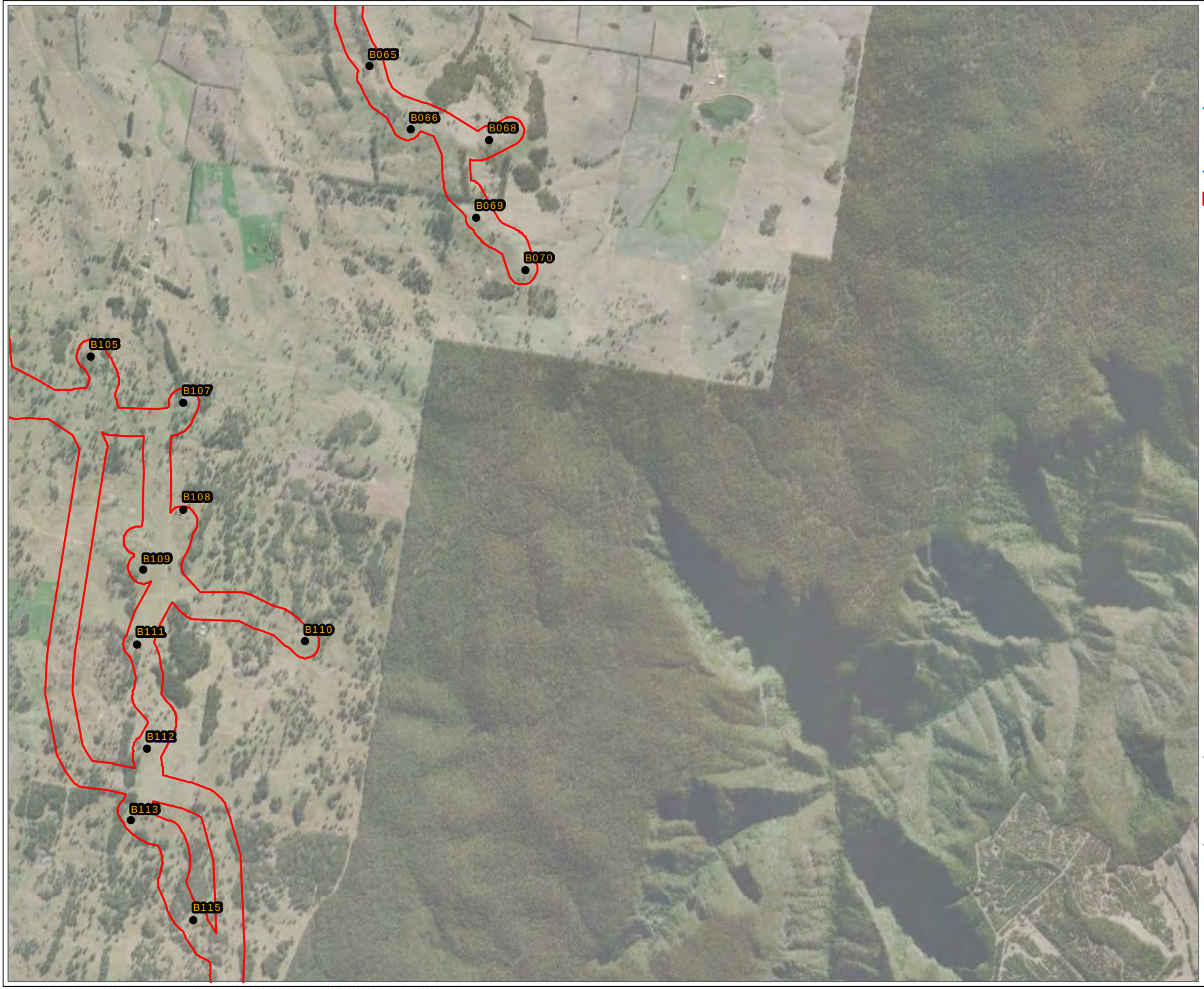
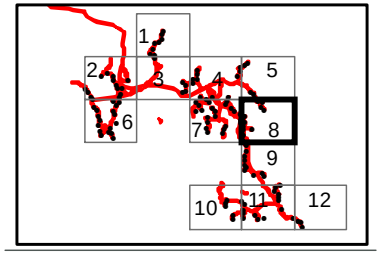


Figure 5-8: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

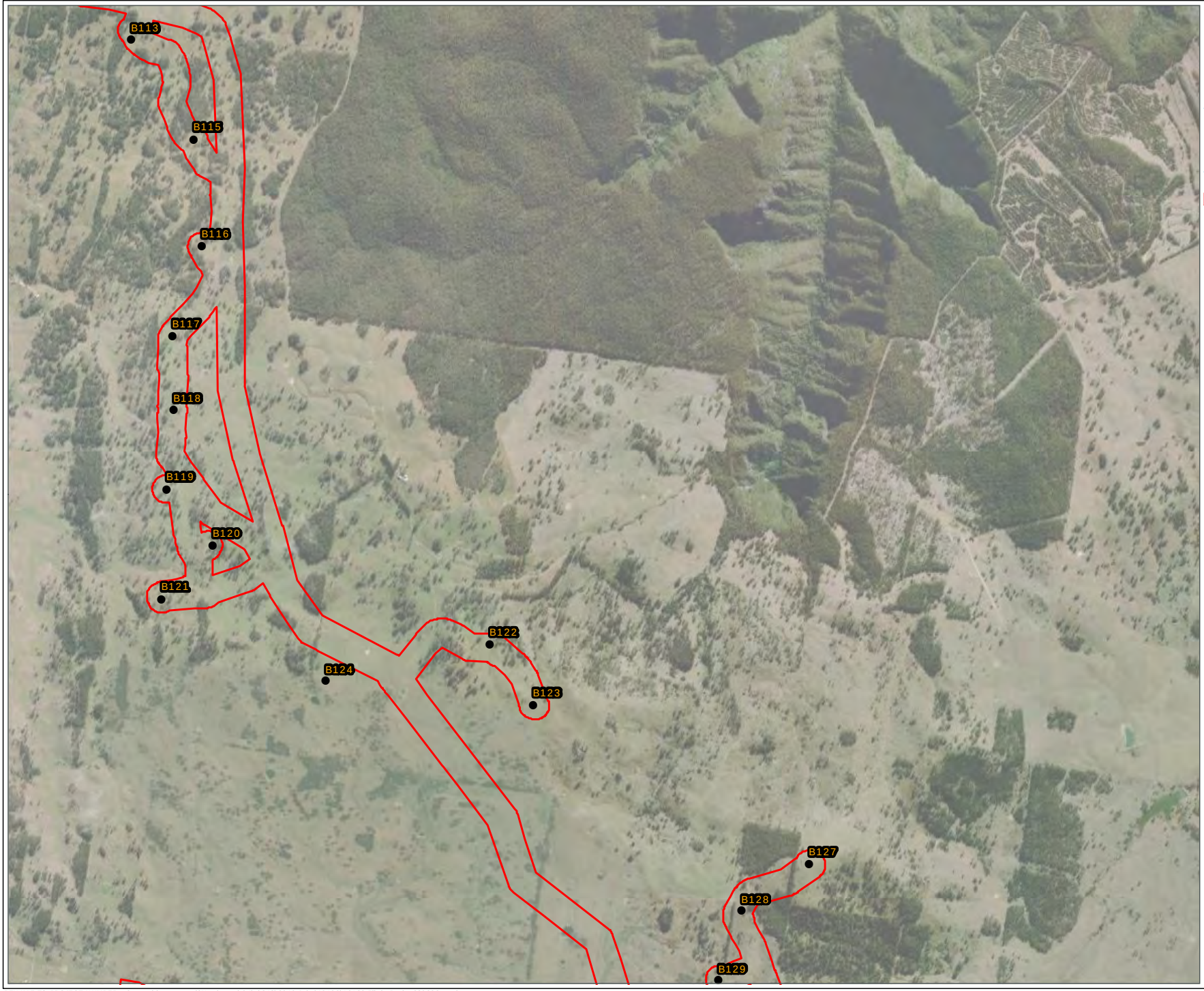
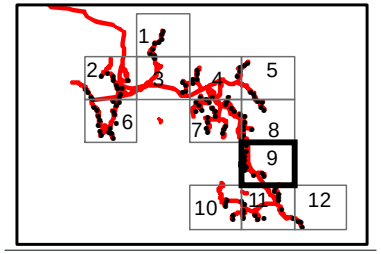


Figure 5-9: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

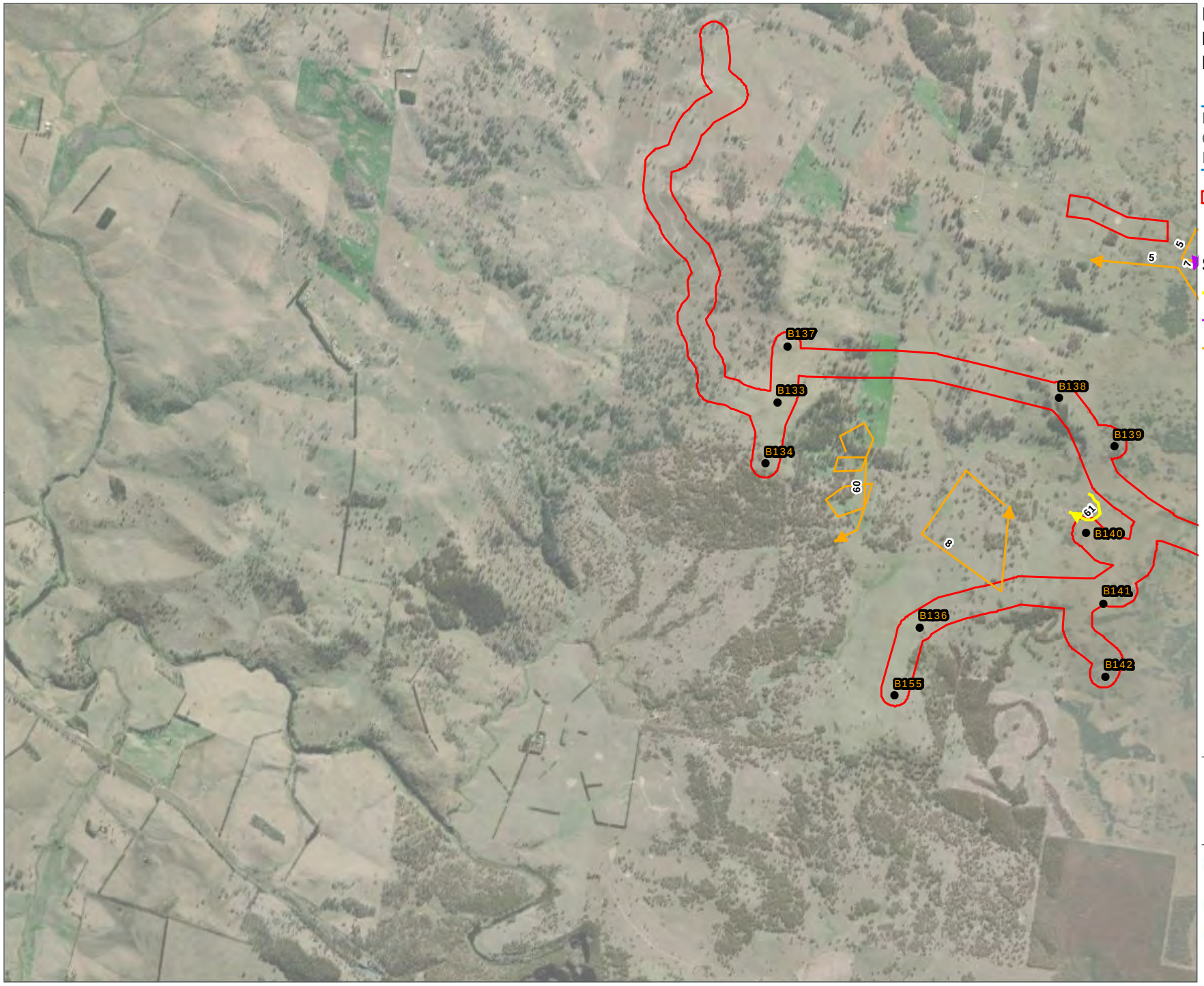


Figure 5-10: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

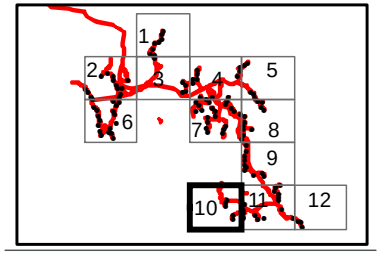
Proposed turbine

Species

Brown Falcon

Nankeen Kestrel

Wedge-tailed Eagle



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

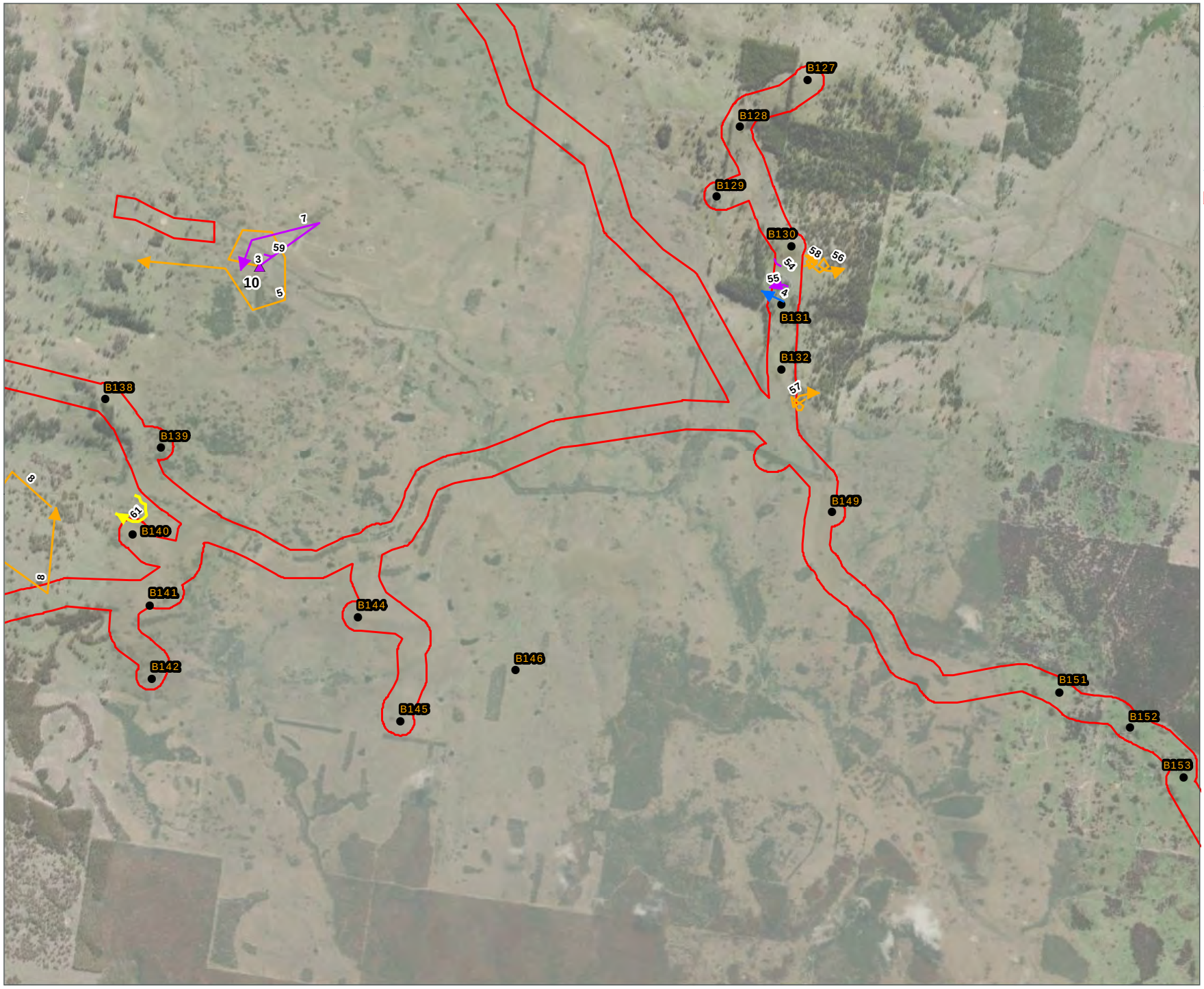


Figure 5-11: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine

Perched

Nankeen Kestrel

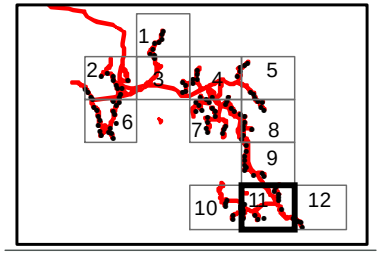
Species

Brown Falcon

Brown Goshawk

Nankeen Kestrel

Wedge-tailed Eagle



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

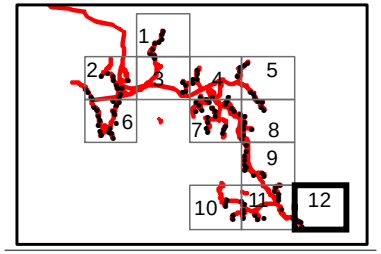


Figure 5-12: Raptor Flight Paths at Winterbourne Wind Farm

Project: Winterbourne Wind Farm
Client: NGH Consulting
Date: 24/02/2022

Winterbourne wind farm boundary

Proposed turbine



N

Metres
0
600

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

4. Conclusions

The conclusions from the Spring 2020 and Autumn 2021 BUS at WWF are presented below.

- The proposed site is a mosaic of farmland and scattered woodland remnants, supporting predominantly farmland and woodland birds.
- During three seasonal BUS, a total of 4,656 individual birds were recorded, 2,609 of these from the impact points at WWF.
- Over 90 species of birds were recorded during the seasonal BUS, of which 65 species were recorded during spring and autumn, and 72 species during summer. At impact and reference points, 64 and 35, and 67 and 29 species were recorded during spring and autumn, and summer, respectively.
- Birds numbers were highest in spring (1,320 individuals), and lowest in summer (979), with autumn numbers (1,310) similar to spring.
- The five most common species (Percent of total birds recorded during the three seasons) at the impact points were; Australian Magpie (12.5%), Torresian Crow (8.9%), Yellow-rumped Thornbill (8,3%), Eastern Rosella (7.3%), and Superb Fairywren (5.8%). At reference points they were: Eastern Rosella (16.3%), Torresian Crow (14.5%), Noisy Miner (13,2%), Australian Magpie (10.5%), and Galah (8.8%). These five species comprised 42.5% of all birds recorded at the impact survey points and 63.3% at the reference survey points.
- A combined average of the distribution of bird flight heights revealed that a significant majority of 95.7% flew below, 3.4% at, and 0.9% over RSA heights. Three raptors, one raven and one cockatoo dominated bird species flying at RSA heights.
- Wedge-tailed Eagle was the most abundant raptor species at WWF during the three seasons of BUS. Numbers observed were high during autumn (64 Observations), lower in spring (41) and lowest in summer (28). Of the total number of eagles seen (133), 62.4% were observed flying at RSA heights. They made up 74.3% of all raptors.
- At the WWF, the number of Wedge-tailed Eagles were exceptionally high compared with other wind farms with similar settings. The utilisation rate of eagles was estimated as 0.66 eagles per hectare per hour, higher than the range (0.01 – 0.44) calculated for other wind farms in south-eastern Australia (Nature Advisory data).
- The Wedge-tailed Eagle and Nankeen Kestrel were both observed regularly flying at RSA height which will lead to interactions with turbines and may result in collisions.
- Waterbirds were found to be largely confined to some small farm dams and were mainly very common farmland species. One individual was seen flying at RSA during the three seasonal surveys.
- Four species of threated birds were recorded on the WWF site during BUS, namely Varied Sitella, Speckled Warbler, Diamond Firetail and Glossy Black-Cockatoo. None of these behave in a manner that puts them at risk of collision with operating wind turbines. One additional threatened species, Little Eagle, was identified incidentally flying over the wind farm site.
- Consideration should be given to mapping the habitat of the Glossy Black Cockatoo and assessing the availability of their favoured feed trees (i.e. *Allocasuarina and Casuarina*) and to identifying where Wedge-tailed Eagles are breeding to provide adequate (minimum 300m) buffers between nests and turbines.

5. References

AusWEA (Australian Wind Energy Association) 2005, *Wind Farms and Birds: Interim Standards for Risk Assessment,* Report prepared by Brett Lane and Associates and AIRA Professional Services; Report No. 2003.35 (2.2), July 2005.

Clean Energy Council 2018, *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia.* Clean Energy Council, Australia.

Clout, M. N. (1989.) Foraging behaviour of Glossy Black-Cockatoos. *Australian Wildlife Research* 1, 467-473.

Crowley, G. M. & Garnett, S.T. (2001). Food value and tree selection by Glossy Black Cockatoos *Calyptorhynchus lathami*. *Austral Ecology* 26, 116-126.

Larkin, C., Jenkins, R., McDonald, P. G. & Debus, S. J. S. (2020). Breeding habitat, nest-site characteristics and productivity of the Little Eagle (*Hieraaetus morphnoides*) near Armidale, New South Wales. *Pacific Conservation Biology* 26(3), 258-268.

Pepper, J. W., Male, T. D & Roberts, G. E. (2000). Foraging ecology of the South Australian Glossy Black-Cockatoo (Calyptorhynchus lathami halmaturinus). *Austral Ecology* 25, 16-24.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Appendix 1: Raw data for BUS spring 2020 survey impact points (BUS1-4) at WWF

Site	BUS1								BUS2												BUS3								BUS4									
Replicate	1	2	3	4	5		6	7	8	1		2	3		4		5		6		7		8	1	2	3	4		5	6	7	8	1		2	3	4	5	6	7		8
Species/height class	A	A	A	A	A	B	A	A	A	A	B	A	A	B	A	B	A	B	A	B	A	B	A	A	A	A	A	A	B	A	A	A	A	A	B	A	A	A	A	A	A	B	A
Australian Wood Duck																														4													
Australasian Darter																																											
Australian King Parrot			2														1											1				1									
Australian Magpie	2	4	2	1	5		3	1	1	1		6			2		2				2		1	2	4	2	2			1	1		5		1	2	3	2	1	2		1
Australian Raven														3										2					3												1
Black-chinned Honeyeater																																		3								
Black-faced Cuckoo-shrike				1						1			1		1				1		1										1			1	3	1		1	1		1
Black-shouldered Kite																															1											
Brown Falcon													1												1										1						
Brown Goshawk																																										
Crested Pigeon																									1																
Crimson Rosella					2								2												2																
Eastern Rosella	5	4	1	4	6			2				4											2	2			2			2			4			4	2		2			2
Eastern Yellow Robin																												1													
Fuscous Honeyeater																																		4		1						
Galah	2		6	5	3			3	3										1		1		3			2	2					1			2			1	1		
Grey Butcherbird	1			2			1			1		1			1						1				1						1			1				1	1		
Grey Shrike-thrush							1			1																								1					1			
Jacky Winter																																										
Laughing Kookaburra																																2										
Leaden Flycatcher		1																																								
Little Corella								2									3						2							2												
Little Friarbird																									1														1			
Magpie-lark			1																																							
Masked Lapwing																																										
Nankeen Kestrel	1					2		1	1	1		1											1					1			1						1				
Noisy Friarbird	3	1					1		2	1							2		1										1	1											
Noisy Miner	1	3	1		8		2	5	2	5		1			2		2		1				3	2		1	2				3					1					
Olive-backed Oriole																																										
Pied Butcherbird																																								2			
Pied Currawong				1	1								1		1									1			1											2			
Red Wattlebird																									1	3				1											
Red-rumped Parrot																																								1		
Restless Flycatcher																														3									1			
Rufous Songlark																														1	1											
Rufous Whistler																												1	1									1			3
Spotted Pardalote		1	1																																							
Straw-necked Ibis																																			10							
Striated Pardalote		1		4	1				1			1					1		2		2		2	3		1	1		2		2	2	1		1	3		1		2		2
Sulphur-crested Cockatoo								1	10														1																1			1
Superb Fairy-wren																			5		5			7					3	4		5			4		2	2	4	5		
Torresian Crow	3		2							3																2				4			4		1		1		5			
Tree Martin																									1											2						
Varied Sitella																																										
Wedge-tailed Eagle											2	3					2		3		2		2			1			1							2				2	
Weebill							3																			2															

Site	BUS1									BUS2														BUS3								BUS4								
Replicate	1	2	3	4	5		6	7	8	1		2	3		4		5		6		7		8	1	2	3	4		5	6	7	8	1		2	3	4	5	6	7		8
Species/height class	A	A	A	A	A	B	A	A	A	A	B	A	A	B	A	B	A	B	A	B	A	B	A	A	A	A	A	B	A	A	A	A	A	B	A	A	A	A	A	A	B	A
Welcome Swallow													1																													
Whistling Kite																																	1								
White-browed Scrubwren																								3	2	1	4			2		1				1					
White-throated Gerygone							1			1															2																
White-throated Treecreeper		2													1										1				1	1	1		1		1	1	1	1			
White-winged Chough													5																												
Willie Wagtail					1		1														1				1	1					1					1				
Yellow-rumped Thornbill		10	4				5	3							3		3		7		7		3						7	3	3	3			3		4	5	6	7		
Yellow-tailed Black Cockatoo																																									
Total	18	27	20	18	27	2	18	18	20	15	2	17	11	3	11	2	14	3	18	2	20	2	18	22	21	13	14	2	20	18	23	17	18	1	22	28	20	17	23	21	2	11

Notes: A = below RSA height, B = At RSA height.

Appendix 1 continued: Raw data for BUS spring 2020 survey impact points (BUS5-8) at WWF

Site	BUS5										BUS6													BUS7								BUS8									Total
Replicate	1	2	3	4	5		6		7	8	1		2	3	4		5		6		7	8		1	2	3	4	5	6	7	8	1	2	3	4		5	6	7	8	
Species/height class	A	A	A	A	A	A	B	A	A	B	A	B	A	A	A	B	A	B	A	B	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	
Australian Wood Duck																																									**4**
Australasian Darter										1																																**1**
Australian King Parrot						1																		1															2			**9**
Australian Magpie	2	4	2	7	1	2		3	1		1		4	3	1		1				1	2		6	4	2	1	5	1	3	2	2	4	1	1				3	2	**134**
Australian Raven																																									**9**
Black-chinned Honeyeater													2	2			2		1		2	4													3						**19**
Black-faced Cuckoo-shrike											1								1			1					1		1	1	1			1			1			**24**
Black-shouldered Kite																																									**1**
Brown Falcon																																									**3**
Brown Goshawk																									1																	**1**
Crested Pigeon													1																													**2**
Crimson Rosella													2											1	2	6		1		2				2								**22**
Eastern Rosella		2		3				2	2					2					2					4	4		7	2	2			2	4				2	2			**90**
Eastern Yellow Robin																																								1		**2**
Fuscous Honeyeater																																		3	4		2					**14**
Galah		6	2	10	2	2		4	3												1	1		2			2							1	2						**74**
Grey Butcherbird		1	1		1			1			1		1	1	1				1		1	1			1						1				1				1		**28**
Grey Shrike-thrush											1		1	1	1		1																								**8**
Jacky Winter	1																																								**1**
Laughing Kookaburra																								2			1	1							1						**7**
Leaden Flycatcher																																2	1	1				1	1	**7**
Little Corella						3			2																																**14**
Little Friarbird													1						1																						**4**
Magpie-lark		1	1	1	1									1																											**6**
Masked Lapwing								2	2																																**4**
Nankeen Kestrel									1					1																												**13**
Noisy Friarbird													1		1						1												2	1	2			1	1	1		**24**
Noisy Miner		1			1				3						2																2										**54**
Olive-backed Oriole																						1													1				2		**4**
Pied Butcherbird																																									**2**

Site	BUS5										BUS6												BUS7								BUS8								Total
Replicate	1	2	3	4	5	6		7	8		1		2	3	4		5		6		7	8		1	2	3	4	5	6	7	8	1	2	3	4		5	6	7	8	
Species/height class	A	A	A	A	A	A	B	A	A	B	A	B	A	A	A	B	A	B	A	B	A	A	B	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	
Pied Currawong											1													2	3		2	1		1	1	1		1						**21**
Red Wattlebird																																								**5**
Red-rumped Parrot		1											4		2																									**8**
Restless Flycatcher																												1												**5**
Rufous Songlark																																								**2**
Rufous Whistler																	1				1						1											1	1	1	**12**
Spotted Pardalote																																								**2**
Straw-necked Ibis		1			1			1						1																										**14**
Striated Pardalote	1	2	1	2	1	1		2	2				1						1		2	2		5	3	5	4	2	1	3	5	3	1	2	1		3	3	2	1	**98**
Sulphur-crested Cockatoo				1					1																															**16**
Superb Fairy-wren														4	7		4		3			5					4		3			7	6	7	4			6	5	4	**115**
Torresian Crow		2	2	1	5	2		2	5		3		7	7	11		4		5		5	2		4		5	2	2		2			4	1	1					**109**
Tree Martin								1					1																											**5**
Varied Sitella																																3								**3**
Wedge-tailed Eagle							1		1			4	1	1		4		2		2	1		2												2					**41**
Weebill	1										3		2		3											2														**16**
Welcome Swallow																													1											**2**
Whistling Kite																																								**1**
White-browed Scrubwren																																								**14**
White-throated Gerygone											1		1		1						1	1																		**9**
White-throated Treecreeper													1	1			1		1					1		1			1		1	2	1		1		1	2	1	1	**29**
White-winged Chough																																								**5**
Willie Wagtail			1								1		1	1	1		1		1		2	1																		**18**
Yellow-rumped Thornbill		3	3	3	5	3		2	3		8		3	4			3		6		4	7			3						3	5	4	4	3		2	4	7	5	**183**
Yellow-tailed Black Cockatoo																																		3							**3**
Total	5	24	13	28	18	14	1	20	26	1	21	4	35	30	31	4	18	2	23	2	22	28	2	28	21	21	25	14	10	13	16	29	26	29	23	2	12	21	25	15	**1321**

Notes: A = below RSA height, B = At RSA height.

Appendix 2: Raw data for BUS autumn 2021 survey impact points (BUS2-5) at WWF

Points	BUS2											BUS3												BUS4																BUS5															
Replicate	1		2	3		4	5	6		7	8	1	2	3		4		5		6	7	8		1		2	3	4		5		6		7	8					1	2		3		4	5		6	7		8	
Species/height class	A	B	A	A	B	A	A	A	B	A	A	A	A	A	B	A	B	A	B	A	A	A	B	A	B	A	A	A	B	A	B	A	B	A	A					A	A	B	A	B	A	A	B	A	A	B	A	B
Australian Wood Duck														4				1																								27						17	9			
Australian Magpie	5		1	4		2	5	2		9	5	3				4		2		4	4	2		5		6	3	3		12		10		4	9					2	5		1		3	1		3	5		5	
Australian Pipit			1															1				1																													
Black-faced Cuckoo-shrike											1	1																																							
Black-shouldered Kite																																																1		
Brown Falcon											1																						1														1			
Common Starling																																			2															
Crested Pigeon																										2																								
Crimson Rosella										5		2	4	1		1		2						1																		1									
Eastern Rosella	6						2	6		2	2	1	2											19		4		4		2		6		4		6			2		13			2					
Galah																											2				5		59			12								14				
Glossy Black Cockatoo																																																	
Grey Butcherbird	2			1		1							1																		1			1	1												
Grey Fantail																1																																	
Grey Shrike-thrush																																																
Laughing Kookaburra						1				1		1																																					
Masked Lapwing																														2														2		3		
Nankeen Kestrel						1	1																														1								1		
Noisy Friarbird																																																
Noisy Miner	7		5	6		5	2	2		2	7															8	3	5		4		2				2			2		2			1	3			
Olive-backed Oriole																										1																							
Peregrine Falcon							1																																										
Pied Currawong																1								1			1																						
Rainbow Lorikeet																																																
Red Wattlebird												1												1			1																						
Red-rumped Parrot																														2			9															
Red-winged Parrot																																																
Rufous Whistler																											2																						
Speckled Warbler														4																																			
Striated Pardalote																								2																									
Striated Thornbill																								4			5																						
Sulphur-crested Cockatoo																																																
Superb Fairy-wren												8	6	3		3								9																									
Torresian Crow	4			1			1			4	1	4	5			2				2	2				2	1	1	8		19		11		6	2	3	1		3		3			5	7		2	
Tree Martin											2																																						
Varied Sitella													12																																				
Wedge-tailed Eagle		1			1				2				3		2		3		3				1		1				8		5	3			1			8		1			2			5		2	
Welcome Swallow			2			1																																			1							
White-browed Scrubwren												2																																				
White-throated Gerygone																																																
White-throated Treecreeper																			1					1		1						1																	
White-winged Chough																														7																		
Willie Wagtail																								1				1						1														
Yellow-rumped Thornbill																					5													8								3							
Total	24	1	9	12	1	11	12	10	2	23	19	23	33	12	2	12	3	6	3	7	6	8	1	44	3	21	16	25	8	44	5	43	1	75	31	14	46	8	8	1	22	5	2	28	41	6	11	2

Appendix 2 continued: Raw data for BUS atumn 2021 survey impact points (BUS6-9) at WWF

Points	BUS6											BUS7									BUS8									BUS9									Total
Replicate	1	2		3		4	5	6	7	8		1		2	3	4	5		6	7	8	1	2	3	4	5		6	7	8	1	2	3	4	5		6		7	8	
Species/height class	A	A	B	A	B	A	A	A	A	A	B	A	B	A	A	A	A	B	A	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	A	A	B	A	A	
Australian Wood Duck																																								58
Australian Magpie		1				2	2		5	1		2		6	2	2	3		3	4	6	4	2	1	1	3		1	1	2	5	5	1	5	2	6		3	3	213
Australian Pipit																																		1						4
Black-faced Cuckoo-shrike		1															1		1																					5
Black-shouldered Kite																																								1
Brown Falcon																																								3
Common Starling																																								2
Crested Pigeon																																								2
Crimson Rosella									5														1	3	1				4						5					36
Eastern Rosella						1	2		6			2										2												2		2		4	4	108
Galah		2							2																		3				5	2								106
Glossy Black Cockatoo														2																										2
Grey Butcherbird							1							1	2		1		1			1		1								1								17
Grey Fantail	1			2		1	1																																	6
Grey Shrike-thrush																						1																		1
Laughing Kookaburra				1				1	1													1						1	1			1				1				12
Masked Lapwing																																								7
Nankeen Kestrel													1								2																				7
Noisy Friarbird	1														1																										2
Noisy Miner				4					2													1										1	3	1		3	5		3	4	95
Olive-backed Oriole																																								1
Peregrine Falcon															1																										2
Pied Currawong														1	1					1				1	1				1		1							1			11
Rainbow Lorikeet																						13											2					2			17
Red Wattlebird																						1	1	3	1			14	1			1	1	1	1	1		1			30
Red-rumped Parrot		3		5																											2	4	3	11	13	2		6			60
Red-winged Parrot										2																															2
Rufous Whistler																																									2
Speckled Warbler																																									4
Striated Pardalote		2					2	2				2			2								3						1												16
Striated Thornbill																																									9
Sulphur-crested Cockatoo																			1														2								3
Superb Fairy-wren	3	6					5		5													4	5						2											59
Torresian Crow	5	1		2			1		3	4		3			18	11	5			3	5	3	2	9	4	5		1	7	8		2			2	1		2		207
Tree Martin				1																						1														4
Varied Sitella																						11																			23
Wedge-tailed Eagle			1		1		1		1		1			2		1		2														1					1			64
Welcome Swallow																																2								6
White-browed Scrubwren																																								2
White-throated Gerygone	1					1																																		2
White-throated Treecreeper		1					1	1	1			1		1					1			2	2	1		1		1	1				1		1				1		22
White-winged Chough				6																																				13
Willie Wagtail	1	5		1																															1					11
Yellow-rumped Thornbill	9	4																				7	7						3	7										53
Total	21	26	1	22	1	5	16	4	31	7	1	10	1	13	27	14	10	2	6	9	13	51	23	19	8	10	3	18	22	17	14	25	9	20	28	18	1	22	12	1310

Appendix 3: Raw data for BUS spring 2020 and autumn 2021 at reference points at WWF

Season	Autumn																					Spring																				
Reference points	RF1												RF2								Autumn Total	RF1								RF2									Spring Total
Replicate	1		2		3		4	5		6	7	8	1	2	3	4	5	6	7	8		1	2		3	4	5	6	7	8	1	2		3	4	5	6	7	8	
Species/height class	A	B	A	B	A	B	A	A	B	A	A	A	A	A	A	A	A	A	A	A		A	A	B	A	A	A	A	A	A	A	A	B	A	A	A	A	A	A	
Australian Magpie	3		4		2		5	6		2	6		7	5	2	5	2	4	4	1	**58**	2	2		1	1	3	1	1	2	2	2		3	2	2	2	1	5	**32**
Australian Pipit													1								**1**																			
Australian Wood Duck																												2												**2**
Black-faced Cuckoo-shrike													1			1					**2**	2			5	1														**8**
Common Starling																									1															**1**
Crimson Rosella	2		2										2				9	4		2	**21**			2	6														2	**10**
Eastern Rosella			21		6		6	3		4	4	3	11		2	4	2	6	9		**81**	5	7		3	5	3		2		6	8		2	4	4	2		6	**57**
Eastern Yellow Robin																						1																			**1**
Galah					2		23	22			16		4							1	**68**		1			2	5		8	1	1			1	3	1				**23**
Grey Butcherbird	1				1		1	1		1			2		1	1	1	2	1		**13**							1		1	1			1	1	1			1	**7**
Laughing Kookaburra																																					1				**1**
Little Corella																											2		2	5											**9**
Magpie-lark													1			1	1	1		1	**5**						1	1												**2**
Masked Lapwing																													3												**3**
Nankeen Kestrel										1					1						**2**											1			1		1	1	2	**6**
Noisy Friarbird																						2			5	1				2					1					**11**
Noisy Miner	3		5		7		6	4		2	1		2	4	1	3	1	4	2	3	**48**	1	3		2	2		1	4	2	3	3		3	2	3			9	**38**
Olive-backed Oriole																	1				**1**																			
Pacific Black Duck										2											**2**																			
Pied Currawong																							1		1							1	1				1		1	**6**
Red Wattlebird																1	1				**2**																			
Red-rumped Parrot			13		4		19	17		8	3	19									**83**																		
Straw-necked Ibis																												5			2			9		13		1		**30**
Striated Pardalote																	2	2	1	1	**6**		3					1	2		2	3		2	4	3	1	2	3	**26**
Sulphur-crested Cockatoo						2	1						1								**4**						5		1	4									**10**
Torresian Crow	1		1		3		5	6		2	5		9	7	8	13	1	8	5	18	**92**		1		2		1	5	5	2	3	9		4	6	8	4	7	7	**64**
Tree Martin																																					2		1		**3**
Wedge-tailed Eagle		1		3	1		1		1	2				1							**10**												2							**2**
Weebill					3																**3**																			
Welcome Swallow					2																**2**																			
White-throated Gerygone																																		1							**1**
White-throated Treecreeper							1														**1**																			
Willie Wagtail																		1			**1**									1									1	**2**
Yellow-rumped Thornbill																										2	3	2	3	7											**17**
Total	10	1	46	3	31	2	68	59	1	24	35	22	41	17	15	29	21	32	22	27	**506**	13	18	2	26	14	23	19	31	27	21	27	2	26	24	38	11	13	37	**372**

Notes: A = below RSA height, B = At RSA height.

Appendix 4: Raw data for BUS summer 2022 survey impact points (BUS2-5) at WWF

| Season | Summer | | |

| Season | Summer | | |

Appendix 4 continued: Raw data for BUS summer 2022 survey impact points (BUS 7-8, 12-13) at WWF

Season	Summer																																Total all surveys
Reference points	BUS7									BUS8								BUS12								BUS13								
Replicate	1	2	3	4		5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4		5	6	7	8		1	2	3	4	5	6	7	8	
Species/height class	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	B	A	A	A	A	A	A	A	A	
Australasian Pipit																																				7
Australian Ibis																																				2
Australian Magpie		8					1	1		2	1	1	2	1	1	1		1	1	4	1			1		1		1	10	2	2	1	3	3	1	102
Australian Raven																																				10
Australian Wood Duck																																				7
Black-faced Cuckoo-shrike				1									1	1		1		1													1					14
Brown Falcon																				1																5
Brown Goshawk								1																												1
Brown Honeyeater																																				4
Brown Quail								1																												1
Brown-headed Honeyeater			1			3	1	1												1	2		1	3	1	2										16
Buff-rumped Thornbill																																				13
Common Starling																																				80
Crested Pigeon																																				1
Crimson Rosella			1									2	1	2	2	3	1											1	1		1	1				22
Diamond Firetail																																				9
Dusky Woodswallow																																				21
Eastern Rosella							2																					1					1			55
Eastern Spinebill			1	1		1	1	1	1										1	1	2		1		1											12
Fairy Martin																												1		3						4
Fan-tailed Cuckoo																																				4
Forest Raven													1		2											3	1			1						11
Fuscous Honeyeater																																				1
Galah									2																											18
Grey Butcherbird	1																													1						10
Grey Fantail	1	2	2	1		1	1	1	1																											10
Laughing Kookaburra																												2			1		2			7
Little Corella																																				26
Little Lorikeet																																	1			1
Little Raven															2	4	1																			7
Magpie-lark																																				4
Masked Lapwing																																				2
Mistletoebird				1																																1
Musk Lorikeet			2																																	2
Nankeen Kestrel											1																									8
Noisy Friarbird						2																								1						6
Noisy Miner																												1				1			1	54
Pacific Black Duck																																				1
Pallid Cuckoo																																				3
Pied Butcherbird																																				6
Pied Currawong					1									2																						5

Season	Summer																																Total all surveys
Reference points	BUS7									BUS8								BUS12									BUS13								
Replicate	1	2	3	4		5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4		5	6	7	8		1	2	3	4	5	6	7	8	
Species/height class	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	B	A	A	A	A	A	A	A	A	
Rainbow Bee-eater																																				2
Raven/Crow sp.											2											1						1	1					1		6
Red Wattlebird																		2	2				1	1	2							1		2		16
Red-rumped Parrot																							2													8
Rufous Songlark																																				5
Rufous Whistler		1		1		2	1	1	1																											10
Striated Pardalote										2						1									2			1	2	1	2	1	1	1	1	32
Striated Thornbill						4																									2					15
Stubble Quail										1										1	1		1	1	2	1										8
Sulphur-crested Cockatoo																																				22
Superb Fairy-wren		1	1	1		1	1	1																				1	1	1	2	1	1			35
Torresian Crow																																				3
Tree Martin																																				5
Varied Sittella		3	3	2		2	2	2	2															1												17
Wedge-tailed Eagle																																				28
Welcome Swallow																																				20
White-browed Scrubwren																																				2
White-eared Honeyeater				1				1																												2
White-naped Honeyeater								1	1																											2
White-throated Treecreeper	1	1	1	1		1	1			1											1		1		1			1	1	1	1	1			1	27
White-winged Chough																																				30
Willie Wagtail		1	1			1	1		1											1	1	1		1		1	1									18
Yellow Thornbill																																				12
Yellow-faced Honeyeater	1	2	2	2		2	3	3	2																											17
Yellow-rumped Thornbill		4				1	1																		1											63
Total	4	23	15	12	1	21	16	15	11	6	4	3	5	6	7	10	2	4	5	9	8	1	7	7	10	10	1	11	16	9	14	8	8	7	4	979

Notes: A = below RSA height.

Appendix 5: Raw data for BUS summer 2022 at reference points at WWF

Season	Summer																Total
Reference site	REF1								REF2								
Replicate	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	
Species/height class	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Australian King Parrot								1									1
Australian Magpie					3	3	3			2	1	1	3	1	5	1	23
Australian Raven			1			1											2
Black-faced Cuckoo-shrike		2	1		1								3				7
Common Starling				5													5
Crested Pigeon				1													1
Crimson Rosella	2	3		2													7
Dollarbird							1										1
Eastern Rosella	5	3	4	1			3	3	2	5	2	2		1	3	3	37
Forest Raven															1		1
Galah			2	2													4
Grey Butcherbird						3											3
Grey Shrike-thrush					1												1
Little Corella								9									9
Little Raven												3		2			5
Nankeen Kestrel	1						2		1								4
Noisy Friarbird						2											2
Noisy Miner	2	3	3	10	5	6	2	8	3	2	3	1	2	1	3	2	56
Pied Butcherbird		2															2
Pied Currawong									2		1						3
Red Wattlebird											2						2
Red-rumped Parrot								3			1						4
Striated Pardalote	2								1					1			4
Sulphur-crested Cockatoo						3		2			1				1		7
Torresian Crow					1												1
Willie Wagtail					1	2											3
Yellow-rumped Thornbill			3														3
Grand Total	12	13	14	21	12	20	11	26	9	9	11	7	8	6	13	6	198

Appendix 6: Raw data for the raptor surveys

Label	Species	Species count	Date	Start time	End time	Observer Initials	Distance (m)	Bearing	Location	Height first observed (m)	Height range of bird (m)	Elevation (m)	Landscape	Direction	Comments	Behaviour
2	Wedge-tailed Eagle	4	13/10/2020	12:30:25 PM	12:36:42 PM	CL		NW	Air		40 to 80				Two pairs - both displaying before heading north-west over Ridge	Displaying
3	Nankeen Kestrel	1	13/10/2020	1:12:09 PM	1:14:17 PM	CL		SE	Air		Oct-20			Away	Kestrel perched on arrival, hovered in flight and moved to another perched 20m away	Foraging (hunting)
4	Brown Goshawk	1	13/10/2020	2:16:58 PM	2:16:09 PM	CL		SE	Air		20 to 40		Ridge	Away	Bird flew from one woodland patch to another	
5	Wedge-tailed eagle	2	13/10/2020	1:14:37 PM	1:20:45 PM	CL		W	Air		60 to 100		Slope	Circling		Soaring
6	wedge-tailed eagle	1	14/10/2020	8:47:06 AM	8:50:18 AM	CL		W	Perched		10 to 30		Slope	Away	Bird was perched and flushed on arrival to another tree. It was mobbed by 2 Torresian crows until it flew off low just above the canopy	Resting
7	Nankeen kestrel	1	14/10/2020	9:25:58 AM	9:28:05 AM	CL		NE	Air		10 to 40		Slope	Toward	Bird hovering then flew to perch in tall Stringybark	
8	Wedge-tailed Eagle	2	14/10/2020	10:02:32 AM	10:03:39 AM	CL		S	Air		70 to 90		Ridge	Circling	Two birds circling above	Soaring
9	Brown Falcon	1	14/10/2020	12:35:02 PM	12:37:08 PM	CL		SE	Air		20 to 30		Valley	Circling	Brown Falcon circled then flew to perch	Foraging (hunting)
10	Nankeen Kestrel	1	14/10/2020	2:20:22 PM	2:23:24 PM	CL		NW	Perched		15		Slope		Kestrel perched on dying stringybark 50m from BUS point	
11	Nankeen Kestrel	1	15/10/2020	8:48:31 AM	8:51:34 AM	CL		S	Air		20		Valley	Circling		Soaring
12	Wedge-tailed Eagle	1	15/10/2020	4:38:47 PM	4:42:50 PM	CL		NW	Air		30 to 40		Ridge	Circling	Circling over lambing paddock	Soaring
13	Wedge-tailed Eagle	1	16/10/2020	9:57:44 AM	10:03:52 AM	CL	200	E	Air		30 to 40		Valley	Circling	Bird circled for several minutes then flew east	Soaring
14	Wedge-tailed Eagle	1	16/10/2020	9:57:44 AM	10:03:52 AM	CL	200	E	Air		30 to 40		Valley	Circling	Bird circled for several minutes then flew east	Soaring
15	Wedge-tailed Eagle	2	16/10/2020	10:25:41 AM	10:28:45 AM	CL	500	NE	Air		40 to 70		Slope	Circling	Two birds circling	
16	Brown Goshawk	1	16/10/2020	9:40:09 AM	9:42:15 AM	CL					15 to 25		Valley	Away	Brown Goshawk flushed then moved to another perch in the paddock	Gliding
17	Wedge-tailed Eagle	2	16/10/2020	10:35:10 AM	10:37:18 AM	CL		S	Perched		20			Away	Birds perched. flushed as I drove past. mobbed by several magpies and 2 kestrels	Gliding
18	Wedge-tailed Eagle	2	16/10/2020	10:46:24 AM	10:50:30 AM	CL		SE	Air		60 to 100			Circling	Two birds circling, headed back over woodland	Soaring
19	Nankeen Kestrel	2	16/10/2020	10:35:26 AM	10:37:31 AM	CL					20				Kestrels mobbed 1 Wedge-tailed Eagle then flew into woodland	
20	Wedge-tailed Eagle	1	8/03/2021	12:42:03 PM	12:44:13 PM	CL					40 to 70		Valley	Circling		Soaring
21	Wedge-tailed Eagle	2	4/01/2022	9:08:52 AM	9:12:11 AM	AB	200		Air		200 to 300		Slope	Circling		Soaring
22	Brown Falcon	2	4/01/2022	9:11:58 AM	9:16:11 AM	AB	200	E	Air		100 to 200		Slope	Away		Powered (flapping) flight
23	Wedge-tailed Eagle	2	4/01/2022	10:15:05 AM	10:16:17 AM	AB	600		Air		200 to 300		Slope	Away		Soaring
24	Nankeen Kestrel	2	4/01/2022	4:18:32 PM	4:20:43 PM	AB	200		Air		100 to 150		Slope	Circling		Hovering
25	Brown Falcon	2	5/01/2022	12:21:08 PM	12:23:18 PM	AB	50	W	Air		50 to 70		Slope	Away		Powered (flapping) flight
26	Wedge-tailed Eagle	1	7/01/2022	2:24:01 PM	2:26:16 PM	AB	400	NE			150 to 200		Slope	Circling		Soaring
27	Wedge-tailed Eagle	2	4/01/2022	3:26:47 PM	3:30:02 PM	AB	400		Air		300 to 400		Valley			Soaring
28	Nankeen Kestrel	2	5/01/2022	1:10:17 PM	1:15:31 PM	AB	200	E	Air		100 to 150		Valley			Hovering
29	Nankeen Kestrel	1	3/01/2022	1:01:51 PM	1:06:11 PM	AB	70	NE			50 to 70		Valley	Circling		Hovering
30	Nankeen Kestrel	2	5/01/2022	4:20:37 PM	4:27:57 PM	AB	80	W	Air		20 to 40		Valley			Hovering
31	Wedge-tailed Eagle	1	4/01/2022	1:35:35 PM	1:37:53 PM	AB	300	S			200 to 300		Slope	Toward		Soaring
32	Wedge-tailed Eagle	2	4/01/2022	11:51:43 AM	11:54:57 AM	AB	300	W	Air		200 to 300		Slope	Circling		Soaring
33	Nankeen Kestrel	2	5/01/2022	9:21:53 AM	9:28:06 AM	AB	200		Air		100 to 150		Slope	Away		Powered (flapping) flight
34	Wedge-tailed Eagle	2	5/01/2022	9:21:33 PM	9:25:49 PM	AB	400	E	Air		300 to 400		Slope			Soaring
35	Wedge-tailed Eagle	4	5/01/2022	3:41:41 AM	3:44:00 AM	AB	300	N	Air		200 to 300		Slope	Toward		Soaring

Label	Species	Species count	Date	Start time	End time	Observer Initials	Distance (m)	Bearing	Location	Height first observed (m)	Height range of bird (m)	Elevation (m)	Landscape	Direction	Comments	Behaviour
36	Wedge-tailed Eagle	2	6/01/2022	8:36:16 PM	8:38:27 PM	AB	300	E	Air		200 to 300		Slope	Circling		Soaring
37	Nankeen Kestrel	1	7/01/2022	11:00:02 PM	11:03:18 PM	AB	50	NE	Air		30 to 50		Slope	Away		Powered (flapping) flight
38	Wedge-tailed Eagle	3	8/01/2022	5:06:24 PM	5:13:37 PM	AB	400	N	Air		200 to 300		Slope	Circling		Soaring
39	Wedge-tailed Eagle	4	3/01/2022	3:00:22 PM	3:03:50 PM	AB	300	E	Air		100 to 300		Valley	Circling		Soaring
40	Wedge-tailed Eagle	2	6/01/2022	8:35:45 AM	8:38:01 AM	AB	400	S	Air		300 to 400		Slope	Circling		Soaring
41	Nankeen Kestrel	2	7/01/2022	11:06:27 AM	11:11:40 AM	AB	200	N	Air		100 to 150		Slope	Circling		Hovering
42	Wedge-tailed Eagle	1	7/01/2022	5:17:04 PM	5:19:46 PM	AB	400	N	Air		300 to 400		Slope	Circling		Soaring
43	Nankeen Kestrel	1	5/01/2022	10:27:13 AM	10:30:39 PM	AB	200	W	Air		50 to 100		Valley	Toward		Hovering
44	Wedge-tailed Eagle	1	5/01/2022	4:40:09 PM	4:43:39 PM	AB	200	N	Air		100 to 150		Valley	Circling		Gliding
45	Nankeen Kestrel	1	3/01/2022	11:25:23 AM	11:28:40 AM	AB	70	W	Air		30 to 50		Valley	Away		Powered (flapping) flight
46	Wedge-tailed Eagle	2	7/01/2022	1:48:19 PM	1:51:47 PM	AB	400	S	Air		200 to 300		Valley	Circling		Soaring
47	Wedge-tailed Eagle	2	5/01/2022	11:20:30 PM	11:22:44 AM	AB	400	NE	Air		300 to 400		Slope	Circling		Soaring
48	Wedge-tailed Eagle	1	4/01/2022	10:44:45 AM	10:45:02 AM	PSL	2000	W	Air	100	80,100	1170	Slope	Parallel to ridge		Soaring
49	Wedge-tailed Eagle	1	7/01/2022	2:24:06 PM	2:24:06 PM	PSL	2500	NE	Air	50	50 to 60	1170	Ridge	Parallel to ridge		Soaring
50	Wedge-tailed Eagle	1	5/01/2022	11:47:32 AM	11:47:49 AM	PSL	300	S	Air	40	40 to 40	1170	Ridge	Parallel to ridge	Adult male	Gliding
51	Wedge-tailed Eagle	1	5/01/2022	11:48:42 AM	11:49:53 AM	PSL	100	SE	Air	150	150,200	1170	Ridge	Parallel to ridge	Adult female	Soaring
52	Brown Goshawk	1	7/01/2022	9:21:22 AM	9:21:36 AM	PSL	100	NE	Air	10	10 to 15	1170	Slope	Away		Powered (flapping) flight
53	Wedge-tailed Eagle	1	7/01/2022	9:48:25 AM	9:49:36 AM	PSL	1500	NE	Air	30	30 to 60	1170	Ridge	Parallel to ridge		Gliding
54	Nankeen Kestrel	1	3/01/2022	10:54:16 AM	10:54:29 AM	PSL	300	NW	Air	40	30 to 40	1290	Ridge	Toward		Gliding
55	Nankeen Kestrel	1	4/01/2022	1:50:25 PM	1:50:39 PM	PSL	100	N	Air	35	15 to 35	1290	Ridge	Parallel to ridge		Gliding
56	Wedge-tailed Eagle	1	5/01/2022	10:41:21 AM	10:42:19 PM	PSL	300	NE	Air	30	30 to 60	1290	Ridge	Away	Adult male	Soaring
57	Wedge-tailed Eagle	2	7/01/2022	12:38:28 PM	12:41:48 PM	PSL	800	S	Air	60	60 to 200	1310	Valley	Away	Adult pair	Soaring
58	Wedge-tailed Eagle	2	7/01/2022	12:49:34 PM	12:50:49 PM	PSL	300	NE	Air	60	60 to 200	1310	Ridge	Parallel to ridge	Adult pair, probably same as seen @12:38 (11 minutes previously)	Soaring
59	Nankeen Kestrel	1	3/01/2022	2:49:13 PM	2:49:34 PM	PSL	100	NE	Air	30	20 to 30	1250	Slope	Away		Hovering
60	Wedge-tailed Eagle	3	3/01/2022	4:12:42 PM	4:13:57 PM	PSL	2000	W	Air	40	30 to 50	1210	Slope	Parallel to ridge	Three together over hill slope to west, probably family group	Soaring
61	Brown Falcon	1	4/01/2022	3:58:31 PM	4:02:24 PM	PSL	15	NW	Air	15	0 to 15	1210	Ridge	Away	Bird flew in, hovered close by, landed on ground then flew away around hillside - foraging	Powered (flapping) flight

APPENDIX G BIODIVERSITY CREDIT REPORT

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00022013/BAAS18074/21/00030009	Proposal Name 21-570 WInterbourne Wind Farm - Walcha Plateau	BAM data last updated * 14/03/2024
Assessor Name	Assessor Number BAAS17034	BAM Data version * 67
Proponent Names	Report Created 13/09/2024	BAM Case Status Finalised
Assessment Revision 2	Assessment Type Major Projects	Date Finalised 13/09/2024

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion

New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Critically Endangered Ecological Community	533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Critically Endangered Ecological Community	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	68.5	32	444	476
533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	0.6	1	10	11
534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	96.9	200	265	465
565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	Not a TEC	7.7	42	0	42
567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	Not a TEC	126.4	825	41	866
568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	Not a TEC	214.6	1046	675	1721
571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	Not a TEC	45.5	318	0	318
766-Carex sedgeland of the slopes and tablelands	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	1.6	0	37	37

965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	Not a TEC	133.0	283	12	295
970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	Not a TEC	130.3	461	0	461
1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	17.3	51	136	187
1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	4.5	22	0	22
501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion	Not a TEC	7.2	99	56	155

501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	501_DC_woodland	Yes	99	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	501_DC_mod_grassland	No	56	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box -	-	510_DC_woodl	No	63	Walcha Plateau, Armidale Plateau,

	Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307,		and			Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421,	-	510_DC_openwoodland	Yes	16	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt	-	510_DC_mod_grassland	No	232	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the

	South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397,					impacted site.

	3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710,	-	510_LRC_mod_grassland	No	107	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298,	-	510_LRC_open woodland	No	42	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW	-	510_TL_canopy	Yes	16	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning.

	North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695,					or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567,	-	510_low_grassland	Yes	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	533_DC_openwoodland	No	2	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	533_DC_modgrassland	No	8	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	533_TL_canopy	Yes	1	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_DC_woodland	Yes	44	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_DC_openwoodland	No	9	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_DC_mod_grassland	No	256	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_LRC_mod_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_LRC_open woodland	Yes	138	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_LRC_canopy	Yes	18	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_low_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	New England Dry Sclerophyll Forests This includes PCT's: 493, 495, 524, 526, 530, 540, 541, 542, 550, 559, 565, 568, 572, 575, 608, 611, 632, 736, 738, 740, 949, 964, 965, 970, 993, 996, 997, 1164, 1394, 1396, 1553, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508	New England Dry Sclerophyll Forests <50%	565_DC_woodland	Yes	42	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Dry Sclerophyll Forests This includes PCT's: 493, 495, 524, 526, 530, 540, 541, 542, 550, 559, 565, 568, 572, 575, 608, 611, 632, 736, 738, 740, 949, 964, 965, 970, 993, 996, 997, 1164, 1394, 1396, 1553, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508	New England Dry Sclerophyll Forests <50%	565_DC_openwoodland	Yes	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 493, 495, 524, 526, 530, 540, 541, 542, 550, 559, 565, 568, 572, 575, 608, 611, 632, 736, 738, 740, 949, 964, 965, 970, 993, 996, 997, 1164, 1394, 1396, 1553, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508	New England Dry Sclerophyll Forests <50%	565_DC_mod_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 493, 495, 524, 526, 530, 540, 541, 542, 550, 559, 565, 568, 572, 575, 608, 611, 632, 736, 738, 740, 949, 964, 965, 970, 993, 996, 997, 1164, 1394, 1396, 1553, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508	New England Dry Sclerophyll Forests <50%	565_low_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_DC_woodland	Yes	444	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_DC_openwoodland	No	6	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_DC_mod_grassland	Yes	334	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_LRC_woodland	Yes	29	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_LRC_mod_grassland	No	35	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_TL_canopy	Yes	18	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_low_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_DC_openforest	Yes	178	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_DC_woodland	Yes	819	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_DC_openwoodland	Yes	16	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_DC_mod_grassland	No	675	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_TL_canopy	Yes	33	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_low_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	571_DC_openwoodland	Yes	318	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	571_DC_mod_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	571_low_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
766-Carex sedgeland of the slopes and tablelands	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions This includes PCT's: 361, 582, 665, 766, 1270, 1298, 3944	-	766_DC_sedgeland	No	37	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions This includes PCT's: 361, 582, 665, 766, 1270, 1298, 3944	-	766_LRC_sedgeland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_DC_openforest	Yes	62	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_DC_woodland	Yes	189	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_DC_shrubland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_DC_mod_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_LRC_openforest	Yes	32	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_LRC_mod_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_TL_canopy	No	12	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_low_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_DC_openforest	Yes	159	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_DC_openwoodland	Yes	249	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_DC_mod_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_LRC_open woodland	Yes	7	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_LRC_openforest	Yes	28	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_LRC_mod_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_TL_canopy	Yes	18	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_low_grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1192_DC_woodland	Yes	37	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1192_LRC_woodland	Yes	14	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1192_low_grassland	No	136	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1194_DC_open woodland	Yes	22	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1194_DC_low_ grassland	No	0	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	**510_DC_woodland, 534_DC_woodland, 567_DC_woodland, 567_DC_openwoodland, 567_TL_canopy, 568_DC_openforest, 568_DC_woodland, 568_DC_openwoodland, 568_TL_canopy, 965_DC_openforest, 965_DC_woodland, 965_LRC_openforest, 970_DC_openforest, 970_DC_openwoodland, 501_DC_woodland**	7.8	255.00
Cryptostylis hunteriana / Leafless Tongue Orchid	**533_DC_openwoodland, 1194_DC_openwoodland**	1.0	18.00
Dichanthium setosum / Bluegrass	**565_low_grassland**	0.8	4.00

Eucalyptus nicholii / Narrow-leaved Black Peppermint	**510_DC_woodland, 510_DC_mod_grassland, 534_DC_woodland, 534_DC_mod_grassland, 567_DC_woodland, 567_TL_canopy, 568_DC_woodland, 568_DC_openwoodland, 568_DC_mod_grassland, 568_TL_canopy, 568_low_grassland**	59.0	118.00

Myotis macropus / Southern Myotis	**510_DC_woodland,** **510_LRC_openwoodland,** **510_TL_canopy,** **534_DC_woodland,** **534_DC_openwoodland,** **534_LRC_canopy,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **965_TL_canopy,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openwoodland,** **1192_LRC_woodland**	9.6	239.00

Ninox connivens / Barking Owl	**510_DC_woodland,** **510_DC_openwoodland,** **510_TL_canopy,** **534_DC_woodland,** **534_DC_openwoodland,** **534_LRC_openwoodland,** **565_DC_openwoodland,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **571_DC_openwoodland,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openforest,** **501_DC_woodland**	25.8	811.00

Petauroides volans / Southern Greater Glider	**510_DC_woodland,** **510_DC_openwoodland,** **510_LRC_openwoodland,** **510_TL_canopy,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **965_TL_canopy,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openwoodland,** **970_LRC_openforest,** **970_TL_canopy,** **1192_DC_woodland,** **1192_LRC_woodland,** **1194_DC_openwoodland**	101.0	2766.00

Petaurus norfolcensis / Squirrel Glider	**510_DC_woodland,** **510_DC_openwoodland,** **510_LRC_openwoodland,** **510_TL_canopy,** **533_DC_openwoodland,** **533_TL_canopy,** **534_DC_woodland,** **534_DC_openwoodland,** **534_LRC_openwoodland,** **534_LRC_canopy,** **565_DC_woodland,** **565_DC_openwoodland,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **965_TL_canopy,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openwoodland,**	106.5	2943.00

	970_LRC_openforest, 970_TL_canopy, 1194_DC_openwoodland		

Phascolarctos cinereus / Koala	**510_DC_woodland,** **510_DC_openwoodland,** **510_LRC_openwoodland,** **510_TL_canopy,** **533_DC_openwoodland,** **533_TL_canopy,** **534_DC_woodland,** **534_DC_openwoodland,** **534_LRC_openwoodland,** **534_LRC_canopy,** **565_DC_woodland,** **565_DC_openwoodland,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **571_DC_openwoodland,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **965_TL_canopy,** **970_DC_openforest,** **970_DC_openwoodland,**	122.9	3411.00

	970_LRC_openwoodland, 970_LRC_openforest, 970_TL_canopy, 1192_DC_woodland, 1192_LRC_woodland, 1194_DC_openwoodland, 501_DC_woodland		

Credit Retirement Options

Like-for-like credit retirement options

Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	Spp	IBRA subregion
	Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	Any in NSW
Cryptostylis hunteriana / Leafless Tongue Orchid	Spp	IBRA subregion
	Cryptostylis hunteriana / Leafless Tongue Orchid	Any in NSW
Dichanthium setosum / Bluegrass	Spp	IBRA subregion
	Dichanthium setosum / Bluegrass	Any in NSW
Eucalyptus nicholii / Narrow-leaved Black Peppermint	Spp	IBRA subregion
	Eucalyptus nicholii / Narrow-leaved Black Peppermint	Any in NSW

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW
Ninox connivens / Barking Owl	Spp	IBRA subregion
	Ninox connivens / Barking Owl	Any in NSW
Petauroides volans / Southern Greater Glider	Spp	IBRA subregion
	Petauroides volans / Southern Greater Glider	Any in NSW
Petaurus norfolcensis / Squirrel Glider	Spp	IBRA subregion
	Petaurus norfolcensis / Squirrel Glider	Any in NSW
Phascolarctos cinereus / Koala	Spp	IBRA subregion
	Phascolarctos cinereus / Koala	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00022013/BAAS18074/21/00030009

Proposal Name
21-570 WInterbourne Wind Farm - Walcha Plateau

BAM data last updated *
14/03/2024

Assessor Name

Assessor Number
BAAS17034

BAM Data version *
67

Proponent Name(s)

Report Created
13/09/2024

BAM Case Status
Finalised

Assessment Revision
2

Assessment Type
Major Projects

Date Finalised
13/09/2024

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Critically Endangered Ecological Community	533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Critically Endangered Ecological Community	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	68.5	32	444	476.00
533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	0.6	1	10	11.00

534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	96.9	200	265	465.00
565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	Not a TEC	7.7	42	0	42.00
567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	Not a TEC	126.4	825	41	866.00
568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	Not a TEC	214.6	1046	675	1721.00
571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	Not a TEC	45.5	318	0	318.00
766-Carex sedgeland of the slopes and tablelands	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	1.6	0	37	37.00
965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	Not a TEC	133.0	283	12	295.00
970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	Not a TEC	130.3	461	0	461.00
1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	17.3	51	136	187.00
1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	4.5	22	0	22.00

501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion	Not a TEC	7.2	99	56	155.00

501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	501_DC_woodland	Yes	99	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	501_DC_mod_grassland	No	56	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Grassy Woodlands	Tier 2 or higher threat status	501_DC_woodland	Yes (including artificial)	99	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Grassy Woodlands	Tier 2 or higher threat status	501_DC_mod_grassland	No	56	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654,	-	510_DC_woodland	No	63	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437,	-	510_DC_openwoodland	Yes	16	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281,	-	510_DC_mod_grassland	No	232	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin,	-	510_LRC_mod_grassland	No	107	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived	-	510_LRC_openwoodland	No	42	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment,

	Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398,					Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401,	-	510_TL_canopy	Yes	16	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710,	-	510_low_grassland	Yes	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	533_DC_openwoodland	No	2	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	533_DC_modgrassland	No	8	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	533_TL_canopy	Yes	1	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_DC_woodland	Yes	44	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_DC_openwoodland	No	9	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_DC_mod_grassland	No	256	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_LRC_mod_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_LRC_openwoodland	Yes	138	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_LRC_canopy	Yes	18	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion This includes PCT's: 533, 534, 681, 704, 734, 736, 965, 970, 996, 1188, 1198, 1200, 1331, 1332, 1551, 3339, 3344, 3345, 4164	-	534_low_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	New England Dry Sclerophyll Forests This includes PCT's: 493, 495, 524, 526, 530, 540, 541, 542, 550, 559, 565, 568, 572, 575, 608, 611, 632, 736, 738, 740, 949, 964, 965, 970, 993, 996, 997, 1164, 1394, 1396, 1553, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508	New England Dry Sclerophyll Forests <50%	565_DC_woodland	Yes	42	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 493, 495, 524, 526, 530, 540, 541, 542, 550, 559, 565, 568, 572, 575, 608, 611, 632, 736, 738, 740, 949, 964, 965, 970, 993, 996, 997, 1164, 1394, 1396, 1553, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508	New England Dry Sclerophyll Forests <50%	565_DC_openwoodland	Yes	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 493, 495, 524, 526, 530, 540, 541, 542, 550, 559, 565, 568, 572, 575, 608, 611, 632, 736, 738, 740, 949, 964, 965, 970, 993, 996, 997, 1164, 1394, 1396, 1553, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508	New England Dry Sclerophyll Forests <50%	565_DC_mod_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 493, 495, 524, 526, 530, 540, 541, 542, 550, 559, 565, 568, 572, 575, 608, 611, 632, 736, 738, 740, 949, 964, 965, 970, 993, 996, 997, 1164, 1394, 1396, 1553, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508	New England Dry Sclerophyll Forests <50%	565_low_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 4 or higher threat status	565_DC_woodland	Yes (including artificial)	42	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 4 or higher threat status	565_DC_openwoodland	Yes (including artificial)	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 4 or higher threat status	565_DC_mod_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 4 or higher threat status	565_low_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_DC_woodland	Yes	444	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_DC_openwoodland	No	6	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_DC_mod_grassland	Yes	334	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_LRC_woodland	Yes	29	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_LRC_mod_grassland	No	35	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_TL_canopy	Yes	18	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Grassy Woodlands This includes PCT's: 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332, 1512, 3351, 3352, 3353, 3354, 3357, 3358, 3359, 3361, 3363	New England Grassy Woodlands >=50% and <70%	567_low_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Grassy Woodlands	Tier 3 or higher threat status	567_DC_woodland	Yes (including artificial)	444	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Grassy Woodlands	Tier 3 or higher threat status	567_DC_openwoodland	No	6	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Grassy Woodlands	Tier 3 or higher threat status	567_DC_mod_grassland	Yes (including artificial)	334	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Grassy Woodlands	Tier 3 or higher threat status	567_LRC_woodland	Yes (including artificial)	29	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Grassy Woodlands	Tier 3 or higher threat status	567_LRC_mod_grassland	No	35	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Grassy Woodlands	Tier 3 or higher threat status	567_TL_canopy	Yes (including artificial)	18	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Grassy Woodlands	Tier 3 or higher threat status	567_low_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_DC_openforest	Yes	178	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_DC_woodland	Yes	819	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_DC_openwoodland	Yes	16	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_DC_mod_grassland	No	675	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_TL_canopy	Yes	33	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	568_low_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	568_DC_openforest	Yes (including artificial)	178	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	568_DC_woodland	Yes (including artificial)	819	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	568_DC_openwoodland	Yes (including artificial)	16	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	568_DC_mod_grassland	No	675	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	568_TL_canopy	Yes (including artificial)	33	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	568_low_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	571_DC_openwoodland	Yes	318	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	571_DC_mod_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 1512, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	571_low_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Grassy Woodlands	Tier 2 or higher threat status	571_DC_openwoodland	Yes (including artificial)	318	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Grassy Woodlands	Tier 2 or higher threat status	571_DC_mod_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Grassy Woodlands	Tier 2 or higher threat status	571_low_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
766-Carex sedgeland of the slopes and tablelands	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions This includes PCT's: 361, 582, 665, 766, 1270, 1298, 3944	-	766_DC_sedgeland	No	37	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions This includes PCT's: 361, 582, 665, 766, 1270, 1298, 3944	-	766_LRC_sedgeland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region

	Freshwater Wetlands	Tier 3 or higher threat status	766_DC_sedgeland	No	37	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Freshwater Wetlands	Tier 3 or higher threat status	766_LRC_sedgeland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_DC_openforest	Yes	62	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_DC_woodland	Yes	189	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_DC_shrubland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_DC_mod_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_LRC_openforest	Yes	32	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_LRC_mod_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_TL_canopy	No	12	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 559, 632, 738, 949, 965, 996, 1164	New England Dry Sclerophyll Forests >=70% and <90%	965_low_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region

Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	965_DC_openforest	Yes (including artificial)	62	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	965_DC_woodland	Yes (including artificial)	189	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	965_DC_shrubland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	965_DC_mod_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	965_LRC_openforest	Yes (including artificial)	32	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	965_LRC_mod_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	965_TL_canopy	No	12	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	965_low_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_DC_openforest	Yes	159	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_DC_openwoodland	Yes	249	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_DC_mod_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_LRC_openwoodland	Yes	7	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_LRC_openforest	Yes	28	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_LRC_mod_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_TL_canopy	Yes	18	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

New England Dry Sclerophyll Forests This includes PCT's: 524, 526, 540, 541, 542, 559, 568, 608, 632, 738, 740, 949, 965, 970, 996, 997, 1164, 1394, 1396, 3501, 3502, 3503, 3506, 3507	New England Dry Sclerophyll Forests >=50% and <70%	970_low_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	970_DC_openforest	Yes (including artificial)	159	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	970_DC_openwoodland	Yes (including artificial)	249	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	970_DC_mod_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	970_LRC_openwoodland	Yes (including artificial)	7	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	970_LRC_openforest	Yes (including artificial)	28	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	970_LRC_mod_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	970_TL_canopy	Yes (including artificial)	18	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	970_low_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1192_DC_woodland	Yes	37	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1192_LRC_woodland	Yes	14	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1192_low_grassland	No	136	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Grassy Woodlands	Tier 3 or higher threat status	1192_DC_woodland	Yes (including artificial)	37	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 3 or higher threat status	1192_LRC_woodland	Yes (including artificial)	14	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 3 or higher threat status	1192_low_grassland	No	136	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1194_DC_openwoodland	Yes	22	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion This includes PCT's: 507, 540, 554, 606, 681, 965, 1188, 1192, 1194, 1200, 1298, 1551, 1555, 1559, 1576, 3339, 3344	-	1194_DC_low_grassland	No	0	Walcha Plateau,Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Wet Sclerophyll Forests (Grassy sub-formation)	Tier 3 or higher threat status	1194_DC_openwoodland	Yes (including artificial)	22	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Wet Sclerophyll Forests (Grassy sub-formation)	Tier 3 or higher threat status	1194_DC_low_grassland	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	**510_DC_woodland, 534_DC_woodland, 567_DC_woodland, 567_DC_openwoodland, 567_TL_canopy, 568_DC_openforest, 568_DC_woodland, 568_DC_openwoodland, 568_TL_canopy, 965_DC_openforest, 965_DC_woodland, 965_LRC_openforest, 970_DC_openforest, 970_DC_openwoodland, 501_DC_woodland**	7.8	255.00
Cryptostylis hunteriana / Leafless Tongue Orchid	**533_DC_openwoodland, 1194_DC_openwoodland**	1.0	18.00
Dichanthium setosum / Bluegrass	**565_low_grassland**	0.8	4.00
Eucalyptus nicholii / Narrow-leaved Black Peppermint	**510_DC_woodland, 510_DC_mod_grassland, 534_DC_woodland, 534_DC_mod_grassland, 567_DC_woodland, 567_TL_canopy, 568_DC_woodland, 568_DC_openwoodland, 568_DC_mod_grassland, 568_TL_canopy, 568_low_grassland**	59.0	118.00

Myotis macropus / Southern Myotis	**510_DC_woodland,** **510_LRC_openwoodland,** **510_TL_canopy,** **534_DC_woodland,** **534_DC_openwoodland,** **534_LRC_canopy,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **965_TL_canopy,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openwoodland,** **1192_LRC_woodland**	9.6	239.00

Ninox connivens / Barking Owl	**510_DC_woodland,** **510_DC_openwoodland,** **510_TL_canopy,** **534_DC_woodland,** **534_DC_openwoodland,** **534_LRC_openwoodland,** **565_DC_openwoodland,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **571_DC_openwoodland,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openforest,** **501_DC_woodland**	25.8	811.00

Petauroides volans / Southern Greater Glider	**510_DC_woodland,** **510_DC_openwoodland,** **510_LRC_openwoodland,** **510_TL_canopy,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **965_TL_canopy,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openwoodland,** **970_LRC_openforest,** **970_TL_canopy,** **1192_DC_woodland,** **1192_LRC_woodland,** **1194_DC_openwoodland**	101.0	2766.00

Petaurus norfolcensis / Squirrel Glider	**510_DC_woodland,** **510_DC_openwoodland,** **510_LRC_openwoodland,** **510_TL_canopy,** **533_DC_openwoodland,** **533_TL_canopy,** **534_DC_woodland,** **534_DC_openwoodland,** **534_LRC_openwoodland,** **534_LRC_canopy,** **565_DC_woodland,** **565_DC_openwoodland,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **965_TL_canopy,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openwoodland,** **970_LRC_openforest,** **970_TL_canopy,** **1194_DC_openwoodland**	106.5	2943.00

Phascolarctos cinereus / Koala	**510_DC_woodland,** **510_DC_openwoodland,** **510_LRC_openwoodland,** **510_TL_canopy,** **533_DC_openwoodland,** **533_TL_canopy,** **534_DC_woodland,** **534_DC_openwoodland,** **534_LRC_openwoodland,** **534_LRC_canopy,** **565_DC_woodland,** **565_DC_openwoodland,** **567_DC_woodland,** **567_DC_openwoodland,** **567_LRC_woodland,** **567_TL_canopy,** **568_DC_openforest,** **568_DC_woodland,** **568_DC_openwoodland,** **568_TL_canopy,** **571_DC_openwoodland,** **965_DC_openforest,** **965_DC_woodland,** **965_LRC_openforest,** **965_TL_canopy,** **970_DC_openforest,** **970_DC_openwoodland,** **970_LRC_openwoodland,** **970_LRC_openforest,** **970_TL_canopy,** **1192_DC_woodland,**	122.9	3411.00

	1192_LRC_woodland, 1194_DC_openwoodland, 501_DC_woodland		

Credit Retirement Options

Like-for-like options

Calyptorhynchus lathami lathami/ South-eastern Glossy Black-Cockatoo	Spp		IBRA region
	Calyptorhynchus lathami lathami/South-eastern Glossy Black-Cockatoo		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Cryptostylis hunteriana/ Leafless Tongue Orchid	Spp		IBRA region
	Cryptostylis hunteriana/Leafless Tongue Orchid		Any in NSW
	Variation options		
	Kingdom	Any species with same or	IBRA region

		higher category of listing under Part 4 of the BC Act shown below	
	Flora	Vulnerable	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dichanthium setosum/ Bluegrass	Spp	IBRA region	
	Dichanthium setosum/Bluegrass	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Flora	Vulnerable	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Eucalyptus nicholii/ Narrow-leaved Black Peppermint	Spp	IBRA region	

	Eucalyptus nicholii/Narrow-leaved Black Peppermint	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Flora	Vulnerable	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Myotis macropus/ Southern Myotis	Spp	IBRA region	
	Myotis macropus/Southern Myotis	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Vulnerable	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Ninox connivens/ Barking Owl	Spp	IBRA region	
	Ninox connivens/Barking Owl	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petauroides volans/ Southern Greater Glider	Spp	IBRA region	
	Petauroides volans/Southern Greater Glider	Any in NSW	
	Variation options		

	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petaurus norfolcensis/ Squirrel Glider	Spp	IBRA region	
	Petaurus norfolcensis/Squirrel Glider	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Phascolarctos cinereus/ Koala	Spp		IBRA region
	Phascolarctos cinereus/Koala		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Walcha Plateau, Armidale Plateau, Comboyne Plateau, Eastern Nandewars, Macleay Gorges, Mummel Escarpment, Peel, Tomalla and Upper Manning. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Candidate Species Report

Proposal Details

Assessment Id 00022013/BAAS18074/21/00030009	Proposal Name 21-570 WInterbourne Wind Farm - Walcha Plateau	BAM data last updated * 14/03/2024
Assessor Name	Report Created 13/09/2024	BAM Data version * 67
Assessor Number BAAS17034	Assessment Type Major Projects	BAM Case Status Finalised
Assessment Revision 2	Date Finalised 13/09/2024	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
Adelotus brevis - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Aepyprymnus rufescens Rufous Bettong	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Burhinus grallarius Bush Stone-curlew	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?

Callitris oblonga Pygmy Cypress Pine	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo	Yes (surveyed)	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Cercartetus nanus Eastern Pygmy-possum	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Chiloglottis anaticeps Bird Orchid	No (surveyed)	☑ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Chiloglottis platyptera Barrington Tops Ant Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Cryptostylis hunteriana Leafless Tongue Orchid	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Dichanthium setosum Bluegrass	Yes (surveyed)	☑ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Diuris eborensis Diuris eborensis	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Diuris pedunculata Small Snake Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus magnificata Northern Blue Box	No (surveyed)	☑ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Eucalyptus nicholii Narrow-leaved Black Peppermint	Yes (surveyed)	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☑ Jun ☑ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Eucalyptus oresbia Small-fruited Mountain Gum	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☑ Jun ☑ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?

Euphrasia arguta Euphrasia arguta	No (surveyed)	☑ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Euphrasia ciliolata Polblue Eyebright	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Haloragis exalata subsp. velutina Tall Velvet Sea-berry	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Hieraaetus morphnoides Little Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Hoplocephalus bitorquatus Pale-headed Snake	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?

Litoria booroolongensis Booroolong Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Litoria daviesae Davies' Tree Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Myotis macropus Southern Myotis	Yes (surveyed)	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox connivens Barking Owl	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox strenua Powerful Owl	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Petauroides volans Southern Greater Glider	Yes (surveyed)	☐ Jan ☑ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Phascolarctos cinereus Koala	Yes (surveyed)	☐ Jan ☑ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Prostanthera cineolifera Singleton Mint Bush	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pteropus poliocephalus Grey-headed Flying-fox	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Pterostylis elegans Elegant Greenhood	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Tasmannia purpurascens Broad-leaved Pepperbush	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Thesium australe Austral Toadflax	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Tyto novaehollandiae Masked Owl	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Tyto tenebricosa Sooty Owl	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Brush-tailed Phascogale	Phascogale tapoatafa	Refer to BAR
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints

Narrow-leaved Bertya	Bertya ingramii	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Swift Parrot	Lathamus discolor	Habitat constraints

BAM Credit Summary Report

Proposal Details

Assessment Id
00022013/BAAS18074/21/00030009

Proposal Name
21-570 WInterbourne Wind Farm - Walcha Plateau

BAM data last updated *
14/03/2024

Assessor Name

Report Created
13/09/2024

BAM Data version *
67

Assessor Number
BAAS17034

BAM Case Status
Finalised

Date Finalised
13/09/2024

Assessment Revision
2

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion												
52	501_DC_woodland	Not a TEC	75	75.0	2.6	PCT Cleared - 83%	High Sensitivity to Gain			2.00		99

53	501_DC_mod_grassland	Not a TEC	24.6	24.6	4.5	PCT Cleared - 83%	High Sensitivity to Gain			2.00		56
											Subtotal	**155**
Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion												
1	510_DC_woodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	67.6	67.6	1.5	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	63

2	510_DC_openwoodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	50.9	50.9	0.49	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	16

3	510_DC_mod_grassland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	28.1	28.1	13.2	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	232

4	510_LRC_mod_grassland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	31.4	31.4	5.5	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	107

5	510_LRC_openwoodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	49.9	49.9	1.4	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	42

6	510_TL_canopy	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	62.5	19.7	1.3	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	16

54	510_low_grassland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	9.5	9.5	45.2	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
											Subtotal	**476**
Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion												
19	567_DC_woodland	Not a TEC	78.3	78.3	13	PCT Cleared - 62%	High Sensitivity to Gain			1.75		444
20	567_DC_openwoodland	Not a TEC	19.3	19.3	0.71	PCT Cleared - 62%	High Sensitivity to Gain			1.75		6
21	567_DC_mod_grassland	Not a TEC	35.3	35.3	21.6	PCT Cleared - 62%	High Sensitivity to Gain			1.75		334

22	567_LRC_woodland	Not a TEC	86.4	86.4	0.77	PCT Cleared - 62%	High Sensitivity to Gain			1.75		29
23	567_LRC_mod_grassland	Not a TEC	24.4	24.4	3.3	PCT Cleared - 62%	High Sensitivity to Gain			1.75		35
24	567_TL_canopy	Not a TEC	70.3	28.2	1.5	PCT Cleared - 62%	High Sensitivity to Gain			1.75		18
57	567_low_grassland	Not a TEC	11.6	11.6	85.5	PCT Cleared - 62%	High Sensitivity to Gain			1.75		0
											Subtotal	**866**
Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion												
25	568_DC_openforest	Not a TEC	64.7	64.7	6.3	PCT Cleared - 59%	High Sensitivity to Gain			1.75		178
26	568_DC_woodland	Not a TEC	61.5	61.5	30.5	PCT Cleared - 59%	High Sensitivity to Gain			1.75		819
27	568_DC_openwoodland	Not a TEC	21.5	21.5	1.7	PCT Cleared - 59%	High Sensitivity to Gain			1.75		16
28	568_DC_mod_grassland	Not a TEC	25.3	25.3	61	PCT Cleared - 59%	High Sensitivity to Gain			1.75		675

29	568_TL_canopy	Not a TEC	55.5	29.1	2.6	PCT Cleared - 59%	High Sensitivity to Gain			1.75		33
58	568_low_grassland	Not a TEC	10.8	10.8	112.6	PCT Cleared - 59%	High Sensitivity to Gain			1.75		0
											Subtotal	**1721**
Carex sedgeland of the slopes and tablelands												
32	766_DC_sedgeland	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	62.8	62.8	1.2	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		37
33	766_LRC_sedgeland	Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	2.2	2.2	0.4	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		0
											Subtotal	**37**

Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion												
34	965_DC_openforest	Not a TEC	56.5	56.5	2.2	PCT Cleared - 75%	High Sensitivity to Gain			2.00		62
35	965_DC_woodland	Not a TEC	29.5	29.5	12.8	PCT Cleared - 75%	High Sensitivity to Gain			2.00		189
36	965_DC_shrubland	Not a TEC	7.4	7.4	0.95	PCT Cleared - 75%	High Sensitivity to Gain			2.00		0
37	965_DC_mod_grassland	Not a TEC	8.6	8.6	4.3	PCT Cleared - 75%	High Sensitivity to Gain			2.00		0
38	965_LRC_openforest	Not a TEC	75.7	75.7	0.84	PCT Cleared - 75%	High Sensitivity to Gain			2.00		32
39	965_LRC_mod_grassland	Not a TEC	1	1.0	0.27	PCT Cleared - 75%	High Sensitivity to Gain			2.00		0
40	965_TL_canopy	Not a TEC	41.9	18.4	1.3	PCT Cleared - 75%	High Sensitivity to Gain			2.00		12
60	965_low_grassland	Not a TEC	3.2	3.2	110.4	PCT Cleared - 75%	High Sensitivity to Gain			2.00		0
											Subtotal	**295**

Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion												
41	970_DC_openforest	Not a TEC	74.6	74.6	4.9	PCT Cleared - 56%	High Sensitivity to Gain			1.75		159
42	970_DC_openwoodland	Not a TEC	51	51.0	11.2	PCT Cleared - 56%	High Sensitivity to Gain			1.75		249
43	970_DC_mod_grassland	Not a TEC	13.3	13.3	24.3	PCT Cleared - 56%	High Sensitivity to Gain			1.75		0
44	970_LRC_openwoodland	Not a TEC	38.8	38.8	0.4	PCT Cleared - 56%	High Sensitivity to Gain			1.75		7
45	970_LRC_openforest	Not a TEC	74.3	74.3	0.86	PCT Cleared - 56%	High Sensitivity to Gain			1.75		28
46	970_LRC_mod_grassland	Not a TEC	12.7	12.7	1.1	PCT Cleared - 56%	High Sensitivity to Gain			1.75		0
47	970_TL_canopy	Not a TEC	75.2	46.6	0.88	PCT Cleared - 56%	High Sensitivity to Gain			1.75		18
61	970_low_grassland	Not a TEC	7.4	7.4	86.6	PCT Cleared - 56%	High Sensitivity to Gain			1.75		0
											Subtotal	**461**

New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion												
7	533_DC_openwoodland	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	48.1	48.1	0.06	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	2
8	533_DC_modgrassland	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	26	26.0	0.49	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	8

9	533_TL_canopy	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	51.1	17.3	0.08	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	1
											Subtotal	**11**
New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion												
10	534_DC_woodland	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	59.2	59.2	1.2	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	44

11	534_DC_openwoodland	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	25.1	25.1	0.59	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	9
12	534_DC_mod_grassland	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	29.9	29.9	13.7	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	256
13	534_LRC_mod_grassland	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	14.9	14.9	12.4	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0

14	534_LRC_openwoodland	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	68.1	68.1	3.2	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	138
15	534_LRC_canopy	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	56.1	23.2	1.3	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	18
55	534_low_grassland	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	11.4	11.4	64.5	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0

											Subtotal	**465**
Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion												
30	571_DC_openwoodland	Not a TEC	60.7	60.7	10.5	PCT Cleared - 78%	High Sensitivity to Gain			2.00		318
31	571_DC_mod_grassland	Not a TEC	14.7	14.7	16.1	PCT Cleared - 78%	High Sensitivity to Gain			2.00		0
59	571_low_grassland	Not a TEC	10.9	10.9	18.9	PCT Cleared - 78%	High Sensitivity to Gain			2.00		0
											Subtotal	**318**
Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion												
16	565_DC_woodland	Not a TEC	50.5	50.5	2.2	PCT Cleared - 44%	High Sensitivity to Gain			1.50		42
17	565_DC_openwoodland	Not a TEC	15.3	15.3	0.12	PCT Cleared - 44%	High Sensitivity to Gain			1.50		0
18	565_DC_mod_grassland	Not a TEC	9.3	9.3	3.3	PCT Cleared - 44%	High Sensitivity to Gain			1.50		0
56	565_low_grassland	Not a TEC	10.5	10.5	2.1	PCT Cleared - 44%	High Sensitivity to Gain			1.50		0

											Subtotal	**42**
Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion												
48	1192_DC_woodland	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	30.3	30.3	2.4	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		37
49	1192_LRC_woodland	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	34.6	34.6	0.82	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		14
62	1192_low_grassland	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	19.4	19.4	14.1	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		136

											Subtotal	**187**
Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion												
50	1194_DC_openwoodland	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	48.2	48.2	0.93	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		22
51	1194_DC_low_grassland	Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	4.5	4.5	3.6	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		0
											Subtotal	**22**
											Total	**5056**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo (Fauna)									
510_DC_woodland	67.6	67.6	0.03			Vulnerable	Vulnerable	False	1
534_DC_woodland	59.2	59.2	0.06			Vulnerable	Vulnerable	False	2
567_DC_woodland	78.3	78.3	0.39			Vulnerable	Vulnerable	False	15
567_DC_openwoodland	19.3	19.3	0.01			Vulnerable	Vulnerable	False	1
567_TL_canopy	28.2	28.2	0.05			Vulnerable	Vulnerable	False	1
568_DC_openforest	64.7	64.7	0.09			Vulnerable	Vulnerable	False	3
568_DC_woodland	61.5	61.5	3.8			Vulnerable	Vulnerable	False	116
568_DC_openwoodland	21.5	21.5	0.16			Vulnerable	Vulnerable	False	2
568_TL_canopy	29.1	29.1	0.02			Vulnerable	Vulnerable	False	1
965_DC_openforest	56.5	56.5	0.05			Vulnerable	Vulnerable	False	1
965_DC_woodland	29.5	29.5	0.01			Vulnerable	Vulnerable	False	1
965_LRC_openforest	75.7	75.7	0.09			Vulnerable	Vulnerable	False	3

970_DC_openforest	74.6	74.6	1.4			Vulnerable	Vulnerable	False	54
970_DC_openwoodland	51.0	51.0	0.53			Vulnerable	Vulnerable	False	14
501_DC_woodland	75.0	75.0	1.1			Vulnerable	Vulnerable	False	40
								Subtotal	**255**
Cryptostylis hunteriana / Leafless Tongue Orchid (Flora)									
533_DC_openwoodland	48.1	48.1	0.06	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Vulnerable	False	1
1194_DC_open woodland	48.2	48.2	0.93	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Vulnerable	False	17
								Subtotal	**18**
Dichanthium setosum / Bluegrass (Flora)									
565_low_grassland	10.5	10.5	0.78	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	4
								Subtotal	**4**
Eucalyptus nicholii / Narrow-leaved Black Peppermint (Flora)									
510_DC_woodland	N/A	N/A	9			Vulnerable	Vulnerable	False	18

510_DC_mod_grassland	N/A	N/A	1			Vulnerable	Vulnerable	False	2
534_DC_woodland	N/A	N/A	4			Vulnerable	Vulnerable	False	8
534_DC_mod_grassland	N/A	N/A	1			Vulnerable	Vulnerable	False	2
567_DC_woodland	N/A	N/A	1			Vulnerable	Vulnerable	False	2
567_TL_canopy	N/A	N/A	1			Vulnerable	Vulnerable	False	2
568_DC_woodland	N/A	N/A	23			Vulnerable	Vulnerable	False	46
568_DC_openwoodland	N/A	N/A	7			Vulnerable	Vulnerable	False	14
568_DC_mod_grassland	N/A	N/A	4			Vulnerable	Vulnerable	False	8
568_TL_canopy	N/A	N/A	3			Vulnerable	Vulnerable	False	6
568_low_grassland	N/A	N/A	5			Vulnerable	Vulnerable	False	10
								Subtotal	**118**
Myotis macropus / Southern Myotis (Fauna)									
510_DC_woodland	67.6	67.6	0.52	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	18

510_LRC_openwoodland	49.9	49.9	0.21	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	5
510_TL_canopy	19.7	19.7	0.62	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	6
534_DC_woodland	59.2	59.2	0.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	9
534_DC_openwoodland	25.1	25.1	0.01	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
534_LRC_canopy	23.2	23.2	0.53	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	6
567_DC_woodland	78.3	78.3	1.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	54
567_DC_openwoodland	19.3	19.3	0.13	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1

567_LRC_woodland	86.4	86.4	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	2
567_TL_canopy	28.2	28.2	0.24	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	3
568_DC_openforest	64.7	64.7	0.18	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	6
568_DC_woodland	61.5	61.5	0.7	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	22
568_DC_openwoodland	21.5	21.5	0.02	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
568_TL_canopy	29.1	29.1	0.43	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	6
965_DC_openforest	56.5	56.5	0.49	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	14

965_DC_woodland	29.5	29.5	1.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	19
965_LRC_openforest	75.7	75.7	0.58	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	22
965_TL_canopy	18.4	18.4	0.45	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4
970_DC_openforest	74.6	74.6	0.32	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	12
970_DC_openwoodland	51.0	51.0	0.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	23
970_LRC_openwoodland	38.8	38.8	0.01	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
1192_LRC_woodland	34.6	34.6	0.25	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4
								Subtotal	**239**

Ninox connivens / Barking Owl (Fauna)									
510_DC_woodland	67.6	67.6	0.36			Vulnerable	Not Listed	False	12
510_DC_openwoodland	50.9	50.9	0.05			Vulnerable	Not Listed	False	1
510_TL_canopy	19.7	19.7	0.07			Vulnerable	Not Listed	False	1
534_DC_woodland	59.2	59.2	0.21			Vulnerable	Not Listed	False	6
534_DC_openwoodland	25.1	25.1	0.01			Vulnerable	Not Listed	False	1
534_LRC_openwoodland	68.1	68.1	0.15			Vulnerable	Not Listed	False	5
565_DC_openwoodland	15.3	15.3	0.08			Vulnerable	Not Listed	False	1
567_DC_woodland	78.3	78.3	2.5			Vulnerable	Not Listed	False	98
567_DC_openwoodland	19.3	19.3	0.13			Vulnerable	Not Listed	False	1
567_LRC_woodland	86.4	86.4	0.04			Vulnerable	Not Listed	False	2
567_TL_canopy	28.2	28.2	0.17			Vulnerable	Not Listed	False	2
568_DC_openforest	64.7	64.7	0.24			Vulnerable	Not Listed	False	8
568_DC_woodland	61.5	61.5	11.8			Vulnerable	Not Listed	False	364
568_DC_openwoodland	21.5	21.5	0.47			Vulnerable	Not Listed	False	5

568_TL_canopy	29.1	29.1	0.16			Vulnerable	Not Listed	False	2
571_DC_openwoodland	60.7	60.7	3.3			Vulnerable	Not Listed	False	100
965_DC_openforest	56.5	56.5	0.16			Vulnerable	Not Listed	False	5
965_DC_woodland	29.5	29.5	0.39			Vulnerable	Not Listed	False	6
965_LRC_openforest	75.7	75.7	0.23			Vulnerable	Not Listed	False	9
970_DC_openforest	74.6	74.6	2			Vulnerable	Not Listed	False	75
970_DC_openwoodland	51.0	51.0	1.3			Vulnerable	Not Listed	False	33
970_LRC_openforest	74.3	74.3	0.24			Vulnerable	Not Listed	False	9
501_DC_woodland	75.0	75.0	1.7			Vulnerable	Not Listed	False	65
								Subtotal	**811**
Petauroides volans / Southern Greater Glider (Fauna)									
510_DC_woodland	67.6	67.6	1.5	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	50
510_DC_openwoodland	50.9	50.9	0.49	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	12

510_LRC_openwoodland	49.9	49.9	1.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	34
510_TL_canopy	19.7	19.7	1.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	13
567_DC_woodland	78.3	78.3	13	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	507
567_DC_openwoodland	19.3	19.3	0.71	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	7
567_LRC_woodland	86.4	86.4	0.77	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	33
567_TL_canopy	28.2	28.2	1.5	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	21
568_DC_openforest	64.7	64.7	6.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	203

568_DC_woodland	61.5	61.5	30.5	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	936
568_DC_openwoodland	21.5	21.5	1.7	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	18
568_TL_canopy	29.1	29.1	2.6	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	37
965_DC_openforest	56.5	56.5	2.2	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	62
965_DC_woodland	29.5	29.5	12.8	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	189
965_LRC_openforest	75.7	75.7	0.84	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	32
965_TL_canopy	18.4	18.4	1.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	12

970_DC_openforest	74.6	74.6	4.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	181
970_DC_openwoodland	51.0	51.0	11.2	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	285
970_LRC_openwoodland	38.8	38.8	0.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	8
970_LRC_openforest	74.3	74.3	0.86	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	32
970_TL_canopy	46.6	46.6	0.88	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	21
1192_DC_woodland	30.3	30.3	2.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	37
1192_LRC_woodland	34.6	34.6	0.82	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	14

1194_DC_open woodland	48.2	48.2	0.93	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	False	22
								Subtotal	**2766**
Petaurus norfolcensis / Squirrel Glider (Fauna)									
510_DC_woodland	67.6	67.6	1.5			Vulnerable	Not Listed	False	50
510_DC_openwoodland	50.9	50.9	0.49			Vulnerable	Not Listed	False	12
510_LRC_openwoodland	49.9	49.9	1.4			Vulnerable	Not Listed	False	34
510_TL_canopy	19.7	19.7	1.3			Vulnerable	Not Listed	False	13
533_DC_openwoodland	48.1	48.1	0.06			Vulnerable	Not Listed	False	1
533_TL_canopy	17.3	17.3	0.08			Vulnerable	Not Listed	False	1
534_DC_woodland	59.2	59.2	1.2			Vulnerable	Not Listed	False	36
534_DC_openwoodland	25.1	25.1	0.59			Vulnerable	Not Listed	False	7
534_LRC_openwoodland	68.1	68.1	3.2			Vulnerable	Not Listed	False	111
534_LRC_canopy	23.2	23.2	1.3			Vulnerable	Not Listed	False	15
565_DC_woodland	50.5	50.5	2.2			Vulnerable	Not Listed	False	56

565_DC_openwoodland	15.3	15.3	0.12			Vulnerable	Not Listed	False	1
567_DC_woodland	78.3	78.3	13			Vulnerable	Not Listed	False	507
567_DC_openwoodland	19.3	19.3	0.71			Vulnerable	Not Listed	False	7
567_LRC_woodland	86.4	86.4	0.77			Vulnerable	Not Listed	False	33
567_TL_canopy	28.2	28.2	1.5			Vulnerable	Not Listed	False	21
568_DC_openforest	64.7	64.7	6.3			Vulnerable	Not Listed	False	203
568_DC_woodland	61.5	61.5	30.5			Vulnerable	Not Listed	False	936
568_DC_openwoodland	21.5	21.5	1.7			Vulnerable	Not Listed	False	18
568_TL_canopy	29.1	29.1	2.6			Vulnerable	Not Listed	False	37
965_DC_openforest	56.5	56.5	2.2			Vulnerable	Not Listed	False	62
965_DC_woodland	29.5	29.5	12.8			Vulnerable	Not Listed	False	189
965_LRC_openforest	75.7	75.7	0.84			Vulnerable	Not Listed	False	32
965_TL_canopy	18.4	18.4	1.3			Vulnerable	Not Listed	False	12
970_DC_openforest	74.6	74.6	4.9			Vulnerable	Not Listed	False	181
970_DC_openwoodland	51.0	51.0	11.2			Vulnerable	Not Listed	False	285

970_LRC_openwoodland	38.8	38.8	0.4			Vulnerable	Not Listed	False	8
970_LRC_openforest	74.3	74.3	0.86			Vulnerable	Not Listed	False	32
970_TL_canopy	46.6	46.6	0.88			Vulnerable	Not Listed	False	21
1194_DC_open woodland	48.2	48.2	0.93			Vulnerable	Not Listed	False	22
								Subtotal	**2943**
Phascolarctos cinereus / Koala (Fauna)									
510_DC_woodland	67.6	67.6	1.5			Endangered	Endangered	False	50
510_DC_openwoodland	50.9	50.9	0.49			Endangered	Endangered	False	12
510_LRC_openwoodland	49.9	49.9	1.4			Endangered	Endangered	False	34
510_TL_canopy	19.7	19.7	1.3			Endangered	Endangered	False	13
533_DC_openwoodland	48.1	48.1	0.06			Endangered	Endangered	False	1
533_TL_canopy	17.3	17.3	0.08			Endangered	Endangered	False	1
534_DC_woodland	59.2	59.2	1.2			Endangered	Endangered	False	36
534_DC_openwoodland	25.1	25.1	0.59			Endangered	Endangered	False	7
534_LRC_openwoodland	68.1	68.1	3.2			Endangered	Endangered	False	111
534_LRC_canopy	23.2	23.2	1.3			Endangered	Endangered	False	15

565_DC_woodland	50.5	50.5	2.2			Endangered	Endangered	False	56
565_DC_openwoodland	15.3	15.3	0.12			Endangered	Endangered	False	1
567_DC_woodland	78.3	78.3	13			Endangered	Endangered	False	507
567_DC_openwoodland	19.3	19.3	0.71			Endangered	Endangered	False	7
567_LRC_woodland	86.4	86.4	0.77			Endangered	Endangered	False	33
567_TL_canopy	28.2	28.2	1.5			Endangered	Endangered	False	21
568_DC_openforest	64.7	64.7	6.3			Endangered	Endangered	False	203
568_DC_woodland	61.5	61.5	30.5			Endangered	Endangered	False	936
568_DC_openwoodland	21.5	21.5	1.7			Endangered	Endangered	False	18
568_TL_canopy	29.1	29.1	2.6			Endangered	Endangered	False	37
571_DC_openwoodland	60.7	60.7	10.5			Endangered	Endangered	False	318
965_DC_openforest	56.5	56.5	2.2			Endangered	Endangered	False	62
965_DC_woodland	29.5	29.5	12.8			Endangered	Endangered	False	189
965_LRC_openforest	75.7	75.7	0.84			Endangered	Endangered	False	32
965_TL_canopy	18.4	18.4	1.3			Endangered	Endangered	False	12

970_DC_openforest	74.6	74.6	4.9			Endangered	Endangered	False	181
970_DC_openwoodland	51.0	51.0	11.2			Endangered	Endangered	False	285
970_LRC_openwoodland	38.8	38.8	0.4			Endangered	Endangered	False	8
970_LRC_openforest	74.3	74.3	0.86			Endangered	Endangered	False	32
970_TL_canopy	46.6	46.6	0.88			Endangered	Endangered	False	21
1192_DC_woodland	30.3	30.3	2.4			Endangered	Endangered	False	37
1192_LRC_woodland	34.6	34.6	0.82			Endangered	Endangered	False	14
1194_DC_open woodland	48.2	48.2	0.93			Endangered	Endangered	False	22
501_DC_woodland	75.0	75.0	2.6			Endangered	Endangered	False	99
								Subtotal	**3411**

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00022013/BAAS18074/21/00030009	21-570 WInterbourne Wind Farm - Walcha Plateau	14/03/2024
Assessor Name	**Report Created**	**BAM Data version ***
	13/09/2024	67
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS17034	Major Projects	Finalised
Assessment Revision		**Date Finalised**
2		13/09/2024

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion

Barking Owl	Ninox connivens	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
		501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
Black-necked Stork	Ephippiorhynchus asiaticus	766-Carex sedgeland of the slopes and tablelands
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Diamond Firetail	Stagonopleura guttata	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion

Diamond Firetail	Stagonopleura guttata	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion
		766-Carex sedgeland of the slopes and tablelands
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion

Dusky Woodswallow	Artamus cyanopterus cyanopterus	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
		501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
Eastern False Pipistrelle	Falsistrellus tasmaniensis	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Flame Robin	Petroica phoenicea	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

Flame Robin	Petroica phoenicea	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Glossy Black-Cockatoo	Calyptorhynchus lathami	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Greater Broad-nosed Bat	Scoteanax rueppellii	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

Greater Broad-nosed Bat	Scoteanax rueppellii	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Grey-headed Flying-fox	Pteropus poliocephalus	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion

Hastings River Mouse	Pseudomys oralis	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion

Large Bent-winged Bat	Miniopterus orianae oceanensis	568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Little Eagle	Hieraaetus morphnoides	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		766-Carex sedgeland of the slopes and tablelands
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Little Lorikeet	Glossopsitta pusilla	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion

Little Lorikeet	Glossopsitta pusilla	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
		501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
Masked Owl	Tyto novaehollandiae	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Masked Owl	Tyto novaehollandiae	1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
New Holland Mouse	Pseudomys novaehollandiae	533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
Olive Whistler	Pachycephala olivacea	1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Painted Honeyeater	Grantiella picta	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Powerful Owl	Ninox strenua	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion

Powerful Owl	Ninox strenua	533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Regent Honeyeater	Anthochaera phrygia	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
Scarlet Robin	Petroica boodang	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion

Scarlet Robin	Petroica boodang	567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		766-Carex sedgeland of the slopes and tablelands
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Sooty Owl	Tyto tenebricosa	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
Speckled Warbler	Chthonicola sagittata	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion

Spotted Harrier	Circus assimilis	533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		766-Carex sedgeland of the slopes and tablelands
Spotted-tailed Quoll	Dasyurus maculatus	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Square-tailed Kite	Lophoictinia isura	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion

Square-tailed Kite	Lophoictinia isura	568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Swift Parrot	Lathamus discolor	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Varied Sittella	Daphoenositta chrysoptera	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion

Varied Sittella	Daphoenositta chrysoptera	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

White-bellied Sea-Eagle	Haliaeetus leucogaster	501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
White-throated Needletail	Hirundapus caudacutus	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion
		766-Carex sedgeland of the slopes and tablelands
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
		501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion
Yellow-bellied Glider	Petaurus australis	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

Yellow-bellied Glider	Petaurus australis	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion
		565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
		567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion
		568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion
		766-Carex sedgeland of the slopes and tablelands
		965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion
		970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion
		1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion
		1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Glossy Black-Cockatoo	Calyptorhynchus lathami	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
		533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion
		534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00022013/BAAS18074/21/00030009

Assessment name
21-570 WInterbourne Wind Farm - Walcha Plateau

BAM data last updated *
14/03/2024

Assessor Name

Report Created
13/09/2024

BAM Data version *
67

Assessor Number
BAAS17034

Assessment Type
Major Projects

BAM Case Status
Finalised

Assessment Revision
2

Date Finalised
13/09/2024

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	510_DC_woodland	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	DC_woodland	1.48	1	

2	510_DC_openwoodland	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	DC_openwoodland	0.49	1	
3	510_DC_mod_grassland	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	DC_mod_grassland	13.22	3	
4	510_LRC_mod_grassland	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	LRC_mod_grassland	5.47	3	
5	510_LRC_openwoodland	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	LRC_openwoodland	1.35	1	
6	510_TL_canopy	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	TL_canopy	1.29	1	
7	533_DC_openwoodland	533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	DC_openwoodland	0.06	1	
8	533_DC_modgrassland	533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	DC_modgrassland	0.49	1	
9	533_TL_canopy	533-New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion	TL_canopy	0.08	1	

10	534_DC_woodland	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	DC_woodland	1.2	1	
11	534_DC_openwoodland	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	DC_openwoodland	0.59	1	
12	534_DC_mod_grassland	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	DC_mod_grassland	13.7	3	
13	534_LRC_mod_grassland	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	LRC_mod_grassland	12.37	3	
14	534_LRC_openwoodland	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	LRC_openwoodland	3.25	2	
15	534_LRC_canopy	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	LRC_canopy	1.26	1	

16	565_DC_woodland	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	DC_woodland	2.22	2	
17	565_DC_openwoodland	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	DC_openwoodland	0.12	1	
18	565_DC_mod_grassland	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	DC_mod_grassland	3.27	2	
19	567_DC_woodland	567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	DC_woodland	12.95	3	
20	567_DC_openwoodland	567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	DC_openwoodland	0.71	1	
21	567_DC_mod_grassland	567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	DC_mod_grassland	21.65	4	
22	567_LRC_woodland	567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	LRC_woodland	0.77	1	
23	567_LRC_mod_grassland	567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	LRC_mod_grassland	3.26	2	

24	567_TL_canopy	567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	TL_canopy	1.49	1	
25	568_DC_openforest	568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	DC_openforest	6.27	3	
26	568_DC_woodland	568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	DC_woodland	30.47	4	
27	568_DC_openwoodland	568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	DC_openwoodland	1.66	1	
28	568_DC_mod_grassland	568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	DC_mod_grassland	60.95	5	
29	568_TL_canopy	568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	TL_canopy	2.57	2	
30	571_DC_openwoodland	571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	DC_openwoodland	10.47	3	

31	571_DC_mod_grassland	571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	DC_mod_grassland	16.07	3	
32	766_DC_sedgeland	766-Carex sedgeland of the slopes and tablelands	DC_sedgeland	1.18	1	
33	766_LRC_sedgeland	766-Carex sedgeland of the slopes and tablelands	LRC_sedgeland	0.4	1	
34	965_DC_openforest	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	DC_openforest	2.18	2	
35	965_DC_woodland	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	DC_woodland	12.82	3	
36	965_DC_shrubland	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	DC_shrubland	0.95	1	
37	965_DC_mod_grassland	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	DC_mod_grassland	4.29	2	

38	965_LRC_openforest	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	LRC_openforest	0.84	1	
39	965_LRC_mod_grassland	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	LRC_mod_grassland	0.27	1	
40	965_TL_canopy	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	TL_canopy	1.26	1	
41	970_DC_openforest	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	DC_openforest	4.86	2	
42	970_DC_openwoodland	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	DC_openwoodland	11.19	3	
43	970_DC_mod_grassland	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	DC_mod_grassland	24.29	4	
44	970_LRC_openwoodland	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	LRC_openwoodland	0.4	1	

45	970_LRC_openforest	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	LRC_openforest	0.86	1	
46	970_LRC_mod_grassland	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	LRC_mod_grassland	1.12	1	
47	970_TL_canopy	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	TL_canopy	0.88	1	
48	1192_DC_woodland	1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	DC_woodland	2.45	2	
49	1192_LRC_woodland	1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	LRC_woodland	0.82	1	
50	1194_DC_openwoodland	1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	DC_openwoodland	0.93	1	
51	1194_DC_low_grassland	1194-Snow Gum - Mountain Gum - Mountain Ribbon Gum open forest on ranges of the NSW North Coast Bioregion and eastern New England Tableland Bioregion	DC_low_grassland	3.58	2	

52	501_DC_woodland	501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion	DC_woodland	2.65	2	
53	501_DC_mod_grassland	501-Bendemeer White Gum - Silvertop Stringybark - Rough-barked Apple +/- Moonbi Apple Box grassy open forest of the southern New England Tableland Bioregion	DC_mod_grassland	4.53	2	
54	510_low_grassland	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	low_grassland	45.22	4	
55	534_low_grassland	534-New England Peppermint grassy woodland on sedimentary or basaltic substrates of the New England Tableland Bioregion	low_grassland	64.51	5	
56	565_low_grassland	565-Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion	low_grassland	2.06	2	
57	567_low_grassland	567-Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	low_grassland	85.54	5	
58	568_low_grassland	568-Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	low_grassland	112.65	6	

59	571_low_grassland	571-Ribbon Gum - Rough-barked Apple - Yellow Box grassy woodland of the New England Tableland Bioregion and NSW North Coast Bioregion	low_grassland	18.92	3	
60	965_low_grassland	965-Narrow-leaved Peppermint - Mountain Ribbon Gum grassy open forest of the eastern New England Tableland Bioregion	low_grassland	110.41	6	
61	970_low_grassland	970-Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion	low_grassland	86.65	5	
62	1192_low_grassland	1192-Snow Gum - Mountain Gum - Mountain Ribbon Gum grassy open forest of the New England Tableland Bioregion	low_grassland	14.07	3	

ERM HAS OVER 160 OFFICES ACROSS THE FOLLOWING COUNTRIES AND TERRITORIES WORLDWIDE

Argentina
Australia
Belgium
Brazil
Canada
China
Colombia
France
Germany
Ghana
Guyana
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
Mozambique
The Netherlands
New Zealand
Peru
Poland
Portugal
Puerto Rico
Romania
Senegal
Singapore
South Africa
South Korea
Spain
Switzerland
Taiwan
Tanzania
Thailand
UAE
UK
US
Vietnam

ERM's Brisbane Office
Level 9, 260 Queen Street
Brisbane QLD 4000

T: +61 7 3839 8393

www.erm.com