

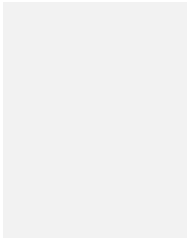
CAIRNCROSS WASTE MANAGEMENT FACILITY

Vegetation Management Plan

27 AUGUST 2021



CONTACT



HEATHER TILLEY
Principal Environmental
Consultant

T +61 2 8907 9183
M +61 (0)429 639 178
E heather.tilley@arcadis.com

Arcadis
Level 16, 850 George Street,
Sydney, NSW, 2000

PORT MACQUARIE HASTINGS COUNCIL CAIRNCROSS WASTE MANAGEMENT FACILITY

VEGETATION MANAGEMENT PLAN

Author Elvira Lanham

Checker Heather Tilley

Approver Heather Tilley

Report No Report Number

Date 27/08/2021

Revision Text 5

AUTHORS DETAILS

Author Details	Qualifications and Experience
Dr Elvira Lanham	• B(Env)Sc Hons (Life Sciences), University of Wollongong • Doctor of Philosophy (Reptile Ecology), Flinders University of South Australia Elvira has been involved in ecological consultancy and research for the past 25 years and has completed projects throughout Australia and overseas, including QLD, NSW, Victoria and South Australia. She has been the project manager and primary author on more than 400 reports ranging from Environmental Impact Assessments, Review of Environmental Factors (REFs) and a range of biodiversity assessments and management plans. She has recently led vegetation condition surveys in Queensland and authored flora and fauna management plans for projects throughout NSW and QLD.

REVISIONS

Revision	Date	Description	Prepared by	Approved by
A	27/02/2020	Draft for Internal Review	CF / EL	HT
1	11/01/2021	Draft for Client Review	CF / EL	HT
2	15/02/2021	Draft with client comments addressed	HT	HT
3	08/03/2021	Final Draft for consultation	HT	HT
4	11/08/2021	Updated to address BCD comments	HT / EL	HT
5	27/08/2021	Final for DPIE submission	HT	HT

ACRONYMS AND DEFINITIONS

Acronym / Term	Meaning
APZ	Asset Protection Zones
BAM	Biobanking Assessment Methodology
BAR	Biodiversity Assessment Report
BCDDEES	Biodiversity and Conversation Division of the of the Department of Environment, Energy and Science, previously Office of Environmental and Heritage (OEH)
BFFMP	Bushfire and Fuel Management Plan
Cairncross WMF	Cairncross Waste Management Facility
DIPNR	Department of Infrastructure, Planning and Natural Resources
DPIE	Department of Planning, Industry and Environment (NSW)
EES	DPIE Environment Energy and Science (previously OEH)
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regs	<i>Environmental Planning and Assessment Regulations 2000</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environmental Protection License
FBA	Framework Biodiversity Assessment
GDEs	Groundwater dependent ecosystems
ha	Hectares
LEMP	Landfill Environmental Management Plan
LGA	Local Government Area
km	kilometres
MRF	Material Recovery Facility
NPWS	National Parks and Wildlife Services
NSW	New South Wales
OEH	Office of Environment and Heritage (now EES)
ORRF	Organic Resource Recovery Facility
PCT	Plant Community Type
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PMHC or Council	Port Macquarie-Hastings Council
SFAZ	Strategic Fire Advantage Zone
SOP	Standard Operating Procedures
SSD	State Significant Development
WMF	Waste Management Facility
WTS	Waste Transfer Station

CONTENTS

ACRONYMS AND DEFINITIONS	VI
CONTENTS	VII
1 INTRODUCTION.....	1
1.1 Background	1
1.2 Scope	1
1.3 Objectives and Targets.....	2
1.4 Consultation	2
2 LANDFILL DESCRIPTION	3
2.1 Proposed Landfill Development Stages.....	3
2.1.1 Landfill construction steps.....	4
2.2 Operating Hours.....	4
2.3 Sensitive Receiving Environments.....	4
3 STATUTORY REQUIREMENTS	8
3.1 Legal and Other Obligations	8
3.2 Development Consent	8
3.3 Roles and Responsibilities.....	12
3.4 Training and Awareness.....	13
3.4.1 Monitoring training.....	14
4 EXISTING ENVIRONMENT	15
4.1 Surrounding Land Uses	15
4.2 Landscape Regions	15
4.2.1 Bioregions and landscapes	15
4.2.2 Soil and geology.....	15
4.3 Rivers, Streams and Wetlands.....	15
4.4 Native Vegetation Extent	15
4.4.1 Existing vegetation	15
4.4.2 Habitat.....	16
4.4.3 Habitat Connectivity	16
4.5 Groundwater Dependent Ecosystems	16
4.6 Threatened Species	19
4.6.1 Flora.....	19
4.6.2 Fauna.....	19
4.7 Predicted Environmental Impacts	19
5 VEGETATION MANAGEMENT FRAMEWORK.....	22
5.1 Vegetation Clearing	22
5.1.1 Objectives	22
5.1.2 Clearing management.....	22
5.1.3 Monitoring and maintenance.....	22
5.2 Koala Connectivity Corridor Management.....	22
5.2.1 Objectives	22
5.2.2 Protection for the corridor.....	22
5.2.3 Habitat enhancement.....	22
5.2.4 Fencing	23

5.2.5	Timing	23
5.2.6	Monitoring and maintenance	23
5.2.7	Bushfire management	26
5.3	Revegetation.....	27
5.3.1	Objectives	27
5.3.2	Revegetation	27
5.3.3	Timing	29
5.3.4	Revegetation maintenance	29
5.3.5	Revegetation monitoring	29
5.3.6	Bushfire management	29
5.4	Hollow Replacement Program	30
5.4.1	Objectives	30
5.4.2	Implementation of the program	30
5.4.3	Nest box construction.....	31
5.4.4	Timing	31
5.4.5	Monitoring and maintenance	31
5.5	Pest Management.....	31
5.6	Weed Management.....	32
5.6.1	Objectives	32
5.6.2	Weeds of National Significance.....	32
5.6.3	Prevention.....	33
5.6.4	Weed control methods	33
5.6.5	Mitigation.....	34
5.6.6	Monitoring and maintenance	34
5.7	Rawdon Creek Nature Reserve Management	34
5.8	Compensatory Habitat Area	37
5.8.1	Background	37
5.8.2	Management	37
5.9	Landfill Closure Plan	37
5.10	Summary of Vegetation Management Measures	38
6	OFFSET REQUIREMENTS	39
6.1	Impacts Requiring Offsetting	39
6.1.1	Impacts on native vegetation	39
6.1.2	Impacts on threatened species	39
6.2	Biobanking agreement	40
6.2.1	Offsetting options	40
6.2.2	Variations to the agreement	41
7	REVIEW	43
7.1	Environmental Auditing.....	43
7.2	Reporting	43
7.2.1	Internal reporting.....	43
7.2.2	Compliance reporting	43
7.3	Review and Improvement.....	44

7.4	Incidents	44
7.5	Complaints.....	44
7.6	Non-Compliance, Non-Conformances and Corrective Actions	44
7.7	Access for information	44
8	RELEVANT DOCUMENTATION	45
9	REFERENCES.....	46

APPENDICES

APPENDIX A CONSULTATION

APPENDIX B SUMMARY OF VEGETATION MITIGATION MEASURES

APPENDIX C FLORA AND FAUNA SPECIES RECORDED AT EXTENDED LANDFILL SITE

APPENDIX D OFFSET CREDIT REPORT

APPENDIX E VEGETATION CLEARING PROTOCOL FOR STAGE 3 (BLACKBUTT GRASSY FOREST)

APPENDIX F BUSHFIRE MANAGEMENT STRATEGY

LIST OF TABLES

Table 1-1: Summary of consultation with Agencies	2
Table 2-1: Indicative timeline for landfill stages	3
Table 3-1: SSD 5792 relevant conditions	8
Table 3-2: Relevant mitigation measures	10
Table 3-3: Key roles and responsibilities	12
Table 4-1: Summary of environmental risks assessment.....	20
Table 5-1: Indicative species for list for revegetation	27
Table 5-2: Nest box details	30
Table 5-3: Recommended control strategies for WoNS recorded on site.....	33
Table 5-4: Risks to Rawdon Creek Nature Reserve and the mitigation measures to be implemented.	35
Table 6-1: Landfill impact summary for PCTs and ecosystem credit species	39
Table 6-2: Impact summary for threatened species credit species	40
Table 7-1: Summary for reporting requirements	43
Table 7-2: Summary for reporting requirements to NWPS.....	43
Table 8-1: Key Operating Procedures and Checklists	45

LIST OF FIGURES

Figure 2-1: Cairncross WMF location	5
Figure 2-2: Land zoning.....	6
Figure 2-3: Landfill existing Stage E and expansion to Stages 1-3 layout.....	7
Figure 4-1: Vegetation mapping (Biolink 2013)	17
Figure 4-2: Fauna survey results (BAR, Arcadis 2017).....	18
Figure 5-1: Stage 1 koala corridor fencing	24
Figure 5-2: Stage 2 koala corridor rehabilitation and fencing.....	25
Figure 5-3: Stage 2 and 3 boundary typical cross section	26
Figure 6-1: Vegetation/Habitat to be offset.....	42

1 INTRODUCTION

1.1 Background

The Cairncross Waste Management Facility (Cairncross WMF) (the Facility) is located at 351 Telegraph Point Road, Pembroke, NSW, approximately 5 km south-west of Telegraph Point and approximately 15 km north-west of Port Macquarie within Lot 10 / DP 1240278. The Facility is operated by Port Macquarie-Hastings Council (PMHC) (Council).

The Cairncross WMF is the primary centre for PMHC's waste operations, and in addition to the landfill, also includes of the following components:

- Waste Transfer Station (WTS);
- Organics Resource Recovery Facility (ORRF);
- Material Recovery Facility (MRF).

The ORRF, MRF and WTS sites have entirely separate leachate and stormwater management systems. The ORRF and MRF are operated under contracts by external parties. Day to day management of these facilities are separated from management of the landfill and WTS operation area.

The Cairncross WMF was constructed to replace the existing Port Macquarie landfill, which was closed in 2001. The Cairncross WMF was opened in 2001 and operates under the *Operational Environmental Management Plan: Cairncross Waste Management Facility* (PMHC, 2016), *Cairncross Waste Management Facility Landfill Environment Management Plan* (2001) (Connell Wagner, 2001) and Environment Protection Licence 11189

The Cairncross WMF development approval was granted to PMHC for the current landfill stage (Stage E) in 1999, however the approval was time limited to 20 years. In February 2013, an extension of 5 years was sought on the original approval and subsequently granted. The approved Stage E of the landfill is now nearing the end of its capacity. The current approval for the progressive excavation, landfilling and rehabilitation of three new landfill cells (Stage 1, 2 and 3) and extension of the life of the landfill by a further 36 years (until 2056) was granted by the Department of Planning, Industries and Environment (DPIE) on 5 November 2019 (State Significant Development (SSD) 5792).

The landfill will continue to receive waste from all areas within the Port Macquarie-Hastings local government area (LGA) including the major townships of Port Macquarie, Wauchope and Camden Haven. Waste will include general solid waste (i.e. putrescible and non-putrescible materials) and asbestos from domestic and commercial and industrial (C&I) sources.

A Landfill Environmental Management Plan (LEMP) has been prepared to reflect of conditions of the Development Consent for the landfill expansion and is the overarching environmental management framework for the landfill operation. It provides an overview of potential environmental impacts of the landfill during its construction and operational phases. This Vegetation Management Plan (VMP) has been developed as a sub plan to the LEMP.

1.2 Scope

This VMP has been developed to address Conditions B27 and B28 of the Development Consent (SSD5792) which require the preparation of a VMP to the satisfaction of the Secretary of the DPIE within two years of the date of the consent and no later than prior to the commencement of Stage 2.

The conditions relevant to the development of this plan are identified in **Section 3.2** and specifically require the VMP to address the management of the koala connectivity corridor (located on the southern boundary of Stage 2), the Strategic Fire Advantage Zone (SFAZ) (located on the eastern side of Stage 3), the established biodiversity offset area (compensatory habitat) located to the west of the larger site and adjacent to Pembroke Road and measures for managing impacts to the adjacent Rawdon Creek Nature Reserve.

A Biodiversity Assessment Report (BAR) (Arcadis, June 2017) was prepared to support the SSD application. The BAR only assessed the impacts of the site not already approved for clearing under the forestry approval, i.e. within Stage 3 of the landfill. As such, the VMP includes methods for vegetation clearing in Stage 3, and also includes methods for the management and restoration of native vegetation within the koala connectivity corridor.

To date, the compensatory habitat has been managed in accordance with the *Cairncross Waste Management Facility Compensatory Habitat Management Plan (CHMP)*, prepared by Connell Wagner in August 2000. Management measures from the CHMP have been incorporated into this VMP to ensure that this habitat continues to be appropriately managed.

The most recent, approved version of this VMP will be implemented to manage impacts associated with the landfill construction and operation activities (detailed in **Section 2**).

1.3 Objectives and Targets

The following outlines the objectives and targets set out for the landfill for the management of vegetation during construction and operation. These objectives and targets were developed based on collective industry experience and best practice.

The key objectives for vegetation management during the landfill construction and operation include:

- Ensuring that weeds are appropriately managed and that native vegetation, where required is planted and protected;
- Identifying the location, species and density of vegetation to be preserved within the koala connectivity corridor;
- Identifying the strategies for the hollow replacement program, remediation and rehabilitation;
- Providing mitigation measures which detail the management of the vegetation to be retained (including weed management);
- Detailing the monitoring program for weed and native vegetation management.

1.4 Consultation

Under Condition B27 (a) of the Development Consent, the VMP is required to be prepared in consultation with Biodiversity and Conservation Division of the of the Department of Environment, Energy and Science (BCDDEES). **Appendix A** demonstrates evidence of consultation.

Table 1-1: Summary of consultation with Agencies

Relevant Agency	Date	Person Contacted	Comments	Status
BCDDEES	10/03/2021	Planning North Mailbox	Submission of VMP for consultation	Open
BCDDEES	04/05/2021	Planning North Mailbox	Email request to discuss the VMP	Open
BCDDEES	13/05/2021	Dimitri Young Senior Planning Leader, North East Branch	Letter including comments to be addressed in the VMP Provided in Appendix A	Open
BCDDEES	17/06/2021	Rachel Lonie, Senior Conservation Planning Officer	Discussed letter sent on 13/05/2021.	Open
BCDDEES	21/07/2021	Rachel Lonie, Senior Conservation Planning Officer	Submission of VMP for further review	Open
BCDDEES	26/08/2021	Dimitri Young Senior Planning Leader, North East Branch	Letter confirming that BCDDEES the comments were satisfactorily addressed	CLOSED

Condition B28 of the Development Consent requires that the VMP is approved by the DPIE.

2 LANDFILL DESCRIPTION

The landfill expansion area includes the area proposed for the construction of the new cells and a 50 m wide koala connectivity corridor located along the south-western border of the Facility. The landfill location is shown in **Figure 2-1** and the layout of Stages 1-3 is shown in **Figure 2-3**.

Approximately 36 hectares (ha) of the landfill expansion area is currently vegetated. 32.6 ha comprises Blackbutt Plantation which is permitted to be progressively cleared under approval GR0412P (26 October 2004), upon written notification to the DIPNR¹. The remaining 3.4 ha consists of native vegetation mapped as Blackbutt Grassy Forest which will be cleared during Stage 3. Biodiversity offsets for this vegetation will be secured with the establishment of biobanking site(s).

The nearest residential properties are located approximately 1.3 km to the north-east and more than 0.8 km to the south-west of the landfill operation area. To the north-east of the landfill operation area lies the ORRF and MRF (which form part of the broader Cairncross WMF) and an Industrial Precinct is currently being developed to the east of the landfill.

Cairncross State Forest borders the landfill operation area to the north and south, with the Rawdon Creek Nature Reserve located to the south-east. The entire Cairncross WMF is zoned *SP2 Infrastructure (Waste and Resource Management Facility)* and which contains a compensatory habitat area that was established as part of the Cairncross WMF. To the west of the compensatory habitat area is Pembroke Road, beyond which is agricultural land zoned for *Primary Production (RU1)* (See **Figure 2-2**).

The expanded landfill will continue to receive waste from all areas within the Port Macquarie-Hastings local government area (LGA) including the major townships of Port Macquarie, Wauchope and Camden Haven. Waste will include general solid waste (i.e. putrescible and non-putrescible materials) and asbestos from domestic and commercial and industrial (C&I) sources as defined in clause 49 of Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act).

The Facility operates under an Environmental Protection Licence (EPL 11189) issued to Cairncross WMF for waste disposal (application to land) and waste processing (non-thermal treatment).

2.1 Proposed Landfill Development Stages

The expansion involves the progressive construction, operation and rehabilitation of three landfill stages (Stages 1-3), following a staged approach, with implementation over approximately 36 years.

The indicative timeline for these stages is provided in **Table 2-1**.

Table 2-1: Indicative timeline for landfill stages

Stage	Timeframe ²	Duration (years)	Activities
Stage 1	2020 – 2040	20	Progressive landfill cell construction, operation and rehabilitation.
Stage 2	2040 – 2047	7	
Stage 3	2047 – 2056	9	

Each stage (new cell) will be designed and constructed in accordance with Conditions of the Development Consent and *Environmental Guidelines: Solid Waste Landfills, Second edition 2016*.

¹ *Authorisation for timber plantation* (Department of Infrastructure, Planning and Natural Resources (DIPNR), 2004)

² Timeframes are approximate and subject to change (e.g. based on altered resource recovery and waste generation rates which would influence landfill life expectancy)

2.1.1 Landfill construction steps

Progressive landfill cell construction, operation and rehabilitation of three landfill stages (Stages 1-3) will include the following steps.

- Clearing of existing vegetation for the construction of access tracks and defensible spaces for bushfire protection;
- Earthworks for cell formation including extraction and stockpiling of materials and the reapplication to form the leachate barrier (cell liner) as well as for daily, intermediate and final cover;
- Installation of leachate management structures including the leachate barrier, collection, storage and disposal system;
- Construction of a rising main to transfer leachate to the adjacent Telegraph Point Sewer Treatment Plant;
- Installation of a stormwater management system;
- Installation of a groundwater management system;
- Signage and other ancillary works;
- Closure and Rehabilitation of the full cell.

In addition to the landfill construction and operation, the delineation and ongoing management of the Koala connectivity corridor will be ongoing³.

2.2 Operating Hours

The landfill is open every day, with the exception of Sundays, Good Friday, and Christmas Day, and operates during the following hours:

- Monday to Friday: 7am - 4pm;
- Saturday, Public holidays: 8am - 4pm;
- Not open to public on Sundays.

Site management activities, such as daily covering operations, may continue one hour after closure of the landfill or be carried out on Sundays from 8am - 5pm.

The new landfill cells will continue to operate during these hours.

NOTE: *Hours of Work in the Development Consent (SSD 5792) may allow for longer operating hours than those detailed above.*

2.3 Sensitive Receiving Environments

Sensitive receiving environments within the vicinity of the landfill that could be affected by potential impacts from operation of the landfill include:

- Downstream waterways including Rawdon Creek and the Hastings River;
- The Rawdon Creek Nature Reserve (managed by the NSW National Parks and Wildlife Service) and the Cairncross State Forest;
- Potential groundwater dependent ecosystems;
- Private groundwater bores.

³ It is noted that Sediment Basin 2 Protrudes approximately 20 m over a minor portion of the corridor. Further detail regarding the nature, implications and potential contingencies associated with this are provided in Section 4 of the RtS (Arcadis, 2018).

Cairncross Waste Management Facility



LEGEND

- Amended Proposal Site
- Cairncross Waste Management Facility
- Forest and Reserve
- Watercourse

ARCADIS AUSTRALIA PACIFIC PTY LTD
ABN 76 104 485 289
Level 16, 580 George St | Sydney NSW 2000
P: +61 (0) 2 8907 9000 | F: +61 (0) 2 8907 9001
Coordinate System: GDA 1994 MGA Zone 56
Aerial Imagery supplied by NSW LPI

1:45,000 at A4

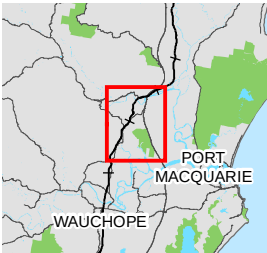
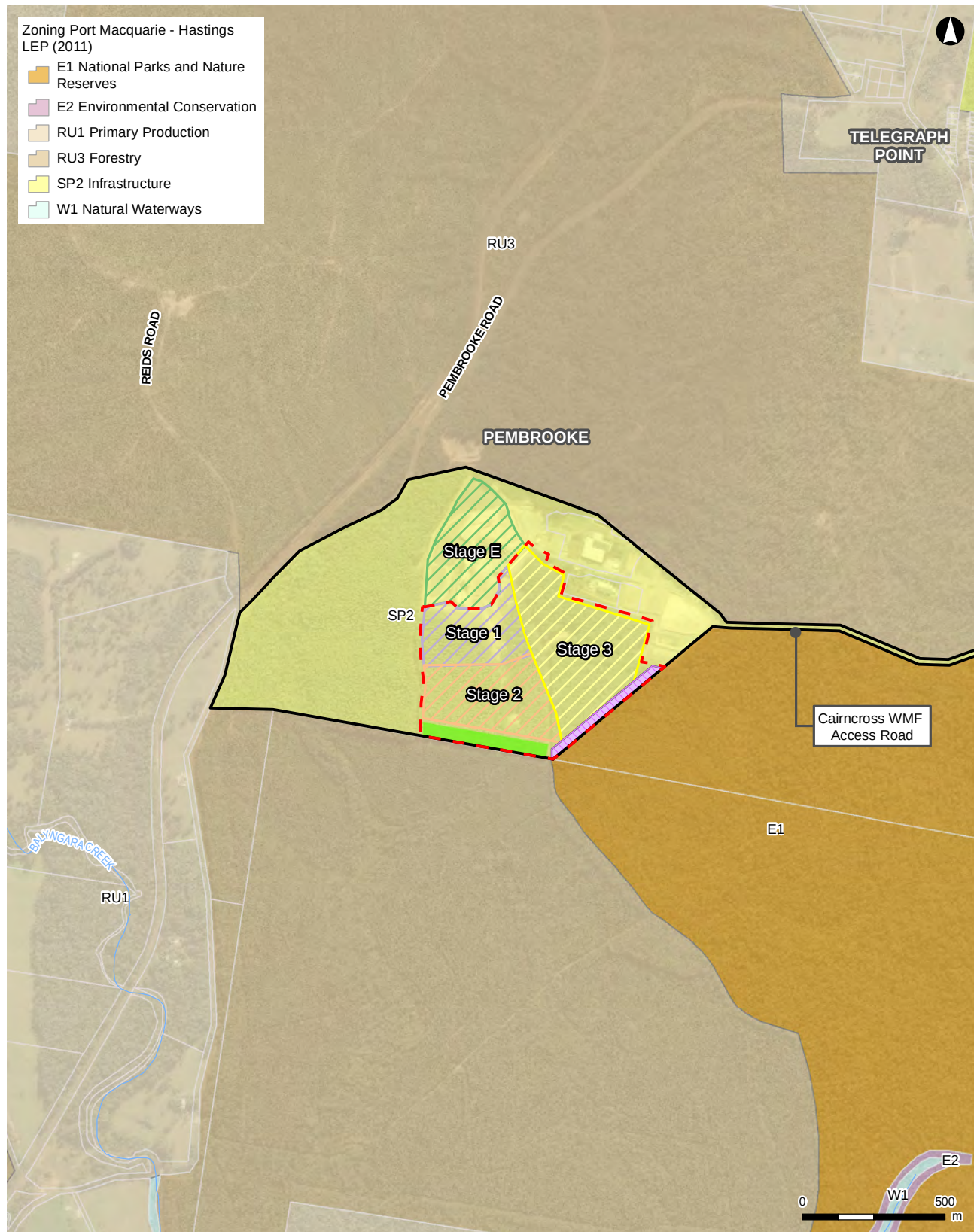


Figure 2-1: Cairncross WMF location

Cairncross Waste Management Facility



LEGEND

- Proposal Site
- Cairncross Waste Management Facility
- Koala Connectivity Corridor
- Strategic Fire Management Zone (SFMZ)
- Cadastre (LPI, 2017)

Existing and Future Landfill

- Stage 1
- Stage 2
- Stage 3
- Stage E
- Watercourse

ARCADIS AUSTRALIA PACIFIC PTY LTD
 ABN 76 104 485 289
 Level 16, 580 George St | Sydney NSW 2000
 P: +61 (0) 2 8907 9000 | F: +61 (0) 2 8907 9001
 Coordinate System: GDA1994 MGA Zone 56
 Aerial Imagery supplied by NSW LPI

1:20,000 at A4

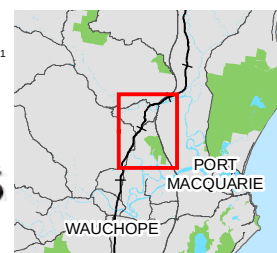


Figure 2-2: Land Zoning

Cairncross Waste Management Facility

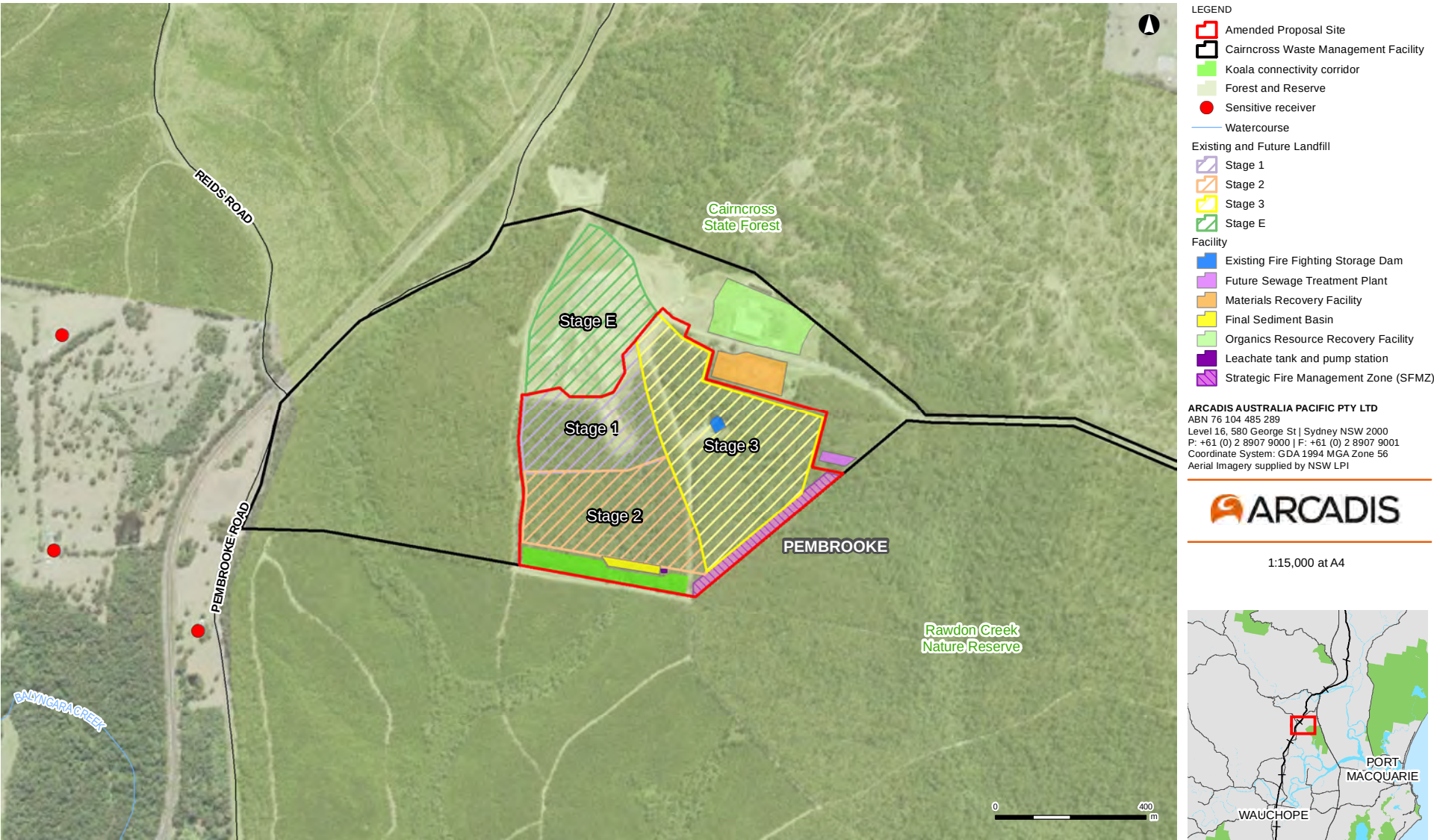


Figure 2-3: Cairncross WMF site layout

3 STATUTORY REQUIREMENTS

3.1 Legal and Other Obligations

The legislation, planning instruments and guidelines considered during development of this plan are listed below.

- *Environmental Planning and Assessment Act 1979 (EP&A Act)*;
- *Environmental Planning and Assessment Regulation 2000 (EP&A Reg)*;
- *Protection of the Environment Operations Act 1997 (POEO Act)*;
- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)*;
- *Biodiversity Conservation Act 2016 (BC Act)*;
- *Biosecurity Act 2015*;
- *Fisheries Management Act 1994 (FM Act)*.

Additional legislation, standards and guidelines relating to the management of vegetation include:

- *NSW Biodiversity Offsets Policy for Major Projects (Office of Environment and Heritage, 2014)*;
- *Guidelines for developments adjoining land managed by the Office of Environment and Heritage (OEH, 2013)*
- *Rawdon Creek National Park Plan of Management (NSW National Parks and Wildlife Service, February 2004)*.

3.2 Development Consent

The landfill expansion was approved as State Significant Development SSD 5792 (Development Consent) on 5 November 2019 under section 4.38 of the *Environmental Planning and Assessment (EP&A) Act 1979*. Approval was granted for the progressive excavation, landfilling and rehabilitation of three new landfill cells (Stage 1, 2 and 3) and for the extension of the life of the landfill for a further 36 years (until 2056) (see **Table 2-1**).

The Development Consent includes requirements to be addressed in this VMP and to be delivered during landfilling.

These requirements, and how they are addressed are provided within **Table 3-1**.

Table 3-1: SSD 5792 relevant conditions

Condition	Requirement	Document Reference
Offsets		
B25	Prior to any clearing work for Stage 3, the applicant must retire the following ecosystem and species credits, as determined in accordance with the OEH's <i>Framework for Biodiversity Assessment (FBA)</i> and the <i>Biobanking Assessment Methodology 2014 (BAM)</i> .	Section 6
(a)	221 ecosystem credits to offset the removal of 3.4 ha of Blackbutt-Pink Bloodwood Shrubby Open Forest of the Coastal Lowlands of the NSW North Coast Bioregion	Section 6 Table 6-1
(b)	83 species credits to offset the removal of koala habitat	Section 6 Table 6-2
(c)	248 species credits to offset the removal of Green-Thighed Frog Habitat; and	Section 6 Table 6-2
(d)	3 species credits to offset the removal of Southern Myotis habitat	Section 6 Table 6-2

Condition	Requirement	Document Reference
Note	<i>If Applicant seeks a variation to the offset rules, the Applicant must demonstrate that reasonable steps have been taken to find like-for-like offsets in accordance with Section 10.5.4.2 of the FBA and Appendix A of the NSW Biodiversity Offsets Policy for Major Projects 2014.</i>	Section 6.2.2
Koala Connectivity Corridor		
B26	The Applicant must establish and maintain the koala connectivity corridor shown in Figure 1 in Appendix 1 (of the Development Consent). The Applicant must determine the timing for establishing the koala connectivity corridor in consultation with the Biodiversity and Conversation Division of the of the Department of Environment, Energy and Science. The agreed must be included in the Vegetation Management Plan required by condition 27.	Section 5.2 Section 5.2.5 (timing)
Vegetation Management Plan		
B27	Within two years of the date of this consent and no later than prior to the commencement of Stage 2, the Applicant must prepare a Vegetation Management Plan (VMP) to the satisfaction of the Planning Secretary. The VMP must:	This plan Section 1.4
(a)	be prepared in consultation with the Biodiversity and Conversation Division of the Department of Environment, Energy and Science;	Section 1.4 Appendix A
(b)	detail the measures for managing impacts of the development on the Rawdon Creek Nature Reserve in accordance with the <i>Guidelines for developments adjoining land managed by the Office of Environment and Heritage (OEH, 2013)</i>	Section 5.7
(c)	detail the procedure for coordinated management of the koala connectivity corridor on the southern boundary, the Strategic Fire Advantage Zone on the south-eastern boundary and the established biodiversity offset area to the west of the site; and	Section 5.2.7 Appendix F Also see Sections 5 and 6 of the BFFMP
(d)	Detail the fencing to be installed, the timing for installation and how this will prevent access by koalas and other fauna into the landfill.	Section 5.2.4
B28	The Applicant must implement the most recent version of the VMP approved by the Planning Secretary for the duration of the development.	Section 1.4
Management Plan Requirements		
C1	Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:	
(a)	detailed baseline data;	Section 4
(b)	details of:	Section 3
	(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);	
	(ii) any relevant limits or performance measures/criteria; and	Appendix B
	(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	Section 5.1.3 Section 5.2.6 Section 5.4.5 Section 5.6.6
(c)	a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria	Section 5.8

Condition	Requirement	Document Reference
(d)	(i) impacts and environmental performance of the development; and (ii) effectiveness of the management measures set out pursuant to paragraph (c) above;	Section 4.7 Section 7.1
(e)	a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	This Plan
g)	a protocol for managing and reporting any: (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria) (ii) complaint (iii) failure to comply with statutory requirements; and	Section 7.2 Section 7.4 Section 7.5 Section 7.6
h)	a protocol for periodic review of the plan	Section 7.2.2
Note	<i>the Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plan</i>	NA

The Applicant's Management and Mitigation Measures are presented within Appendix 2 of the Development Consent (SSD 5792). A list of Mitigation Measures as relevant to vegetation management at the landfill and within the koala connectivity corridor, and how they have been complied within this plan are provided in **Table 3-2**.

Table 3-2: Relevant mitigation measures

#	Mitigation Measures (MM)	Timing	Document Reference / MM#
FF-01	Clearing of vegetation and excavation activities would not be undertaken during overland flow events (where there is surface runoff present after rainfall and prior to entering a waterway).	Construction Operation	Section 5.1.2 Appendix B FFA-03 Appendix E
FF-02	Stabilisation of disturbed areas adjacent to retained native vegetation, including revegetation where appropriate, would be undertaken as soon as feasible and reasonable after disturbance.	Construction Operation	Section 5.3.3 Appendix E
FF-03	A biobanking agreement, or equivalent, would be established to secure an offset site in accordance with applicable legislation prior to clearing the 3.4 ha of native vegetation within the Stage 3 area. The offsets site will secure the ecosystem and species credit offset requirements outlined in Section 8.2.3 of the EIS. All offset land will be funded and managed in perpetuity under <i>Councils Public Bushland Management Programme</i> . Management actions will include, but not be limited to, the following: • Identification of type and location of weeds of concern within the site • Identification of sensitive receivers (such as native vegetation and waterways) within or adjacent to the Proposal Site	Prior to clearing the 3.4 ha of native vegetation within the Stage 3 area.	Section 6.2 Section 5.5 Section 2.3

#	Mitigation Measures (MM)	Timing	Document Reference / MM#
	Management and disposal of weeds (including declared noxious weeds) in accordance with requirements of the <i>Biosecurity Act 2015</i>⁴.		Section 5.5
FF-04	Fauna microhabitat, such as logs, would be removed from areas to be cleared and relocated to suitable nearby habitat.	Pre-construction Construction	Section 5.1.2
FF-05	Extent of clearing would be fenced with highly visible temporary fencing to ensure that clearing does not extend beyond the area necessary.	Pre-construction Construction	Section 5.2.4 Section 5.1.2 Appendix B FFA-09 Appendix E
FF-06	A hollow replacement program would be implemented in the koala corridor and on any proposed offset site. Hollows would be replaced at 1:1 ratio to offset the impacts to one small hollow, 10 medium hollows and five large hollows.	Pre-construction Construction	Section 5.4 Table 5-2 Appendix B FFA-07
FF-07	All injured fauna to be reported to the Landfill Supervisor. Contact details would be kept on landfill site for the local animal rescue group (Fawna Wildlife Rescue, Port Macquarie) and veterinarian if any fauna is injured at landfill or require capture and/or relocation.	Pre-construction Construction Operation	Section 5.1.2 Appendix B FFA-08
FF-08	A two-stage clearing process will be implemented in areas of the new cells construction that containing hollow-bearing trees. An experienced ecologist would be engaged and be present on landfill to supervise all stages of removal of hollow bearing trees, as well as relocation of any fauna.	Pre-construction Construction Operation	Section 5.1.2 Appendix B FFA-07 Appendix E
FF-09	If feasible and reasonable, vegetation clearing would not be undertaken during the breeding seasons for threatened fauna species with potential habitat on the landfill site. This will not be possible for all identified threatened species as breeding seasons collectively span a large portion of the year. In order of preference of avoidance, the breeding periods are: - Koala – September to February (breeding season) - Glossy Black Cockatoo – March to August (breeding season) - Spotted-tail Quoll – June to January (maternal den season) - Grey-headed Flying Fox – October to March (breeding season) - Southern Myotis – November to February (breeding season) Scheduling the vegetation removal for Autumn months would generally avoid the breeding season of most species that could occur on landfill site.	Pre-construction Construction	Section 5.1.2 Appendix B FFA-06
FF-10	The koala connectivity corridor will be managed in perpetuity and rezoned for environmental protection with the next standard LEP instrument amendment by Council.	Construction Operation	Section 5.2.2 Appendix B FFA-11

⁴ The Biosecurity Act 2015 repealed the Noxious Weed Act 1993 from 1 July 2017

#	Mitigation Measures (MM)	Timing	Document Reference / MM#
FF-11	A Vegetation Management Plan (VMP) will be prepared in accordance with the BCDDES ⁵ Guidelines for development adjoining land managed by the Office of Environment and Heritage (2013) and will include measures for the maintenance, management and revegetation of the koala connectivity corridor and the setback area, including:	Construction Operation	This Plan
	Clear objectives for management outcomes	Construction Operation	Section 5
	A remediation and revegetation strategy	Operation	Section 5.3
	Management measures for existing plantation vegetation	Construction Operation	Section 4.4.1 Authorisation GR0412P for timber plantation BFFMP
	Environmental and noxious weed management actions	Construction Operation	Section 5.6
	Implementation strategies for the hollow replacement program	Construction Operation	Section 5.4
	Vegetation management in accordance with the Cairncross Waste Management Facility Bush Fire and Fuel Management Plan (BFFMP)	Construction Operation	Section 5.2.7 Appendix F
	Roles, responsibilities and timing for implementation	Construction Operation	Section 3.3

3.3 Roles and Responsibilities

All personnel undertaking operational activities at the landfill are responsible for the implementation of this VMP and have the responsibility to stop works if there is potential for a safety or environmental incident to occur. The key roles and responsibility for vegetation management and landfill operation are outlined in **Table 3-3**.

Table 3-3: Key roles and responsibilities

Role	Responsibility
PMHC Waste Manager	- Ensuring a VMP is developed and implemented - Ensuring compliance with conditions of Development Consent and any regulatory or other requirements - Ensuring appropriate resources are available to implement all aspects of the VMP and maintain necessary records
Waste Services Coordinator	- Ensuring that all personnel undertaking work at the landfill receive adequate training and education in the environmental measures developed to mitigate or minimise risks associated with vegetation and fauna management at the landfill - Implement appropriate vegetation monitoring to ensure that the management measures adopted are effective

⁵ BCDDEES – Biodiversity and Conversation Division of the of the Department of Environment, Energy and Science

Role	Responsibility
Waste Projects Officer	• Undertaking reporting and internal audits as required by the Compliance Tracking Program • Engaging an ecologist prior to the commencement of clearing • Providing advice in relation to flora and fauna management issues to Landfill Supervisor
Cairncross Team Leader (Landfill Supervisor)	• Assisting in the implementation and maintenance of mitigation measures to manage the koala connectivity corridor • Complying with environmental measures and procedures implemented to minimise or eliminate environmental risks • Maintaining onsite records and documents for inspections as required • Attending environmental training and other educational sessions • Reporting any environmental incidents in accordance with the VMP, particularly those related to vegetation clearing and injured fauna that may occur • Inducting all staff, works and any person conducting or engaged by the company to complete works onsite
Cairncross Plant Operators/ Weighbridge Operator	• Completing the site induction • Reporting incidents, particularly those related to vegetation clearing and injured fauna • Being aware of and following onsite instructions and procedures implemented to minimise or eliminate environmental risks within the koala connectivity corridor • Attending environmental training and other educational sessions • Continuous awareness of activities and processes that may have environmental impacts • Reporting incidents promptly and assisting with implementing control measures as required
Contractors	• Completing the site induction • Identifying the environmental risks associated with their activities at the landfill • Developing mitigating measures to minimise or eliminate the identified environmental risks • Being aware of and following onsite instructions and procedures implemented to minimise or eliminate environmental risks • Reporting incidents, particularly those related to vegetation clearing and injured fauna
Ecologist	• Completing the site induction • Undertaking pre-clearing surveys prior to the commencement of clearing • Supervise all stages of removal of hollow bearing trees, as well as relocation of any fauna • Providing advice in relation to flora and fauna management issues as required

3.4 Training and Awareness

All employees, contractors and utility staff working on landfill will undergo a landfill induction (which includes environmental due diligence training) and environmental training in relation to the management of the koala connectivity corridor, weeds and vegetation clearing.

Records will be kept of all personnel undertaking the site induction and training, including the contents of the training, date and name of trainer/s.

3.4.1 Monitoring training

PMHC will ensure that all site personnel, contractors and sub-contractors undergo site specific induction training, which has been developed with an emphasis on understanding and managing risks associated with the landfill construction and operation, including environmental aspects and impacts.

Landfill operation personnel will undergo a variety of training to ensure an adequate level of skill and education is possessed to enable all tasks and activities to be carried out successfully. Training will be conducted by PMHC, and if required, external experts will be engaged to provide the specialist training.

Minimum training requirements are summarised in Section 5.3 and Table 5-2 of the LEMP. A record of all training undertaken will be maintained on site and within the PMHC *Solid Waste Management Operational Policies, Standard Operating Procedures and Safe Work Method Statements (PMHC, November 2018)*.

4 EXISTING ENVIRONMENT

4.1 Surrounding Land Uses

The land uses surrounding the landfill are shown on the Cairncross WMF site layout map (**Figure 2-1**) and the land zoning map (**Figure 2-2**). To the north-east of the landfill operation area lies the ORRF and MRF (which form part of the broader Cairncross WMF) and an Industrial Precinct is currently being developed to the east of the landfill.

Cairncross State Forest borders the landfill operation area to the north and south, with the Rawdon Creek Nature Reserve located to the south-east. The western edge of the landfill contains a compensatory habitat area that was established as part of the Cairncross WMF and to the west of this is Pembroke Road and agricultural land.

4.2 Landscape Regions

4.2.1 Bioregions and landscapes

The landfill expansion area is located within the Northern Rivers Bioregion and the Macleay – Hastings Subregion classified under Interim Biogeographic Regionalisation for Australia. The landfill expansion area is located within the Wauchope Coastal Foothills Mitchell landscape.

4.2.2 Soil and geology

The Hastings 1:20,000 Hastings geological sheet (Brunker *et al.*, 1970) indicates the Facility is underlain by the Lower Permian Beechwood Beds that are comprised of sandstone, siltstone and mudstone. The Beechwood Beds are described as laminated blue grey mudstone with quartz, mica sandstone.

The Port Macquarie Area 1:100,000 Quaternary Geological Sheet (Hashimoto and Troedson, 2008) identifies Carboniferous and Permian sedimentary rocks including coal measures and minor volcanics in the landfill operation area.

4.3 Rivers, Streams and Wetlands

The landfill is drained by two ephemeral creeks; Rawdon Creek and Tommy Owens Creek. Rawdon Creek is located approximately 2 km south of the Facility, discharging into the Hastings River. Tommy Owens Creek is located north of the Facility site and is a tributary of Rawdon Creek.

4.4 Native Vegetation Extent

4.4.1 Existing vegetation

Approximately 36 ha of the landfill expansion area is currently vegetated. An authorisation for timber plantation (Department of Infrastructure, Planning and Natural Resources (DIPNR), 2004) applies to 32.6 ha of this area, and comprises *Eucalyptus pilularis* (Blackbutt) plantation. This vegetation can be progressively cleared for the purposes of expansion of the landfill under approval GR0412P (26 October 2004), upon written notification to the DIPNR.

The remaining 3.4 ha (See **Figure 4-1**) consists of native vegetation mapped as Blackbutt Grassy Forest, which will be cleared within the Stage 3 landfill area as part of SSD 5792.

At the time the EIS was written (2017), this vegetation consisted of:

- A tall open forest with a mature canopy of *Eucalyptus microcorys* (Tallowwood) *Eucalyptus pilularis* (Blackbutt), *Corymbia intermedia* (Pink Bloodwood), *Eucalyptus resinifera* (Red Mahogany) and *Eucalyptus globoidea* (White Stringybark);

- The mid-layer included small trees and tall shrubs such as *Alphitonia excelsa* (Red Ash), *Allocasuarina littoralis* (Black She-Oak), *Acacia floribunda* (White Sally) and *Callistemon salignus* (White Bottlebrush);
- The ground layer was generally grassy and herbaceous, with *Gahnia sieberiana* (Red-fruit Saw-sedge), *Entolasia marginata* (Bordered Panic), *Imperata cylindrica* (Blady Grass), *Entolasia stricta* (Wiry Panic) and *Oplismenus imbecillis* (Narrow-leaved Basketgrass) dominant.

In the eastern parts of the site, the ground was slightly boggy and swamp forest elements of the community were dominant, with *Callistemon salignus* forming a dense mid-storey and *Gahnia sieberiana* prevalent in the ground layer.

Blackbutt Grassy Forest corresponds with the Plant Community Type (PCT) Blackbutt – Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion (NR117) in the OEH Vegetation Information System Database (OEH, 2015).

The structure and floristics of the PCTs present in the landfill expansion area (See **Figure 4-1**) were sampled using 13 quadrats, each 0.1 hectare in area. Of the 13 quadrats, two (Q4 and Q5) were within the Stage 3 area. The findings from these quadrants is summarised in **Appendix C (Table C2)**.

4.4.2 Habitat

The landfill expansion area comprises tall open forest. The canopy is up to 30 m in height and provides shelter and foraging habitat for arboreal fauna, including koalas. Koala feed trees comprised about 45% of the canopy species in this habitat.

The Biodiversity Assessment Report (BAR) (Arcadis, 2017) identified that hollow-bearing trees were present in low densities and four were recorded within the landfill expansion area (**Figure 4-2**).

Hollow logs and fallen timber were present in high densities. Grasses and timber provide shelter for ground-dwelling fauna. Cavernous areas in the grass and runs/tracks and diggings were common in the ground-layer indicating high activity of ground-dwelling fauna in this habitat type.

Camera traps identified a diversity of fauna in this habitat including Swamp Wallaby, Eastern Grey Kangaroo, Northern Brown Bandicoot and Bush Rat.

4.4.3 Habitat Connectivity

Rawdon Creek Nature Reserve lies east and south of the landfill expansion area, separated by a vehicle access track, approximately 5 m wide. The canopy is well connected over the access track and woodland birds were frequently observed moving between the site and nature reserve (BAR, Arcadis 2017).

West of the landfill expansion area is the compensatory habitat which is the offset area for the existing landfill area approved under the forestry approval. This provides connectivity from the state forest to the south to the state forest to the north.

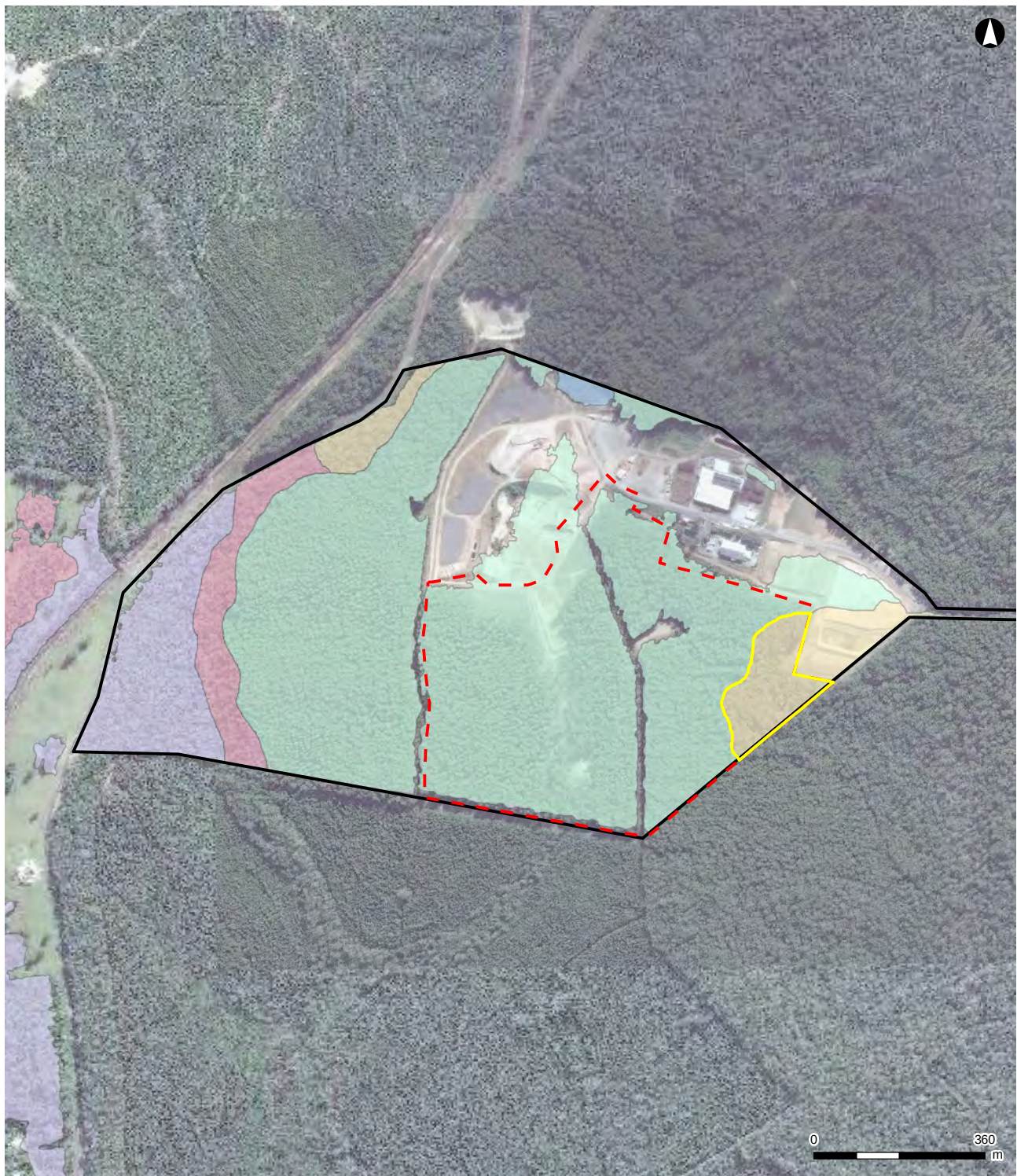
The koala connectivity corridor will be established to the south of Stage 2 of the landfill to maintain connectivity for fauna between the Rawdon Creek Nature Reserve in the east to the compensatory habitat in the west.

4.5 Groundwater Dependent Ecosystems

There are no registered groundwater dependent ecosystems (GDEs) within a 3 km radius of the landfill as per the Bureau of Meteorology National GDE Atlas, although there is potential for groundwater interaction with surface water nearby (Trace Environmental, 2016).

The BAR (Arcadis, 2017) indicated that the landfill expansion was unlikely to impact GDEs during the period of excavation and construction. The study predicts (Trace Environmental, 2016) the drawdown to be negligible at a distance of 1.2 km from the landfill boundary (<0.001m maximum drawdown during excavation).

Potential impacts on groundwater and GDEs are discussed in more detail within the **Water Management Plan**.



LEGEND

- Development site
- Proposal Site
- Cairncross Waste Management Facility

Vegetation mapping (Biolink 2013)

- Blackbutt Grassy Forest
- Flax-leaved Paperbark - Mixed Eucalypt Coastal Floodplain Wetlands Forest Complex
- Grey Gum - Tallowwood - White Mahogany Grassy Forest
- Plantation (Der)
- Wattle Scrub (Dist)

ARCADIS AUSTRALIA PACIFIC PTY LTD
 ABN 76 104 485 289
 Level 16, 580 George St | Sydney NSW 2000
 P: +61 (0) 2 8907 9000 | F: +61 (0) 2 8907 9001
 Coordinate System: GDA1994 MGA Zone 56
 Aerial Imagery supplied by NSW LPI

1:12,500 at A4

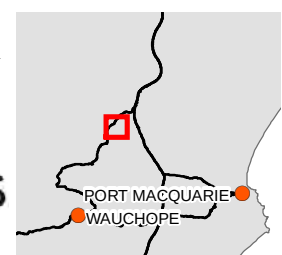
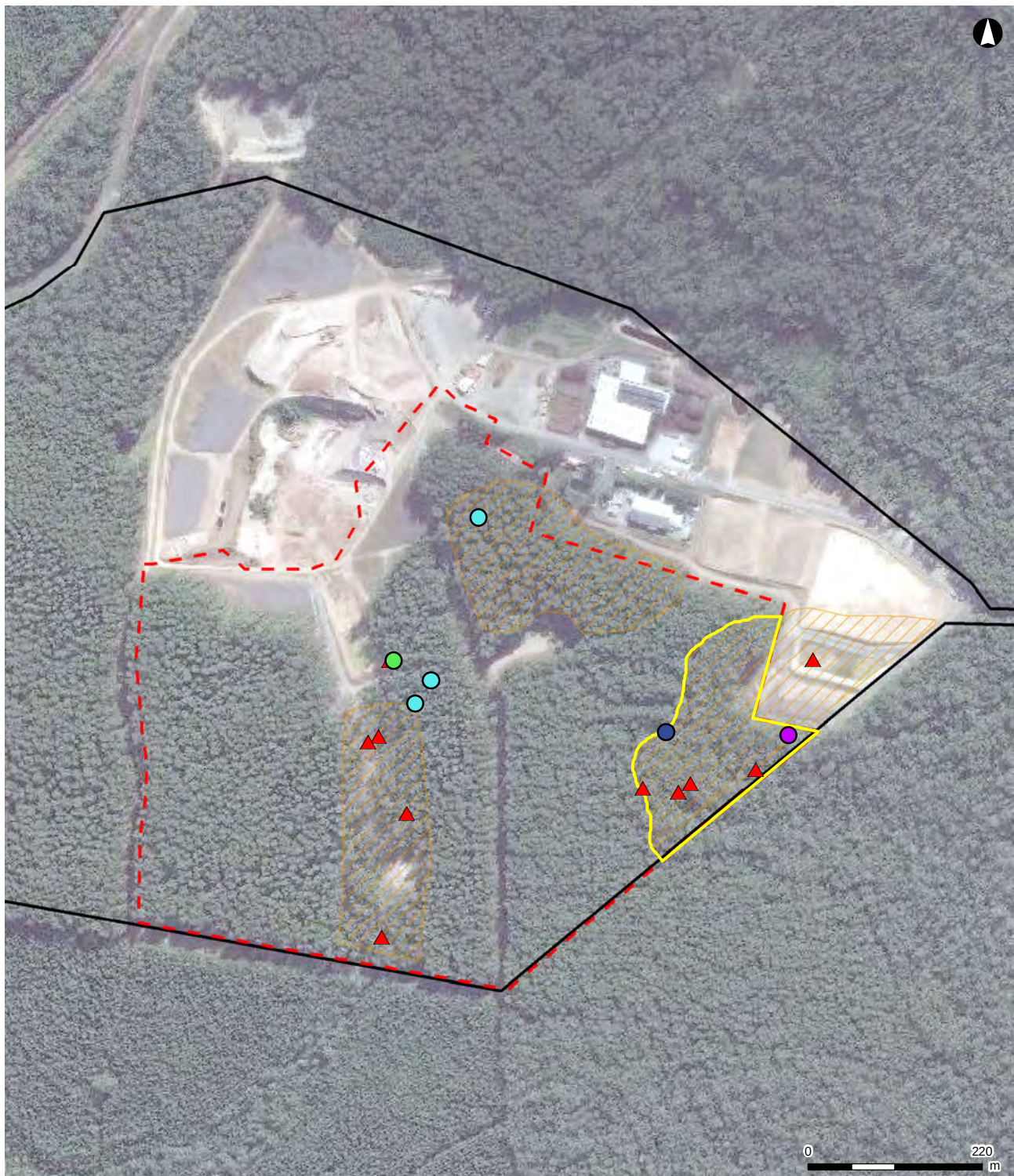


Figure 4-1: Vegetation mapping (Biolink 2013)



LEGEND

Threatened species recorded in the study area

- Eastern Bentwing Bat, Eastern Freetail Bat, Little Bentwing Bat, Southern Myotis
- Eastern Freetail-bat
- Koala
- Rufous fantail
- ▲ Hollow-bearing trees
- Development site
- Koala habitat - feed trees present
- Proposal Site
- Cairncross Waste Management Facility

ARCADIS AUSTRALIA PACIFIC PTY LTD
 ABN 76 104 485 289
 Level 16, 580 George St | Sydney NSW 2000
 P: +61 (0) 2 8907 9000 | F: +61 (0) 2 8907 9001
 Coordinate System: GDA1994 MGA Zone 56
 Aerial Imagery supplied by NSW LPI

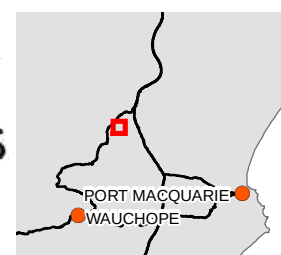


Figure 4-2: Fauna survey results

4.6 Threatened Species

The BAR (Arcadis, 2017) included an assessment of the likelihood of occurrence of threatened flora and fauna species within the landfill expansion which are listed under the EPBC Act. The findings are summarised in the following sections.

A full list of the flora and fauna species recorded at the Cairncross WMF is provided in **Appendix C**.

4.6.1 Flora

A search of the online EPBC Protected Matters Search Tool (PMST) found 10 threatened flora species and 43 threatened fauna species listed under the EPBC Act that are known, or likely to occur, within 10 km of the Facility. See **Appendix C (Table C1)**.

The likelihood of each threatened species occurring in the landfill expansion area was assessed and only one threatened flora species listed under the EPBC Act, *Cynanchum elegans* (White-flowered Wax Plant) was found to have a moderate likelihood of occurrence. The assessment found that impacts to this species would not be significant.

The other nine threatened flora species identified in the search were found to have a low likelihood of occurrence.

4.6.2 Fauna

A search of the EPBC PMST found 17 threatened fauna species or migratory species listed under the EPBC Act that had likelihood to occur within 10 km of the Facility. **Appendix C (Table C3)**.

The likelihood of each threatened or migratory species occurring in the landfill expansion area was assessed and the following species were considered to have a high likelihood of occurrence:

- Koala (*Phascolarctos cinereus*)
- Rufous Fantail (*Rhipidura rufifrons*) (listed as migratory under the EPBC Act)
- Spotted-tail Quoll (*Dasyurus maculatus maculatus*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*).

The Giant Barred Frog is considered to have a moderate likelihood of occurrence.

No impacts were found to be significant for any of those fauna species. See **Figure 4-2** for more details.

4.7 Predicted Environmental Impacts

Predicted environmental impacts for the landfill construction and operation were identified and evaluated in the EIS (Arcadis, 2017) and were further reviewed during engagement with government and community stakeholders and through a preliminary environmental risk assessment process.

Impacts to flora and fauna was identified as a key environmental impact that will require management during construction and operation of the landfill.

The BAR (Arcadis 2017) identified potential biodiversity impacts and risks associated with construction and operation of the new landfill cells. **Table 4-1** lists these impacts and the associated risk assessment rating.

Table 4-1: Summary of environmental risks assessment

Aspect	Construction and Operation Activities	Potential Impact	Preliminary Risk Rating	Comment
Construction				
Flora and Fauna	A total of 3.4 ha of the Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion will be cleared within Stage 3 of the landfill expansion	Loss of native vegetation Loss of terrestrial fauna habitat including habitat for threatened and migratory species	HIGH	The area of habitat to be cleared does not comprise a significant area of habitat within the wider locality. Habitat features and vegetation communities that will be cleared are prevalent within the wider landscape, particularly within Rawdon Creek Nature Reserve to the east and south-east of the landfill.
		Habitat fragmentation Loss of fauna habitat connectivity	HIGH	Vegetation clearing within the landfill area may reduce the capacity of some less mobile fauna to move within, and between patches of remaining habitat. In order to maintain connectivity between larger areas of native vegetation adjoining the site, a 50 m wide koala connectivity corridor will be maintained across the southern boundary of the landfill expansion area (See Figure 2-3).
		Fauna mortality	HIGH	Fauna injury or mortality is most likely to occur during vegetation clearing activities, but also may result from collisions with construction vehicles or plant, or accidental entrapment in plant, trenches or other earthworks. In order to minimise these impacts, an experienced ecologist will be engaged and will be present onsite to supervise all stages of removal of hollow bearing trees, as well as relocation of any fauna.
Flora and Fauna	New landfill cells construction	Indirect impacts	MEDIUM	The landfill construction has a risk of indirect impacts to remnant native vegetation adjacent to construction areas. This includes a risk of increased sedimentation runoff, dust and noise emissions and weed establishment.
Groundwater Dependent Ecosystems	New landfill cells construction	Indirect impact to Groundwater Dependent Ecosystems	LOW	A detailed hydrogeological investigation of the landfill site was undertaken by Trace Environmental (2016) during preparation of the EIS (Arcadis, 2017). This included an assessment of the potential impacts on groundwater. Trace Environmental (2016) predicts the drawdown to be negligible at a distance of 1.2 km from the Proposal Site boundary (<0.001 m maximum drawdown during excavation).

Aspect	Construction and Operation Activities	Potential Impact	Preliminary Risk Rating	Comment
Operation				
Flora and Fauna	Landfill operation	Fauna mortality	LOW	Fauna injury or mortality may result from collisions with vehicles or plant in operation of the landfill, or as a result of increased truck movements.
		Edge effects and weed invasion	LOW	Increased movement of people, vehicles, machinery, vegetation waste and soil may facilitate the introduction or spread of weeds in adjacent areas of native vegetation.
		Alteration to air quality and noise environments	LOW	Operation of the landfill may increase utilisation of the site by both people and vehicles from current levels. This may impact upon the roosting, breeding and foraging activities of locally occurring fauna, as a result of increased exposure to light, noise, dust, vehicles and people.

5 VEGETATION MANAGEMENT FRAMEWORK

5.1 Vegetation Clearing

5.1.1 Objectives

To minimise the amount of vegetation cleared and reduce disturbance to retained vegetation and fauna populations.

5.1.2 Clearing management

The expansion of the Facility will occur progressively with cell construction (including clearing), operation and rehabilitation in three stages. See **Table 2-1** for more details on staging.

Mitigation measures will be implemented to minimise the impact to the environment during clearing. These measures which also include information on the proposed timing, frequency, performance criteria and expected outcomes of each action are provided in **Appendix B**.

See **Appendix E** for the vegetation clearing protocol for Stage 3.

5.1.3 Monitoring and maintenance

All fauna killed, injured or relocated during clearing activities will be recorded by the ecologist who will be present on-site during clearing activities.

All records will be reported to PMHC in a *Post-clearing Fauna Management Report* at completion of the clearing activities.

5.2 Koala Connectivity Corridor Management

5.2.1 Objectives

The management objective for the koala connectivity corridor is to:

- Maintain habitat connectivity between the compensatory habitat to the west and habitat within the Rawdon Creek Nature Reserve to the east;
- Protect koalas and other fauna during landfilling operations. This will be achieved through installation of fauna fencing.

5.2.2 Protection for the corridor

The koala connectivity corridor is located just south of Stage 2 (**Figure 2-3**). This corridor will be enhanced and maintained as part of PMHC's Public Bushland Management Programme and will be managed in perpetuity. Management of the area will also include the provision of bushfire control measures (See **Section 5.2.7** and **Appendix F**).

The area will be rezoned for environmental protection with the next standard PMHC Local Environmental Plan (LEP) instrument amendment.

5.2.3 Habitat enhancement

Existing vegetation (i.e. leftover blackbutt plantation and groundcover) in the koala connectivity corridor will be maintained. All disturbed areas in the corridor will be planted with koala food tree species, shrubs and ground cover which are identified in **Table 5-1**. The koala food tree species are the preferred food trees for the local area, while the ground cover and shrubs are based on the native species recorded within the

Facility⁶. The final planting list will be based largely on the availability of seeds which can be collected from the site or nearby the site, and the suitability of the seed stock germinated and propagated under nursery conditions.

Further details on revegetation for the Facility are included in **Section 5.3**. One koala feed tree will be planted per 10 m spacing. This general layout is shown on **Figure 5-2**.

5.2.4 Fencing

Temporary fencing will be installed along the northern edge of the connectivity corridor and along the western edge of the Stage 2 area prior to clearing of Stage 2 to ensure koalas cannot access the site during clearing activities.

Once construction activities are complete, permanent fencing will be installed to separate the corridor from the Stage 2 landfill area to prevent migration of koalas, and other fauna, onto the landfill site during operation. The corridor will not be fenced on the other sides to maintain connectivity with the surrounding vegetation.

The fencing should have the following features:

- Either:
 - chain wire fencing material with a floppy top that falls in the direction that the koala will attempt to climb the fence (in the connectivity corridor) or;
 - smooth metal or Perspex sheets (at least 600 mm wide) at the top of the fence.
- Fence bracing or supports are on the side of the fence that is away from koala access;
- The top of the unclimbable section of fencing is at least 1.5 m from the ground to prevent koalas jumping and gripping the top of the fencing;
- Fencing should extend to ground level along uneven or undulating ground;
- Vegetation beside the fence is regularly maintained to exclude trees and shrubs from within 3 m of the fence;
- Canopies of the trees next to fence must be trimmed to remove links to tree canopies on the other side of the fence.

Figure 5-1 shows the fencing to be installed to minimise the movement of koalas into the operational area for Stage 1. **Figure 5-2** shows the fencing which will be installed once Stage 2 is constructed, and landfilling has commenced.

5.2.5 Timing

The koala connectivity corridor will be demarcated from other areas within six months of the approval of this Plan. This will involve marking out the exact boundaries and installing some bunting.

Planting of the koala connectivity corridor will be undertaken within two years of the approval of this Plan or sooner if possible.

5.2.6 Monitoring and maintenance

Fencing will be inspected weekly to ensure that there has been no damage. Damage to the fence will be reported to the Landfill Supervisor and repaired as soon as practicable.

Any plantings undertaken within the koala connectivity corridor will be maintained and monitored as detailed in **Section 5.3.4** and **Section 5.3.5**.

⁶ Arcadis, 2017: Cairncross Landfill Expansion Biodiversity Assessment Report, dated 1 June 2017.

Cairncross Waste Management Facility

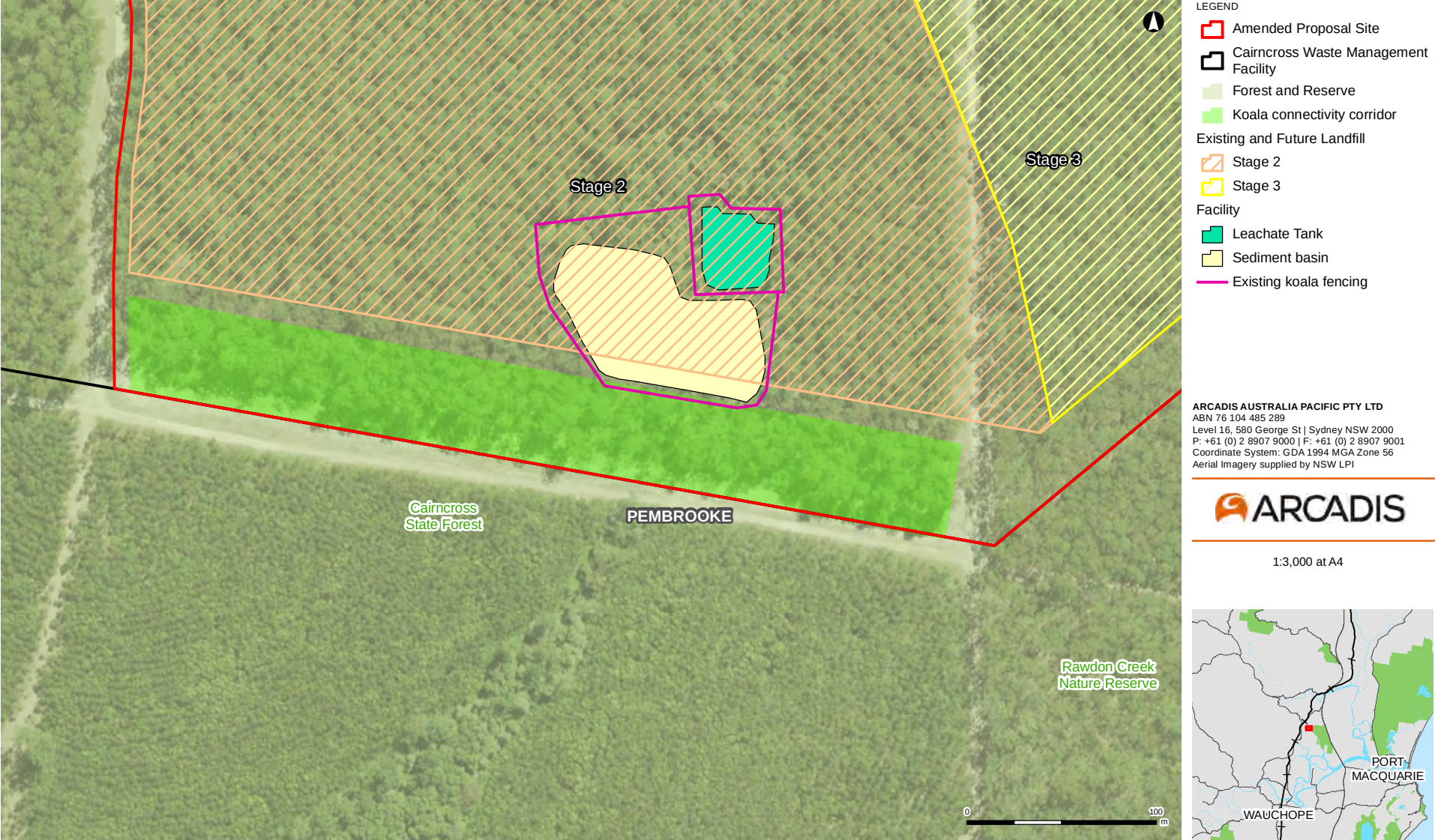


Figure 5-1: Stage 1 Koala corridor fencing

Cairncross Waste Management Facility

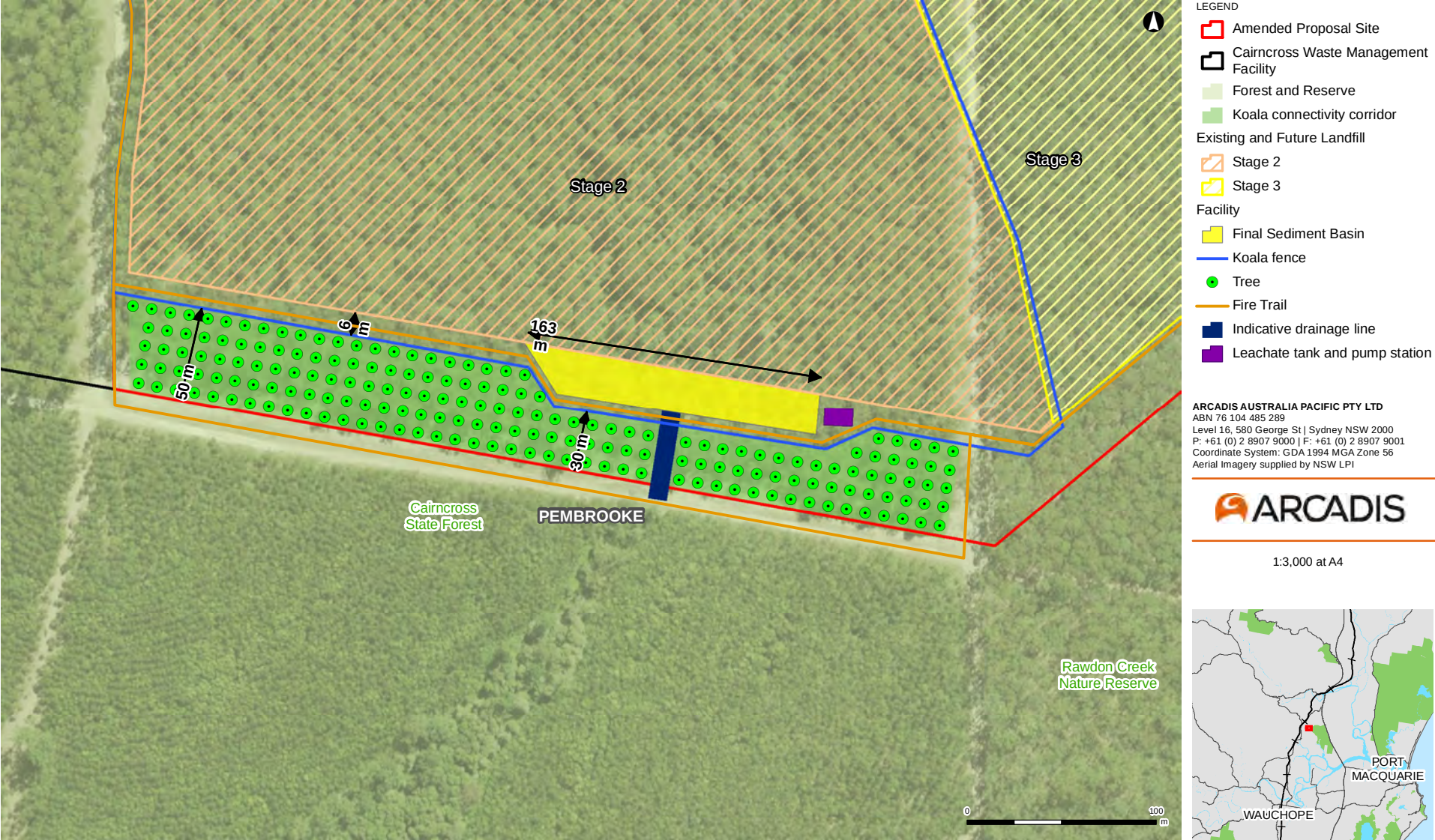


Figure 5-2: Stage 2 Koala corridor rehabilitation and fencing

5.2.7 Bushfire management

Roads and trails within the landfill site act as firebreaks and fire access tracks and form part of the strategy for assisting with bushfire mitigation and suppression. There is a 30 m wide SFAZ along the eastern boundary of the koala connectivity corridor with the adjoining Rawdon Creek Nature Reserve. The southern forestry trail (Extension Road) acts as an APZ between the koala connectivity corridor and forestry.

Figure 5-3 shows a cross section of a typical Stage 2 and 3 boundaries for the koala connectivity corridor and the SFAZ. It is noted that the koala connectivity corridor will reduce to 30 m in Stage 2 for a maximum length of 163 m to allow adequate sizing of the sediment basin.

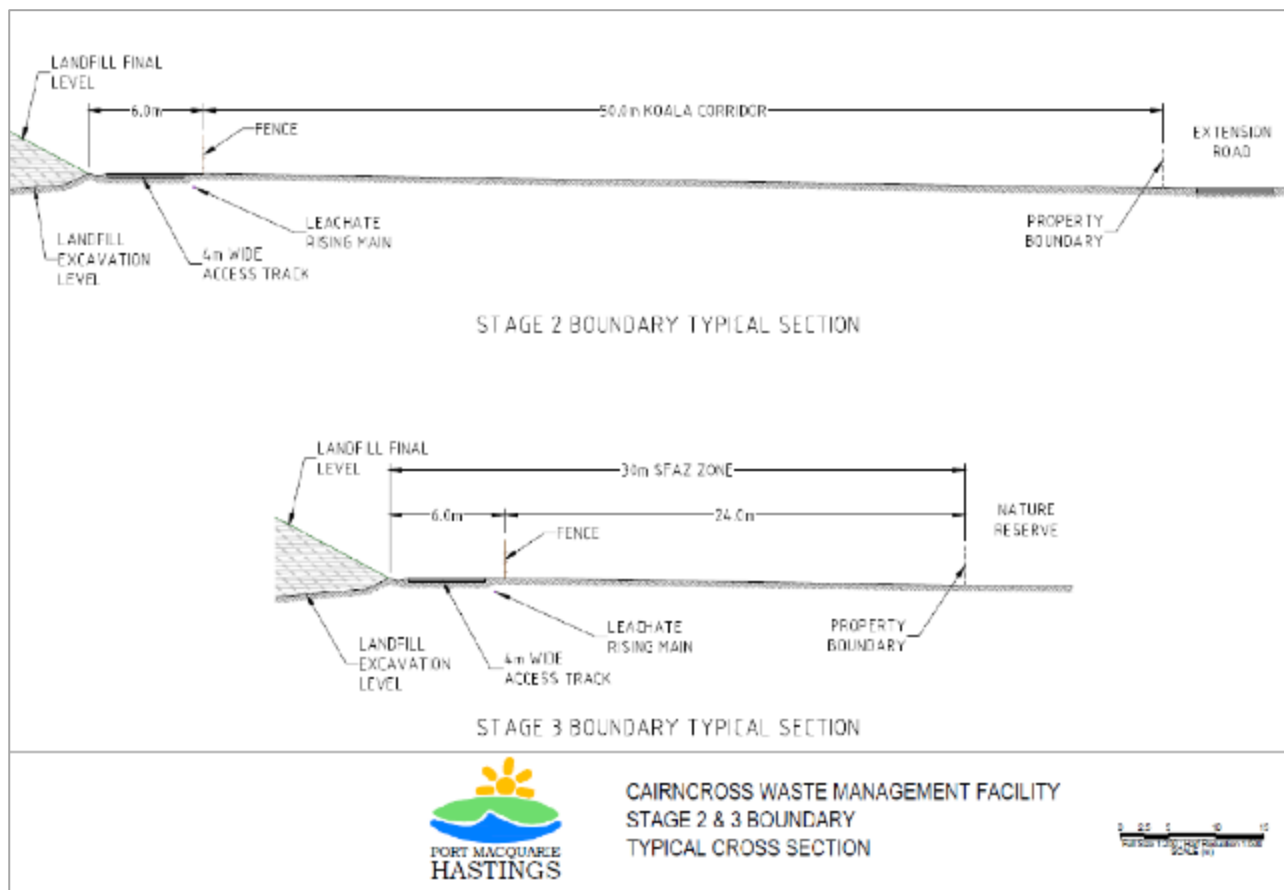


Figure 5-3: Stage 2 and 3 boundary typical cross section

The fire trails and SFAZ will be managed in accordance with the **Bushfire and Fuel Management Plan (BFFMP)**. The BFFMP has been prepared for the site in consultation the NSW Rural Fire Service Mid-Coast District Fire Control Centre and approved by the DPIE.

Additionally, the Cairncross LEMP, BFFMP and the Solid Waste Management Manual outline the procedures for fire prevention and firefighting throughout the site, including weekly inspections for litter and fences.

Appendix F summarises the bushfire strategy for the Facility.

5.3 Revegetation

5.3.1 Objectives

The objective of revegetation is to enhance habitat quality for threatened fauna (particularly koalas) and to stabilise disturbed areas.

5.3.2 Revegetation

Revegetation will be required to stabilise disturbed areas adjacent to retained native vegetation and to enhance habitat quality in the koala connectivity corridor. This will be undertaken as soon as feasible and reasonable after disturbance has occurred.

Table 5-1 lists the potential species or plantings suitable for the koala connectivity corridor, and includes a selection of trees, shrubs and grounds cover. As stated above, this list is based on the native species recorded within the Facility⁷ and the local koala food trees and the final planting list will be based largely on the availability of seeds and the suitability of the seed stock germinated and propagated under nursery conditions.

Table 5-1: Indicative species for list for revegetation

Botanical name	Common name	Botanical name	Common name
Trees (preferred koala food tree species are shaded grey ⁸)			
<i>Eucalyptus microcorys</i>	Tallowwood	<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Eucalyptus resinifera</i>	Red Mahogany	<i>Eucalyptus propinqua</i>	Small-fruited Grey Gum
<i>Eucalyptus tereticornis</i>	Forest Red Gum	<i>Alphitonia excelsa</i>	Red Ash
<i>Eucalyptus propinqua</i>	Small-fruited Grey Gum	<i>Allocasuarina littoralis</i>	Black She-Oak
<i>Eucalyptus robusta</i>	Swamp Mahogany	<i>Acacia floribunda</i>	White Sally
<i>Eucalyptus planchoniana</i>	Bastard Tallowwood	<i>Eucalyptus pilularis</i>	Blackbutt
<i>Eucalyptus bancroftii</i>	Orange Red Gum	<i>Callistemon salignus</i>	White Bottlebrush
<i>Eucalyptus racemosa</i>	Scribbly Gum	<i>Corymbia intermedia</i>	Pink Bloodwood
<i>Eucalyptus patentinervis</i>	Tallowwood hybrid	<i>Eucalyptus acmenoides</i>	White Mahogany
<i>Eucalyptus grandis</i>	Flooded Gum	<i>Eucalyptus siderophloia</i>	Grey Ironbark
<i>Eucalyptus saligna</i>	Blue Gum	<i>Syncarpia glomulifera</i>	Turpentine
<i>Eucalyptus resinifera</i>	Red Mahogany		
Shrubs ⁷			
<i>Acacia falcata</i>	Sickle Wattle	<i>Leucopogon juniperinus</i>	Long-flowered Beard-heath
<i>Acacia floribunda</i>	White Sally	<i>Ozothamnus diosmifolius</i>	White Dogwood
<i>Breynia oblongifolia</i>	Coffee Bush	<i>Persoonia conjuncta</i>	
<i>Callistemon salignus</i>	White Bottlebrush, Pink-tips	<i>Polyscias sambucifolia</i>	Elderberry Panax
<i>Dodonaea triquetra</i>	Hopbush	<i>Pultenaea retusa</i>	Notched Bush-pea

⁷ Arcadis, 2017: Cairncross Landfill Expansion Biodiversity Assessment Report, dated 1 June 2017.

⁸ Preferred koala food tree species according to OEH (2018)

Botanical name	Common name	Botanical name	Common name
Groundcover – Grasses ⁷			
<i>Aristida vagans</i>	Threeawn Speargrass	<i>Oplismenus aemulus</i>	Broad-leaved Basket Grass
<i>Entolasia marginata</i>	Bordered Panic	<i>Oplismenus imbecillis</i>	Narrow-leaved Basket Grass
<i>Entolasia stricta</i>	Wiry Panic	<i>Panicum simile</i>	Two-colour Panic
<i>Imperata cylindrica</i>	Blady Grass	<i>Themeda australis</i>	Kangaroo Grass
<i>Microlaena stipoides</i>	Weeping Grass, Meadow Rice-grass		
Groundcover – Herbs, ferns etc ⁷			
<i>Billardiera scandens</i>	Hairy Apple Berry	<i>Kennedia rubicunda</i>	Dusky Coral-pea
<i>Blechnum cartilagineum</i>	Gristle Fern	<i>Lepidosperma laterale</i>	Variable Sword-sedge
<i>Calochlaena dubia</i>	Rainbow Fern, False Bracken	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Dampiera sylvestris</i>	Blue Dampiera	<i>Lomandra multiflora</i>	Many-flowered Mat-rush
<i>Desmodium rhytidophyllum</i>	Tick-trefoil	<i>Opercularia diphylla</i>	Stinkweed
<i>Dianella caerulea</i>	Blue Flax-lily	<i>Oxalis perennans</i>	
<i>Dichondra repens</i>	Kidney-weed, Mercury Bay Weed	<i>Pimelea linifolia</i>	Slender Rice Flower
<i>Gahnia clarkei</i>	Tall Saw-sedge	<i>Pratia purpurascens</i>	Whiteroot
<i>Gonocarpus tetragynus</i>	Common Raspwort	<i>Pseuderanthemum variabile</i>	Pastel Flower
<i>Goodenia hederacea</i>	Ivy Goodenia	<i>Pteridium esculentum</i>	Bracken
<i>Hardenbergia violacea</i>	False Sarsaparilla	<i>Sigesbeckia orientalis</i>	Indian Weed
<i>Hibbertia aspera</i>	Rough Guinea-flower	<i>Thysanotus juncifolius</i>	
<i>Hibbertia scandens</i>	Twining Guinea-flower	<i>Vernonia cinerea</i>	
<i>Hydrocotyle peduncularis</i>			
Groundcover – Vines and creepers ⁷			
<i>Cissus hypoglauca</i>	Native Grape, Water Vine	<i>Parsonsia straminea</i>	Common Silkpod, Monkey Rope
<i>Eustrephus latifolius</i>	Wombat Berry	<i>Polymeria calycina</i>	Polymeria
<i>Glycine clandestina</i>	Twining Glycine	<i>Rubus moluccanus</i>	Molucca Bramble
<i>Marsdenia rostrata</i>	Common Milkvine	<i>Stephania japonica</i>	Snake Vine

The physical properties of the location of the planting (e.g. soil type, drainage, aspect) will be taken into account when selecting species for revegetation.

The following guidelines will be followed when undertaking plantings:

- Seeds and plants used within the Cairncross WMF should be obtained from sources within the Northern Rivers Bioregion and the Macleay – Hastings Subregion if possible;
- If possible, seeds should be collected on site;
- Appropriate site treatment (e.g. ripping, primary works) identified in the planting schedule must be undertaken or completed prior to planting;
- Equipment entering the site must be visually inspected for pest and diseases (Myrtle Rust/ Phytophthora);

- Planting should be undertaken in Autumn to ensure plants are able to become established before growing season;
- Avoid planting canopy and sub-canopy species within 10 m of the drip-line of existing canopy trees;
- Avoid planting into areas where there is canopy species recruitment;
- Follow planting maintenance regime after planting;
- Monitor plantings.

Planting methods will include a combination of direct seeding, branch spread, and tubestock planting.

Figure 5-2 provides the proposed planting of trees within the koala connectivity corridor.

5.3.3 Timing

Timing for the koala connectivity corridor will be undertaken as detailed in **Section 5.2.5**

All other plantings in disturbed areas will take place as soon as feasible after the disturbance has occurred.

Planting will be undertaken in autumn, in order to maximise the time available for establishment prior to a winter season. This also allows the roots to develop sufficiently prior to the summer season which will ultimately reduce the need for maintenance (particularly watering) required during the hotter months.

5.3.4 Revegetation maintenance

Maintenance of any revegetated areas will be required in order to meet the performance criteria for that activity (see **Appendix B**). Maintenance will be required during the plant establishment phase, and for a period of at least five years. Such activities could include:

- Re-installing tree guards which have been damaged or removed.
- Watering of plantings, the frequency and duration of the watering events will be dictated by the climatic conditions following planting. It is anticipated that a minimum of three weeks of watering will be required, however it is the responsibility of the Bush Regeneration and Restoration Contractor to source the required water and determine a suitable frequency to ensure that the relevant plant survival performance criteria are met.
- Undertaking weed control within surrounding plants using appropriate methods that do not impact the plantings and in accordance with the procedures used for the rest of the site (**Section 5.6**).
- Re-planting of failed tube stock to meet performance targets.
- Planting and direct seeding in disturbed areas and areas of retained vegetation in autumn after completion of weed control works.

The requirements for these activities will be determined during monitoring events and will be documented within the annual report.

5.3.5 Revegetation monitoring

During the establishment phase, monitoring of plantings will occur at an interval determined by the Bush Regeneration and Restoration Contractor. The results of the monitoring will be presented in the annual report prepared by the Contractor. Monitoring will occur for a period of three years post planting.

Monitoring of plantings and fencing will be inspected by operational staff as a part of the weekly checklist.

5.3.6 Bushfire management

Locations for plantings will consider the requirements of Section 5 of the BFFMP, which details bushfire management and mitigation measures to ensure that the plantings will not increase the fire risk to assets and sensitive receptors.

This includes:

- Maintaining fuel reduced areas (i.e. SFAZ, asset protection zones (APZ) and defensible spaces (see **Figure 5-3**);
- Temporary fire breaks;
- Management of combustible fuels through hazard reduction burning.

See **Appendix F** for more information on the bushfire strategy for the Facility.

5.4 Hollow Replacement Program

5.4.1 Objectives

The objective of the hollow replacement program is to provide alternate hollows to offset the hollows removed during the construction of Stages 1-3 of the landfill.

5.4.2 Implementation of the program

A hollow replacement program will be implemented within the koala connectivity corridor and on any proposed offset site.

All hollows (i.e. one small, 10 medium and five large hollows) removed during clearing will be replaced at 1:1 ratio. The type, target species, number required, and dimensions of each box are listed in **Table 5-2**.

It is noted that these numbers have been determined in the BAR. As clearing progresses throughout the whole site, inspections will be undertaken by an ecologist for other hollow-bearing trees in addition to these known ones.

Table 5-2: Nest box details

Species suitable	#	Dimensions* (mm)			Placement (m)	Notes
		Entrance	Depth	Inner		
Small Hollows (<10 cm)						
Small mammals, birds and reptiles	1	30 – 50	200- 300	150 x 200	2-6	Consider location with nearby branches to reduce predation.
Medium Hollows (10-20 cm)						
Small parrots (and reptiles)	2	55-100	400	200 x 200	5 – 8	
Possums	3	85-100	300	250 x 250	2 – 4	
Large gliders	3	90	400	250 x 250	6 – 10	Rear entry to reduce uptake by birds, jagged spout entrance
Bats	2	Horizontal slit	400	250 x 250	3 – 5	Wedge shaped
Large Hollows (>20 cm)						
Large parrots (cockatoos)	3	Horizontal slit	400	250 x 250	3 – 5	
Smaller owls	2	100	500	250 x 300	4 – 6	

Note *: Dimensions taken from Franks and Franks (2003).

5.4.3 Nest box construction

The boxes should be constructed using timber (or a suitable alternative such as recycled plastic) that is either recycled or plantation timber. Nest boxes made from hollow limbs and trunks of cleared trees (preferably from the site) could also be used if available.

When considering the construction of the boxes ensure the manufacturer takes the following into account:

- The entrance hole should be no larger than that required for the target species. This will reduce the uptake by unwanted species;
- Shade cloth (or similar) should be installed in bat boxes to give the bats something to cling to;
- The entrance hole should generally be positioned toward the top of the nest box, so the area remains dark unless this is not suitable for the species (e.g. ducks or kookaburras);
- Rear entrances should be used for gliders and bats to avoid competition from the Common Myna or other birds;
- Rough sawn timber on the outside of the box or a notch of timber will allow animals to grip the exterior of the nest box. Similarly, rough timber should be left inside the box to aid young to get out of the box;
- Furniture such as wood shavings should be added to each box if suited to the target species;
- There should be no sharp edges or exposed screws or nails;
- Joins should be sealed with non-toxic glue to reduce drafts;
- Thick timber (at least 30 mm thick) should be used to help insulate the box from heat and cold;
- If the boxes are to be painted on the outside, then the paint should be dark coloured water-based paint. The inside should not be painted;
- Small drain holes should be placed in the box to allow water to drain and the lids should overhang by 25 mm to minimise the entrance of rain.

5.4.4 Timing

Boxes should be installed as vegetation is cleared and installed in either the compensatory habitat to the west of the landfill or in the koala connectivity corridor once it is established enough.

One nest box has already been installed in the compensatory habitat as a result of Stage 1 clearing activities.

5.4.5 Monitoring and maintenance

Nest boxes will be monitored periodically for damage and any required repairs will be reported to the Landfill Supervisor.

5.5 Pest Management

The landfill, while covered daily, contains a large amount of putrescible general waste which can provide food for pests and the overall Cairncross WMF contains large industrial buildings which can provide shelter for feral animals, including foxes and wild dogs.

The *Cairncross WMF Pest Management Plan [PMHC 2013]* will be implemented for Stages 1-3. The plan aims to conserve biodiversity of neighbouring land by reducing feral populations

An annual report will be submitted to NPWS describing the feral animal management activities undertaken and any corrective actions required.

5.6 Weed Management

5.6.1 Objectives

The objective of weed management within the Facility is to:

- Prevent the introduction of new weeds into the Facility;
- Reduce the spread of weeds into new areas within the Facility;
- Decrease the density of weeds within the koala connectivity corridor.

5.6.2 Weeds of National Significance

In NSW all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Under the National Weeds Strategy (Natural Resource Management Ministerial Council)⁹, 32 introduced plants have been identified as Weeds of National Significance (WoNS¹⁰). These weeds are regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts.

Two WoNS were recorded during the biodiversity assessment (Arcadis, 2017). See **Plate 5-1**.



Lantana (*Lantana camara*)

⁹ <https://weeds.org.au/wp-content/uploads/2020/04/The-Australian-Weeds-Strategy.pdf>

¹⁰ <https://www.dpi.nsw.gov.au/biosecurity/weeds/weed-categories#Weed-of-National-Significance>

Fireweed (*Senecio madagascariensis*)

Plate 5-1: WoNS recorded during the biodiversity assessment

5.6.3 Prevention

The spread of weeds within the Facility will be controlled and preventative measures put in place to prevent new species from establishing within the Facility. Weed propagules are easily transported on plant, personnel and vegetative material that is being transported to and from the Facility. Without adequate hygiene protocols, the risk of spreading weeds during clearing, operation and while undertaking of management activities is high.

To reduce the spread of weeds within the Facility, the following measures will be implemented:

- Keep tracks clear and ensure that all vehicles stay on the formed tracks;
- Vehicles and machinery used during clearing must be weed free when entering the Facility;
- Any fill bought into the Facility must be from weed free sources.

5.6.4 Weed control methods

The aim of weed management is to minimise the spread of WoNS and invasive weeds around the Facility.

Successful long-term weed management will require long-term maintenance as weeds can be introduced and spread through vehicles and machinery entering the site and within the waste brought in by third parties. The NSW Government WeedWise website¹¹, provides methods for controlling weed species and registered herbicide options. **Table 5-3** summarises the recommended control for Lantana and Fireweed.

Table 5-3: Recommended control strategies for WoNS recorded on site

Weed species	Common Name	Control strategy
<i>Lantana camara</i>	Lantana	Mechanical control of dense infestations may be undertaken where practicable, otherwise manual removal is recommended. Follow up with herbicide control and ongoing spot-spraying while native vegetation re-establishes.
<i>Senecio madagascariensis</i>	Fireweed	Hand pull small infestations. Control with herbicide in late autumn, by spot spraying with an appropriate herbicide.

¹¹ <https://weeds.dpi.nsw.gov.au/>

Other environmental weeds are likely to be present within the Facility and these should be controlled using methods recommended by Council's Natural Resources Team.

5.6.5 Mitigation

Mitigation measures while undertaking weed controls includes, but is not limited to:

- Minimise soil disturbance and herbicide use within proximity to waterways to reduce impacts on water quality;
- Install silt traps downstream of any soil disturbance to reduce sediment and nutrient pollution;
- Making use of "cut and paint" techniques is preferable to broad spectrum spraying as this minimises the potential transport of herbicide into waterways.

5.6.6 Monitoring and maintenance

The following weed monitoring and maintenance will be undertaken:

- Observations for weeds will be made by PMHC waste staff and the Waste Services Team Leader will be notified of any presence of weeds. This will include the presence of weeds within the SFAZ and the koala connectivity corridor.
- Weed inspections and controls will be undertaken a minimum of four times per year by Council's qualified weed management officers.
- Weed controls will be undertaken bi-annually or as required using techniques advised by Council's Natural Resource Team.
- An annual report will be submitted to NPWS describing the weed management activities undertaken and any corrective actions required.

5.7 Rawdon Creek Nature Reserve Management

The expansion of the Facility is unlikely to directly impact the Rawdon Creek Nature Reserve (the Reserve). However, potential indirect impacts could include visual, odour, noise, air quality, off-site migration of litter, edge effects, waste dumping, and soil and water quality impacts.

NSW OEH (now BCDDEES) has developed *Guidelines for developments adjoining land managed by the Office of Environment and Heritage*¹² (OEH, 2013) which provides landowners with guidance to assist in developing mitigation measures for potential impacts to OEH land.

The risks to the Reserve and the mitigation measures that will be implemented to reduce the risk are listed in **Table 5-4**.

¹² <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Parks-reserves-and-protected-areas/Development-guidelines/guidelines-for-developments-adjoining-land-managed-by-OEH-130122.pdf>

Table 5-4: Risks to Rawdon Creek Nature Reserve and the mitigation measures to be implemented.

Potential indirect impact	Risks to Rawdon Creek Nature Reserve	Mitigation measures
Noise	Potential to disturb native fauna and adversely affect the public enjoyment of walking trails and picnic areas.	- Clearing of vegetation within Stage 2 will only occur during the day - Operation of the landfill will be confined to daylight hours - Vehicles will be limited to a speed limit of 20 km/h - Implement requirements for on-going maintenance of fixed and mobile plant in accordance with manufacturers specifications, ensuring silencers are fitted where reasonably practicable and considering replacing tonal reversing alarms with broadband devices on all site-owned plant.
Odour and air quality	Potential to adversely affect the public enjoyment of walking trails and picnic areas.	- The active tipping face will be kept as small as practicable. - Vehicles will be maintained and serviced according to the manufacturer's specifications and engines will be switched off when not in use - All trucks entering and leaving the premises carrying loads will be covered at all times, except during loading and unloading - Vehicles will be limited to a speed limit of 20 km/h - Appropriate dust management practices will be maintained, including washing down vehicles (as required) and reducing drop heights from loading and handling equipment (where possible).
Visual amenity	Potential to adversely affect the public enjoyment of walking trails and picnic areas.	No impacts are expected as vegetation within the SFAZ is expected to block the view of the Stage 3 clearing area.
Off-site migration of litter and illegal dumping	Litter may migrate through wind or water into the Reserve. Illegal dumping of waste may occur in the Reserve.	In 2017, PMHC finalised two MOUs with NPWS and Forestry Corporation of NSW. In the MOUs, PMHC committed to a coordinated partnership approach to managing illegal dumping. Key actions include cleaning up of the areas around the Cairncross WMF. Other measures include: - Strengthening community understanding of illegal dumping issues through community education programs - Participating in regional planning and illegal dumping projects - Providing support for investigation, surveillance and follow up by PMHCs Compliance team - Clean up of areas around the Cairncross WMF - All trucks entering and leaving the premises carrying loads must be covered at all times, except during loading and unloading - The active tipping face will be kept as small as practicable.

Potential indirect impact	Risks to Rawdon Creek Nature Reserve	Mitigation measures
Soil	Soil erosion and/or sedimentation from erosion in the landfill will impact vegetation, waterways or visual amenity Inappropriately managed leachate could contaminate soils	The LEMP, WMP and LMP have been developed, to cover both construction and operation of the extended landfill in accordance with the Blue Book, including: • Installation of erosion and sediment controls prior to construction commencing • Separation of clean and dirty water • Minimisation of ground disturbance and areas of exposed soils, where possible • Stabilisation and revegetation of exposed soils as soon as practicable • Avoidance/minimisation of clearing and earthworks during periods of heavy rain • Measures to reduce the velocity and erodibility of surface water flows across the site • Measures for management of stockpiles and sediment basins • Requirements for classification of surplus excavated materials under the NSW <i>EPA Waste Classification Guidelines 2014</i>.
Water quality	Contaminated surface water from the landfill could run into Rawdon Creek Nature Reserve	• A surface and groundwater monitoring program will be implemented to monitor water quality flowing outside of the landfill (See Section 4.4 and Section 5.4 of the Water Management Plan). • A combined sediment basin and fire-fighting storage dam will be located on the southern boundary of the Stage 3 landfill area, adjacent to the nature reserve (See Figure 2-3). The basin has been designed to capture and treat all sediment-laden runoff during a 90th-percentile 5-day rainfall event.
Fire	Fires started in the landfill have the potential to spread into the Rawdon Creek Nature Reserve	The Cairncross WMF Bush Fire and Fuel Management Plan outlines the mitigation measures that will be implemented to minimise the impacts of fire during landfill operations and for minimising the potential for landfill fires spreading into the Rawdon Creek Nature Reserve. This includes measures for work practices by staff as well as providing defensible space, fire breaks and a Strategic Fire Advantage Zone (SFAZ). Proposed mitigation measures are provided in Section 5 of the BFFMP. Also see Appendix F of this VMP, which shows the bushfire management strategy for the Facility.
Weeds	Weeds from the Facility may spread to the Reserve	Weeds will be monitored and controlled along the border of the Reserve as part of Councils regular weed control at the Facility.

5.8 Compensatory Habitat Area

5.8.1 Background

Based on the CHMP (Connell Wager, 2000), the Rawdon Creek Compensatory Habitat comprises a triangular parcel of land bounded by Pembroke Road and the North Coast Railway Line to the west and Extension Road to the south with the Cairncross WMF buffer area forming the eastern boundary.

The site was traversed by two forestry trails, namely 9.2 and 9.3, which connected Extension Road to Thurlings Road. The compensatory habitat area is separated from the landfill site by a ridge and is a discrete sub-catchment of Rawdon Creek.

The vegetation of the site comprises a mosaic of forest types including:

- Forest Red Gum / Small-fruited Grey Gum riparian forest along Rawdon Creek
- 1974 Blackbutt plantation predominantly east of the creek
- Small-fruited Grey Gum dry sclerophyll forest predominantly to the west of the creek
- 1976 Blackbutt plantation over an area west of the creek
- A smaller area of Blackbutt dry sclerophyll forest in the north of the site.

The structural and floristic diversity of the site's vegetation notably declines from the riparian area to the Blackbutt plantation.

The site has been subject to regular fuel reduction burning and thinning of the Blackbutt plantation areas since the Cairncross WMF has been operational.

5.8.2 Management

The compensatory habitat area is managed by PMHC, predominantly as a hands-off approach with the exception of fire management as required and periodic monitoring and control of weed and fauna populations. The following activities will be undertaken:

- Periodic monitoring of weed species and subsequent treatment as required.
- A program of monitoring of selected native and introduced species.
- Management of feral animals is directed by the findings of the monitoring program and is undertaken by a consultant with guidance from NPWS.
- Depending on the findings of the monitoring program, NPWS and Council may recommend amendments to the CHMP as well as the frequency and extent of monitoring activities.
- Fire protection zones have been established and will be managed in accordance with the requirements of the **Bush Fire and Fuel Management Plan (BFFMP)**. This work would be undertaken in consultation with NPWS and Council's Bushfire Officer.

Additional measures for the compensatory habitat are included in **Appendix B Table B1**.

5.9 Landfill Closure Plan

As required by Condition B43, PMHC will develop a Landfill Closure Plan (LCP) 12 months prior to the closure of Stage 3 and will be prepared in accordance with the requirements of the EPA's Environmental Guidelines. The LCP will describe the monitoring and management measures to be undertaken once the landfill is closed to ensure the integrity of the cap, including measures for the management of surface water, leachate, odour and dust control.

It is common for sediment basins to still operate once a landfill has been closed. This sediment basin is no different and will remain in place for up to 30 years after the landfill closes. Details on the final rehabilitation of the sediment basin will also be included within the LCP.

Further consideration to changing the design of the rehabilitated sediment basin to allow a wider koala connectivity corridor will be given in the LCP and will be confirmed at a later stage following further water balance modelling and through detailed design.

5.10 Summary of Vegetation Management Measures

Appendix B Table B1 provides a summary of the vegetation management activities to be undertaken as part of this VMP, as well as information on the proposed timing (stage of works), frequency, performance criteria and expected outcomes of each action.

The table also summarises the measures that are applicable to the following areas:

- General Cairncross WMF Activities;
- Koala corridor;
- Offset area (to be determined);
- SFAZ (the 30 m wide SFAZ along the boundary of the koala connectivity corridor with the adjoining Rawdon Creek Nature Reserve (eastern side of Stage 3). See **Figure 5-3** for a cross section of a typical Stage 2 and 3 boundary, including for the koala connectivity corridor;
- Vegetated future stages (includes Stages 1 to 3 which will require clearing prior to construction);
- The compensatory habitat located on the western edge of landfill.

6 OFFSET REQUIREMENTS

As required by Condition B25 of the Development Consent, PMHC are required to retire the ecosystem and species credits prior to any clearing work for Stage 3. These ecosystem and species credits were determined and detailed in the BAR (Arcadis, 2017), prepared for the Cairncross WMF. The BAR was prepared in accordance with the *Framework for Biodiversity Assessment (FBA)* under the *NSW Biodiversity Offsets Policy for Major Projects*¹³ (OEH, September 2014) to identify and assess the biodiversity impacts during construction and operation of Stages 1-3. The BAR only addresses impacts on the 3.4ha not approved under the plantation approval and as such any offsets discussed in this section are for this 3.4ha.

It was determined that impacts on threatened species and ecological communities listed under the *Threatened Species Act 1995 (now repealed)* were possible. The BAR (Arcadis, 2017) assessed and quantified the impacts to these threatened entities in accordance with the FBA requirements and detailed the corresponding offsetting requirements. These offsetting requirements are discussed in more detail in the Sections below.

6.1 Impacts Requiring Offsetting

6.1.1 Impacts on native vegetation

One PCT, *Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion (NR117)* was recorded at the site and was found to be in Moderate to Good condition. Although not associated with any TEC under the *Threatened Species Act 1995 (now repealed)* or the EPBC Act, the PCT provides potential habitat for *Cynanchum elegans* (White-flowered Wax Plant) which is listed as endangered under the EPBC Act. The BAR found that there was moderate likelihood of occurrence of *Cynanchum elegans* on the site (see **Appendix C Table C1**) and 3.4 hectares of this PCT will be cleared for the construction of Stage 3.

The site value score for the vegetation zone identified was determined through assessment of site attribute data collected in two vegetation plots. The site attribute data was entered into the Biobanking credit calculator to generate site value scores.

Loss of landscape and site value for the PCT and its associated ecosystem species, as determined using the credit calculator, is presented in **Table 6-1**.

Table 6-1: Landfill impact summary for PCTs and ecosystem credit species

Vegetation zone	Associated EECs and/or Threatened Species	Loss in landscape value	Loss in site value score	Number of Ecosystem Credits Required
Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion (NR117): Moderate/Good	Spotted-tailed Quoll	15.00	84.38	221

6.1.2 Impacts on threatened species

Fifteen threatened fauna species were identified in the credit calculator as predicted fauna species credit species. The site was considered to support suitable potential habitat for eight of these species, with marginal habitat present for an additional four species.

Targeted surveys for these species identified two species credit species from the list generated by the calculator (Koala and Green-thighed Frog). The Southern Myotis was identified on the site but was not listed in the calculator.

Impacts to threatened species credit species and their associated species are summarised in **Table 6-2**.

¹³ <https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-biodiversity-offsets-policy-for-major-projects>

Table 6-2: Impact summary for threatened species credit species

Common Name	Scientific Name	Status	Impacts	Number of Species Credits Required
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	3.4 ha	84
Green-thighed Frog	<i>Litoria brevipalmata</i>	Vulnerable	3.4 ha	248
Southern Myotis	<i>Myotis macropus</i>	Vulnerable	0.12ha	3

6.2 Biobanking agreement

A biobanking agreement is required to secure an offset site for any impacts requiring offset determination under the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014).

Prior to any clearing work for Stage 3, PMHC must retire the following ecosystem and species credits, as determined in accordance with the OEH's FBA and the *Biobanking Assessment Methodology (BAM)* (OEH, 2014):

- 221 ecosystem credits for *Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion*.
- 84 species credits for the Koala.
- 248 species credits for the Green-thighed Frog.
- 3 species credits for the Southern Myotis.

The vegetation to be offset is shown in **Figure 6-1**. The full credit report prepared as part of the BAR (Arcadis, 2017) is provided in **Appendix D**.

Since the preparation of the BAR in 2017, the FBA, the NSW Biodiversity Offsets Policy for Major Projects and the BioBanking Scheme have been replaced by the NSW Biodiversity Offset Scheme, underpinned by the Biodiversity Assessment Method (2020). The number of credits noted above was calculated in accordance with the FBA and these are referred to as Biobanking (BBAM) credits. Under the current legislation, all Biodiversity Stewardship Agreement (BSA) sites generate credits calculated in accordance with the Biodiversity Assessment Method (BAM) credits. In order to utilise BAM credits to satisfy a BBAM credit requirement, a Statement of Reasonable Equivalence must be applied for from DPIE EES.

6.2.1 Offsetting options

The options that are in place for satisfying the existing offset obligation are as follows:

- Purchase and retire BBAM credits from the open market. Note that BBAM credits are becoming scarcer since the introduction of BAM credits in 2017.
- Request a statement of reasonable equivalence from DPIE EES to determine the number of BAM credits required for the project and meet this obligation by:
 - Purchasing and retiring credits from the open market
 - Purchasing a property that has appropriate biodiversity values present and entering into a BSA to generate credits
 - Make a payment into the NSW Biodiversity Conservation Fund.

Given the potential lead time associated with purchasing a property and entering into a BSA (approximately 2 years) this is considered unlikely to be an attractive option. The BCF payment option provides a rapid solution but there is a cost premium on credits secured in this manner. Purchasing and retiring BBAM or BAM credits from the open market is likely to provide the most cost effective and timely solution, provided credits are available to purchase.

6.2.2 Variations to the agreement

In the event that PMHC seeks a variation to the offset rules discussed above, reasonable steps will be taken to find like-for-like offsets in accordance with Section 10.5.4.2 of the FBA and Appendix A of the *NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014)*.



LEGEND

- Development site
- Koala and Green-thighed Frog species polygon
- Proposal Site
- Cairncross Waste Management Facility
- Southern Myotis species polygon

ARCADIS AUSTRALIA PACIFIC PTY LTD
 ABN 76 104 485 289
 Level 16, 580 George St | Sydney NSW 2000
 P: +61 (0) 2 8907 9000 | F: +61 (0) 2 8907 9001
 Coordinate System: GDA1994 MGA Zone 56
 Aerial Imagery supplied by NSW LPI

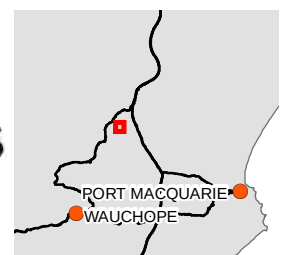


Figure 6-1: Vegetation /habitat to be offset

7 REVIEW

7.1 Environmental Auditing

Environmental audits will be undertaken in accordance with the Independent Environmental Audit program approved by the DPIE, the Conditions of Consent and LEMP requirements.

Detailed audit requirements used to evaluate environmental performance and the compliance status of the Facility operation is outlined in Section 7.3 of the LEMP.

7.2 Reporting

7.2.1 Internal reporting

Any flora, fauna or vegetation related incidents will be reported verbally to the Waste Manager (or delegate). This will enable identification of and proactive management of any changed conditions that might have contributed to the incident. All verbal reporting, including any agreed actions, shall be confirmed in writing by e-mail.

The following internal reporting will be undertaken.

Table 7-1: Summary for reporting requirements

Report	Description	Responsibility	Frequency
Fauna Impacts	Records of injured or killed fauna. Records will include what species was injured/killed, where it was found and how it was injured (if known).	Contractors Site personnel	As required
Post-Clearing Fauna Management Report	The ecologist present on site during any clearing works shall compile a <i>Post-clearing Fauna Management Report</i> to detail any fauna breeding places (such as hollow bearing trees or nests) and fauna impacted by the clearing.	Ecologist	Post-clearing

7.2.2 Compliance reporting

Annual monitoring and compliance summary monitoring reports will be prepared and submitted to the EPA and DPIE in accordance with Section 7.5.1 of the LEMP.

Table 7-2: Summary for reporting requirements to NPWS

Report	Description	Responsibility	Frequency	Responsible Authority
Weed management	Report detailing weed management activities, including reporting any corrective actions undertaken to address issues raised.	Weed management officer Site personnel	Annually	NPWS
Feral animal management	Report detailing feral animal management activities, including reporting any corrective actions undertaken to address issues raised.	Contractors Site personnel	Annually	NPWS

7.3 Review and Improvement

Review and improvement of this plan will be undertaken in accordance with the Conditions of Consent and in accordance with Section 7.6 of the LEMP. Continuous improvement will be achieved by the ongoing evaluation of environmental management performance and effectiveness of this plan against environmental policies, objectives and targets.

The updated plan and a summary of changes will be available at the Facility and distributed to all relevant stakeholders.

7.4 Incidents

In the event of a safety / environmental incident or unpredicted impacts relating to the landfill construction and operation, it is the responsibility of all personnel to report the incident or event to the Landfill Supervisor.

All environmental incidents are to be reported and managed in accordance with the PMHC *Pollution Incident Response Management Plan (PIRMP)* and in accordance with to Section 5.5 and Section 5.6 of the LEMP.

7.5 Complaints

Complaints may be received directly from stakeholders, or indirectly via the dedicated phone number, website. Complaints handling will be undertaken in accordance with Section 5.4 of the LEMP.

7.6 Non-Compliance, Non-Conformances and Corrective Actions

Non-compliance may be identified via internal and external audits, compliance monitoring, inspections and observations, environmental incidents and emergencies, complaints and management reviews.

Non-compliance, non-conformances and resulting corrective actions are to be managed in accordance with Section 7.4 of the LEMP.

7.7 Access for information

All documents associated with the landfill construction and operation will be published on the PMHC website in accordance with Section 7.2 of the LEMP.

<https://www.pmhc.nsw.gov.au/About-Us/What-We-Are-Up-To/Whats-Happening-Now/Port-Macquarie-Projects/Cairncross-Landfill-Expansion>

8 RELEVANT DOCUMENTATION

The following are the key operating procedures and checklists relevant to the landfill construction and operation are listed in **Table 8-1**.

Table 8-1: Key Operating Procedures and Checklists

Document name
<i>PMHC Pest Management Plan for Cairncross WMF (dated 2013)</i>
<i>Solid Waste Management Manual (PMHC, 2018)</i>
<i>PMHC Incident Follow-Up [SOP1]</i>
<i>PMHC Fire Prevention and Fire Fighting [SOP11]</i>
<i>PMHC Incident Reporting [SOP25]</i>
<i>PMHC Site Inspection and Audit Checklist [SOP39.2]</i>
<i>Pollution Incident Response Management Plan (PMHC, 2020)</i>
<i>Authorisation for timber plantation GR0412P (the DPIE, 26 October 2004)</i>
<i>Operational Environmental Management Plan: Cairncross Waste Management Facility (landfill) (PMHC, 2015)</i>

9 REFERENCES

Arcadis, 2017a: Cairncross Landfill Expansion EIS, dated 10 November 2017.

Arcadis, 2017b: Cairncross Landfill Expansion Biodiversity Assessment Report, dated 1 June 2017.

Arcadis, 2019: Cairncross Waste Management Facility Expansion SSD 5792 Response to Submissions – Supplementary responses, dated 9 May 2019.

Connell Wagner, 2000: Cairncross Waste Management Facility Compensatory Habitat Management Plan, 14 August 2000.

RTA Environment Branch, 2011: Biodiversity Guidelines, Guide 5: Re-use of woody debris and bushrock will be used to guide placement activities.

Franks, AJ and Franks, S (2003): Nest boxes for wildlife: a practical guide, Bloomings books, Melbourne.

NSW OEH, 2013: Guidelines for developments adjoining land managed by the Office of Environment and Heritage.

NSW OEH, 2014a: NSW Biodiversity Offsets Policy for Major Projects.

NSW OEH, 2014b: Framework for Biodiversity Assessment, NSW Biodiversity Offsets Policy for Major Projects.

NSW OEH, 2014c: Biobanking Assessment Methodology.

NSW OEH, 2018: A review of koala tree use across New South Wales. OEH, Sydney.

APPENDIX A CONSULTATION



Our Ref: DOC21/176276
Your Ref: SSD 5792

Chief Executive Officer
Port Macquarie Hastings Council
PO Box 84
Port Macquarie NSW 2444

Attention: Mr Sean McKinnon, Waste Projects Officer

Dear Dr Allen

RE: Vegetation Management Plan for the Cairncross Waste Management Facility at 351 Telegraph Road, Pembroke, Port Macquarie-Hastings LGA (SSD 5792)

Thank you for your e-mail dated 10 March 2021 about the Vegetation Management Plan (VMP) for the Cairncross Waste Management Facility at Pembroke seeking comments from the Biodiversity and Conservation Division (BCD) of the Biodiversity, Conservation and Science Directorate in the Environment, Energy and Science Group of the Department of Planning, Industry and Environment. I appreciate the opportunity to provide input.

The BCD was formerly part of the Office of Environment and Heritage, but now forms part of a Group that has responsibilities relating to biodiversity (including threatened species and ecological communities, or their habitats), National Parks and Wildlife Service (NPWS) estate, climate change, sustainability, flooding, coastal and estuary matters.

We have reviewed the documents supplied and advise that there are some errors that require rectification regarding the location of the sediment basin and fire trails. Also, the VMP lacks enough detail for the measures to remediate and revegetate the koala corridor. In addition, it appears that clearing for the Stage 1 South Basin has exceeded the amount that was to be undertaken according to the State Significant Development (SSD) conditions of consent. These issues are discussed in detail in **Attachment 1** to this letter.

In summary, the BCD recommends:

1. The VMP should detail the works that will be undertaken to stabilise disturbed areas and to enhance habitat quality in the koala connectivity corridor.
2. The VMP should state that planting of native species in the koala corridor is required and specify the tree, shrub and groundcover species to be planted. The total number, location and density of koala feed trees that are to be planted, detailed monitoring and maintenance requirements and replacement plans for any trees lost within the first five years following planting should be provided.
3. The koala corridor should be established and protected within six months of the approval of the VMP. Replanting should occur within two years of the approval of the VMP or sooner if possible.

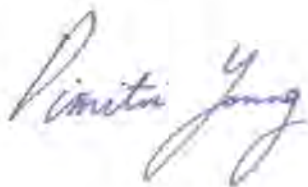
4. The VMP must be amended to depict the correct extent of the sediment basin in accordance with the SSD conditions of consent.
5. The VMP should document the final rehabilitation of the sediment basin (i.e. once Stage 2 is rehabilitated).
6. The VMP must be amended to show the correct locations of fences, bushfire asset protection zones and fire trails in relation to the koala corridor and the Rawdon Creek Nature Reserve. This information should be provided within the VMP itself and indicate measures for each stage of the development such as fencing, restoration and planting areas.
7. The Bushfire and Fuel Management Plan (BFFMP) must also be amended to correct the locations for fire trails and the sediment basin in the koala corridor (Figures 2-3 and 2-5) and other references throughout the plan that are not consistent with the SSD approval.
8. The reference under 5.2.7 of the VMP, and any related references in the BFFMP, to the western compensatory habitat being managed in partnership with NPWS should be removed.
9. The VMP must include the cross section that describes the location of the fire trail and fence on the landfill side of the Strategic Fire Management Zone (SFMZ).
10. The VMP should describe how the SFMZ will be managed for bushfire suppression including inspection of fencing and removal of litter originating from the landfill site.
11. Weed surveys should be undertaken on a regular basis and the site should be added to the Port Macquarie Hastings Council's weed management operations plan and conducted by qualified council weed management officers.
12. Annual results of the weed inspections and monitoring and management of feral animals should be reported to the NPWS and, if corrective actions are required, the results of the required works should be reported in the following annual report.

We suggest a meeting be held with the council and the consultants together with the BCD to discuss these matters.

Once the VMP is revised we request an opportunity to further review and comment on the plan.

If you have any questions about this advice, please do not hesitate to contact Ms Rachel Lonie, Senior Conservation Planning Officer, at rachel.lonie@environment.nsw.gov.au or 6650 7130.

Yours sincerely



13 May 2021

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Biodiversity and Conservation

Enclosure: Attachment 1: Detailed BCD Comments – Cairncross Waste Management Facility Vegetation Management Plan (SSD 5792)

Attachment 1: Detailed BCD Comments – Cairncross Waste Management Facility Vegetation Management Plan (SSD 5792)

The Biodiversity and Conservation Division (BCD) of the Department of Planning, Industry and Environment has reviewed the draft Vegetation Management Plan (VMP) for the Cairncross Waste Management Facility prepared by Arcadis and dated 8 March 2021. The VMP has been prepared to satisfy condition B27 of the conditions of consent (SSD 5792).

The relevant conditions of consent for SSD 5792 are:

Koala Connectivity Corridor

B26. The Applicant must establish and maintain the koala connectivity corridor shown in Figure 1 in Appendix 1. The Applicant must determine the timing for establishing the koala connectivity corridor in consultation with the Biodiversity and Conservation Division of the Department of Environment, Energy and Science. The agreed timing must be included in the Vegetation Management Plan required by condition B27.

Vegetation Management Plan

B27. Within two years of the date of this consent and no later than prior to the commencement of Stage 2, the Applicant must prepare a Vegetation Management Plan (VMP) to the satisfaction of the Planning Secretary. The VMP must:

- a. be prepared in consultation with the Biodiversity and Conservation Division of the Department of Environment, Energy and Science.
- b. detail the measures for managing impacts of the development on the Rawdon Creek Nature Reserve in accordance with the Guidelines for developments adjoining land managed by the Office of Environment and Heritage (OEH, 2013)
- c. detail the procedures for coordinated management of the koala connectivity corridor on the southern boundary, the Strategic Fire Advantage Zone on the south-eastern boundary and the established biodiversity offset area to the west of the site; and
- d. detail the fencing to be installed, the timing for installation and how this will prevent access by koalas and other fauna into the landfill.

1. BCD Consultation

Verbal consultation on the VMP between the BCD and Ms Carissa Free of Arcadis occurred on 5 March 2020. This was followed by an e-mail from the BCD and copies of our previous three letters on this matter. The main issue we discussed was the extent of area requiring revegetation in the koala corridor zone. We stated that we would prefer a fully vegetated area rather than just koala feed trees but agreed this needed further consideration as the consultant was awaiting advice on bushfire requirements.

We advised that a figure should be included in the VMP to show where the bushfire Asset Protection Zones (APZs) and fire trail would be located, details on planting design and maintenance, fencing types and locations, fox and wild dog controls, monitoring and reporting regime and nest boxes.

We also stated that given the timeframes for developing each stage of the facility, it would be helpful to have these specified in a figure as well as the text in the VMP. For example, koala fencing for Stage 1 would not be required until clearing was imminent.

As discussed below, aspects of this advice have not been implemented in this draft VMP.

2. Revegetation in koala corridor

The VMP lacks enough detail on the measures to remediate and revegetate the koala corridor. The commitment from the proponent (FF-11) was that the VMP would include measures for the maintenance, management and revegetation of the koala connectivity corridor and the setback area, including clear objectives for the management outcomes.

A purpose of the VMP is to determine where the plantings will occur, which species will be used and what is the timeframe for the works. Instead the VMP appears to defer such decisions. For example, the VMP states that, "revegetation may be required to stabilise disturbed areas adjacent to retained native vegetation and to enhance habitat quality in the koala connectivity corridor. This will be undertaken as soon as feasible and reasonable after disturbance has occurred." (added emphasis in underlined text).

The VMP also states that, "*if plantings are recommended by a qualified ecologist, these will be undertaken prior to clearing for Stage 2. The location of the corridor will be mapped and clearly demarcated prior to commencement of clearing.*" Further, the VMP states, "*The physical properties of the location of the planting (e.g. soil type, drainage, aspect) will be taken into account when selecting species for revegetation. If the site is suitable, koala food trees will be planted to provide feed for koalas within the site.*"

The area will require planting as confirmed by a site visit in 2017 and aerial imagery (see Figure 1 below) which shows that the area along the property boundary but within the site is cleared and will require revegetation.



Figure 1. South part of landfill site showing cadastre boundary, Extension Road and adjoining forestry land.

BCD Recommendations

1. The VMP should detail the works that will be undertaken to stabilise disturbed areas and to enhance habitat quality in the koala connectivity corridor.
2. The VMP should state that planting of native species in the koala corridor is required and specify the tree, shrub and groundcover species to be planted. The total number, location and density of koala feed trees that are to be planted, detailed monitoring and maintenance requirements and replacement plans for any trees lost within the first five years following planting should also be provided.

3. Timing and details for koala corridor works

The Response to Submissions letter from Arcadis dated 1 May 2019 advised:

"The koala corridor is proposed to be revegetated to enhance the biodiversity value of the corridor and to increase the density of koala feed tress throughout it. Revegetation of the corridor will commence upon approval of the Amended Proposal during the Stage1 landfilling activities. While the corridor is being revegetated koalas will be able to traverse both the corridor and the existing vegetated area within the Stage 2 landfill cell (north of the corridor) which has a higher density of vegetation. The corridor will therefore have had approximately 20 years of revegetation prior to it becoming the primary koala corridor ensuring adequate vegetation coverage for use of the corridor by koalas." (p4-5) (added emphasis in underlined text).

Therefore, the revegetation should already be underway as the Stage 1 landfilling activities have commenced. The koala corridor should be established and protected as soon as possible and certainly within six months of the approval of the VMP. The VMP needs to detail the revegetation works that will be undertaken to stabilise disturbed areas adjacent to retained native vegetation and to enhance habitat quality in the koala connectivity corridor.

BCD Recommendations

3. The koala corridor should be established and protected within six months of the approval of the VMP. Replanting should occur within two years of the approval of the VMP or sooner if possible.

4. Sediment basin

Figure 2-3 of the VMP maps the final sediment basin extending fully into the koala corridor (see Figure 2 below). This is inconsistent with the SSD approval as shown in Appendix 1 Development Layout Plans in the SSD conditions of consent (see Figure 3 below) because the location of the sediment basin for Stage 2 does not extend fully into the 50 m wide koala corridor. The basin is sized at 163m by 20m allowing for a 30m wide corridor to be maintained in this location. The Stage 1 basin does not extend into the 50m corridor at all.

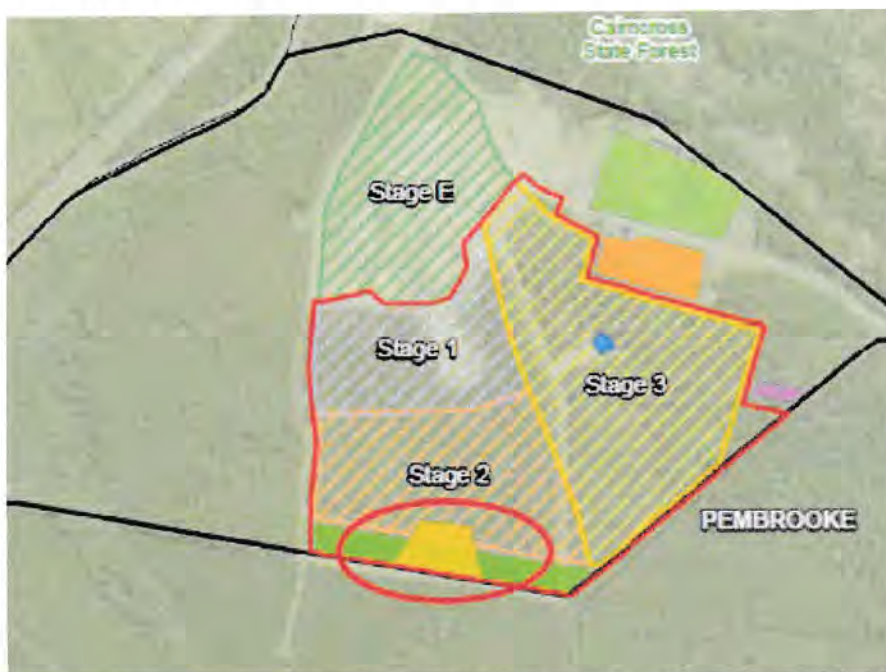


Figure 2. Detail of Figure 2-3 in the VMP showing location of final sediment basin (outlined in red oval).

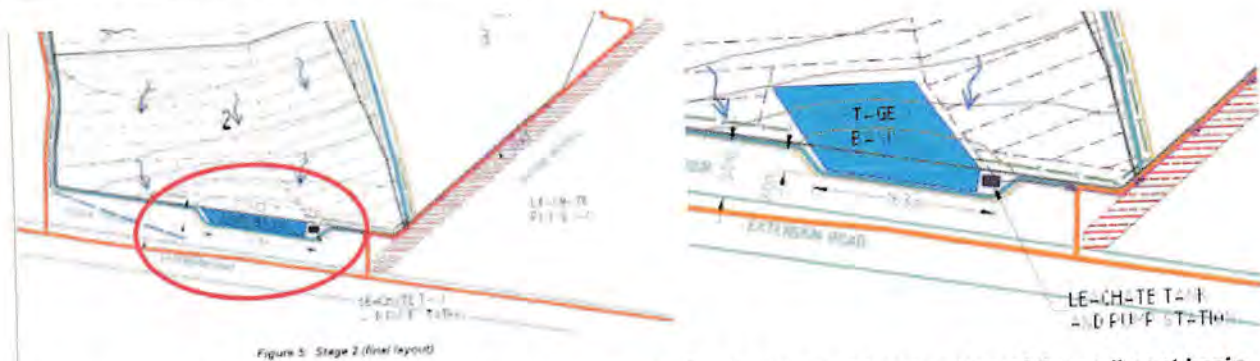


Figure 3. Appendix SSD 5792 conditions of consent which show the Stage 2 final location of the sediment basin (outlined in red oval) and a detail from the R/S (p67) showing the basin dimensions.

We also understand the sediment basin will decrease in size over time and will be removed following rehabilitation of the landfill and is therefore considered temporary in nature. A letter from Arcadis dated 1 May 2019 advised the BCD that in the initial year, following installation of the sediment basin, the basin would be wholly contained within the Stage 2 area and would only encroach on the koala corridor once landfill within Stage 2 has substantially progressed. Arcadis advised us that the sediment basin sizing can potentially be refined to extend the width of the koala corridor post-closure (i.e. once Stage 2 is rehabilitated). All of this should be documented in the VMP, including the final rehabilitation arrangements.

BCD Recommendations

4. The VMP must be amended to depict the correct extent of the sediment basin in accordance with the SSD conditions of consent.
5. The VMP should document the final rehabilitation of the sediment basin (i.e. once Stage 2 is rehabilitated).

5. Fire trails, fencing and strategic fire management zone (SFMZ)

Appendix F of the VMP describes the location of fire trails and asset protection zones (APZs) with reference to a Bush Fire and Fuel Management Plan (BFFMP) (see Figure 4 below).

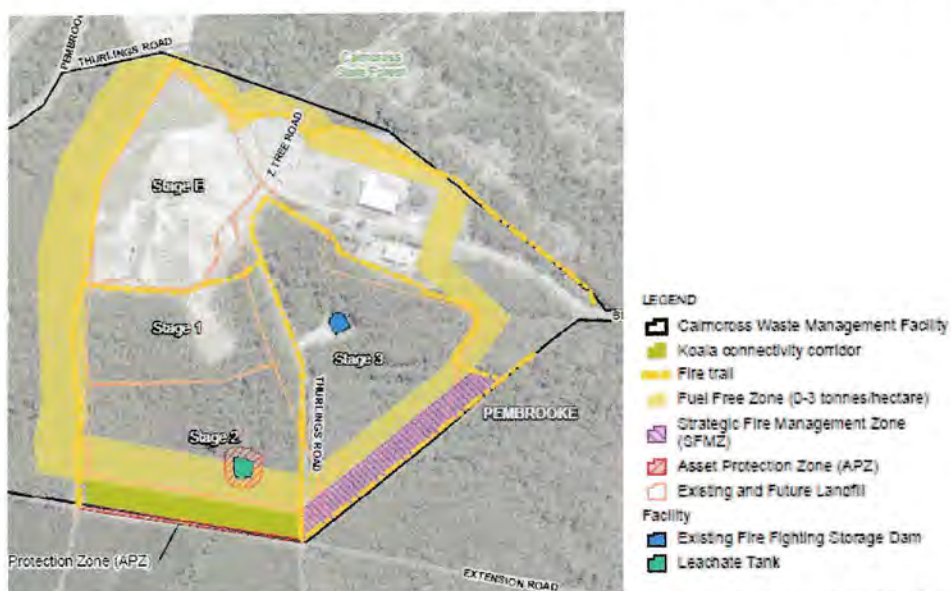
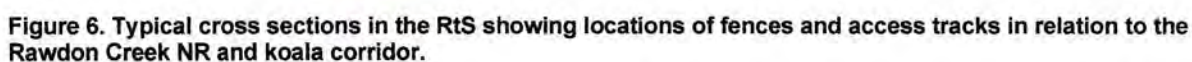


Figure 4. Detail from the Cairncross WMF bushfire management strategy showing fire trail on wrong site of SFMZ. Also APZ on edge of koala corridor.

[illegible]

Figure 5. Amended Proposal layout (Figure 6-2) in the RTS showing fire trail locations (orange lines)



Page 5 of 7

previously recommended, given the timeframes for developing each stage of the facility it would be helpful to have these specified in a figure as well as the text in the VMP. This information should be within the document itself.

The BCD has been provided with a copy of the BFFMP and we have also reviewed it. The BFFMP also does not show the correct extent of the sediment basin in the koala corridor in Figure 2-3 or the approved locations for fire trails in Figure 2-5. We note the BFFMP was prepared for the site in consultation with the NSW Rural Fire Service Mid-Coast District Fire Control Centre and approved by the Department. However, it is not in accordance with the approval and must be amended.

We note there is a reference in the VMP under section 5.2.7 Bushfire Management to the western compensatory habitat being managed in partnership with NPWS. The NPWS have advised that they are not aware of any commitment under a BFFMP to 'partner' with PMHC to manage fuel in the compensatory habitat. We request that this reference be removed.

BCD Recommendations

6. The VMP must be amended to show the correct locations of fences, bushfire asset protection zones and fire trails in relation to the koala corridor and the Rawdon Creek Nature Reserve. This information should be provided within the VMP itself and indicate measures for each stage of the development such as fencing, restoration and planting areas.
7. The BFFMP must also be amended to correct the locations for fire trails and the sediment basin in the koala corridor (Figures 2-3 and 2-5) and other references throughout the plan that are not consistent with the SSD approval.
8. The reference under 5.2.7 of the VMP and any related references in the BFFMP to the western compensatory habitat being managed in partnership with NPWS should be removed.

6. Impacts on Rawdon Creek Nature Reserve and weed and pest management

In relation to impacts on the Rawdon Creek Nature Reserve (NR) the RtS letter from Arcadis stated: *"The 30 metre-wide area would be maintained such that only understory canopy of the SFAZ would be cleared. This would maintain the visual amenity of the SFAZ area, and provide adequate screening of the Landfill site to recreational users of the Nature Reserve."*

The VMP must include the cross section that describes the location of the fire trail and detail how the area now described as a SFMZ will be managed. We were advised in the RtS that regular maintenance of this zone would be outlined in the VMP including inspection of fencing that would include removal of litter originating from the landfill site.

The plan identifies as a key weed control mitigation measure that the Port Macquarie Hastings Council's waste management staff will be responsible for observations to detect any weed incursions onsite, and in the reserve. Weed identification is highly specialised so regular surveys of the site should be added to the council's weed management operations plan and conducted by qualified council weed management officers.

Table B1 in the VMP states the frequency of weed inspection and monitoring and management of feral animals will be *"as required"*. This should be amended to require these activities to be considered and reported annually. If corrective actions are required, then these should be undertaken, and the results of the works reported in the following annual report. Annual reports on weeds and feral animal survey and control should also be submitted to the National Parks and Wildlife Service (NPWS).

BCD Recommendations

9. The VMP must include the cross section that describes the locations of the fire trail and fence on the landfill side of the SFMZ.
10. The VMP should describe how the SFMZ will be managed for bushfire suppression including inspection of fencing and removal of litter originating from the landfill site.
11. Weed surveys should be undertaken on a regular basis and the site should be added to the council's weed management operations plan and conducted by qualified council weed management officers.
12. Annual results of the weed inspections and monitoring and management of feral animals should be reported to the NPWS and, if corrective actions are required, the results of the required works should be reported in the following annual report.

Response to BCD Letter dated 13 May 2021

Item #	Comment	PMHC Response
1	The VMP should detail the works that will be undertaken to stabilise disturbed areas and to enhance habitat quality in the koala connectivity corridor.	Section 5.2 of the VMP addresses the requirements for enhancing habitat quality within the koala connectivity corridor (KCC) Section 5.2.3 has been updated with more details the strategy for enhancing the habitat within the KCC. This includes a reference to Section 5.3 (Revegetation) and Table 5-1 (plant species).
2	The VMP should state that planting of native species in the koala corridor is required and specify the tree, shrub and groundcover species to be planted. The total number, location and density of koala feed trees that are to be planted, detailed monitoring and maintenance requirements and replacement plans for any trees lost within the first five years following planting should be provided.	Table 5-1 has been updated to include shrubs and ground cover, in addition to the potential tree species already listed. The tree species were identified based on the preferred koala food tree species suggested by OEH (2018). The indicative list of ground cover and shrub species is based on the native species recorded within the area during the preparation of the Biodiversity Assessment Report (Arcadis, 2017). Section 5.3.4 and Section 5.3.5 provides details the monitoring and maintenance requirements respectively. Both sections have been updated to provide more details.
3	The koala corridor should be established and protected within six months of the approval of the VMP Replanting should occur within two years of the approval of the VMP or sooner if possible.	Only construction of Stage 1 has commenced, not landfilling. Fencing has been installed around the Stage 1 site, as shown on the new Figure 5-1 . Although the fencing has been installed for security purposes, koalas cannot access this area either. Replanting will occur within two years of the approval of the VMP.
4	The VMP must be amended to depict the correct extent of the sediment basin in accordance with the SSD conditions of consent.	Figure 2-3 has been updated to show the correct final detailed design of the sediment basin.
5	The VMP should document the final rehabilitation of the sediment basin (i.e. once Stage 2 is rehabilitated).	Section 5.9 has been include which discusses the rehabilitation of the sediment basin which will be addressed when the Landfill Closure Plan is prepared.
6	The VMP must be amended to show the correct locations of fences, bushfire asset protection zones and fire trails in relation to the koala corridor and the Rawdon Creek Nature Reserve. This information should be provided within the VMP itself and indicate measures for each stage of the development such as fencing, restoration and planting areas	Figures 5-1 and 5-2 show the fencing for Stage 1 and Stage 2 landfilling operations Appendix F Bushfire strategy (of the VMP) has been updated to show the fire trail located on the western boundary of the SFAZ. This figure will also be updated in the BFFMP.

Item #	Comment	PMHC Response
7	The Bushfire and Fuel Management Plan (BFFMP) must also be amended to correct the locations for fire trails and the sediment basin in the koala corridor (Figures 2-3 and 2-5) and other references throughout the plan that are not consistent with the SSD Approval	Appendix F Bushfire strategy (of the VMP) has been updated to show the fire trail located on the western boundary of the SFAZ. Figure 2-3 has been updated to show the correct final detailed design of the sediment basin. This figure has also been updated in the BFFMP.
8	The reference under 5.2.7 of the VMP, and any related references in the BFFMP, to the western compensatory habitat being managed in partnership with NPWS should be removed.	Noted. The reference to the western compensatory habitat being managed in partnership with NPWS in Section 5.2.7 has been removed from the VMP This comment has also been removed from Section 6.2 of the BFFMP.
9	The VMP must include the cross section that describes the location of the fire trail and fence on the landfill side of the Strategic Fire Management Zone (SFMZ).	Noted. This has been added to Section 5.2.7 of the VMP as Figure 5-3 .
10	The VMP should describe how the SFMZ will be managed for bushfire suppression including inspection of fencing and removal of litter originating from the landfill site.	Section 5.2.7 has been updated to reference the Cairncross LEMP, BFFMP and the Solid Waste Management Manual, which outline the procedures for fire prevention and firefighting throughout the site.
11	Weed surveys should be undertaken on a regular basis and the site should be added to the Port Macquarie Hastings Council's weed management operations plan and conducted by qualified council weed management officers.	Section 5.6.6 has been updated to include: - This will include the presence of weeds within the SFAZ and the koala connectivity corridor." - Weed inspections and controls will be undertaken a minimum of four times per year by Council's qualified weed management officers.
12	Annual results of the weed inspections and monitoring and management of feral animals should be reported to the NPWS and, if corrective actions are required, the results of the required works should be reported in the following annual report	Table B1 has been updated to include the requirement to report weed and feral animal management on an annual basis. A new Table 7.2 has been added to address the requirement for annual reporting to NPWS. Sections 5.5 and 5.6.6 have also been updated to include this requirement.



Our Ref: DOC21/713338
Your Ref: SSD 5792

Chief Executive Officer
Port Macquarie Hastings Council
PO Box 84
Port Macquarie NSW 2444

Attention: Mr Sean McKinnon, Waste Projects Officer

Dear Dr Allen

RE: Amended Vegetation Management Plan for the Cairncross Waste Management Facility at 351 Telegraph Road, Pembroke, Port Macquarie-Hastings LGA (SSD 5792)

Thank you for your e-mail dated 17 August 2021 about the Amended Vegetation Management Plan (VMP) for the Cairncross Waste Management Facility at Pembroke seeking comments from the Biodiversity and Conservation Division (BCD) of the Biodiversity, Conservation and Science Directorate in the Environment, Energy and Science Group of the Department of Planning, Industry and Environment. I appreciate the opportunity to provide input.

We have reviewed the amended VMP and consider it has been satisfactorily revised to address our previous recommendations. Therefore, we have no further issues to raise on this matter.

If you have any questions about this advice, please do not hesitate to contact Ms Rachel Lonie, Senior Conservation Planning Officer, at rachel.lonie@environment.nsw.gov.au or 6650 7130.

Yours sincerely

26 August 2021

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Biodiversity and Conservation

APPENDIX B SUMMARY OF VEGETATION MITIGATION MEASURES

Table B1: Summary of vegetation management actions

ID No	Action	Area						Stage of works			Frequency	Outcome	Performance Criteria	Responsibility
		Cairncross WMF Activities	Koala Corridor	Offset Area	SFAZ	Vegetated Future Stages	Compensatory Habitat	Pre-clearing	Construction / clearing	Operation				
Site establishment and protection of native vegetation during clearing														
FFA-01	Clearly identify areas to be cleared and retained and ensure that clearing is restricted to these areas. Clearly show these areas on construction plans and ensure that staff are made aware of any changes.	✓				✓		✓	✓		Once off and then maintained	Prevent unplanned clearing	No clearing outside of designated clearing areas	Waste Services Coordinator Waste Projects Officer
FFA-02	Extent of clearing is to be fenced with highly visible temporary fencing to ensure that clearing does not extend beyond the area necessary.	✓				✓		✓	✓		Once off and then maintained	Prevent disturbance to habitat to be retained	All fencing installed prior to clearing and no clearing outside of designated clearing areas	Waste Services Coordinator Waste Projects Officer
FFA-03	Clearing of vegetation and excavation activities will not be undertaken during overland flow events (where there is surface runoff present after rainfall and prior to entering a waterway).	✓				✓		✓	✓		As clearing and excavation occurs	Prevent sedimentation and erosion leading to a reduction in water quality and degradation of aquatic habitats	No clearing undertaken during overland flow events	Team Leader - Waste Services Waste Services Coordinator
Protection of fauna														
FFA-04	Fauna microhabitat, such as logs, will be removed from areas to be cleared and relocated to suitable adjacent habitat in consultation with an ecologist.		✓	✓	✓	✓	✓		✓		As clearing occurs	Minimise the loss of fauna habitat resource	All logs relocated to adjacent habitat.	Waste Services Coordinator Waste Projects Officer Ecologist
FFA-05	Scheduling the vegetation removal for Autumn months will generally avoid the breeding season of most species that could occur on landfill site.	✓			✓	✓		✓	✓		As clearing occurs	Minimise impacts to threatened fauna	No injuries or fatalities of fauna during clearing activities	Waste Services Coordinator Waste Projects Officer
FFA-06	If feasible and reasonable, vegetation clearing shall not be undertaken during the breeding seasons for threatened fauna species with potential habitat on the landfill site. This will not be possible for all identified threatened species as breeding seasons collectively span a large portion of the year. In order of preference of avoidance, the breeding periods are: - Koala - September to February (breeding season); - Glossy Black Cockatoo - March to August (breeding season); - Spotted-tail Quoll - June to January (maternal den season); - Grey-headed Flying Fox - October to March (breeding season); - Southern Myotis - November to February (breeding season).				✓	✓		✓	✓		As clearing occurs	Minimise impacts to threatened fauna	No injuries or fatalities of fauna during clearing activities	Waste Services Coordinator Waste Projects Officer
FFA-07	During construction of the new cells within in areas that contain hollow-bearing trees, a two-stage clearing process will be implemented. An experienced ecologist will be engaged and will be present to supervise all clearing and removal of hollow bearing trees and to relocate any displaced fauna.	✓			✓	✓			✓		As clearing occurs	Minimise fauna fatalities and injuries during clearing	An ecologist present at all clearing works and clearing of hollow bearing trees.	Team Leader - Waste Services Waste Services Coordinator Waste Projects Officer Ecologist
FFA-08	All injured fauna will be reported to the Landfill Supervisor. Contact details for the local animal rescue group (Fawna Wildlife Rescue, Port Macquarie) and a veterinarian will be kept at the site office in the event that any fauna is injured or require capture and/or relocation during landfill construction and operation. A record of what fauna was injured, where it was found and how it was injured (if known) will be maintained.	✓	✓	✓	✓	✓	✓		✓	✓	As clearing occurs and during landfill operation	Minimise fauna fatalities and injuries during clearing and operation of the landfill	All injured or killed wildlife reported to Landfill Supervisor for records	All landfill personnel
FFA-09	Fauna fencing will be installed along the northern edge of the connectivity corridor and along the western edge of the Stage 2 area to prevent koala and other fauna from entering the landfill during clearing and operation	✓	✓		✓	✓		✓	✓	✓	Prior to clearing	Minimise fauna fatalities and injuries during clearing and operation of the landfill	Fences installed prior to clearing Fences monitored and maintained every six months.	Waste Projects Officer Team Leader - Waste Services Waste Services Coordinator

ID No	Action	Area						Stage of works			Frequency	Outcome	Performance Criteria	Responsibility
		Cairncross WMF Activities	Koala Corridor	Offset Area	SFAZ	Vegetated Future Stages	Compensatory Habitat	Pre-clearing	Construction / clearing	Operation				
FFA-10	A hollow replacement program for the loss of one small hollow, 10 medium hollows and five large hollows will be implemented in the koala connectivity corridor and on any proposed offset site. Sixteen hollows will be installed to offset loss of hollow bearing trees within in the Stage 1-3 clearing area.	✓				✓	✓	✓	✓	✓	Prior to clearing for Stage 2. Periodic monitoring and maintenance .	Replace hollows lost in the clearing area	Hollows installed prior to Stage 2 clearing. 80% of installed hollows utilised by native species within 12 months of installation.	Waste Services Coordinator Waste Projects Officer
FFA-11	The koala connectivity corridor will be managed in perpetuity and rezoned for environmental protection with the next standard LEP instrument amendment by Council.		✓						✓	✓	During landfill operations in perpetuity	Protection of the corridor	Not applicable	Waste Services Coordinator Waste Projects Officer
Revegetation														
FFA-12	Seed collection, where possible, will be undertaken at least 12 months prior to the commencement of revegetation and within the Facility.	✓			✓	✓		✓			Initial seed collection period prior to and during construction and clearing. Further collections may be required over time for replacement of tubestock planting.	Maintain the genetic integrity of native vegetation in the Facility and offset site.	Certification that all plant stock used for revegetation are of local provenance	Bush regeneration contractor
FFA-13	Propagation of tubestock from collected seed (if possible).	✓	✓		✓	✓		✓			For initial planting and ongoing replacement planting for a period of 2 years	Maintain the genetic integrity of native vegetation in the Facility and offset site.	Certification that all plant stock used for revegetation are of local provenance	Bush regeneration contractor
FFA-14	Seeds and plants used within the Cairncross WMF must be obtained from sources within the Northern Rivers Bioregion and the Macleay – Hastings Subregion if possible	✓	✓		✓	✓		✓			For initial planting and ongoing replacement planting for a period of 2 years	Maintain the genetic integrity of native vegetation in the Facility and offset site.	Certification that all plant stock used for revegetation are of local provenance	Bush regeneration contractor
FFA-15	Appropriate site treatment (e.g. spraying weeds, ripping, primary works) identified in the planting schedule will be undertaken or completed prior to planting	✓	✓					✓	✓	✓	Prior to clearing for each stage	Revegetation of disturbed areas and provision of supplementary plantings in offset areas	Site treatments undertaken prior to plantings	Bush regeneration contractor
FFA-16	Plants entering the site will be visually inspected for pest and diseases (Myrtle Rust/ Phytophthora)	✓	✓					✓	✓	✓	For initial planting and ongoing replacement planting for a period of 2 years	No pests and diseases enter the Facility or offset areas	No introduction of new pests and disease within the Facility through propagated plants or seed	Bush regeneration contractor
FFA-17	Planting and direct seeding in disturbed areas and areas of retained vegetation in autumn after completion of weed control works		✓	✓			✓	✓	✓	✓	For initial planting and ongoing replacement planting for a period of 2 years	Revegetation of disturbed areas using local native plants	Gradual improvement of native plant establishment with the aim of achieving 80% cover of native vegetation after 5 years following initial planting.	Bush regeneration contractor
FFA-18	Maintenance (including watering) and monitoring of plantings		✓							✓	For initial planting and ongoing replacement planting for a period of 2 years	High survival of plantings	More than 80% survival of plantings	Bush regeneration contractor
FFA-19	A program of enrichment planting or bushland regeneration will be supervised by PMHC, with input from NSW State Forests and NPWS. The implementation of the bush regeneration program will be directly coordinated with the weed monitoring and treatment activities						✓			✓	For initial planting and ongoing replacement planting for a period of 2 years	Implementation of a program of enrichment planting with Koala food species and regeneration of understorey areas.	Seasonal survey of condition of past regeneration work.	Bush regeneration contractor

ID No	Action	Area						Stage of works			Frequency	Outcome	Performance Criteria	Responsibility
		Cairncross WMF Activities	Koala Corridor	Offset Area	SFAZ	Vegetated Future Stages	Compensatory Habitat	Pre-clearing	Construction / clearing	Operation				
Weed management														
FFA-20	Routine weed control and monitoring	✓	✓	✓	✓	✓	✓		✓	✓	Bi-annually for the life of the Facility	Removal of dense weed cover on edges of retained vegetation and within the koala connectivity corridor.	Gradual reduction in weed density to 5% of total area in koala connectivity corridor.	Natural Resources Team
Monitoring and reporting														
FFA-21	Weed inspection and control reports to be provided to Waste Services and the NPWS annually.	✓	✓	✓	✓	✓	✓			✓	Annually	Determine whether management measures are achieving performance	Reports compiled and provided to Waste Services.	Natural Resources Team Waste Services Coordinator Waste Projects Officer
FFA-22	Monitoring surveys of threatened species (including Koala, Square-tailed Kite, Powerful Owl, Little Bent-wing Bat, Common Bent-wing Bat, Greater Broad-nosed Bat, Long-nosed Potoroo, Brush-tailed Phascogale and the Eastern Chestnut Mouse) will be conducted every two years to ascertain the effect of the reservation of the compensatory land and the operation of the waste facility on local fauna populations.						✓			✓	Every two years	To ascertain the effect of the reservation of the compensatory land and the operation of the waste facility on local fauna populations.	Reports compiled and provided to Waste Services.	Natural Resources Team Waste Services Coordinator Waste Projects Officer
FFA-23	Monitoring and management of feral animals will be undertaken by a consultant with guidance from NPWS and reported annually to the NPWS.						✓			✓	Annually	Determine whether management measures are achieving performance	Reports compiled and provided to Waste Services.	Natural Resources Team Waste Services Coordinator Waste Projects Officer
FFA-23	The site will be restricted from public access and site surveillance will be undertaken as required						✓			✓	Occasional or in response to public concerns	To monitor unauthorised public access and associated problems (ie. fly tipping)	No issues with unauthorised access and illegal fly tipping	Waste Services Coordinator Waste Projects Officer

APPENDIX C FLORA AND FAUNA SPECIES RECORDED AT EXTENDED LANDFILL SITE

An assessment of the likelihood of occurrence of threatened flora and fauna species listed under the EPBC Act in the Development Site was undertaken during the prepared of the Biodiversity Assessment Report (BAR), prepared by Arcadis in March 2017.

The findings from the BAR (Arcadis, 2017) are provided in the following tables:

- Table C1: Likelihood of occurrence of threatened flora species
- Table C2: Flora species recorded on the Proposal Site and in Quadrats 4 and 5 on the Development Site
- Table C3: Likelihood of occurrence of threatened fauna species
- Table C4: Fauna species recorded on the Proposal Site

Please note that that for the purposes of the BAR (Arcadis, 2017):

- The Proposal Site refers to the landfill extension area as shown in hashed red on **Figure 4-1**.
- The Development Site refers to the area which will be subject to clearing during Stage 3 as shown in yellow on **Figure 4-1**.

Table C1: Likelihood of occurrence of threatened flora species

Scientific Name	Common Name	Status	Habitat	Likelihood of occurrence on Proposal Site
<i>Allocasuarina defungens</i>	Dwarf Heath Casuarina	Endangered	From the Napiac area north to Byron Bay. Grows mainly in tall heath on sand, but can also occur on clay soils and sandstone. Also extends onto exposed nearby-coastal hills or headlands adjacent to sandplains.	Low. Development Site does not support preferred habitat
<i>Arthraxon hispidus</i>	Hairy Jointgrass	Vulnerable	Moisture and shade-loving species found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps	Low. Development Site does not support preferred habitat
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	Vulnerable	Orchid with an upright flower-stem to 45 cm tall. Sparse distribution along east coast. Known from a range of communities including swamp, heath and most typically woodland dominated by <i>Eucalyptus sclerophylla</i> , <i>E. sieberi</i> , <i>Corymbia gummifera</i> and <i>Allocasuarina littoralis</i> .	Low Development Site does not support preferred habitat
<i>Cynanchum elegans</i>	White-flowered Wax Plant	Endangered	A climber restricted to the east coast of NSW, inland to Merriwa. Occurs on margins of dry rainforest, also littoral rainforest, open forest and woodland, and scrub.	Moderate. Development Site supports potential habitat. Closest record is a proximately 8 km to west of Development Site.
<i>Euphrasia arguta</i>		Critically Endangered	An erect annual herb 20-35 cm high, branches densely hairy. Recently rediscovered in the Nundle area of the NSW north western slopes and tablelands in 2008. Current known populations are located in the Nundle State Forest in eucalypt forest with a mixed grass and shrub understorey. Has been observed to die off over the winter months. Active growth and flowering is between January and April.	Low. Development Site does not support preferred habitat
<i>Macadamia integrifolia</i>	Macadamia Nut	Vulnerable	Grows in remnant rainforest, preferring partially open areas such as rainforest edge.	Low. Development Site does not support preferred habitat
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	Vulnerable	Scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Generally grows in damp places, often near streams or low-lying areas on alluvial es or sheltered aspects.	Low. Development Site does not support preferred habitat

Scientific Name	Common Name	Status	Habitat	Likelihood of occurrence on Proposal Site
<i>Parsonsia dorrigoensis</i>	Milky Silkpod	Vulnerable	Subtropical and warm-temperature rainforest, on rainforest margins, m, on brown clay soils.	Low. Development Site does not support preferred habitat
<i>Phaius australis</i>	Lesser Swamp-orchid	Endangered	Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas.	Low. Development Site does not support preferred habitat
<i>Thesium australe</i>	Austral Toadflax	Vulnerable	A small, straggling herb to 40 cm tall. Occurs in grassland or grassy woodland, commonly in association with <i>Themeda australis</i> in damp areas.	Low. Development Site does not support preferred habitat

Table C2: Flora species recorded on the Proposal Site and in Quadrats 4 and 5 on the Development Site

Notes: 1. * indicates exotic species

2. Values in quadrat columns denote estimated cover of the species within the 20 m x 20 m quadrat.

Family	Botanical name	Common name	Q04	Q05
Pteridophytes				
Blechnaceae	<i>Blechnum cartilagineum</i>	Gristle Fern		
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken		1
Dicksoniaceae	<i>Calochlaena dubia</i>	Rainbow Fern, False Bracken		
Angiosperms - Dicotyledons				
Acanthaceae	<i>Pseuderanthemum variabile</i>	Pastel Flower	1	1
Apiaceae	<i>Hydrocotyle peduncularis</i>			1
Apocynaceae	<i>Marsdenia rostrata</i>	Common Milkvine	1	
	<i>Parsonia straminea</i>	Common Silkpod, Monkey Rope		
Araliaceae	<i>Polyscias sambucifolia</i>	Elderberry Panax	1	1
Asteraceae	<i>Ageratum houstonianum</i>	Floss Flower		
	<i>Bidens pilosa</i>	Cobblers Pegs		
	<i>Ozothamnus diosmifolius</i>	White Dogwood		
	<i>Senecio madagascariensis</i>	Fireweed, Madagascar Ragwort		
	<i>Sigesbeckia orientalis</i>	Indian Weed		
	<i>Sonchus oleraceus</i>	Common Sow-thistle, Milk-thistle		
	<i>Vernonia cinerea</i>			
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-Oak	2	
Convolvulaceae	<i>Dichondra repens</i>	Kidney-weed, Mercury Bay Weed		1
	<i>Polymeria calycina</i>	Polymeria		1
Dilleniaceae	<i>Hibbertia aspera</i>	Rough Guinea-flower		1
	<i>Hibbertia scandens</i>	Twining Guinea-flower		
Ericaceae Styphelioideae	<i>Leucopogon juniperinus</i>	Long-flowered Beard-heath		
Fabaceae Caesalpinioideae	<i>Senna septemtrionalis</i>	Smooth Cassia, Arsenic Bush		
Fabaceae Faboideae	<i>Desmodium rhytidophyllum</i>	Tick-trefoil		
	<i>Glycine clandestina</i>	Twining Glycine		
	<i>Hardenbergia violacea</i>	False Sarsaparilla		
	<i>Kennedia rubicunda</i>	Dusky Coral-pea		
	<i>Pultenaea retusa</i>	Notched Bush-pea		
Fabaceae Mimosoideae	<i>Acacia falcata</i>	Sickle Wattle		
	<i>Acacia floribunda</i>	White Sally		5
Goodeniaceae	<i>Dampiera sylvestris</i>	Blue Dampiera	1	1
	<i>Goodenia hederacea</i>	Ivy Goodenia		
Haloragaceae	<i>Gonocarpus tetragynus</i>	Common Raspwort		1
Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot	1	1
Menispermaceae	<i>Stephania japonica</i>	Snake Vine		

Family	Botanical name	Common name	Q04	Q05
Myrtaceae	<i>Callistemon salignus</i>	White Bottlebrush, Pink-tips	60	15
	<i>Corymbia intermedia</i>	Pink Bloodwood	5	2
	<i>Eucalyptus globoidea</i>	White Stringybark	2	2
	<i>Eucalyptus microcorys</i>	Tallowwood	10	5
	<i>Eucalyptus pilularis</i>	Blackbutt		
	<i>Eucalyptus propinqua</i>	Small-fruited Grey Gum		
	<i>Eucalyptus resinifera</i> subsp. <i>resinifera</i>	Red Mahogany	3	1
	<i>Eucalyptus saligna</i>	Sydney Blue Gum		
	<i>Eucalyptus siderophloia</i>	Grey Ironbark		
	<i>Lophostemon confertus</i>	Brush Box		
	<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark		1
	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark		
Oxalidaceae	<i>Oxalis perennans</i>			1
Phyllanthaceae	<i>Breynia oblongifolia</i>	Coffee Bush	1	1
	<i>Glochidion ferdinandi</i>	Cheese Tree		1
Phytolaccaceae	<i>Phytolacca octandra</i>	Inkweed		
Pittosporaceae	<i>Billardiera scandens</i>	Hairy Apple Berry		1
Polygonaceae	<i>Acetosa sagittata</i>	Rambling Dock, Turkey Rhubarb		
Proteaceae	<i>Persoonia conjuncta</i>			1
Rhamnaceae	<i>Alphitonia excelsa</i>	Red Ash, Soap Tree	2	1
Rosaceae	<i>Rubus moluccanus</i>	Molucca Bramble		1
Rubiaceae	<i>Opercularia diphylla</i>	Stinkweed		
Sapindaceae	<i>Dodonaea triquetra</i>	Hopbush		
Solanaceae	<i>Solanum mauritianum</i>	Tree Tobacco, Wild Tobacco		
Thymelaeaceae	<i>Pimelea linifolia</i>	Slender Rice Flower		
Verbenaceae	<i>Lantana camara</i>	Lantana	2	3
Vitaceae	<i>Cissus hypoglauca</i>	Native Grape, Water Vine		
Angiosperms - Monocotyledons				
Anthericaceae	<i>Thysanotus juncifolius</i>			
Cyperaceae	<i>Carex</i> sp.	Sedge		1
	<i>Gahnia clarkei</i>	Tall Saw-sedge	50	20
	<i>Lepidosperma laterale</i>	Variable Sword-sedge		
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		1
	<i>Lomandra multiflora</i>	Many-flowered Mat-rush		
Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat Berry	1	
Orchidaceae	<i>Cryptostylis</i> sp.			1
	<i>Pterostylis</i> sp.	Greenhood Orchid		
Phormiaceae	<i>Dianella caerulea</i>	Blue Flax-lily		1

Family	Botanical name	Common name	Q04	Q05
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass		
	<i>Entolasia marginata</i>	Bordered Panic		40
	<i>Entolasia stricta</i>	Wiry Panic		20
	<i>Imperata cylindrica</i>	Blady Grass	10	1
	<i>Microlaena stipoides</i>	Weeping Grass, Meadow Rice-grass		10
	<i>Oplismenus aemulus</i>	Broad-leaved Basket Grass		
	<i>Oplismenus imbecillis</i>	Narrow-leaved Basket Grass	2	5
	<i>Panicum simile</i>	Two-colour Panic		
	<i>Paspalum dilatatum</i>	Paspalum		
	<i>Themeda australis</i>	Kangaroo Grass		

Table C3: Likelihood of occurrence of threatened fauna species**Note: Species restricted to marine environments and offshore islands have been excluded from this table.**

Scientific Name	Common Name	Status	Habitat	Likelihood of occurrence on Proposal Site
<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically Endangered	Occurs in temperate eucalypt woodlands, most commonly box-ironbark associations and wet lowland coastal forests. Nests usually constructed in eucalypts, casuarinas or mistletoes. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes	Low. Development Site does not support preferred habitat.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Endangered	Widespread distribution but uncommon across south-eastern Australia. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spike rushes (<i>Eleocharis</i> spp), where it forages at night for amphibians, invertebrates and crustaceans. Nests are built within densely vegetated wetlands on a platform of reeds.	Low. Development Site does not support preferred habitat.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Vulnerable	Found mainly in areas with extensive cliffs and caves. It is generally rare with a very patchy distribution in NSW, with scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Hirundo ariel</i>). Forage in low to mid-elevation dry open forest and woodland and well-timbered areas containing gullies close to roosting habitat, for small, flying insects. Most likely hibernates through coolest months.	Low. Development Site does not support preferred habitat.
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	Endangered	Distribution confined to three disjunct areas in NSW: the Queensland/NSW border, the Illawarra and the NSW/Victoria border. Species inhabits dense, low vegetation including heath and open woodland with a heathy understorey. Forages on the ground for insects, rarely flies. Nest constructed on the ground amongst dense vegetation.	Low. No records in the locality. Development Site does not support preferred habitat.
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	Endangered	Found along the escarpments, tablelands and coast of the eastern seaboard from the Bundaberg area in south-east Qld south through NSW to Victoria and Tasmania. Known from dry and moist eucalypt forests and rainforest. Species tends to move along drainage lines and make dens in fallen hollow logs or among large rocky outcrops. Usually nocturnal but are known to and bask during the day. Hunts terrestrially and arboreally.	High. Numerous records within 10 km of the Development Site. Development Site supports preferred habitat.

Scientific Name	Common Name	Status	Habitat	Likelihood of occurrence on Proposal Site
<i>Erythroriorchis radiates</i>	Red Goshawk	Vulnerable	Inhabit open woodland and forest, preferring mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	Low. No records in the locality. Development Site does not support preferred habitat.
<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable	Nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. Inhabits Boree/ Weeping Myall, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	Low. No records in the locality. Development Site does not support preferred habitat.
<i>Lathamus discolor</i>	Swift Parrot	Critically Endangered	Migrates from breeding grounds in Tasmania to the Australian mainland in winter. Preferred over-winter habitat is woodlands and riparian vegetation where there are winter flowering eucalypts such as the Swamp Mahogany, <i>Eucalyptus robusta</i> , in coastal areas.	Low. No records within 10km of the Development Site. Winter flowering eucalypts are present within the Development Site and may provide seasonal foraging habitat.
<i>Litoria aurea</i>	Green and Golden Bell Frog	Vulnerable	Isolated, scattered populations throughout coastal NSW, several within the Sydney metropolitan area, Shoalhaven and mid-north coast. Breeding habitat comprises natural and constructed waterbodies including wetlands, stormwater detention basins, marshes, dams and streams-side, preferably those that are unshaded but with fringing vegetation. Forage for invertebrates within grassy habitats near breeding habitat. May shelter under vegetation, rocks and building materials such as fibro, sheet iron or bricks.	Low. Only one record of the species, dated from 1974, within 10km of the Development Site. Development Site does not support preferred habitat.
<i>Mixophyes balbus</i>	Stuttering Frog	Vulnerable	Typically found in association with permanent streams through temperate and sub-tropical rainforest and wet sclerophyll forest, rarely in dry open tableland riparian vegetation, and also in moist gullies in dry forest. In north-east NSW, the species has a preference for the interiors of large forest tracts in areas with relatively cool mean annual temperatures. These sites are typically free from any disturbance with a thick canopy and relatively simple understorey. Not associated with ponds or ephemeral pools.	Low. Species has not been recorded within 10 km of the Development Site. Development Site does not support preferred habitat.

Scientific Name	Common Name	Status	Habitat	Likelihood of occurrence on Proposal Site
<i>Mixophyes iteratus</i>	Giant Barred Frog	Endangered	wkesbury River, where it inhabits rainforests, moist eucalypt forest or nearby dry eucalypt forest below elevations of 1000m. Require shallow, flowing rocky streams for breeding in summer. Outside of breeding period, is found sheltering and foraging	Moderate. No breeding habitat present, however, foraging habitat and shelter present. Species has not been recorded within 10km of the Development Site.
<i>Petauroides volans</i>	Greater Glider	Vulnerable	Largely restricted to eucalypt forests and woodlands. Typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species	Low. Records from 1998 and 2001 located over 7 km west of the Development Site. No breeding habitat present, however foraging habitat present.
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Distribution of the species throughout Australia is highly fragmented. In NSW it mainly occurs on the central and north coasts with some populations in the western region inhabiting eucalypt woodlands and forests. The species feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Known. Species recorded on Development Site. Koala feed trees are present.
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	Vulnerable	Distribution in NSW restricted to coastal heaths and forests east of the Great Dividing Range. Also known from dry and wet sclerophyll forest. Requires dense understorey and ground layer vegetation for sheltering. Forages from fungi, roots tubers and insects in the soil.	Low. Species has not been recorded within 10km of the Development Site. Preferred habitat present, however not recorded in targeted surveys.
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	Vulnerable	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes	Low. Species has not been recorded within 10 km of the Development Site. Preferred habitat present, however not recorded in targeted surveys.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Found within 200km of the east coast of Australia. Roosting camps commonly found in gullies, close to water, in vegetation with a dense canopy. Camps typically located within 20km of a regular food source; nectar and pollen of native trees and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.	High. Numerous records within 10 km of the Development Site. Foraging habitat present.

Scientific Name	Common Name	Status	Habitat	Likelihood of occurrence on Proposal Site
<i>Rostratula australis</i>	<i>Australian Painted Snipe</i>	Endangered	Occurs throughout Australia. Inhabits shallow freshwater wetlands, vegetated ephemeral and permanent lakes and swamps, and inundated grasslands. Roosts during the day in dense vegetation and is active at dusk, throughout the night and dawn. It nests on the ground amongst tall reed-like vegetation near water, and forages near the water's edge and on mudflats for invertebrates and seeds.	Low. Development Site does not support preferred habitat. Species has not been recorded within 10 km of the Development Site.

Table C4: Fauna species recorded on the Proposal SiteObservation type

H	Hair, feathers or skin	Q	Camera	O	Observed	U	Ultrasonic recording	OW	Observed and heard call	W	Heard call	P	Scat
---	------------------------	---	--------	---	----------	---	----------------------	----	-------------------------	---	------------	---	------

Fauna species list

TSC Act – Threatened Species Act 1995 , EPBC Act - Environment Protection and Biodiversity Conservation Act 1999 [V – vulnerable, M – migratory]					
Conservation Status	Common Name	Scientific name	Observation type	Survey/Opportunistic observation	Certainty of ID
Amphibians					
	Broad-palmed Frog	<i>Litoria latopalmata</i>	O	Tadpole survey	Probable
	Common Eastern Froglet	<i>Crinia signifera</i>	W	Opportunistic & Frog survey	
	Eastern Dwarf Tree frog	<i>Litoria fallax</i>	W	Opportunistic & Frog survey	
	Striped Marsh Frog	<i>Limnodynastes peronii</i>	O	Opportunistic & Tadpole survey	
V-TSC Act	Green-thighed Frog	<i>Litoria brevipalmata</i>	Anecdotal	Opportunistic	Probable
	Great Barred Frog	<i>Mixophyes fasciolatus</i>	O	Tadpole survey	Probable
Birds					
	Australian King Parrot	<i>Alisterus scapularis</i>	W	Bird survey	
	Australian Magpie	<i>Cracticus tibicen</i>	W	Opportunistic	
	Australian Raven	<i>Corvus coronoides</i>	W	Opportunistic	
	Australian Wood Duck	<i>Chenonetta jubata</i>	O	Opportunistic	
	Bar-shouldered Dove	<i>Geopelia humeralis</i>	O	Opportunistic	
	Bell Miner	<i>Manorina melanophrys</i>	W	Opportunistic	
	Black-faced Cuckoo Shrike	<i>Coracina novaehollandiae</i>	W	Bird survey / Opportunistic	
	Brown Thornbill	<i>Acanthiza pusilla</i>	W	Bird survey	
	Brush Cuckoo	<i>Cacomantis variolosus</i>	W	Opportunistic / Bird survey	

TSC Act – Threatened Species Act 1995 , EPBC Act - Environment Protection and Biodiversity Conservation Act 1999 [V – vulnerable, M – migratory]					
Conservation Status	Common Name	Scientific name	Observation type	Survey/Opportunistic observation	Certainty of ID
Exotic	Common Myna	<i>Sturnis tristis</i>	O	Opportunistic	
	Crimson Rosella	<i>Platycercus elegans</i>	W	Opportunistic	
	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	W	Opportunistic	
	Eastern Whipbird	<i>Psophodes olivaceus</i>	W	Bird survey, Opportunistic	
	Eastern Yellow Robin	<i>Eopsaltria australis</i>	W	Opportunistic	
	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	W	Bird survey	
	Golden Whistler	<i>Pachycephala pectoralis</i>	W	Bird survey	
	Grey Fantail	<i>Rhipidura albiscapa</i>	W	Bird survey	
	Lewin's Honeyeater	<i>Meliphaga lewinii</i>	W	Bird survey	
	Little Raven	<i>Corvus mellori</i>	W	Bird survey	
	Magpielark	<i>Grallina cyanoleuca</i>	W	Bird survey	
	Masked Lapwing	<i>Vanellus miles</i>	OW	Opportunistic, Spotlight	
	Noisy Friarbird	<i>Philemon corniculatus</i>	W	Opportunistic	
	Pied Currawong	<i>Strepera graculina</i>	OW	Spotlight survey, Opportunistic	
	Red-browed Finch	<i>Neochmia temporalis</i>	OW	Opportunistic	
M-EPBC	Rufous Fantail	<i>Rhipidura rufifrons</i>	O	Opportunistic	
	Rufous Whistler	<i>Pachycephala rufiventris</i>	O	Opportunistic	
	Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>	W	Bird survey, Opportunistic	
	Spotted Pardalote	<i>Pardalotus punctatus</i>	W	Bird survey, Opportunistic	
	Variegated Fairy-wren	<i>Malurus lamberti</i>	W	Bird survey, Opportunistic	
	Wedge-tailed Eagle	<i>Aquila audax</i>	O	Opportunistic – pair circling over canopy	
	Welcome Swallow	<i>Hirundo neoxena</i>	O	Opportunistic	

TSC Act – Threatened Species Act 1995 , EPBC Act - Environment Protection and Biodiversity Conservation Act 1999 [V – vulnerable, M – migratory]					
Conservation Status	Common Name	Scientific name	Observation type	Survey/Opportunistic observation	Certainty of ID
	White-throated Treecreeper	<i>Cormobates leucophaeus</i>	W	Bird survey, Opportunistic	
	White-necked Heron	<i>Ardea pacifica</i>	O	Opportunistic	
	Willie Wagtail	<i>Rhipidura leucophrys</i>	O		
	Yellow-faced Honeyeater	<i>Lichenstomus chrysops</i>	W	Bird survey	
	Yellow Thornbill	<i>Acanthiza nana</i>	W	Bird survey, Opportunistic	
Mammals					
Exotic	Black Rat	<i>Rattus rattus</i>	Q/H	Camera, hair tube	
	Brown Antechinus	<i>Antechinus stuartii</i>	Q/H	Camera, hair tube	Probable (camera)
	Bush Rat	<i>Rattus fuscipes</i>	Q/H	Camera, hair tube	
	Chocolate Wattle Bat	<i>Chalinolobus morio</i>	U	Anabat survey at dam	Probable
	Common Dunnart	<i>Sminthopsis murina</i>	Q	Camera	Probable
	Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>	P	Opportunistic	
V-TSC Act	Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	U	Anabat survey in development site	Confident
	Eastern Horseshoe Bat	<i>Rhinolophus megaphyllus</i>	U	Anabat survey in development site / Anabat survey at dam	Confident
	Eastern Forest Bat	<i>Vespadelus pumilus</i>	U	Anabat survey in development site / Anabat survey at dam	Probable
V-TSC Act	Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	U	Anabat survey in development site / Anabat survey at dam	Confident
	Eastern Grey Kangaroo	<i>Macropus giganteus</i>	O/Q	Opportunistic, camera	
Exotic	Fox	<i>Vulpes vulpes</i>	Q	Camera	
Exotic	Goat	<i>Capra hircus</i>	O	Opportunistic	
Exotic	House Mouse	<i>Mus musculus</i>	H	Hair tube	
V-TSC Act V-EPBC Act	Koala	<i>Phascolarctos cinereus</i>	Q/P	Camera, Koala SAT survey	

TSC Act – Threatened Species Act 1995 , EPBC Act - Environment Protection and Biodiversity Conservation Act 1999 [V – vulnerable, M – migratory]					
Conservation Status	Common Name	Scientific name	Observation type	Survey/Opportunistic observation	Certainty of ID
V-TSC Act	Little Bentwing-bat	<i>Miniopterus australis</i>	U	Anabat survey in development site	Confident
	Long-nosed Bandicoot	<i>Perameles nasuta</i>	H	Hair tube	
	Northern Brown Bandicoot	<i>Isodon macrourus</i>	Q	Camera	Confident
	Red-necked Wallaby	<i>Macropus rufogriseus</i>	P	Opportunistic	Possible
	Short-beaked Echidna	<i>Tachyglossus aculeatus</i>	Q	Camera	
V-TSC Act	Southern Myotis	<i>Myotis macropus</i>	U	Anabat survey in development site	Probable
	Sugar Glider	<i>Petaurus breviceps</i>	O	Spotlight	Probable
	Swamp Wallaby	<i>Wallabia bicolor</i>	O/P	Opportunistic	
	Unidentified Antechinus	<i>Antechinus sp.</i>	Q/H	Camera (probable), hair tube	
	Unidentified Brushtail Possum	<i>Trichosurus sp.</i>	H	Hair tube	
	Unidentified Nyctophilus	<i>Nyctophilus sp.</i>	U	Anabat survey in development site / Anabat survey at dam	Probable
	Unidentified Vespadelus	<i>Vespadelus sp.</i>	U	Anabat survey in development site / Anabat survey at dam	Probable
	White-striped Freetail-bat	<i>Austronomus australis</i>	U	Anabat survey in development site	Confident
Reptiles					
	Red-tailed Calyptotis	<i>Calyptotis ruficauda</i>	O	Reptile survey	

APPENDIX D OFFSET CREDIT REPORT

Biodiversity credit report



This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 17/03/2017

Time: 3:43:57PM

Calculator version: v4.0

Major Project details

Proposal ID: 0023/2014/1302D

Proposal name: Cairncross WMF

Proposal address: Pacific Highway Telegraph Point NSW

Proponent name: Port Macquarie Hastings Council

Proponent address: Burrawan Street Port Macquarie NSW 2444

Proponent phone: 0265818111

Assessor name: Jane Rodd

Assessor address: Level 5, 141 Walker Street NORTH SYDNEY NSW 2060

Assessor phone: 8907 8266

Assessor accreditation: 0023

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion	3.40	221.00
Total	3.40	221

Credit profiles

1. Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion, (NR117)

Number of ecosystem credits created	221
IBRA sub-region	Macleay Hastings - Northern Rivers

Offset options - Plant Community types	Offset options - IBRA sub-regions
Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion, (NR117) Flooded Gum - Brush Box moist forest of the coastal ranges of the North Coast, (NR159) Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast, (NR160) Pink Bloodwood - Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion, (NR219) Spotted Gum - Brush Box moist forest of ranges of the southern Clarence Valley of the NSW North Coast Bioregion, (NR243) Spotted Gum - Grey Ironbark shrubby open forest of the Richmond Range of the NSW North Coast, (NR248) Sydney Blue Gum open forest on coastal foothills and escarpment of the North Coast, (NR258) Tallowwood - Brush Box moist open forest of the coastal ranges of the central NSW North Coast, (NR260) Tallowwood - Narrow-leaved White Mahogany - Spotted Gum moist open forest in the Washpool area of the NSW North Coast, (NR261) Turpentine moist open forest of the coastal hills and ranges of the NSW North Coast Bioregion, (NR274)	Macleay Hastings - Northern Rivers and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Koala	Phascolarctos cinereus	3.22	84
Green-thighed Frog	Litoria brevipalmata	3.22	248
Southern Myotis	Myotis macropus	0.12	3

APPENDIX E VEGETATION CLEARING PROTOCOL FOR STAGE 3 (BLACKBUTT GRASSY FOREST)

The following flora and fauna management procedures will be implemented to ensure that all vegetation clearing, and grubbing required for Stage 3 is conducted to minimise impacts on fauna and the surrounding environment.

Works Area Establishment

- Prior to the commencement of Stage 3 construction, clearly defined work areas (including access tracks) will be established. Extent of clearing will be fenced with highly visible temporary fencing to ensure that clearing does not extend beyond area necessary.
- All on-site construction movements are to be restricted to approved construction areas, to prevent uncontrolled or inadvertent access by vehicles or construction personnel to vegetation and fauna habitat to be protected.

Site Induction and Training

- As outlined in **Section 3.4** of this Plan, all landfill staff and contractors are required to undergo a site induction and/or training and regular toolbox talks to ensure they are aware of the environmental protection requirements, including for flora and fauna.

Vegetation Clearing Process

- Clearing of vegetation and excavation activities will not be undertaken during overland flow events (where there is surface runoff present after rainfall and prior to entering a waterway).
- A two-stage clearing process will be implemented in areas of the Stage 3 new cell construction that containing hollow-bearing trees.
- An experienced ecologist will be engaged and be present onsite to supervise all stages of removal of hollow bearing trees, as well as relocation of any fauna, when required.
- If feasible and reasonable, vegetation clearing shall not be undertaken during the breeding seasons for threatened fauna species with potential habitat on the landfill site. This will not be possible for all identified threatened species as breeding seasons collectively span a large portion of the year. In order of preference of avoidance, the breeding periods are:
 - Koala – September to February (breeding season)
 - Glossy Black Cockatoo – March to August (breeding season)
 - Spotted-tail Quoll – June to January (maternal den season)
 - Grey-headed Flying Fox – October to March (breeding season)
 - Southern Myotis – November to February (breeding season)

Scheduling the vegetation removal for Autumn months will generally avoid the breeding season of most species that could occur on landfill site.

- All injured fauna will be reported to the Landfill Supervisor and Ecologist (during vegetation removal). Contact details will be kept on landfill site for the local animal rescue group (Fawna Wildlife Rescue, Port Macquarie) and veterinarian if any fauna is injured at landfill or require capture and/or relocation.
- Stabilisation of disturbed areas adjacent to retained native vegetation, including revegetation where appropriate, will be undertaken as soon as feasible and reasonable after disturbance.
- No vegetation clearing outside the project boundary shall occur without the necessary approvals in place.

Sediment and erosion control

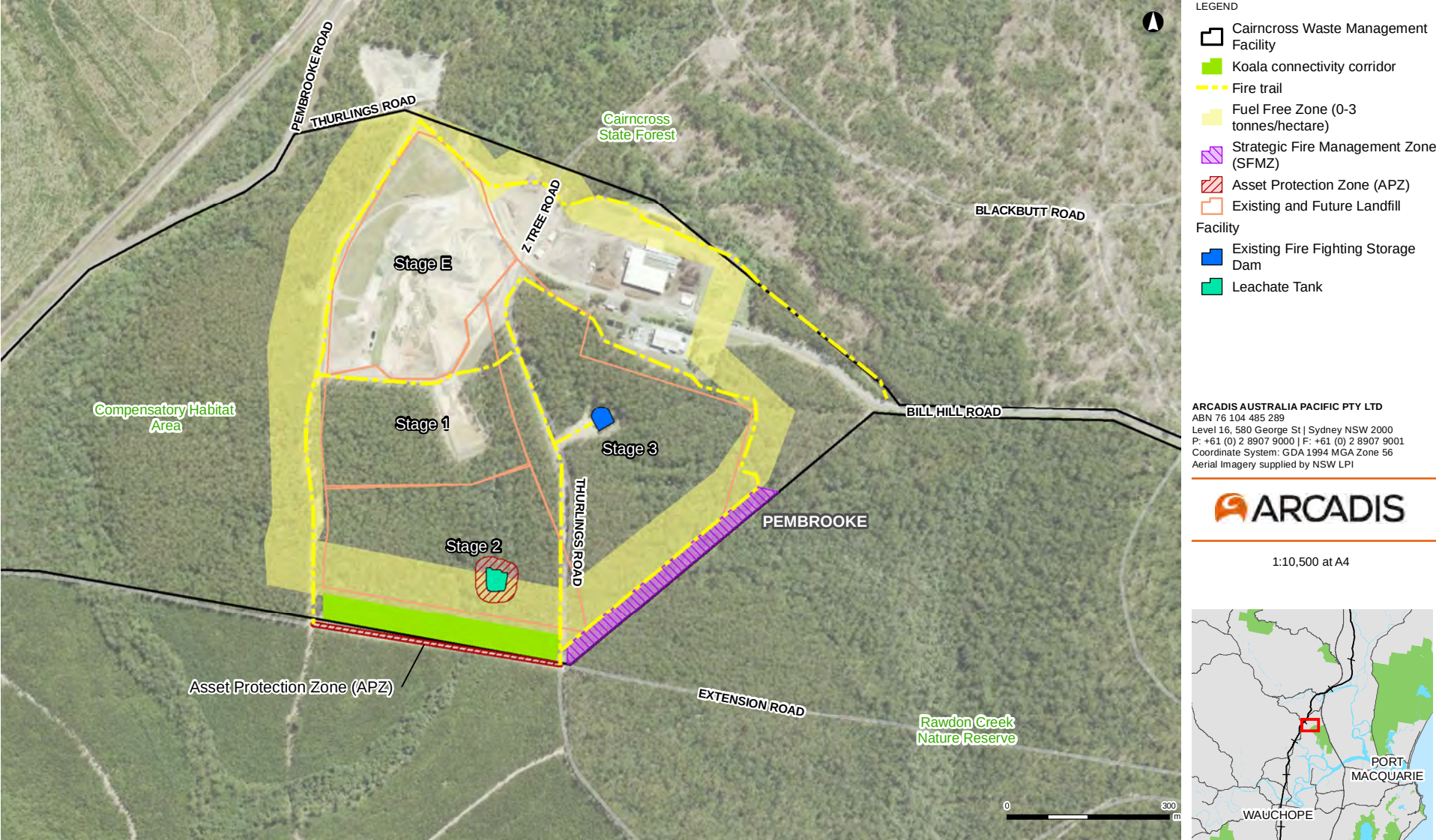
- Disturbance to soil will be minimised as much as possible.
- Sediment and erosion control will be installed in accordance with the requirements of the Water Management Plan (refer to Appendix B of the LEMP).

Cleared vegetation placement protocol

- Dead trees and other suitable mature native trees cleared will be placed in the koala connectivity corridor to provide additional habitat for fauna.
- Placement of cleared vegetation immediately adjacent to the landfill boundary will not be possible as there are bushfire asset protection zones around the landfill operation area.
- The *Biodiversity Guidelines Guide 5: Re-use of woody debris and bushrock* will be used to guide placement activities (RTA Environment Branch, 2011).
- The excess cleared vegetation that cannot be used for fauna habitat will be managed (composted) at the Cairncross ORRF.

APPENDIX F BUSHFIRE MANAGEMENT STRATEGY

Cairncross Waste Management Facility



Appendix F: Cairncross WMF bushfire management strategy