
Murwillumbah Education Campus Biodiversity Assessment

Biodiversity Development Assessment Report

Prepared for Schools Infrastructure NSW
March 2022

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18 March 2022

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Table of Contents

1	Introduction	1
1.1	The project	1
1.2	Assessment requirements	2
1.3	Purpose of this report	3
1.4	Information sources	3
1.5	Project assessment under the BAM 2020 streamlined assessment module- 'planted native vegetation'	4
1.6	Staff qualifications and contributions	5
2	Legislative context	9
2.1	Commonwealth	9
2.2	State	10
	Stage 1- Biodiversity Assessment	13
3	Landscape features	14
3.1	Landscape features	15
3.2	Assessment of site context	17
4	Planted native vegetation	20
4.1	Assessment of Appendix D: D.1- Decision-making key	20
4.2	Assessment of Appendix D: D.2 Assessment of planted native vegetation for threatened species habitat	31
	Stage 2- Impact assessment	37
5	Impact assessment	38
5.1	Potential direct, indirect and prescribed impacts	38
5.2	Avoidance and minimisation measures	40
5.3	Mitigation and management strategy	41
6	Assessment of other relevant biodiversity legislation	44
6.1	Environment Protection and Biodiversity Conservation Act 1999	44
6.2	Biosecurity Act 2015	61
7	Conclusion	63
	References	64

Appendices

Appendix A	Vegetation plot survey datasheets
Appendix B	Planted vegetation documentation
Appendix C	Protected Matters Search Tool (PMST) Report
Appendix D	BCD correspondence
Appendix E	Anabat analysis

Tables

Table 1.1	Project elements referred to in this BDAR	2
Table 1.2	Secretary's Environmental Assessment Requirements	3
Table 1.3	Assessment of Appendix D: D1- Decision-making key against the project	5
Table 1.4	Staff qualifications and contributions	6
Table 3.1	Landscape features of the buffer area	14
Table 3.2	Percentage of native vegetation cover	17
Table 4.1	Assessment method	20
Table 4.2	Vegetation types within the development footprint	21
Table 4.4	Commemorative rainforest planting – Plot 2	21
Table 4.7	Vegetation types and PCT justifications	28
Table 4.8	Likelihood of occurrence of threatened species	32
Table 4.10	Microbat survey effort	35
Table 4.11	Threatened fauna recorded or considered to have potential to occur in the subject land	35
Table 5.1	Assessment of prescribed impacts	39
Table 5.2	Mitigation and management measures	41
Table 6.1	Likelihood of occurrence for threatened species (excluding wetland and marine species)	45
Table 6.2	Likelihood of occurrence for migratory species	52
Table 6.3	Species subject to significant impact assessments	53
Table 6.4	Assessment of significance for vulnerable rainforest flora in the subject land	54
Table 6.5	Assessment of significance for endangered rainforest flora in the subject land	55
Table 6.6	Assessment of significance for Scrub Turpentine (<i>Rhodamnia rubescens</i>) in the subject land	56
Table 6.7	Assessment of significance for Koala (<i>Phascolarctos cinereus</i>) in the subject land	58
Table 6.8	Assessment of significance for Grey-headed Flying-fox in the subject land	59
Table 6.9	Priority and high threat weeds recorded within the subject land	61

Figures

Figure 1.1	Regional context	7
Figure 1.2	The project	8
Figure 3.1	Location map	18
Figure 3.2	Site map	19
Figure 4.1	Vegetation within the development footprint	30

Plates

Plate 4.1	Commemorative rainforest planting	22
Plate 4.2	Harmony Day trees	24
Plate 4.3	Captain's and Memorial Trees (left: adjacent Bruce Chick Rainforest, right: adjacent Block A)	24
Plate 4.4	An isolated Spotted Gum (<i>Corymbia maculata</i>)	25
Plate 4.5	Landscaped garden beds	25
Plate 4.6	Slash Pine plantation area	26

1 Introduction

1.1 The project

Schools Infrastructure NSW (SINSW) is seeking to develop the Murwillumbah Education Campus (hereafter 'the site'). The site is legally defined as Lot 2 in Deposited Plan (DP) 578679 and Lots 5 and 6 in DP 820602 (Figure 1.1 and Figure 1.2).

The Murwillumbah Education Campus development involves the co-location of Murwillumbah Primary School, Murwillumbah East Primary School, Murwillumbah High School, and Wollumbin High School, to establish a new primary school and a new high school as part of the same education campus.

The project will include the following scope of works within the SSD application:

- demolition of Building E;
- demolition of all inground slabs, pathways, hardstands and footings including those to buildings B, C, D, G, H, M, P, S, AW and AZ (Note: the above ground demolition of these buildings will be under a separate planning pathway);
- associated ground works required to facilitate the construction of new buildings and landscaped areas;
- construction of new Buildings 1, 2, 3 and 4:
 - Building 1 – New public school building comprising general learning spaces, administration, canteen, School Support Unit (SSU) and library;
 - Building 2 – Hall building including a public school hall, out of school hours care (OSHC) facilities, high school hall/gymnasium and other spaces for physical education and creative and performing arts (CAPA);
 - Building 3 – New high school building including the following facilities; general and specialist learning spaces, SSU, and library.
 - Building 4 - New high school building including the following facilities; science, support, administration and canteen;
- refurbish Building A for DoE offices and school community health facilities along with associated access requirements. Building A is a locally listed heritage building and will be retained and refurbished;
- refurbishment of Building F to provide learning space for agricultural education;
- retention of existing AY;
- creation of new public school and high school outdoor learning spaces to support future focused learning outcomes;
- new landscaping and embellishment of outdoor playgrounds;
- civil and infrastructure works; and

- kiss n drop and parking off Nullum Street.

The project will involve the clearing of planted native vegetation for the demolition and construction of the above project components and includes cut and fill batters, general construction space and clearing for bushfire asset protection setbacks.

The project is being assessed as a State Significant Development (SSD) under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). EMM Consulting Pty Limited (EMM) is undertaking the biodiversity assessment under the NSW Biodiversity Offsets Scheme (BOS) for the project on the behalf of SINSW. Biodiversity assessment requirements are discussed in section 1.2 and 1.5. Project elements referred to in this BDAR are described in Table 1.1.

Table 1.1 Project elements referred to in this BDAR

Project elements	Definition
Buffer area	1,500m buffer of project footprint (site-based developments only)
Subject land	The land proposed for development, encompassing Lot 2 in Deposited Plan (DP) 578679 and Lots 5 and 6 in DP 820602
Development footprint	Area subject to all proposed direct impacts; located entirely within the subject land
Indirect impact area	Area subject to anticipated indirect impacts. For this project this includes the area five metres outside of but adjacent to the development footprint (see Section 5.1.2 for justification)
Locality	Buffered search area for database searches

1.2 Assessment requirements

The NSW *Biodiversity Conservation Act 2016* (BC Act) is responsible for the conservation of biodiversity in NSW. The BC Act, together with the NSW *Biodiversity Conservation Regulation 2017*, establishes the Biodiversity Offsets Scheme (BOS), the Biodiversity Assessment Method (the BAM) and a method for determining if developments are likely to significantly affect threatened species, ecological communities or their habitats (BCD 2020).

For SSD developments being assessed under Part 4 of the EP&A Act, the requirement for assessment under the BOS is automatically triggered under Section 7.9 of the BC Act. For some projects as part of the assessment under the BAM, a streamlined assessment module may be applied that includes specific requirements to assess the impacts on biodiversity values for the purpose of preparing a Biodiversity Development Assessment Report (BDAR).

This project will be assessed under the 'streamlined assessment module- Planted native vegetation' in accordance with Appendix D of the BAM (DPIE 2020) and as explained in Section 1.5. Further details of the relevant legislative pathways are further discussed in Section 2.

1.2.1 Secretary's environmental assessment requirements

SINSW submitted a request for Secretary's environmental assessment requirements (SEARs) to the Department of Planning, Industry and Environment (DPIE) on 05 May 2021 along with supporting documentation describing the project, stakeholder engagement, key matters to be addressed in the EIS and the proposed assessment methods. The SEARs were issued on 5 May 2021. Table 1.2 lists the assessment requirements relevant to the project and describes where these are addressed in the BDAR.

Table 1.2 Secretary's Environmental Assessment Requirements

Requirement	Section addressed
Key issues- biodiversity	
Provide a Biodiversity Development Assessment Report (BDAR), that assesses the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016, Biodiversity Conservation Regulation 2017 and Biodiversity Assessment Method, except where a BDAR waiver has been issued in relation to the development or the development is located on biodiversity certified land.	This report comprises a BDAR prepared in accordance with Table 28 of the BAM (DPIE 2020).
Where a BDAR is not required, because a BDAR waiver has been issued, in relation to the development, provide: a copy of the BDAR waiver and demonstrate that the proposed development is consistent with that covered in BDAR waiver. an assessment of flora and fauna impacts where significant vegetation or flora and fauna values would be affected by the proposed development.	Not applicable.

1.3 Purpose of this report

The specific objectives of this assessment are to:

- describe biodiversity values of the subject land;
- assess the likelihood that relevant threatened species and communities (threatened biodiversity) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) could occur in the subject land;
- document the strategies implemented to avoid and/or minimise impacts of the project on threatened biodiversity;
- assess residual threatened biodiversity impacts, after avoidance and minimisation strategies have been implemented; and
- provide environmental safeguards to mitigate threatened biodiversity impacts during construction and operation.

1.4 Information sources

1.4.1 Publications and databases

In order to provide context for the project, information about flora and fauna species, populations, communities and habitats from the locality (generally within 10 km) was obtained from the following databases:

- BioNet Atlas of NSW Wildlife for previous threatened species records.
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST) for Matters of National Environmental Significance (MNES) likely to occur within the subject land.
- The NSW Plant Community Types (PCTs), as held within the BioNet Vegetation Classification database (BioNet).

- Threatened species associated with the PCT(s) present in the subject land.

1.4.2 Other relevant reports

This biodiversity assessment has been prepared with reference to other technical reports that were prepared as part of the project. The other relevant reports referenced in this biodiversity assessment include:

- Arboricultural Impact Assessment Report (Civica Pty Ltd 2022).

1.4.3 Spatial data

Spatial data encompassing the subject land, including the development footprint, was obtained from Built Pty Ltd. Base map data was obtained from Department of Finance, Services and Innovation (DFSI) NSW databases, with cadastral data obtained from DFSI digital cadastral database. Mapping for stream orders was obtained from NSW Department of Primary Industries (DPI).

The following spatial datasets were utilised during the development of this report:

- Tweed LGA Vegetation 2012. VIS_ID 3912 (DPIE 2013).
- Strahler Stream Order (DPI 2015a).
- Local Government Area (DFSI 2017).
- Road Segment (DFSI 2017).
- NPWS Reserve (DFSI 2017).
- State Forest (DFSI 2017).
- Important Area maps (BCD 2021).
- NSW (previously termed Mitchell) Landscapes Version V3.1 (OEH 2017).
- Interim Biogeographic Regionalisation of Australia (IBRA) Version 7 (DoEE 2018).

Mapping undertaken during the site assessment was conducted using a hand-held GPS unit, mobile tablet computers running Collector for ArcGIS™ and Survey123 for ArcGIS™ and aerial photo interpretation. Accuracy is subject to accuracy of GPS devices, generally ± 5 m. Mapping has been produced using a Geographic Information System (GIS; ArcGIS 10.8.1).

Spatial data relevant to this BDAR was provided to the BCD following lodgement of the BDAR.

1.5 Project assessment under the BAM 2020 streamlined assessment module- 'planted native vegetation'

The Biodiversity Assessment Method (BAM) (DPIE 2020) sets out provisions for projects triggering the Biodiversity Offsets Scheme to be assessed under the planted native vegetation streamlined assessment module if the development meets the decision-making key in Appendix D of the BAM (DPIE 2020). A summary and further discussion of the project and its conformance to the decision-making key is outlined in Table 1.3 and section 4.

Table 1.3 Assessment of Appendix D: D1- Decision-making key against the project

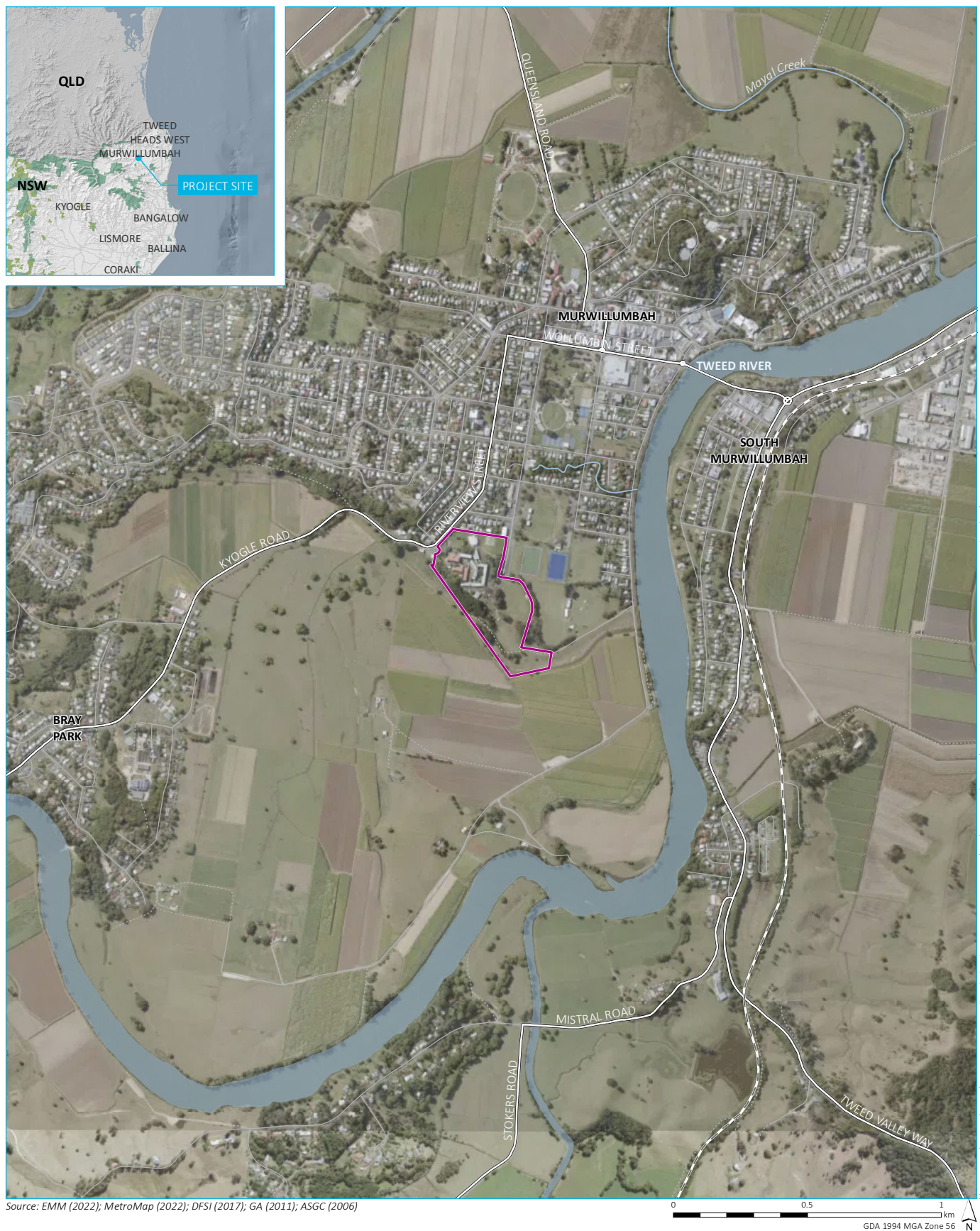
Question	Result	Where addressed in BDAR
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	ii. No..... Go to 2.	Chapter 4.1.2 and 4.1.3
2. Is the planted native vegetation: a) planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b) the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	ii. No..... Go to 3.	Chapter 4.1.3
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: a) a species recovery project b) Saving our Species project c) other types of government funded restoration project d) condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat e) legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (eg Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) f) ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or g) approved vegetation management plan (eg as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000)?	ii. No..... Go to 4.	Chapter 4.1.3
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	ii. No..... Go to 5.	Chapter 4.1.3
5. Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms?	i. Yes Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied).	Chapter 4.2

1.6 Staff qualifications and contributions

EMM staff that have contributed to field surveys and authoring this report are listed Table 1.4.

Table 1.4 **Staff qualifications and contributions**

Name	Position	Project role	Qualifications	Relevant years of experience
Cecilia Phu	Associate Ecologist	Lead BAM assessor, BDAR review	BSc (Hons) BAM Accredited Assessor (BAAS17058)	14+
Chris Beavon	Associate Ecologist	BDAR reporting, preliminary field surveys and vegetation mapping.	BSc	17+
Gus Daly	Ecologist	Flora survey, BAM plots, vegetation mapping, and BDAR reporting	BEnvSc&Mgt, BSc (Hons)	3+
Bianca Seal	Ecologist	BDAR reporting	BSc, GradDipGIS	3+
Jeshua Apland	Ecologist	Detailed roost cavity searches	BEnvSc	3+
Elliot Leach	Ecologist	Microbat roost assessments – visual inspections of buildings for potential roost entries	PhD, BSc (Hons)	7+
Daniel Kelly	Ecologist	Microbat roost assessments – visual inspections of buildings for potential roost entries	BSc (Hons)	4+
Amy Rowles	Microbat Specialist	Bat call analysis	BSc (Hons)	20+
Kimberley Warren	GIS Analyst	Report figures, GIS support	BEnvSc, MGIS	4



KEY

- Subject land
- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody

INSET KEY

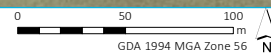
- Major road
- NPWS reserve
- State forest

Regional context

Murwillumbah Education Campus
Biodiversity development assessment report
Figure 1.1



Source: EMM (2022); MetroMap (2022); DFSI (2017)



KEY

- Subject land
- New building plan
- Watercourse/drainage line
- Cadastral boundary

Project area

Murwillumbah Education Precinct
Biodiversity development assessment report
Figure 1.2

2 Legislative context

This chapter provides a brief outline of the key biodiversity legislation and government policy considered in this assessment.

2.1 Commonwealth

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places and water resources which are defined as Matters of National Environmental Significance (MNES) under the EPBC Act. These are:

- world heritage properties;
- places listed on the National Heritage Register;
- Ramsar wetlands of international significance;
- threatened flora and fauna species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- water resources, in relation to coal seam gas or large coal mining development.

Under the EPBC Act, an action that may have a significant impact on an MNES is deemed to be a 'controlled action' and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that may potentially have a significant impact on an MNES is to be referred to DAWE for determination as to whether or not it is a controlled action. If deemed a controlled action the project is assessed under the EPBC Act and a decision made as to whether or not to grant approval.

The proposed development is very unlikely to have a significant impact on an MNES, and therefore will not require a referral to DAWE.

2.2 State

2.2.1 Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) was enacted to encourage the consideration and management of impacts of proposed development or land-use changes on the environment and the community. The EP&A Act is administered by the NSW Department of Planning, Industry and Environment (DPIE).

The EP&A Act provides the overarching structure for planning in NSW; however, is supported by other statutory environmental planning instruments (EPIs) including State Environmental Planning Policies (SEPPs). EPIs relevant to the natural environment are outlined further below.

i State Environmental Planning Policy (Koala Habitat Protection) 2021

The *State Environmental Planning Policy (Koala Habitat Protection) 2021* (the Koala SEPP 2021) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. It applies to development applications on land which is >1 hectares (ha) on its own, or together with adjoining land in the same ownership, whether or not the development application applies to only part of the land, and which is within council areas listed in Schedule 1 of Koala SEPP 2021.

The Koala SEPP 2021 does not apply to assessments under Part 5 of the EP&A Act, or to SSD projects. Despite this, Koala habitat has been further considered under the EPBC Act (Section 6.1 and Section 6.1.2iv) and a significant impact is considered highly unlikely.

ii State Environmental Planning Policy (Coastal Management) 2018

The *State Environmental Planning Policy (Coastal Management) 2018* (Coastal Management SEPP) aims to promote an integrated and co-ordinated approach to land use planning in the coastal zone by managing development in the zone and protecting the environmental assets of the coast. The Coastal Management SEPP also establishes a framework for land use planning to guide decision-making in the coastal zone with the provision of mapped coastal management areas. These mapped areas are identified as:

- coastal wetlands and littoral rainforests area;
- coastal vulnerability area;
- coastal environment area; and
- coastal use area.

The development footprint is not located within these mapped areas, with the exception of the coastal environment area. Despite this, the Coastal Management SEPP does not apply to assessments under Part 5 of the EP&A Act, or to SSD projects.

2.2.2 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) is the legislation responsible for the conservation of biodiversity in NSW through the protection of threatened flora and fauna species, populations and ecological communities. The BC Act, together with the *Biodiversity Conservation Regulation 2017* (BC Regulation), established the Biodiversity Offsets Scheme (BOS).

The BOS includes establishment of the Biodiversity Assessment Method (the BAM, DPIE 2020) for use by accredited persons in biodiversity assessment under the scheme. The purpose of the BAM is to assess the impact of actions on threatened species and threatened ecological communities, and their habitats and determine offset requirements. For SSD developments being assessed under Part 4, the requirement for assessment under the BOS is automatically triggered under Section 7.9 of the BC Act.

The BAM sets out the requirements for a repeatable and transparent assessment of terrestrial biodiversity values on land in order to:

- identify the biodiversity values on land subject to proposed development area;
- determine the impacts of a proposed development, following all measures to avoid, minimise and mitigate impacts; and
- quantify and describe the biodiversity credits required to offset the residual impacts of proposed development on biodiversity values.

This Biodiversity Development Assessment Report (BDAR) addresses the requirements for biodiversity assessment under the BC Act.

2.2.3 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) contains provisions for the conservation of fish stocks, key fish habitat, biodiversity, threatened species, populations and ecological communities. It regulates the conservation of fish, vegetation and some aquatic macroinvertebrates and the development and sharing of the fishery resources of NSW for present and future generations. The FM Act lists threatened species, populations and ecological communities, key threatening processes (KTPs) and declared critical habitat. Assessment guidelines to determine whether a significant impact is expected are detailed in section 220ZZ and 220ZZA of the FM Act.

Another objective of the FM Act is to conserve key fish habitat (KFH). These are defined as aquatic habitats that are important to the sustainability of recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. KFH is defined in Section 3.2.1 and 3.2.2 of the Policy and Guidelines for Fish Conservation and Management (DPI 2013).

There is no aquatic habitat present within the development footprint (see Section 3.1.2 for more details). The project is unlikely to have any impacts on threatened aquatic species, populations, communities, habitats or KFH.

2.2.4 Biosecurity Act 2015

The primary objective of the *NSW Biosecurity Act 2015* (Biosecurity Act) is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

The Biosecurity Act stipulates management arrangements for weed biosecurity risks in NSW, with the aim to prevent, eliminate and minimise risks. Management arrangements include:

- any land managers and users of land have a responsibility for managing weed biosecurity risks that they know about or could reasonably be expected to know about;
- applies to all land within NSW and all waters within the limits of the State; and

- local strategic weed management plans will provide guidance on the outcomes expected to discharge duty for the weeds in that plan.

NSW WeedWise identifies relevant weed species by region. The relevant region for the project is the North Coast. About 129 priority weed species are listed for the North Coast region (DPI n.d.a).

The North Coast Regional Strategic Weed Management Plan 2017 – 2022 (LLS 2017) supports regional implementation of the Biosecurity Act by articulating community expectations in relation to effective weed management and facilitating a coordinated approach to weed management in the region. The plan identifies:

- weed management in the region;
- weed risk assessment and prioritisation;
- recommended actions;
- details regarding how to apply the actions; and
- measures proposed to increase the chance of success and for continuous improvement.

Appendix 1 of the regional strategic weed management plan provides a list of priority weeds for the North Coast LLS region and Appendix 2 identifies other weeds of regional concern. Should any of these species be recorded on site the management actions provided in the plan will need to be implemented.

The provisions of the Biosecurity Act are discussed further in Section 6.2.

2.2.5 Water Management Act 2000

Division 6 of the *Water Management Act 2000* (WM Act) requires consideration of controlled activities (ie activities within 40 m of riparian land) and aquifer interference activities. The NSW Aquifer Interference Policy (NOW 2012) requires an assessment of potential impacts on groundwater users, including groundwater dependent ecosystems.

The development footprint is not located within 40 m of riparian land. The development footprint and indirect impact area are located approximately 15 metres from the 40 m buffer and therefore does not represent a controlled activity.

Groundwater will not be intercepted for the project and therefore it does not represent an aquifer interference activity.

Stage 1- Biodiversity Assessment

3 Landscape features

The identification of landscape features in the buffer area was undertaken in accordance with Section 3 of the BAM (DPIE 2020), and results are summarised within this chapter. The landscape features described in the following sections are summarised in Table 3.1 and shown in Figure 3.1 and Figure 3.2.

Table 3.1 **Landscape features of the buffer area**

Landscape feature	Subject land
Method applied for site context components	1500 m buffered assessment area
Interim Biogeographic regionalisation of Australia (IBRA) bioregion	South East Queensland
IBRA subregion	Burringbar-Conondale Ranges
BioNet NSW landscapes (formerly Mitchell landscapes)	Mount Warning Exhumed Slopes landscape (dominant) fringed by the Byron - Tweed Alluvial Plains landscape.
Rivers, streams and estuaries	No rivers, streams or estuaries are located within the development footprint. The following rivers, streams and estuaries have been mapped within the 1500 m buffered assessment area: • three man-made canals; • 18 first order watercourses (including Murwillumbah Creek); • eight second order watercourses; • five third order watercourses; • one fifth-order watercourse; • two sixth-order watercourses (Dunbible Creek and Rous River); and • one seventh-order watercourse (Tweed River).
Wetlands	No Nationally Important Wetlands or RAMSAR wetlands have been mapped within the subject land. Stotts Island Nature Reserve is a Nationally Important Wetland which is located approximately 14 km downstream on the Tweed River from the subject land.
Connectivity of different areas of habitat	The subject land contains several built environments which limit connectivity of habitat. This includes existing buildings, sporting courts, carparks, paved surfaces agricultural plots and sporting ovals. The subject land also contains cultivated gardens, windbreaks, small patches of native vegetation and a Hoop Pine (<i>Araucaria cunninghamii</i>) plantation. Surrounding land uses within the locality limit connectivity to these potential habitats, including a third-order stream which is moderately fragmented and has sparse riparian vegetation to support connectivity of habitat.
Areas of geological significance and soil hazard	There are no areas of geological significance within the subject land. A review of the Acid Sulfate Soil probability data layer (Naylor <i>et al</i> 1998) identified low probability acid sulfate soils directly adjacent to the subject land. However, the Detailed Site Investigation for Contamination (Douglas Partners 2021) identified Potential Acid Sulphate Soils (PASS) in the lower lying eastern areas of the site, below a depth of approximately 0.5 m bgl, and at a depth of 1.25 m bgl.

Table 3.1 Landscape features of the buffer area

Landscape feature	Subject land
Areas of outstanding biodiversity value	There are no areas of outstanding biodiversity value mapped within the subject land. Critical habitat for Mitchell’s Rainforest Snail (<i>Thersites mitchellae</i>) in Stotts Island Nature Reserve is located approximately 14 km downstream on the Tweed River from the subject land. This is highly unlikely to be impacted due to its distance from the subject land.
Percent native vegetation cover	The area of native vegetation within the buffered assessment area is estimated to be 27.36 ha and conservatively includes the following units as mapped by the Tweed LGA Vegetation 2012. VIS_ID 3912 (DPIE 2013): • Brush Box Open Forest; • Grey Ironbark / White Mahogany / Grey Gum Open Forest Complex; • Native Plantation; • areas mapped as ‘Not Assessed – Miscellaneous Map Units’; • Tallowood Open Forest; and • Urban Bushland in ‘Early Regeneration’ or ‘Not Determined’ condition states. The buffered assessment area is approximately 866 ha. Based on the above, the % native vegetation cover within the buffered assessment area is approximately 3%.

3.1 Landscape features

The landscape features described in the following sections are shown on Figure 3.1 and Figure 3.2.

3.1.1 Bioregions and landscapes

The subject land is located in the Burringbar-Conondale Ranges IBRA subregion within the South East Queensland IBRA bioregion, on the Mount Warning Exhumed Slopes landscape fringed by the Byron - Tweed Alluvial Plains landscape.

3.1.2 Rivers, streams, estuaries and wetlands

There are no waterways that pass within the development footprint. The nearest waterway is an unnamed third-order stream approximately 55 m to the south-west which runs parallel to the boundary before joining the Tweed River (Figure 3.1). The unnamed third-order stream is also mapped as Key Fish Habitat, however, it is not mapped within threatened freshwater fish distribution maps (DPI n.d.b). The development footprint avoids these areas and would therefore be unlikely to impact the riparian buffer or its associated waterways (Figure 3.2). The following rivers, streams and estuaries have been mapped within the 1500 m buffered assessment area:

- three man-made canals;
- 18 first order watercourses (including Murwillumbah Creek);
- eight second order watercourses;
- five third order watercourses;
- one fifth-order watercourse;

- two sixth-order watercourses (Dunbible Creek and Rous River); and
- one seventh-order watercourse (Tweed River).

The buffer area does not contain any nationally important wetlands or RAMSAR wetlands, however Stotts Island Nature Reserve a Nationally Important Wetland is located approximately 14 km downstream on the Tweed River from the subject land (DAWE, 2020; DECCW 2010).

3.1.3 Connectivity

The subject land is approximately 11.5 hectares and is 22 km south-west of Tweed Heads. The site contains several existing buildings, sporting courts, carparks, paved surfaces agricultural plots, sporting ovals, cultivated gardens, windbreaks, small patches of native vegetation and a Hoop Pine (*Araucaria cunninghamii*) plantation. The large sporting ovals in the south of the site are comprised of maintained grass. The site is surrounded by residential, recreational, and agricultural uses (Figure 3.1). The following key land uses are immediately adjacent to the site:

- North – residences along Riverview Street and James Street, and an Auto One auto parts store;
- South – ‘Kendovale’ jersey cattle farm;
- East – sporting fields including two football fields, a field hockey pitch, a cricket pitch, and a junior AFL football pitch. The Tweed River is located in the other side of these areas; and
- West – Riverview Street and residences, and the Murwillumbah NSW State Emergency Service (SES) Unit.

The current and historical land uses within the subject land locality limit the connectivity of flora and fauna habitat. Isolated patches of vegetation and parks to the north provide marginal habitat but is restricted by residential areas and roads. Connectivity from isolated patches of vegetation to the west follows the third order stream along the southern boundary of the site to the Tweed River (approximately 400 m) to the east. This stream is moderately fragmented and has sparse riparian vegetation to support connectivity of habitat. Connectivity to the south is restricted by large areas of farmland.

3.1.4 Areas of geological significance

No areas of geological significance occur in the buffer area.

Low probability acid sulfate soils (greater than 3 m below ground surface) are mapped directly adjacent to the subject land in the south-west (Naylor *et al* 1998) (Figure 3.2).

The Detailed Site Investigation for Contamination (Douglas Partners 2021) identified Potential Acid Sulphate Soils (PASS) in the lower lying eastern areas of the site, below a depth of approximately 0.5 m bgl, and at a depth of 1.25 m bgl. Although major excavation of soil below this depth is not expected to be required for the development, if any minor excavation of soil from below 0.5 m occurs (e.g., building piles and footings, underground service trenches) the procedures detailed in this Acid Sulphate Soil Management Plan (ASSMP) should be implemented.

3.1.5 Areas of outstanding biodiversity value

No areas of outstanding biodiversity value, as declared by the NSW Minister for Energy and Environment, occur in the buffer area. However, critical habitat for Mitchell’s Rainforest Snail (*Thersites mitchellae*) in Stotts Island Nature Reserve is located approximately 14 km downstream on the Tweed River from the subject land. This is highly unlikely to be impacted due to its distance from the subject land.

3.2 Assessment of site context

Native vegetation within the buffer area has been assessed using regional mapping (DPIE 2013). The native vegetation cover and patch size have been calculated for this project (Table 3.2).

Table 3.2 Percentage of native vegetation cover

Native vegetation in buffer area (ha)	Buffer area (ha)	Percentage of native vegetation in buffer area	Cover class
27.36	866.12	~3%	0-10%



Source: EMM (2022); MetroMap (2022); DFSI (2017); OEH (2017, 2011)

KEY

Development footprint

Subject land

1,500 m buffer

Major road

Watercourse/drainage line

Acid sulfate soil risk

High probability of occurrence

Low probability of occurrence

Mitchell Landscape

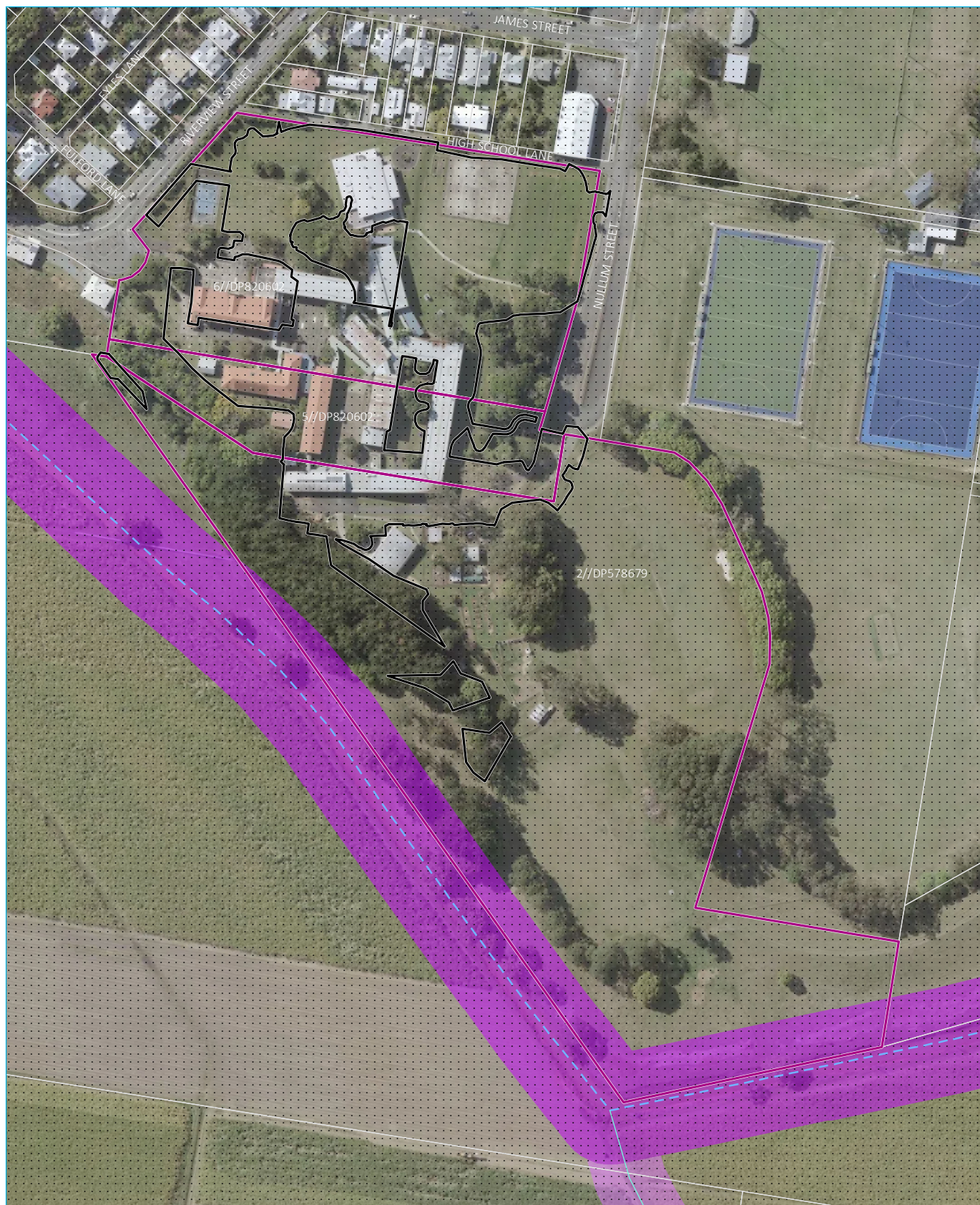
Byron - Tweed alluvial plains

Estuary/water added

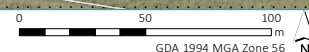
Mount Warning exhumed slopes

Location map

Murwillumbah Education Precinct
Biodiversity development assessment report
Figure 3.1



Source: EMM (2022); MetroMap (2022); DFSI (2017); DPI (2015); DPIE (2010)



KEY

- | | |
|-----------------------|-----------------------|
| Development footprint | Strahler stream order |
| Subject land | 2nd order |
| Cadastral boundary | 3rd order |
| Estuarine area | Riparian buffer |
| | 20 m |
| | 30 m |

Site map

Murwillumbah Education Precinct
Biodiversity development assessment report
Figure 3.2

4 Planted native vegetation

4.1 Assessment of Appendix D: D.1- Decision-making key

Table 1.3 outlines the decision-making pathway assessed against the project. Evidence demonstrating the application of the decision-making key to the areas of planted native vegetation is provided in the below sections.

4.1.1 Methods

i Vegetation mapping and stratification

An assessment of the vegetation of the subject land was undertaken across two visits:

- 19 February 2020; and
- 1 November to 4 November 2021.

This assessment included detailed vegetation mapping and vegetation stratification. Plant community types (PCT) were considered during the vegetation mapping, including those which could be reasonably assigned to a PCT known to occur in the Burringbar-Conondale Ranges IBRA subregion. Vegetation types and zones were stratified based on dominant species and current and historical management practices.

The subject land was traversed on foot, whilst the vegetation was mapped in the field using GPS-enabled tablet computers using Collector for ArcGIS™.

ii Plot surveys

To assess conformity to potential PCTs within the subject land, plot surveys were carried out to assess data against PCT descriptions provided by the NSW Plant Community Types (PCTs), as held within the BioNet Vegetation Classification database (BioNet). To provide consistency with results, these plot surveys were assessed as per the methodology outlined in Section 4.2.1, 4.3.3 and 4.3.4 of the BAM (DPIE 2020). Plot data was collected from two assessment sites on the subject land on 10 and 11 January 2022 (Figure 4.1).

For one of the plot sites (Plot 2), the standard plot size for the function assessment (20x50 m) could not fit within the vegetation zone boundary. As such, an alternative plot size was utilised. Plot sizes for each assessment are summarised below in Table 4.1.

Table 4.1 Assessment method

Assessment site	Function assessment	Composition and structure assessment
Plot 1	20 x 20 m plot	20 x 50 m plot and five 1 x 1 m subplots
Plot 2	20 x 20 m plot	20 x 25 m plot and five 1 x 1 m subplots

The assessment of composition and structure, based on a 20 x 20 m plot, recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) was estimated for all species rooted in or overhanging the plot, and recorded using decimals (if less than 1%, rounded to whole number (1-5%) or estimated to the nearest 5% (5- 100%). Abundance was counted (up to 20) and estimated above 20, and recorded using the following intervals: 1, 2, 3, 4, 5, 10, 20, 50, 100, 500, 1,000, 1,500, 2,000 etc.

The assessment of function recorded the number of large trees, the presence of tree stem size class, tree regeneration, number of trees with hollows and length of fallen logs, as well as leaf litter cover within the plot and 1 x 1 m subplots.

Datasheets are provided in Appendix A. Surveys for flora and vegetation communities were completed under the authority of Scientific License (SL100409). A list of flora species was compiled for each plot. Records of all flora species will be submitted to BioNet for incorporation into the Atlas of NSW Wildlife.

4.1.2 Vegetation within the development footprint

Vegetation within the development footprint consists of landscaped garden beds, planted native vegetation areas, and pine plantations (Figure 4.1). Some trees and shrubs are indigenous to the region, whilst some are native but not locally indigenous. The remaining areas of vegetation comprise planted exotic trees and exotic turf associated with sports fields and areas of managed lawn.

The landscaped garden beds in and around the school buildings comprise of a mix of native and exotic species including trees planted by past school leaders (Captains trees) and trees planted as part of Memorial Day plantings (Memorial Day Trees).

The vegetation within the development footprint occurs as four vegetation types (Table 4.2).

Table 4.2 Vegetation types within the development footprint

Vegetation type	Direct impact area (ha)
Hoop Pine plantation	0.22
Commemorative rainforest plantings	0.03
Native gardens and landscape trees	0.38
Exotic vegetation including maintained lawns	2.87

It was determined that these vegetation types could not be reasonably assigned to a PCT known to occur in the Burringbar-Conondale Ranges IBRA subregion. A detailed description of these vegetation types are written in Table 4.3 to Table 4.6 below, whilst discussion of potential 'best fit' PCTs are discussed in the section 4.1.3.

Table 4.3 Commemorative rainforest planting – Plot 2

PCT ID	None applicable.
Common Name	Commemorative rainforest planting
Description	A small patch of planted vegetation approximately 0.03 ha in area and enclosed by maintained lawns on the eastern side of the school (Plate 4.2). This patch of vegetation is commemoratively named after the former teacher Bruce Chick who undertook the plantings (ie Bruce Chick Rainforest). The canopy is relatively diverse with no dominant species. Canopy species recorded include Bunya Pine (<i>Araucaria bidwillii</i>), Hoop Pine, White Beech (<i>Gmelina leichhardtii</i>), Native Tamarind (<i>Diploglottis australis</i>), and Black Bean (<i>Castanospermum australe</i>). The mid-stratum is also relatively diverse and was dominated primarily by Tuckeroo (<i>Cupaniopsis anacardioides</i>) with other species recorded such as Blunt-leaved Steelwood (<i>Toechima dasyrrhache</i>) and Small-leaved Tamarind (<i>Diploglottis campbellii</i>). Exotic species are also present as shrubs and small trees including Umbrella Tree (<i>Schefflera actinophylla</i>) and Camphor Laurel (<i>Cinnamomum camphora</i>).

Table 4.3 Commemorative rainforest planting – Plot 2

PCT ID	None applicable.
	The ground layer is heavily infested with exotic species, in particular Arrowhead vine (<i>Syngonium podophyllum</i>) and Mickey Mouse Plant. Natives in the ground stratum are primarily represented by seedlings of upper-stratum species. A total of eight high-threat exotics were recorded in the vegetation patch (Appendix A)
Condition description	The community is in poor condition due to the density and diversity of exotic species within this patch of vegetation – particularly Arrowhead vine.



Plate 4.1 Commemorative rainforest planting

Table 4.4 Native gardens and landscape trees

PCT ID	None applicable
Common Name	Native gardens and landscape trees
Description	The remainder of the native vegetation within the site comprise planted garden beds and landscaped trees, many of which were established commemoratively or for shade or visual amenity. Key plantings are described below. The Captain's Trees and Memorial Trees were planted on the eastern boundary of the school grounds as small clumps and rows, with some planted in formal garden beds. The trees area generally mature and form a sparse canopy and low tree layer with mown understories. The species planted include Red Cedar (<i>Toona ciliata</i>), Eumundi Quandong (<i>Elaeocarpus eumundi</i>), Foam Bark Tree (<i>Jagera pseudorhus</i>), Black Bean, Tulipwood (<i>Harpullia pendula</i>), Bennett's Ash (<i>Flindersia bennettii</i>), Illawarra Flame Tree (<i>Brachychiton acerifolius</i>), Onion Cedar (<i>Owenia cepiodora</i>), Blueberry Ash (<i>Elaeocarpus reticulatus</i>), Swamp Mahogany (<i>Lophostemon suaveolens</i>), Peanut Tree (<i>Sterculia quadrifida</i>), White Beech (<i>Gmelina leichhardtii</i>), Crows Ash (<i>Flindersia australis</i>), Lemon-scented Myrtle (<i>Backhousia citriodora</i>), Coolamon (<i>Syzygium moorei</i>), Small-leaved Tamarind, Small-leaved Lilly Pilly. The shrub layer in these areas is largely absent, and the groundcover is mulched and maintained by slashing/mowing. The Harmony Day Trees were planted in 2004. The canopy and low tree layer consist of Hoop Pine (<i>Araucaria cunninghamiana</i>), Red Cedar (<i>Toona ciliata</i>), Flooded Gum (<i>Eucalyptus grandis</i>), Queensland Kauri Pine (<i>Agathis robusta</i>), Foam Bark Tree (<i>Jagera pseudorhus</i>), Tulipwood (<i>Harpullia pendula</i>), Bennett's Ash (<i>Flindersia bennettii</i>), Crows Ash (<i>Flindersia australis</i>), Small-leaved Tamarind (<i>Diploglottis campbellii</i>), Smooth Davidson's Plum (<i>Davidsonia johnsonii</i>), Small-leaved Lilly Pilly (<i>Syzygium luehmannii</i>), Silky Oak (<i>Grevillea robusta</i>), Alexandra Palm (<i>Archontophoenix alexandrae</i>), Slash Pine (<i>Pinus elliottii</i>)* and Ash (<i>Fraxinus</i> sp.)*. The shrub layer is largely absent and the groundcover is mulched and maintained by slashing/mowing. Enclosed and open formal gardens and landscape trees are planted throughout the school grounds and comprise of a wide range of indigenous and non-indigenous species. Trees and shrubs species in these areas include: Red Cedar, Black Bean, Tulipwood, Queensland Kauri Pine (<i>Agathis robusta</i>), Brown Kurrajong (<i>Commersonia bartramia</i>), Lacebark Tree (<i>Brachychiton discolor</i>), Crow's Ash (<i>Flindersia australis</i>), Weeping Bottlebrush (<i>Callistemon viminalis</i>), Pink-flowered Doughwood (<i>Melicope elleryana</i>), Weeping Lilly Pilly (<i>Waterhousia floribunda</i>), Illawarra Flame Tree (<i>Brachychiton acerifolius</i>), Davidson's Plum (<i>Davidsonia jerseyana</i>), Cheese tree (<i>Glochidion ferdinandi</i>), Atherton Oak (<i>Athertonia diversifolia</i>), Macadamia sp., Small-leaved Tamarind, Brown Gardenia (<i>Atractocarpus fitzalanii</i>), White Oak (<i>Grevillea baileyana</i>), Alexandra Palm (<i>Archontophoenix alexandrae</i>), Small-leaved Lilly Pilly, Tallowwood (<i>Eucalyptus microcorys</i>), Flooded Gum (<i>Eucalyptus grandis</i>), Pink Bloodwood (<i>Corymbia intermedia</i>) and Spotted Gum (<i>Corymbia maculata</i>) (Plate 4.5).
Condition description	This area comprises of a sparse native canopy and low tree with a largely absent shrub layer and mown ground cover.
Characteristic species used for identification of PCT	The species recorded within this community do not align with any PCT according to the NSW VIS Classification Version 2.1.



Plate 4.2 Harmony Day trees



Plate 4.3 Captain's and Memorial Trees (left: adjacent Bruce Chick Rainforest, right: adjacent Block A)

Table 4.4 Native gardens and landscape trees



Plate 4.4 An isolated Spotted Gum (*Corymbia maculata*)



Plate 4.5 Landscaped garden beds

Table 4.5 **Exotic vegetation and maintained lawns**

PCT ID	None applicable
Common Name	Exotic vegetation
Description	Exotic vegetation is represented by planted patches of vegetation, windrows, and isolated trees. These areas include a small Slash Pine (<i>Pinus elliottii</i>)* plantation that is located on the southern boundary of the school grounds and is approximately 0.03 ha in area (Plate 4.7). Isolated trees around the school grounds include Jacaranda (<i>Jacaranda mimosifolia</i>)*, Royal Poinciana (<i>Delonix regia</i>)*, Camphor Laurel (<i>Cinnamomum camphora</i>)*, Slash Pine and Cocos Palm (<i>Syagrus romanzoffiana</i>). Windrows have also been planted around sports fields of the school - these areas comprise largely of Camphor Laurel and Slash Pine. Maintained lawns (including four sports fields) comprise of the remaining vegetation of the subject land.
Condition description	These areas are dominated by exotic species.
Characteristic species used for identification of PCT	The species recoded within this community do not align with any PCT according to the NSW VIS Classification Version 2.1.



Plate 4.6 **Slash Pine plantation area**

4.1.3 PCT justifications

i Background information

Murwillumbah High School has conducted multiple planting events during which the extant vegetation on site was established. Historical records state that these plantings have occurred from 1970 onwards, which includes the planting of 'Hoop Pine, Slash Pine and Flooded Gum' (Tweed Regional Museum 2021). These plantings included threatened species, due to the person responsible (Bruce Chick) collecting and planting these species within the subject land. Further evidence that the vegetation was planted within the development footprint is provided in Appendix B.

Mapping for the Tweed local government area (DPIE 2013) also identifies no PCTs in the subject land.

ii Vegetation justification

Vegetation on the subject land largely consists of planted vegetation in the form of native and exotic gardens, plantations, landscape trees, windrows, and commemorative plantings. Of these, two areas of native planted vegetation (Hoop Pine plantation and Commemorative rainforest plantings) were conservatively considered for PCT classification due to weak similarities to potentially PCTs. As such, an assessment plot was completed in both to collect data for further analysis against described PCTs.

A total of 72 species (42 native and 30 exotic) were recorded in the two completed plots from the subject land. Both sites showed heavy disturbance with high weed encroachment and lacking native shrub layers. The origin of vegetation for both plots is considered artificial with the dominant species of *Araucaria cunninghamii* within Plot 1 planted for cultivation and the Plot 2 vegetation originating as a commemorative garden. Both patches of vegetation are surrounded by maintained lawns or grazing pasture with gardens and other small, planted vegetation patches adjacent. Both also occur away from riparian zones and do not support wetlands.

Given the high degree of modification and landscaping, vegetation within the development footprint does not conform to any PCT or ecological community listed under the BC Act and/or EPBC Act (Table 4.7). Accordingly, the areas of native planted vegetation identified as Hoop Pine plantation and Commemorative rainforest plantings are assessed as planted vegetation in this BDAR.

Table 4.6 **Vegetation types and PCT justifications**

Vegetation type mapped in the subject land	Potential PCTs considered	Key findings
Hoop Pine plantation (Plot 1)	PCT 887 - Hoop Pine - Yellow Tulipwood dry rainforest of the NSW North Coast Bioregion was considered based on initial vegetation assessments and the dominance of Hoop Pine.	This patch of vegetation shows several structural characteristics of a plantation such as the complete dominance of the upper stratum by one species (Hoop Pine) occurring as a dense, level canopy with all trees of a similar size and age. With the exception of Hoop Pine in the canopy, there are almost no other floristic characteristics consistent with PCT 887. No middle or ground stratum species listed for the PCT are represented at the site with exotic species largely dominant. The few native species detected in the lower strata were either Hoop Pine seedlings or saplings from various species not conforming to the PCT such as Red Ash and Cockspur Thorn. Based on the detailed floristic data the community is considered not to align with any PCT according to the NSW VIS Classification Version 2.1.
Commemorative rainforest planting (Plot 2)	Several PCTs were considered for this patch of vegetation. These included: • PCT - 751 - Brush Box - Tuckeroo littoral rainforest on coastal headlands of the NSW North Coast Bioregion; • PCT - 1068 - Pepperberry - Giant Stinging Tree - Fig lowland rainforest in the NSW North Coast Bioregion; • PCT - 1275 - Tuckeroo - Riberry - Yellow Tulipwood littoral rainforest of the NSW North Coast Bioregion; and • PCT - 1302 - White Booyong - Fig subtropical rainforest of the NSW North Coast Bioregion.	Four PCT were considered for this patch of planted vegetation made up primarily of indigenous species. Justification ruling out each PCT is summarised below: • PCT 751: This PCT typically occurs on coastal headlands and has an upper stratum consisting of Brush Box (<i>Lophostemon confertus</i>), Tuckeroo, Coastal Banksia (<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>), Lilly Pilly (<i>Syzygium smithii</i>), and Yellow Tulipwood (<i>Drypetes deplanchei</i>). However, the subject patch of vegetation does not occur on a coastal headland and although some species of the upper stratum are represented, they do not occur in the upper stratum (ie Tuckeroo). Additionally, no middle or ground stratum species associated with PCT 751 were recorded. • PCT 1068: This PCT shares some species with subject land vegetation, however, many species listed for the PCT are not present and are only represented as single specimens or occur within differing strata. For example, Black Bean and Hoop Pine are represented in the upper stratum but only as single trees. Pepperberry (<i>Cryptocarya obovata</i>) was also recorded but is only present as small specimens (<1 m) in lower strata. Several additional species not associated with PCT description are also present and could be considered dominant in some layers. These include Bunya Pine (non-indigenous), White Beech, Tuckeroo, Native Tamarind and <i>Cryptocarya triplinervis</i> var. <i>triplinervis</i>. Due to these factors of conflicting structural attributes, function and overall floristics of the subject vegetation including the addition of many disparate species, the subject patch of vegetation is considered not to conform to PCT 1068.

Table 4.6 Vegetation types and PCT justifications

Vegetation type mapped in the subject land	Potential PCTs considered	Key findings
		• PCT 1275: This community is considered a littoral rainforest community found in protected sites near the coast. The subject vegetation shares at least four species with this PCT including Tuckeroo, Brown Pine (<i>Podocarpus elatus</i>), Small-leaved Lilly Pilly (<i>Syzygium luehmannii</i>) and Lilly Pilly. However, species composition throughout all strata do not conform to the PCT whereby not a single species associated with PCT is represented in the correct stratum, and several recorded species within the subject vegetation do not conform to the PCT. The commemorative rainforest plantings also do not comprise a littoral rainforest. • PCT 1032: The description for this PCT comprises only two species recorded from the subject vegetation including Black Bean and Pepperberry with only the former occurring in the correct stratum. Due to the observed discrepancies in species composition this PCT was not considered to conform with the subject vegetation.



Source: EMM (2022); MetroMap (2022); DFSI (2017); DPI (2015); DPIE (2010)

KEY

- Development footprint
- Subject land
- BAM plot location
- ▲ Anabat survey
- Cadastral boundary

Threatened flora species

- *Davidsonia jerseyana*
- *Davidsonia johnsonii*
- *Diploglottis campbellii*
- *Lepiderema pulchella*
- *Macadamia integrifolia*
- *Owenia cepiodora*
- *Rhodamnia rubescens*
- *Syzygium moorei*

Vegetation mapping

- Commemorative rainforest plantings
- Hoop pine plantation
- Native gardens and landscape trees
- Exotic vegetation including maintained lawns

Vegetation within the development footprint

Murwillumbah Education Precinct
Biodiversity development assessment report
Figure 4.1

4.1.4 Assessment summary

Based on the information and data above, the subsection of the decision-making key which applies to this project is 5(i). As a result, chapters 4 and 5 of the BAM are not required to be applied (DPIE 2020). The project must be assessed based on the occurrence of threatened species habitat under Appendix D (D.2) of the BAM (See Section 4.2).

4.2 Assessment of Appendix D: D.2 Assessment of planted native vegetation for threatened species habitat

The vegetation within the subject land comprises both native and exotic planted vegetation in the form of gardens, patches of vegetation and isolated trees in a largely urban landscape. However, it was ascertained during vegetation surveys that several threatened flora species were established in gardens and commemorative plantings in past planting events. Planted vegetation can also provide foraging habitat for several native fauna species including microbats, fruit bats and birds.

An assessment of the planted vegetation as threatened species habitat is provided below. It includes review of the likely occurrence of threatened species within the subject lands, followed by site-based assessments during which targeted survey as well as habitat assessment was undertaken.

Furthermore, since there would be building demolition undertaken as part of the project, consideration of the potential use of buildings for cave-roosting species was undertaken to make inferences about the likely use of the planted vegetation for foraging by microbat species, and to inform the assessment of prescribed impacts (see Section 5.1.3).

4.2.1 Likelihood of occurrence assessment- desktop review

The following sources were reviewed prior to the site assessment to identify potentially occurring threatened species:

- State Vegetation Type Map – Tweed LGA Vegetation 2012 (VIS ID 3912) (DPIE 2013);
- BioNet Atlas of NSW Wildlife (database search for BC Act listed threatened species records within 10 km of the site) (BCD 2021);
- Biodiversity Values Map and Threshold Tool (BMAT) (DPIE 2021) to determine if there were any high value matters identified on the site; and
- Protected Matters Search Tool (database search for EPBC Act listed species within 1 km of the site) (Appendix C).

Based on results of the desktop assessment, which included the likelihood of occurrence analysis (Section 6.1.1) a list of threatened species with potential to occur was established. Results of potentially occurring threatened species included one flora species, six bird species and six mammal species (Table 4.8). These species are largely associated with rainforest habitats and are known or predicted to occur in the wider locality. Regarding the fauna species, many are highly mobile species that could potentially fly-over or utilise the planted vegetation within the subject lands as part of a larger foraging range. If present, the planted vegetation within the subject could provide sub-optimal or low-value foraging habitat for such species. Roosting, nesting or breeding within the planted vegetation is unlikely.

Table 4.7 **Likelihood of occurrence of threatened species**

Species	BC Act conservation status	EPBC Act conservation status	Likelihood of occurrence within the site
Flora			
Scrub turpentine (<i>Rhodamnia rubescens</i>)	Critically Endangered	Critically Endangered	Low potential. This species occurs in a wide range of habitats preferring rainforest vegetation classes on volcanic soils.
Birds			
White-eared Monarch (<i>Carterornis leucotis</i>)	Vulnerable	Not Listed	Low potential. This species prefers areas of rainforest and other dense habitats such riparian vegetation which does not occur on the site.
Barred Cuckoo-shrike (<i>Coracina lineata</i>)	Vulnerable	Not Listed	Low potential. A frugivorous species that may utilise the rainforest tree species on the site, particularly <i>Ficus</i> species.
Oriental Cuckoo (<i>Cuculus optatus</i>)	Not listed	Migratory	Low potential. An arboreal species that likes dense to open forests, particularly the edges of riparian forest.
White-throated Needletail (<i>Hirundapus caudacutus</i>)	Not Listed	Vulnerable, Marine, Migratory	Potential. This species is highly aerial and will forage over a broad range of habitats.
Rose-crowned Fruit-dove (<i>Ptilinopus regina</i>)	Vulnerable	Not listed	Potential. This frugivorous species prefers rainforests and other dense habitats but will also utilise isolated areas of fruiting trees including introduced species such as <i>Cinnamomum camphora</i> .
Superb Fruit-dove (<i>Ptilinopus superbus</i>)	Vulnerable	Not listed	Low potential. This frugivorous species prefers rainforests and other dense habitats but will also utilise isolated areas of fruiting trees such as <i>Ficus</i> spp.
Mammals			
Little Bent-winged Bat (<i>Miniopterus australis</i>)	Vulnerable	Not listed	Potential. This species prefers to forage in densely vegetated habitats. Caves or culverts in which this species would roost area absent.
Large Bent-winged Bat (<i>Miniopterus orianae oceanensis</i>)	Vulnerable	Not listed	Potential. This species prefers to forage in densely vegetated habitats. Caves or culverts in which this species would roost area absent.
Northern Free-tailed Bat (<i>Ozimops lumsdenae</i>)	Vulnerable	Not listed	Potential. Known to occur in a range of habitats including urban and peri-urban environments. This species has been recorded roosting in both tree hollows and buildings.
Koala (<i>Phascolarctos cinereus</i>)	Vulnerable	Vulnerable	Low potential. This species forages almost exclusively on eucalypt species and can occur in a wide range of habitats from urban and peri-urban environments to remnant woodlands.
Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	Vulnerable	Vulnerable	Potential. This species can utilise a range of vegetation for foraging such as eucalypt species when in flower and fruiting rainforest tree species. No flying-fox camps are known to occur within the site.
Greater Broad-nosed Bat (<i>Scoteanax rueppellii</i>)	Vulnerable	Not listed	Potential. This species Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. This species usually roosts in tree hollows, it has also been found in buildings.

4.2.2 Threatened flora habitat

i Survey method

Random meanders were the primary survey method for potentially occurring threatened flora species. These were undertaken as a part of the initial site visit on 19 February 2020 with supplemental meanders undertaken from 1 November to 4 November 2021. Further meanders were also undertaken 10 January to 11 January in conjunction with plot assessments carried out on the subject land.

ii Threatened flora results

A total of eight threatened flora species were detected on the subject land. Although all the threatened species recorded are indigenous to northern NSW, they are also widely cultivated and planted in northern NSW. Evidence from construction of existing buildings, landscape gardening, personal communications with school staff and historical information indicates that most species are likely to have been planted on the subject land. The threatened flora species established in planted areas are persisting and appear to be in good health and for this reason, the planted vegetation could be considered suitable habitat for these threatened species. However, the viability of the population is considered to be low because:

- there is no evidence of natural establishment, ie establishment of these threatened species would have been unlikely without active planting activities; and
- there is no evidence of self-seeding or natural regeneration that would lend itself to a self-sustaining population.

The only exception to the above is the occurrence of Scrub Turpentine (*Rhodamnia rubescens*), which appears to be regenerating from mature individuals whose provenance may be from planted stock. For this reason, this occurrence of Scrub Turpentine has been completely avoided by the project.

All threatened flora recorded within the subject land are summarised below in Table 4.9 which includes BC Act and EPBC Act status as well as the number of individuals identified.

Table 4.8 Threatened flora recorded in the subject land

Scientific name	Common Name	BC Act Status	EPBC Act Status	Number of individuals recorded within the subject land	Number of individuals recorded within the development footprint
<i>Davidsonia jerseyana</i>	Davidson's Plum	Endangered	Endangered	11	4
<i>Davidsonia johnsonii</i>	Smooth Davidson's Plum	Endangered	Endangered	3	0
<i>Diploglottis campbellii</i>	Small-leaved Tamarind	Endangered	Endangered	6	2
<i>Lepiderema pulchella</i>	Fine-leaved Tuckeroo	Vulnerable	Not listed	5	0
<i>Macadamia integrifolia</i>	Queensland Nut	Not listed	Vulnerable	4	1
<i>Owenia cepiodora</i>	Onion Cedar	Vulnerable	Vulnerable	4	1
<i>Rhodamnia rubescens</i>	Scrub Turpentine	Critically Endangered	Critically Endangered	20	0
<i>Syzygium moorei</i>	Coolamon	Vulnerable	Vulnerable	2	1

4.2.3 Threatened fauna habitat

The initial site visit undertaken on 19 February 2020 comprised characterisation of native vegetation and habitat assessments including searches for specific habitat features or signs of threatened fauna (ie nests, burrows, hollows, scats and tracks). Supplementary habitat assessments were also undertaken between 1 November to 4 November 2021.

As indicated in the desktop assessment, the fauna species that have potential to occur within the subject lands are largely highly mobile species that could potentially fly-over or utilise the planted vegetation within the subject lands as part of a larger foraging range. If present, the planted vegetation within the subject could provide sub-optimal or marginal foraging habitat for such species. As there are no hollow resources in the planted vegetation and considering their patch size and proximity to buildings and foot traffic, activities such as roosting, nesting or breeding within the planted vegetation is unlikely.

The initial site visit determined that existing buildings proposed to be demolished may provide roosting habitat for microbat species as some are known to use a variety of urban and peri-urban habitats such as roof cavities. As Buildings Block E is planned to be demolished and buildings A and F are being refurbished, there is potential that roosting habitat would be affected. As a result, subsequent dedicated survey for microbats was initiated.

i Microbat survey methods

Roost searches and dusk emergence surveys

Roost searches of Building E was conducted in general accordance with survey guidance 'Species Credit' threatened bats and their habitats (OEH 2018). Roost searches were undertaken to determine the potential for threatened microbat species to roost in Building E proposed for demolition. Assessments were undertaken on 9 August 2021 and 26 August 2021 and comprised of building perimeter inspections to identify potential roosting habitat, suitable points of entry or signs of use (ie urine stains, droppings, remains, and bat fly casings). Additionally, a dusk emergence survey was undertaken with a handheld bat detector (Echo Meter Touch 2) to record any microbat activity. During the dusk emergence survey, the building perimeter was inspected with a torch to identify any emerging microbats.

No evidence of microbat activity was identified, and no microbat activity was observed during the dusk emergence survey or recorded on the bat detector device.

Anabat detection and further dusk emergence surveys

Based on consultation with, and formal advice from BCD on 1 October 2021 (Appendix D **Error! Reference source not found.**), further surveys were undertaken. BCD advised that,

...a bat detector and dusk emergence survey should be undertaken over three nights. This should record minimum temperatures, which should be 12 degrees or above, and weather conditions. Surveys should not be undertaken if there is strong wind, heavy rain, or a full moon. Echolocation call detection should be conducted for a minimum of four hours on each night, however, recording for the entire night is recommended. The surveys should target all structures likely to harbour roosting microbats.

In accordance with this advice, EMM deployed four Anabat devices across the site from the 1 November to 4 November 2021 (Figure 4.1). The Anabats were in place for three nights recording from dusk to dawn, with an ecologist present during the dusk period to undertake dusk emergence surveys using a handheld bat detector.

The total survey effort undertaken for microbat species included 12 bat detector nights, four hours of roost inspection and four hours of emergence surveys. The survey effort and methods undertaken for microbat species is summarised below in Table 4.10.

Table 4.9 Microbat survey effort

Date	Method	Effort
19/02/2020	Habitat assessments	3 hours
09/08/2021	Roost assessment	2 hours
26/08/2021	Cavity search and emergence survey	3 hours
	Bat detector operation (x 1)	1 hours
01/11/2021	emergence survey	1 hours
	Bat detector operation (x 4)	1 night
02/11/2021	emergence survey	1 hours
	Bat detector operation (x 4)	1 night
03/11/2021	emergence survey	1 hours
	Bat detector operation (x 4)	1 night

ii Threatened fauna results

A total of five threatened fauna species were detected on the subject land; this includes four microbat species and one flying-fox species. All threatened fauna recorded within the subject land are summarised below in Table 4.11 which includes BC Act and EPBC Act status. The subject land also supports suitable habitat for an additional two species, which are also included in Table 4.11. For Anabat analysis results see Appendix E.

Table 4.10 Threatened fauna recorded or considered to have potential to occur in the subject land

Scientific name	Common Name	BC Act Status	EPBC Act Status	Recorded
<i>Miniopterus australis</i>	Little Bent-winged Bat	Vulnerable	Not listed	Recorded on Anabat detector. Suitable foraging habitat present as part of a larger foraging range.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Vulnerable	Not listed	Recorded on Anabat detector. Suitable foraging habitat present as part of a larger foraging range.
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Vulnerable	Suitable habitat present, although not assessed as highly suitable habitat. Site utilisation likely to be low.
<i>Ptilinopus regina</i>	Rose-crowned Fruit-dove	Vulnerable	Not listed	Suitable foraging habitat present. Site utilisation likely to be low or infrequent.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Vulnerable	Sighted. No camp sites present. Suitable foraging habitat present as part of a larger foraging range.
<i>Ozimops lumsdenae</i>	Northern Free-tailed Bat	Vulnerable	Not listed	Recorded on Anabat detector. Suitable foraging habitat present as part of a larger foraging range.
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Vulnerable	Not listed	Recorded on Anabat detector. Suitable foraging habitat present as part of a larger foraging range.

Grey-headed Flying-fox

Grey-headed Flying-fox has been previously recorded on the site and was identified flying over the site during surveys. This species is likely to forage on eucalypt species when in flower and fruiting rainforest tree species. No flying-fox camps occur within the site. The planted vegetation as foraging habitat is not likely to be critical to the persistence of the Grey-headed Flying-fox in the locality.

Threatened microbats

Microbat activity was not identified during the bat roost inspections or emergence surveys. However, Anabat detectors recorded four threatened microbat species (see Table 4.11). It is likely these bats utilise the site for foraging activities only based on the lack of evidence of roosting. Considering that these species have large foraging ranges, the planted vegetation as foraging habitat is not likely to be critical to the persistence of these threatened microbat species in the locality.

Koala

No evidence of Koala was identified on site during the surveys; however, regionally significant preferred foraging tree species¹ were recorded and include Flooded Gum, Spotted Gum and Tallowwood. Although the Koala SEPP 2021 does not apply to SSD projects, the preferred foraging trees species established in the subject lands would not comprise *highly suitable habitat* because they do not comprise 15% or more of the total number of trees within a classified PCT on site.

Furthermore, the planted feed trees on site are isolated from large remnant patches, and is surrounded by heavily developed areas and barriers (ie fences). Although there are records of individuals of Koala within the locality (most recently from 2019), these are all located to the north of Kyogle Road, Riverview Street and Wollumbin Street with at least one animal being recorded as being stranded in unsuitable habitat (BCD 2021). Therefore site utilisation and also species dependence on the feed trees within the site is considered to be low.

Rose-crowned Fruit Dove

The subject land also provides potential foraging habitat for the Rose-crowned Fruit Dove in the form of planted native rainforest trees and exotic windrows comprising of Camphor Laurel. Potential foraging trees are distributed throughout the site and utilisation is likely to be seasonal and with low frequency of animals as well as visitation events.

4.2.4 Habitat connectivity

All patches of vegetation within the subject land are relatively fragmented and isolated with buildings, maintained lawns, and roads intersecting large areas and limiting connectivity. The site is located within a busy education precinct, with light industrial estate and residential properties to the north, east and west, and agricultural areas to the south. Native vegetation and fauna habitats in the development footprint are highly fragmented and of limited connectivity value.

Given its isolation, planted vegetation within the site is not considered important to the movement of threatened species across their range. Any vegetation clearing and development on site is unlikely to affect the current connectivity values of the site for native or threatened species. Any fauna species that might currently utilise the site for occasional foraging would be highly mobile species. Threatened flora species planted within the subject lands have limited connectivity to known populations within the locality and the project is unlikely to further degrade current poor connectivity values.

¹ Tweed Local Government Area is part of the North Coast Koala Management Area, as listed under Schedule 1 of the State Environmental Planning Policy (Koala Habitat Protection) 2021 and feed tree species are taken from Schedule 2 of the Koala Habitat Protection SEPP.

Stage 2- Impact assessment

5 Impact assessment

This chapter identifies the potential impacts of project on the biodiversity values and summarises avoidance and minimisation measures that are proposed to manage impacts on these biodiversity values.

5.1 Potential direct, indirect and prescribed impacts

5.1.1 Direct impacts

The project would result in the following direct impacts:

- loss of a total of 0.63 hectares of planted native vegetation;
- loss of 9 individual planted threatened flora species (5 flora species in total); and
- loss of marginal foraging habitat for threatened cave-roosting microbats, Koala, Grey-headed Flying-fox and Rose-crowned Fruit Dove.

5.1.2 Indirect impacts

The project has potential to result in the following indirect impacts:

- erosion and sedimentation;
- weed introduction and spread; and
- increased noise, vibration and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour.

For the purposes of evaluating indirect impacts from weed encroachment and erosion, a five metre buffer from the development footprint was considered as an indirect impact zone.

5.1.3 Prescribed impacts

Table 5.1 Assessment of prescribed impacts

Feature	Present	Description of features	Potential impact	Affected threatened species	Section of BDAR where this impact is addressed.
Karst, caves, crevices, cliffs, rocks and other geological features of significance	No	N/A	The proposed development does not contain geologically significant features, rocky areas that represent habitat for threatened species or ecological communities.	N/A	N/A
Human-made structures or non-native vegetation	Yes	Building cavities	Disturbance to potential roost sites for cave-roosting microbat species.	• Little Bent-winged Bat • Large Bent-winged Bat • Northern Free-tailed Bat • Greater Broad-nosed Bat	Section 4.2.3
Habitat connectivity	No	N/A	Connectivity within the subject land is limited due to the existing structures associated with the school and the current land uses within the locality. These include residences to the north and west, a cattle farm to the south and sporting grounds to the east. Native vegetation and fauna habitats in the development footprint are highly fragmented and of limited connectivity.	N/A	N/A
Waterbodies, water quality and hydrological processes	No	N/A	There are no waterways that pass within the development footprint. The proposed development is located within 55 metres of an unnamed third-order stream which flows into the Tweed River to the east. The development footprint avoids the 30 m buffer required by the BC Act and the 40 m buffer required by the WM Act (Figure 3.2).	N/A	N/A
Impacts of wind turbine strikes on protected animals.	No	N/A	The development does not include wind turbines; therefore this prescribed impact is not relevant to the project.	N/A	N/A
Vehicle strikes	No	N/A	No new roads required for the proposed development. The site is an existing school site and speed limits will be restricted to 40 km/h.	N/A	N/A

5.2 Avoidance and minimisation measures

Avoidance and minimisation through project design has been undertaken to limit the impacts of the project on known threatened species values. This includes:

- redesigning the limits of disturbance for bushfire asset protection setbacks to achieve the minimum bushfire standards whilst avoiding clearance of all individuals of Scrub Turpentine;
- redesigning the footprint to retain as many individuals of planted threatened flora within existing landscaped areas as possible and to minimise the number of planted threatened flora that will be cleared;
- maximising the use of existing cleared areas to reduce the overall impact to planted native vegetation; and
- adjusting the development footprint to avoid certain mature trees in accordance with the Arboricultural Impact Assessment Report (Civica Pty Ltd 2022), which will minimise the removal of foraging habitat for native fauna including threatened species.

5.3 Mitigation and management strategy

Table 5.2 summarises the mitigation and management measures proposed.

Table 5.2 Mitigation and management measures

Impact	Action	Intended outcome	Timing	Responsibility
General	A Site Plan should be included in the construction environmental management plan (CEMP), and should include: - the extent of approved clearing; - all threatened plant occurrences; and - stockpile, material laydown areas, and site compounds. This Site Plan is to be placed in an accessible location to be viewed by all site personnel (site office for example).	-	Prior to construction	Contractor
Demolition of buildings which may be utilised as potential roosts by threatened microbats	Pre-clearance inspection to be conducted by a suitably qualified ecologist to: - inspect buildings prior to demolition; - remove any individuals prior to demolition if found; - relocate microbats to suitable habitat within the locality; and - any animals injured during clearing works should be taken to a veterinarian.	Reduce risk of injury or death of any microbat species that may be roosting in the buildings	Prior to construction	Contractor Qualified Ecologist
Inadvertent removal of planted threatened flora species.	All occurrences of threatened flora should be identified on the Site Plan and delineated in the field using flagging tape, fencing, bunting or the like. Threatened flora that are to be retained should be flagged with high visibility tape, or in the case of Scrub Turpentine within the Hoop Pine Plantation, the limits of the occurrence on the upslope side should be clearly demarcated with high visibility tape or fencing. All contractors should be provided with an environmental induction prior to starting work on site, which includes communications about sensitive areas and no-clear zones.	Reduce risk on retained threatened flora species during construction	Prior to and during construction	Contractor

Table 5.2 Mitigation and management measures

Impact	Action	Intended outcome	Timing	Responsibility
Inadvertent clearing of vegetation to be retained	Clearing is to be to the minimum extent necessary. If parts of the development footprint areas are identified during construction as not needing use for construction activities, clearing will be avoided. Define clearing limits using clearly visible barrier, such as flagging tape. This should be maintained and checked daily through construction.	Reduce risk to retained vegetation during construction	Prior to and during construction	Contractor
Increased sedimentation due to construction	Sediment controls, including fencing and sediments traps, should be installed in any areas where works will occur in proximity to low lying vegetation or streams.	Minimise indirect impacts on retained vegetation	Prior to and during construction	Contractor
Increased weed encroachment into adjacent vegetation	All weeds should be appropriately removed offsite and where possible, without stockpiling. If stockpiling of weeds is required before removal from site, weeds are to be stockpiled and appropriately covered and located in areas away from vegetation to be retained to minimise the spread of seed and other propagules. Where feasible it is recommended weeds are cut and roots are kept minimising erosion. Hygiene protocols should be implemented including hygiene procedures for equipment, footwear and clothing. Ensure works vehicles are washed down prior to entering the works area.	Minimise indirect impacts on retained vegetation	Prior to and during construction	Contractor
	Weed monitoring should be undertaken within the indirect impact zone at the Hoop Pine Plantation at regular intervals post construction for a period of 6 months and corrective weeding actions taken to manage the establishment and spread of weeds into the Hoop Pine Plantation. Weed monitoring and management works should be undertaken and documented in accordance with a weed management sub-plan of the CEMP.	Minimise impacts and protect habitat for existing occurrence of Scrub Turpentine	Post construction	Contractor

Table 5.2 **Mitigation and management measures**

Impact	Action	Intended outcome	Timing	Responsibility
Pathogen introduction	Hygiene measures should be implemented as part of the CEMP to minimise the risk of Myrtle Rust (<i>Austropuccinia psidii</i>) spread on site and should include procedures for equipment, footwear and clothing. Ensure works vehicles are washed down prior to entering the works area. Affected plants in proximity of the occurrence of Scrub Turpentine should be removed and disposed of appropriately to minimise the spread of Myrtle Rust, such as: • spraying infected and nearby plants with a fungicide to kill spores 3-4 days prior to removal; • enclosing smaller plants and plant parts in a plastic bag before being removed; • cutting larger plants that do not fit in bags into smaller pieces and covering with black plastic for 3-4 weeks in a sunny spot. This process is called solarisation and kills remaining spores; and • appropriate disposal of affected material off site.	Minimise impacts on existing occurrence of Scrub Turpentine	Prior to and during construction	Contractor

6 Assessment of other relevant biodiversity legislation

6.1 Environment Protection and Biodiversity Conservation Act 1999

This chapter provides an assessment of the project's impacts specific to species and communities listed under the EPBC Act. A likelihood of occurrence assessment for protected matters is presented in Section 6.1.1.

6.1.1 Likelihood of occurrence assessment

i Threatened ecological communities

No PCTs are recognised on the subject site due to the high degree of modification, garden landscaping and disturbance. As such, no site vegetation conforms to any ecological community listed under the EPBC Act.

ii Threatened species

Approximately 41 species listed under the EPBC Act was predicted by databases to occur within the subject land. The refined likelihood of occurrence assessment for these species is provided below in Table 6.1 and Table 6.2. A single threatened fauna species in Grey-headed Flying-fox (*Pteropus poliocephalus*) was confirmed to occur in the subject land with one other species considered to have a low likelihood to occur, the Koala (*Phascolarctos cinereus*).

A total of seven threatened flora species were also confirmed to occur on the subject land. However, based on the history of plantings and the structural attributes of extant vegetation patches, the provenance of all threatened flora on site are likely to be from planted stock.

Of these threatened flora species, Scrub Turpentine is the only species that appears to be naturally regenerating, with juveniles and seedlings observed around mature individuals.

Table 6.1 **Likelihood of occurrence for threatened species (excluding wetland and marine species)**

Scientific name	Common name	EPBC Status	Habitat Associations	Likelihood	Justification
Flora					
<i>Bosistoa transversa</i>	Yellow Satinheart	Vulnerable	This species grows in lowland subtropical rainforests less than 300 m above sea level (ASL) with minimal disturbance.	Negligible	No suitable habitat of undisturbed lowland subtropical rainforest is present on the subject land.
<i>Corokia whiteana</i>	Corokia	Vulnerable	Corokia is known to occur in ecotones of warm-temperate rainforest and wet sclerophyll forest, and littoral rainforest associations. Its known distribution is restricted to Mt Jerusalem National Park (NP), Nightcap NP and Whian Whian State Forest.	Negligible	The subject land does not contain this species preferred habitats and is outside of the distribution of the only known populations associated with the Nightcap Range.
<i>Cryptocarya foetida</i>	Stinking Cryptocarya	Vulnerable	This species is largely restricted to littoral rainforests on sandy substrates.	Negligible	The subject land does not support its preferred habitat of littoral rainforest.
<i>Cyperus semifertilis</i>	Missionary Nutgrass	Vulnerable	This species is only known to grow in wet sclerophyll forests with limited grazing pressure and low weed encroachment.	Negligible	The site does not contain this species preferred habitats.
<i>Davidsonia jerseyana</i>	Davidson's Plum	Endangered	This species is restricted to the Brunswick and Tweed River catchments from approximately 100 sites. These areas are typically southern or eastern facing inclines below 300 m ASL within subtropical and gallery rainforest habitats.	Known	Eleven individuals were recorded on the site. This species is Indigenous to the region; however, it is also widely cultivated.
<i>Davidsonia johnsonii</i>	Smooth Davidson's Plum	Endangered	Smooth Davidson's Plum natural range is restricted to 27 distinct populations from the Tallebudgera Valley in south-eastern QLD to Tintenbar in northern NSW. This species is typically found within wet sclerophyll forests and subtropical rainforest.	Known	Three individuals were recorded on the site. This species is Indigenous to the region; however, it is widely cultivated.
<i>Desmodium acanthocladum</i>	Thorny Pea	Vulnerable	Thorny Pea occurs from Grafton to the Mount Warning area where it prefers riparian zones within dry and subtropical rainforests.	Negligible	The subject land does not support its preferred habitat of riparian rainforest communities.
<i>Diospyros mabacea</i>	Red-fruited ebony	Endangered	This species is restricted to the Tweed Valley where it occurs in lowland subtropical rainforest.	Negligible	The subject land does not contain its preferred habitat of lowland subtropical rainforest.

Table 6.1 **Likelihood of occurrence for threatened species (excluding wetland and marine species)**

Scientific name	Common name	EPBC Status	Habitat Associations	Likelihood	Justification
<i>Diploglottis campbellii</i>	Small-leaved tamarind	Endangered	Small-leaved tamarind is restricted to 25 known populations from north-eastern NSW to south-eastern QLD. It occurs exclusively in subtropical rainforest habitats.	Known	Six individuals were recorded on the site. This species is Indigenous to the region; however, it is also widely planted.
<i>Elaeocarpus sedentarius</i>	Minyon Quandong	Endangered	Minyon Quandong is endemic to the Mount Warning Caldera where it is found at a few remaining locations on moist slopes and gullies associated with warm temperate and subtropical rainforests.	Negligible	The subject land does not contain its preferred habitat. It is also considered very rare and is only known from the Whian Whian and Mount Jerusalem areas.
<i>Elaeocarpus williamsianus</i>	Hairy Quandong	Endangered	The Hairy Quandong is only known from nine populations in north-eastern NSW. It grows in subtropical to warm temperate rainforest habitats including areas of regrowth.	Negligible	Suitable habitat for this species is not supported on the subject land.
<i>Endiandra floydii</i>	Crystal Creek Walnut	Endangered	This species is restricted to north-eastern NSW and south-eastern QLD where it grows in subtropical and warm temperate rainforest to 430 m ASL.	Negligible	The subject land does not contain its preferred habitat of subtropical or temperate rainforest communities.
<i>Endiandra hayesii</i>	Rusty Rose Walnut	Vulnerable	The Rusty Rose Walnut occurs in sheltered rainforest gullies on alluvial and sedimentary soils. The species can also occur in regrowth of similar habitats.	Negligible	Preferred habitat of sheltered rainforest valleys are not support on the subject land.
<i>Floydia praealta</i>	Ball Nut	Vulnerable	This species is found in small disjunct populations from the Clarence River to Gympie QLD. Its preferred habitats consist of closed gallery forests, subtropical rainforests, and coastal vine scrub.	Negligible	The subject land does not support suitable habitat for this species.
<i>Fontainea australis</i>	Southern Fontainea	Vulnerable	Southern Fontainea is known only to occur in the Tweed and Richmond Valleys where it primarily grows in lowland subtropical rainforest.	Negligible	The subject land does not support preferred habitat of lowland subtropical rainforest.
<i>Hicksbeachia pinnatifolia</i>	Red Boppel Nut	Vulnerable	This species grows in the understorey of subtropical rainforest and wet sclerophyll forests up to 500 m ASL.	Negligible	The subject land does not support suitable habitat for this species.

Table 6.1 **Likelihood of occurrence for threatened species (excluding wetland and marine species)**

Scientific name	Common name	EPBC Status	Habitat Associations	Likelihood	Justification
<i>Isoglossa eranthemoides</i>	Isoglossa	Endangered	Isoglossa has a highly restricted geographical range and is only known from a limited number of locations. Habitat in these areas consist of lowland subtropical rainforest.	Negligible	This species has a highly restricted geographical range and is only known from a limited number of locations which do not include the subject site.
<i>Macadamia integrifolia</i>	Queensland nut	Vulnerable	This species naturally occurs in remnant rainforest communities on high nutrient soils such as alluvium and volcanics where it prefers slightly open areas.	Known	Four individuals were recorded on the site. This species is Indigenous to the region; however, it is widely planted for ornamental and fruit production purposes.
<i>Marsdenia longiloba</i>	Slender Marsdenia	Vulnerable	This species grows in open woodland and on the margins of rainforest communities.	Negligible	Preferred habitats of subtropical rainforest or adjacent moist eucalypt woodland do not occur on the subject lands.
<i>Ochrosia moorei</i>	Southern Ochrosia	Endangered	Southern Ochrosia prefers subtropical rainforest and vine forest where it is often found along drainage lines.	Negligible	The subject land does not support suitable habitat for this species.
<i>Owenia cepiodora</i>	Onion Cedar	Vulnerable	This species is restricted to the NSW-QLD border region where it grows in subtropical rainforest, vine forest communities and wet sclerophyll forests.	Known	Four individuals were recorded on the site. This species is Indigenous to the region; however, it is also widely planted.
<i>Ozothamnus vagans</i>	Wollumbin Dogwood	Vulnerable	This species is only found above 500 m ASL where it occupies lower strata of canopy gaps with strong light. These areas are typically caused by natural and artificial disturbances within wet sclerophyll and rainforest communities.	Negligible	Only known to occur at elevations above 500 m ASL.
<i>Randia moorei</i>	Spiny Gardenia	Endangered	Spiny Gardenia grows in various rainforest community types such as lowland subtropical, littoral and dry rainforests.	Negligible	The species is found in most rainforest type communities. However, suitable natural habitats do not occur on the site.

Table 6.1 **Likelihood of occurrence for threatened species (excluding wetland and marine species)**

Scientific name	Common name	EPBC Status	Habitat Associations	Likelihood	Justification
<i>Rhodamnia rubescens</i>	Scrub Turpentine	Critically Endangered	Scrub Turpentine occurs in a range of rainforest communities including ecotones of woodland and rainforest, as well as riparian zones.	Known	20 specimens of this species were identified within subject land. The provenance of these individuals is unclear but could be from planted stock.
<i>Rhodomyrtus psidioides</i>	Native guava	Critically Endangered	This species is found in a range of rainforest communities including subtropical rainforest, littoral rainforest, warm temperate rainforest, and ecotones adjoining sclerophyllous communities.	Negligible	The subject land does not support suitable habitat for this species.
<i>Sarcochilus fitzgeraldii</i>	Ravine Orchid	Vulnerable	This Orchid is found primarily on rocks in valleys and riparian zones of subtropical rainforests and open woodland. It is restricted to elevations between 500 and 700 m ASL.	Negligible	This species is restricted to elevations above 500 m ASL, well above the subject lands elevation of <50 m.
<i>Symplocos baeuerlenii</i>	Small-leaved Hazelwood	Vulnerable	This species is restricted to the Mount Warning caldera where it is associated with subtropical rainforest and warm temperate rainforest on rhyolite derived soils.	Negligible	The subject land does not support suitable habitat for this species.
<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly	Vulnerable	This species is found within subtropical rainforest communities in association with highly fertile basaltic or alluvial soils.	Negligible	The subject land does not support suitable habitat for this species.
<i>Syzygium moorei</i>	Coolamon	Vulnerable	Coolamon grows on fertile soils within lowland gallery rainforests and dense rainforest gullies.	Known	Two individuals were recorded on the site. This species is Indigenous to the region; however, it is also widely planted.
Amphibians					
<i>Mixophyes iteratus</i>	Giant Barred Frog	Endangered	This species occupies streams of lower catchment areas supporting rainforest and wet sclerophyll forests.	Negligible	The subject land does not contain suitable foraging or breeding habitat for the species

Table 6.1 **Likelihood of occurrence for threatened species (excluding wetland and marine species)**

Scientific name	Common name	EPBC Status	Habitat Associations	Likelihood	Justification
Birds					
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-Parrot	Endangered	This species was formally widespread from the Richmond River to Gympie QLD where it occurred in a range of rainforest habitats. Habitat preferences included lowland subtropical rainforest with abundant figs (<i>Ficus</i> spp.) and other fleshy fruit-bearing trees.	Negligible	This species is extremely rare with no recent verified records. The subspecies may no longer be extant.
<i>Erythrotriorchis radiatus</i>	Red Goshawk	Vulnerable	The Red Goshawk prefers woodlands and forest habitats supporting high numbers of medium to large bird species. It formally occurred south to Sydney but has undergone a northerly range retraction over the past two decades. Currently it is considered extinct in NSW.	Negligible	This species has undergone an extreme range contraction and is considered regionally extinct. As such it is considered unlikely to occur.
<i>Hirundapus caudacutus</i>	White-throated Needletail	Vulnerable	A non-breeding summer migrant to eastern Australia is an exclusively aerial forager and can occupy airspace over a broad range of habitats although preferring vegetated areas. Roosting habits are poorly known but the species has been recorded roosting within hollows, dense foliage and on up-right stems of large trees within hilly forests and woodlands.	Low	This species is highly aerial and will forage over a broad range of habitats including those within the subject land. No suitable roosting habitat is available.
Mammals					
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Endangered	Spotted-tailed Quoll favours large, contiguous areas of forest or woodland with appropriate denning structures and relatively high densities of mammalian prey.	Negligible	The subject land does not contain suitable foraging or breeding habitat for the species
<i>Petaurus volans</i>	Greater Glider	Vulnerable	This species favours wet sclerophyll forests and tall riparian woodlands with a high diversity of foraging tree species (eucalypts) and abundant large hollows for shelter.	Negligible	The subject land does not contain suitable foraging or breeding habitat for the species

Table 6.1 **Likelihood of occurrence for threatened species (excluding wetland and marine species)**

Scientific name	Common name	EPBC Status	Habitat Associations	Likelihood	Justification
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	DAWE define Koala habitat as: 1. any forest or woodland (including remnant, regrowth and modified vegetation communities) that contains Koala food trees (tree species in the genera of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> , <i>Melaleuca</i> and <i>Allocasuarina</i>) or 2. any shrubland with emergent Koala food trees – this definition includes mixed eucalypt regrowth.	Low	Some suitable feed tree species including Flooded Gum, Spotted Gum and Tallowwood occur on the site.
<i>Potorous tridactylus</i>	Long-nosed Potoroo	Vulnerable	This species prefers coastal heathlands and sclerophyll forests with adjacent open areas for foraging.	Negligible	The subject land does not contain suitable foraging or breeding habitat for the species.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	The species is highly nomadic and has the potential to occur anywhere in its known range when conditions are suitable (nectar and fruit availability). The species favours myrtaceous woodland for foraging but has broad habitat tolerances and may occur in any area providing fruit or nectar.	Known	This species has been previously recorded on the site and was identified flying over the site during targeted surveys. This species is likely to utilise the vegetation on the site such as eucalypt species when in flower and fruiting rainforest tree species. No flying-fox camps occur within the site.

iii Migratory species

Eight species listed as migratory or marine species under the EPBC Act were predicted to occur in the subject land based on database searches undertaken. One of these species have already been assessed as they are also listed as a threatened species under the EPBC Act.

Migratory waders and seabirds were excluded from the assessment due to the absence of wetland, coastal and marine habitat available to them in or around the subject land. Table 6.2 provides an assessment of the likelihood of the remaining three migratory species that may utilise habitat within the subject land.

No species listed as migratory or marine under the EPBC Act were recorded as being present in subject land. However, one species is considered to potentially occur in the subject land. Some migratory species may also utilise airspace over the subject land but are unlikely to utilise the vegetation or other habitats present at or near ground level.

Table 6.2 **Likelihood of occurrence for migratory species**

Scientific name	Common name	EPBC Status	Habitat Associations	Likelihood	Justification
<i>Cuculus optatus</i>	Oriental Cuckoo	Migratory	This species is a rare non-breeding summer migrant to NSW. Habitat preferences are relatively broad and include disturbed and undisturbed areas of woodland or dense vegetation such as riparian zones.	Low	A highly mobile species that can occur in a range of habitats including those supported on the subject land. However, it occurs in very low numbers to the region and therefore is unlikely to occur with regular frequency.
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	Marine	This species is strongly associated with coastal environments and large wetlands including estuaries, bays, rivers, and inland lakes.	Negligible	The subject land does not contain suitable foraging or breeding habitat for the species. However, it may utilise airspace over the subject land.
<i>Pandion cristatus</i>	Eastern Osprey	Marine, Migratory	Ospreys are primarily associated with marine environments such as entrances of large rivers, lagoons and lakes. However, the species can also occur upstream on large river systems and on larger inland waters.	Negligible	The subject land does not contain suitable foraging or breeding habitat for the species. However, it may utilise airspace over the subject land.

6.1.2 Significant impact assessments

Eight species are known to occur within the subject land with one additional species considered to have a moderate likelihood of occurrence following the desktop assessment and field survey. These species and the results of the significant impact assessment are summarised below in Table 6.3.

Table 6.3 Species subject to significant impact assessments

Scientific name	Common name	EPBC status	Likelihood of occurrence	Significant impact assessment result
Vulnerable rainforest flora				
<i>Macadamia integrifolia</i>	Queensland nut	Vulnerable	Known	Not significant
<i>Owenia cepiodora</i>	Onion Cedar	Vulnerable	Known	Not significant
<i>Syzygium moorei</i>	Coolamon	Vulnerable	Known	Not significant
Endangered rainforest flora				
<i>Davidsonia jerseyana</i>	Davidson's Plum	Endangered	Known	Not significant
<i>Davidsonia johnsonii</i>	Smooth Davidson's Plum	Endangered	Known	Not significant
<i>Diploglottis campbellii</i>	Small-leaved tamarind	Endangered	Known	Not significant
Critically endangered rainforest flora				
<i>Rhodamnia rubescens</i>	Scrub Turpentine	Critically Endangered	Known	Not significant
Mammals				
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Moderate	Not significant
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Known	Not significant

i Vulnerable rainforest flora

The species in this group share similar habitat requirements as well as site occupation within the subject land and were therefore assessed for impacts collectively. The group includes the following vulnerable species:

- Queensland nut (*Macadamia integrifolia*);
- Onion Cedar (*Owenia cepiodora*); and
- Coolamon (*Syzygium moorei*).

The occurrence of this group of flora species within the subject land are artificial populations 'not in the wild' and derived from planted stock. Although indigenous to the region, all are located within maintained gardens or within planted commemorative vegetation plots surrounded by mown lawns or artificial structures. Given the high degree of modification and landscaping, vegetation at the site does not conform to any recognised native plant community type.

Table 6.4 Assessment of significance for vulnerable rainforest flora in the subject land

Criteria	Response
Conservation status	Vulnerable
Lead to a long-term decrease in the size of an important population	The populations of these three species located on the subject land are not considered naturally occurring populations and therefore not part of an important population. Furthermore, most individuals from all species will be retained with three of four for both Queensland nut (<i>Macadamia integrifolia</i>) and Onion Cedar (<i>Owenia cepiodora</i>) being retained along with one of two Coolamon (<i>Syzygium moorei</i>). Due to the artificial origins of the populations of these species along with a number of individuals being retained, the project is considered unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population	The populations of the three species located on the subject land are not considered naturally occurring populations and therefore not part of an important population. They also occur within artificial habitats that do not conform to known vegetation communities. As such, activities associated with project are unlikely to reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	The populations of the three species located on the subject land are not considered naturally occurring populations and therefore not part of an important population. The project is unlikely to further fragment the populations despite their artificial provenance.
Adversely affect habitat critical to the survival of the species	The populations of the three species located on the subject land are not considered naturally occurring populations and are within artificial habitats that do not conform to known vegetation communities. Habitats impacted in the project area are therefore not considered habitat critical to the survival of the species. No suitable habitat for these species exists on the subject land and therefore the project will not adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	The populations of the three species located on the subject land are not considered naturally occurring populations and therefore not part of an important population. As such, project activities will not disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The populations of the three species located on the subject land are not considered naturally occurring populations and are within artificial habitats that do not conform to known vegetation communities. No suitable habitat for these species exists on the subject land and therefore the project will not modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to the species becoming established in the species habitat	The populations of the three species located on the subject land are not considered naturally occurring populations and are of artificial provenance. The areas they are in are highly disturbed and support several established invasive weed species. As such, the project is unlikely to result in additional invasive species that are harmful to the species becoming established in the species habitat.
Introduce disease that may cause the species to decline	The populations of the three species located on the subject land are not considered naturally occurring populations and are not known to suffer from disease. Therefore, the project activities are unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species	The populations of the three species located on the subject land are not considered naturally occurring populations and are of artificial provenance. These populations are not a part of recovery objectives for the species and most individuals will be retained regardless. As such, the project is unlikely to interfere substantially with the recovery of the species

Table 6.4 Assessment of significance for vulnerable rainforest flora in the subject land

Criteria	Response
Conclusion	All populations of these species located on the subject land originate from plantings and therefore do not represent natural or important populations. Most individuals will be retained with three of four for both Queensland nut (<i>Macadamia integrifolia</i>) and Onion Cedar (<i>Owenia cepiodora</i>) being retained along with one of two Coolamon (<i>Syzygium moorei</i>). Due to the artificial origins of the populations of these species along with a substantial number of individuals being retained, the project will not result in a significant impact.

ii Endangered rainforest flora

The species in this group share similar habitat requirements as well as site occupation within the subject land and were therefore assessed for impacts collectively. The group includes the following endangered species:

- Davidson's Plum (*Davidsonia jerseyana*);
- Smooth Davidson's Plum (*Davidsonia johnsonii*); and
- Small-leaved tamarind (*Diploglottis campbellii*).

The occurrence of this group of flora species within the subject land are artificial populations 'not in the wild' and derived from planted stock. Although indigenous to the region, all are located within maintained gardens or within planted commemorative vegetation plots surrounded by mown lawns or artificial structures. Given the high degree of modification and landscaping, vegetation at the site does not conform to any recognised native plant community type.

Table 6.5 Assessment of significance for endangered rainforest flora in the subject land

Criteria	Response
Conservation status	Endangered
Lead to a long-term decrease in the size of a population	The populations of these three species located on the subject land are not considered naturally occurring populations. Notwithstanding, most individuals from all species will be retained with: • no individuals of Smooth Davidson's Plum (<i>Davidsonia johnsonii</i>) to be removed; • seven out of 11 Davidson's Plum (<i>Davidsonia jerseyana</i>) to be retained; and • four of six Small-leaved tamarind (<i>Diploglottis campbellii</i>) to be retained. Although the project will reduce the overall number of Davidson's Plum and Small-leaved tamarind in the subject lands, a substantial number will be retained and the project is not considered to significantly decrease the size of the population within the the subject lands.
Reduce the area of occupancy of a population	The populations of the three species located on the subject land are not considered naturally occurring populations and are within artificial habitats that do not conform to known vegetation communities. Although the project will reduce the overall number of Davidson's Plum and Small-leaved tamarind in the subject lands, a substantial number will be retained and the area of occupancy is not considered to be significantly impacted.
Fragment an existing population into two or more populations	The populations of the three species located on the subject land are not considered naturally occurring populations and are within a heavily modified and fragmented environment. However, the project is unlikely to further fragment the populations despite their artificial provenance.

Table 6.5 Assessment of significance for endangered rainforest flora in the subject land

Criteria	Response
Adversely affect habitat critical to the survival of the species	The populations of the three species located on the subject land are not considered naturally occurring populations and are within artificial habitats that do not conform to known vegetation communities. Habitats to be impacted in the project area are therefore not considered habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	The populations of the three species located on the subject land are not considered naturally occurring populations. As such, project activities will not disrupt the breeding cycle of a population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The populations of the three species located on the subject land are not considered naturally occurring populations and are within artificial habitats that do not conform to known vegetation communities. Having been established through planting, the project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Result in invasive species that are harmful to the species becoming established in the species habitat	The planted vegetation within which these species currently occur are currently weed affected but are likely to be managed and maintained as part of the visual amenity of the school grounds. The project is unlikely to result in additional invasive species being established in these habitats.
Introduce disease that may cause the species to decline	The populations of the three species located on the subject land are not considered naturally occurring populations and none are known to suffer from disease. Therefore, the project activities are unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species	The populations of the three species located on the subject land are not considered naturally occurring populations and are of artificial provenance. These populations are not a part of recovery objectives for the species and most individuals will be retained regardless. As such, the project is unlikely to interfere substantially with the recovery of the species
Conclusion	All populations of these species located on the subject land originate from plantings and therefore are not natural populations. Most individuals will be retained with no individuals of Smooth Davidson's Plum (<i>Davidsonia johnsonii</i>) within the impact area, a total of seven out of 11 Davidson's Plum (<i>Davidsonia jerseyana</i>) will be retained along with four out of six Small-leaved tamarind (<i>Diploglottis campbellii</i>). Due to the artificial origins of the populations of these species along with a substantial number of individuals being retained, the project will not result in a significant impact.

iii Scrub Turpentine (*Rhodamnia rubescens*)

Table 6.6 Assessment of significance for Scrub Turpentine (*Rhodamnia rubescens*) in the subject land

Criteria	Response
Conservation status	Critically endangered
Lead to a long-term decrease in the size of a population	A total of 20 individual Scrub Turpentine (<i>Rhodamnia rubescens</i>) were recorded in the subject land, all occurring outside of the proposed impact area. According to the Conservation Advice for <i>Rhodamnia rubescens</i> (TSSC 2020), the species occurs contiguously across its broad geographical range with no known distinct populations. As such, the project is unlikely to lead to a long-term decrease in the size of an important population of Scrub Turpentine.

Table 6.6 Assessment of significance for Scrub Turpentine (*Rhodamnia rubescens*) in the subject land

Criteria	Response
Reduce the area of occupancy of the species	No individuals will be directly impacted by project activities and impacts to habitat will be negligible. Therefore, it is considered unlikely that the project will reduce the occupancy of this species.
Fragment an existing population into two or more populations	No individuals will be directly impacted by project activities and the existing population will not undergo fragmentation with the area of vegetation supporting this species remaining contiguous. As such, the project activities will not fragment the existing population into two or more populations.
Adversely affect habitat critical to the survival of the species	Scrub Turpentine has no defined habitat critical to the survival of the species. The species is known to occur in a broad range of habitat types, largely associated with rainforest communities such as lowland subtropical rainforest and littoral rainforest. It can also occur as a pioneer species in sclerophyllous communities adjacent to rainforest type communities. Within the subject land, all 20 individuals are restricted to an area of dense Hoop Pine (<i>Araucaria cunninghamii</i>) plantation which is largely a monoculture with very few other species present in the canopy. The lower vegetative strata are very sparse consisting primarily of a low (<1 m), predominately exotic shrub layer and sparse groundlayer. This area of habitat has also suffered from high disturbance with historic and continued land use of running livestock (cattle & sheep as part of the school's agricultural program) resulting in soil compaction, reduced native lower-stratum species diversity, and weed encroachment. Due to the atypical, cultivated habitat utilised by the species on the subject land, along with the limited available local habitats and the high incidence of planted indigenous threatened flora species, the provenance of this population may be from planted stock. As Scrub Turpentine has no defined habitat critical to the survival of the species and the subject lands habitat is atypical for the species as well as highly degraded. The project is considered unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	All individuals of the species recorded on the subject land are immature specimens indicating relatively recent dispersal. However, the origin of this population is unknown and based on limited available local habitats and the high incidence of planted indigenous threatened flora species, the origin of this population may be from planted stock. No individuals of the subject population will be removed and as such there are unlikely to be disruptions to the breeding cycle of the subject population of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The habitat that Scrub Turpentine occupies on the subject land is considered atypical for the species, is highly isolated from typical habitat areas and is heavily degraded. Furthermore, the area of vegetation occupied by the species will remain contiguous with all individuals located outside of the project impact area. Therefore, the development is considered unlikely to impact habitat attributes that lead to the further decline of the species.
Result in invasive species that are harmful to the species becoming established in the species habitat	The area of vegetation supporting this species is highly degraded and modified with widespread weed encroachment and ongoing grazing pressures. The project is unlikely to result in additional invasive species being established in these habitats but reduction in the patch size may exacerbate existing weed problems. As part of the mitigation and management of weed impacts, weed monitoring and corrective actions will be undertaken in accordance with a weed management sub-plan of the CEMP.

Table 6.6 Assessment of significance for Scrub Turpentine (*Rhodamnia rubescens*) in the subject land

Criteria	Response
Introduce disease that may cause the species to decline	A key threatening process identified for this species is infection from the introduced pathogenic fungi known as Myrtle Rust (<i>Austropuccinia psidii</i>). Scrub Turpentine is highly susceptible to infection with it being considered the main contributing factor to population decline and the highest ongoing threat to species survival. Several individuals within the subject land population had signs of Myrtle Rust infection. Due to the presence of Myrtle Rust within the subject population, it is considered unlikely that new diseases will be introduced due to activities relating to the project. As part of the mitigation and management of pathogen impacts, hygiene protocols will be implemented during construction to manage the risk of exacerbating existing Myrtle Rust on the existing population.
Interfere substantially with the recovery of the species	No individuals will be directly impacted by project activities and impacts to habitat will be negligible. Therefore, it is considered unlikely that the project will interfere with the recovery of the species.
Conclusion	None of the 20 recorded individuals will be directly impacted by project activities and impacts to habitat will be negligible. The habitat occupied by the subject population is considered atypical for the species, is highly isolated from typical habitat areas and is heavily degraded. However, this area of vegetation will remain contiguous with all individuals located outside of the project impact area. Myrtle Rust is an active risk to the subject population. As part of the mitigation and management of pathogen impacts, hygiene protocols will be implemented during construction to manage the risk of exacerbating existing Myrtle Rust on the existing population. Due these factors, the activities associated with the project will not result in a significant impact and the species population is unlikely to be adversely affected.

iv **Koala (*Phascolarctos cinereus*)**

Table 6.7 Assessment of significance for Koala (*Phascolarctos cinereus*) in the subject land

Criteria	Discussion
Conservation status	Vulnerable
Lead to a long-term decrease in the size of an important population	No Koalas have been recorded on the subject land and suitable habitat is limited. The habitat present consists primarily of isolated foraging trees or small patches vegetation within landscape gardens and windrows. Foraging food trees in these areas recorded include Tallowwood, Flooded Gum and Spotted Gum. The subject land is also surrounded by heavily developed areas and barriers (ie fences) that are likely to impede site utilisation. It is considered unlikely that Koala would be reliant on the limited habitat areas surrounded by existing barriers and disturbances within the subject land and therefore the development is considered unlikely to lead to a decrease in size of an important population.
Reduce the area of occupancy of an important population	The subject land does not support any known populations of Koala and the removal of sub-optimal habitat in the form of individual feed trees will not reduce the area of occupancy of the local population.
Fragment an existing important population into two or more populations	The subject land is a part of an existing fragmented urban landscape, and it is not known to support any known populations of Koala. In this context, the removal of several feed trees will not fragment an important population into two or more populations.

Table 6.7 **Assessment of significance for Koala (*Phascolarctos cinereus*) in the subject land**

Criteria	Discussion
Adversely affect habitat critical to the survival of the species	Habitat critical to the survival of the Koala consists of forests and woodlands dominated by eucalypt species. Habitat within the Project area was scored using the EPBC Act referral guidelines for the vulnerable Koala (DoE 2014). Habitat within the subject land scored 4, therefore not meeting the definition of critical habitat (which acts as a surrogate for important populations). As such, the project is not expected to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	The subject land does not support any known populations of Koala and therefore project activities are not expected to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The habitat present consists primarily of isolated foraging trees or small patches vegetation within landscape gardens and windrows. Foraging food trees in these areas recorded include Tallowwood, Flooded Gum and Spotted Gum. The subject land is also surrounded by heavily developed areas and barriers (ie fences) that are likely to impede site utilisation. It is considered unlikely that Koala would be reliant on the limited habitat areas surrounded by existing barriers and disturbances within the subject land and therefore the development is considered unlikely to modify or decrease the availability or quality of habitat to the extent that would lead to further decline.
Result in invasive species that are harmful to the species becoming established in the species habitat	The subject land is a part of an existing urban landscape supporting numerous invasive species and it is not known to support any known populations of Koala. As such, the removal of sub-optimal habitat will not result in the establishment of additional invasive species considered harmful to Koala or their habitats.
Introduce disease that may cause the species to decline	The most well-known disease present in the Koala population is associated with particular strains of Chlamydia. Koala Retrovirus was recently identified and is thought to be responsible for a range of conditions, including leukaemia and an immunodeficiency syndrome (DoEE, 2012). The subject land is not known to support an existing Koala population and therefore the project is considered highly unlikely to introduce a disease that may cause the species to decline.
Interfere substantially with the recovery of the species	The subject land is not known to support an existing Koala population and the habitat present does not meet any attributes related to Koala recovery according to Table 1 of the <i>EPBC Act referral guidelines for the vulnerable Koala</i> (DoE 2014). As such, project activities are not considered unlikely to impact the recovery of the species.
Conclusion	Habitat for the Koala consists primarily of isolated foraging trees or small patches vegetation within landscape gardens and windrows. Foraging food trees in these areas recorded include Tallowwood, Flooded Gum and Spotted Gum. The subject land is also surrounded by heavily developed areas and barriers (ie fences). No Koalas have been recorded on the subject land. The habitat present on the subject land scored 4 using the <i>EPBC Act referral guidelines for the vulnerable Koala</i> (DoE 2014) scoring approach, and therefore does not meet the definition of habitat critical to the survival of the species. The clearance of isolated foraging trees and small patches of vegetation will not result in a significant impact on the Koala.

v **Grey-headed Flying-fox (*Pteropus poliocephalus*)**

Table 6.8 **Assessment of significance for Grey-headed Flying-fox in the subject land**

Criteria	Discussion
Conservation status	Vulnerable

Table 6.8 **Assessment of significance for Grey-headed Flying-fox in the subject land**

Criteria	Discussion
Lead to a long-term decrease in the size of an important population	The <i>National Recovery Plan for the Grey-headed Flying-fox</i> (DAWE 2021) does not define an important population for the species. The species is known to regularly occur in the region with two confirmed records on the subject land with the most recent from November 2021. No evidence of camps was observed within the subject land with nearest known camp located approximately 1.3 kilometres away on the periphery of the Murwillumbah township (DAWE 2021). The subject land is therefore considered unlikely to support an important population. The development will remove less than 0.5 ha of foraging habitat which consists largely of planted vegetation within the school grounds, including both native and exotic species. Due to the limited impact on foraging habitat and absence of an important population, the development is unlikely to lead to a decrease in size of an important population.
Reduce the area of occupancy of an important population	As important populations have not been defined (DAWE 2021) and the site is considered unlikely to harbour an important population, it is unlikely that removal of planted foraging habitat would reduce the area of occupancy of the local population.
Fragment an existing important population into two or more populations	The species is considered highly mobile and the removal of less than 0.5 ha of foraging habitat in an already fragmented urbanised landscape will not cause any discernible fragmentation effects.
Adversely affect habitat critical to the survival of the species	Habitat critical to the survival of the species has been defined by the National Recovery Plan (DAWE 2021) as important winter and spring flowering vegetation communities which sustain foraging habitat over drier periods for the species. This includes 19 important foraging tree species, three of which are present on the subject land including Black Bean (<i>Castanospermum australe</i>), Spotted Gum (<i>Corymbia citriodora</i>) and Silky Oak (<i>Grevillea robusta</i>). However, the occurrence of these important foraging trees is limited to scattered individuals planted within the subject land and is unlikely to be sufficient in numbers to be an important resource during drier periods. Habitat critical to the survival of the Grey-headed Flying-fox also includes tree species known to be productive between August and May which occur within 20 km of a nationally important camp as identified by DAWE, as well as the presence of native or exotic species used for roosting at the site of a nationally important camp as identified by the Department. The subject land is located approximately 2 kilometres from the nearest nationally important camp identified by the Department (DAWE 2022a). However, tree species known to be productive between August and May are not recognised on the subject land. As such, the subject land is unlikely to represent foraging habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	The nearest known camp is located approximately 1.3 kilometres away on the periphery of the Murwillumbah township (DAWE 2022a), with results of the surveys on the subject land not identifying any breeding camps or the species. Therefore, the development is not considered likely to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project will remove less than 0.5 ha of potential foraging habitat for the Grey-headed Flying-fox. Given the large distance the species travels to forage and the amount of potential foraging habitat within the locality, the Grey-headed Flying-fox is unlikely to decline.
Result in invasive species that are harmful to the species becoming established in the species habitat	The subject land contains invasive flora species which are not likely to alter the indirect impact area to the extent that they become established within the Grey-headed Flying-fox habitat to cause harm. Given the small extent of the proposed impact, it is unlikely that any further species invasions will be facilitated by the proposed activity (either directly or indirectly).

Table 6.8 Assessment of significance for Grey-headed Flying-fox in the subject land

Criteria	Discussion
Introduce disease that may cause the species to decline	The National Recovery Plan for the Grey-headed Flying-fox does not identify any diseases likely to impact the health of the species. Any discussion about diseases in that plan concerns risk of disease transmission from bats to humans. The development is unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species	The National Recovery Plan for the Grey-headed Flying-fox provides several actions (DAWE 2021). The following is a subset of these actions, targeting actions relevant to the project which have not been specifically addressed above: • Verify and spatially identify key foraging areas and vegetation communities used by the Grey-headed Flying-fox through an annual cycle. • Enhance winter and spring foraging habitat for Grey-headed Flying-foxes. • Assess the impacts on Grey-headed Flying-foxes of electrocution on powerlines and entanglement in netting and barbed wire, and implement strategies to reduce these impacts. • Assess the impacts on Grey-headed Flying-foxes of climate change. The subject land is located approximately 2 kilometres from the nearest nationally important camp identified by the Department (DAWE 2022a). The habitat for the species which would be impacted does not contain substantial winter and spring foraging habitat resources. Black Bean, Spotted Gum and Silky Oak occur within the subject land; however, the development is likely to directly impact less than 0.16 ha of vegetation containing these species. The project will not require constructing or moving powerlines. Therefore, the project is not considered to substantially interfere with the recovery of the Grey-headed Flying-fox.
Conclusion	The clearance of less than 0.5 ha of Grey-headed Flying-fox foraging habitat will not result in a significant impact and the species population is unlikely to be adversely affected. The area to be removed is unlikely to represent habitat critical to the survival of the species and the proposed development is unlikely to interfere with the recovery of the species.

6.2 Biosecurity Act 2015

Four priority weeds of the North Coast region were recorded in the subject land (Table 6.9).

Table 6.9 Priority and high threat weeds recorded within the subject land

Scientific name	Common name	Priority weed	High threat weed (BCD 2020)
<i>Bidens pilosa</i>	Cobbler's Pegs	-	Y
<i>Canna indica</i>	Tous-les-mois Arrowroot	-	Y
<i>Celtis sinensis</i>	Japanese Hackberry	Y	-
<i>Cestrum parqui</i>	Green Cestrum	Y	Y
<i>Cinnamomum camphora</i>	Camphor Laurel	-	Y
<i>Dolichandra unguis-cati</i>	Cats Claw Creeper	Y	Y
<i>Lantana camara</i>	Lantana	Y	Y
<i>Ligustrum sinense</i>	Small-leaved Privet	-	Y

Table 6.9 **Priority and high threat weeds recorded within the subject land**

Scientific name	Common name	Priority weed	High threat weed (BCD 2020)
<i>Ochna serrulata</i>	Mickey Mouse Plant	-	Y
<i>Passiflora suberosa</i>	Cork Passionfruit	-	Y
<i>Schefflera actinophylla</i>	Umbrella Tree	-	Y
<i>Senna pendula</i>	Easter Cassia	-	Y

If any priority weeds of NSW are identified in the development footprint during construction, they must be removed from the development footprint.

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.

The species must not be imported into NSW or sold. In addition, there is a regional recommended measure for land managers in the central tablelands to mitigate the risk of new weeds being introduced to, and spread from, their land. The plant should not be bought, sold, grown, carrier or released into the environment. Conservation areas, natural environments and primary production lands should be protected that are free of the priority weed.

7 Conclusion

This BDAR has been assessed under the 'streamlined assessment module- Planted native vegetation' in accordance with Appendix D of the BAM (DPIE 2020). No PCTs or TECs occur within the development footprint, with all native vegetation within the development footprint having been previously planted during multiple planting events for the school. As such, the project does not generate Biodiversity Credits for offsetting. However, the suitability of planted native vegetation has been duly assessed.

There are eight threatened flora species recorded within the subject land within planted vegetation. One of these species, Scrub Turpentine, appears to be regenerating with a portion of the Hoop Pine Plantation and as such, has been avoided through design measures. Mitigation and management actions have been outlined in accordance with Section 8.4 of the BAM (DPIE 2020) to mitigate and manage impacts on these species during and post construction.

There are four threatened microbat species and one threatened flying-fox species detected over the school grounds that could potentially utilise the planted vegetation as marginal foraging habitat. The microbat species may potentially roost within Building E although no evidence of roosting was detected during assessments. Mitigation and management actions have been outlined in accordance with Section 8.4 of the BAM (DPIE 2020) to mitigate possible impacts on potential roost sites during demolition works, and to limit inadvertent clearing of potential foraging habitat above that assessed for the Project.

The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The development is expected to result in no significant impacts to any TECs or threatened species. As such, the development is unlikely to be a 'controlled action' and no referral is necessary.

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Appendix A

Vegetation plot survey datasheets

BAM Site – Field Survey Form

Plot ID:	BAMPLOT1HP	Date:	01/10/22	Project number:	E210679		Plot dimensions:	20x50, 20x20m
Datum:	GDA94	Easting:	538,318	Recorders:	Gus Daly			
Zone:	56	Northing:	6,865,515	IBRA region:	Burringbar-Conondale Ranges		Midline bearing:	120
Plant Community Type:	887: Hoop Pine - Yellow Tulipwood dry rainforest of the NSW North Coast Bioregion				Condition class:	Low	PCT confidence:	medium
Vegetation Class:	Dry Rainforests				EEC:	no	EEC confidence:	low

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	13
	Shrubs:	2
	Grasses etc.:	1
	Forbs:	3
	Ferns:	1
	Other:	4
Sum of Cover of native vascular plants by growth form group	Trees:	66.2
	Shrubs:	0.2
	Grasses etc.:	0.1
	Forbs:	0.3
	Ferns:	0.1
	Other:	0.5
High Threat Weed cover:		2.6

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	8
80 + cm:	0		
50 – 79 cm:	6		
30 – 49 cm:	2		
20 – 29 cm:	1	Tree hollow count	0
10 – 19 cm:	1		
5 – 9 cm:	1		
< 5 cm:	1		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	95	97	95	98	99
Average litter cover (%):	96.8				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features
Heavy loam - dark brownish with high moisture content. Gentle SW slope.

Plot Disturbance
Weeds widespread. Some evidence of cattle grazing although it appears to be low.

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
 Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	E210679				
Recorders:	Gus Daly	Plot ID:	BAMPLOT1HP	Date:	01/10/22

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Tree (TG)	<i>Ailanthus triphysa</i> (White Bean)	0.1	1		N
Tree (TG)	<i>Alphitonia excelsa</i> (Red Ash)	0.1	1		N
Tree (TG)	<i>Araucaria cunninghamii</i> (Hoop Pine)	65	4050	no	N
	<i>Ardisia crenata</i> (Coralberry)	0.1	10		E
Fern (EG)	<i>Blechnum cartilagineum</i> (Gristle Fern)	0.1	10		N
	<i>Celtis sinensis</i> (Japanese Hackberry)	0.1	5		E
Forb (FG)	<i>Centella asiatica</i> (Indian Pennywort)	0.1	10		N
	<i>Cinnamomum camphora</i> (Camphor Laurel)	0.2	20		HTE
	<i>Commelina benghalensis</i>	0.1	20		E
Tree (TG)	<i>Cryptocarya obovata</i> (Pepperberry)	0.1	2		N
	<i>Dolichandra unguis-cati</i>	0.1	5		HTE
	<i>Eugenia uniflora</i> (Brazilian Cherry)	1	70		E
Shrub (SG)	<i>Ficus coronata</i> (Creek Sandpaper Fig)	0.1	5		N
Other (OG)	<i>Geitonoplesium cymosum</i> (Scrambling Lily)	0.1	10		N
Tree (TG)	<i>Glochidion sumatranum</i> (Umbrella Cheese Tree)	0.1	1		N
Tree (TG)	<i>Grevillea robusta</i> (Silky Oak)	0.1	10		N
Tree (TG)	<i>Guioa semiglauca</i> (Guioa)	0.1	1		N
Shrub (SG)	<i>Hymenosporum flavum</i> (Native Frangipani)	0.1	2		N
Tree (TG)	<i>Jagera pseudorhus</i> var. <i>pseudorhus</i> (Foambark Tree)	0.1	20		N
	<i>Lantana camara</i> (Lantana)	0.1	1		HTE
	<i>Ligustrum sinense</i> (Small-leaved Privet)	0.1	10		HTE
Other (OG)	<i>Maclura cochinchinensis</i> (Cockspur Thorn)	0.2	30		N
Tree (TG)	<i>Mallotus discolor</i> (White Kamala)	0.1	1		N
Tree (TG)	<i>Mallotus philippensis</i> (Red Kamala)	0.1	1		N
Tree (TG)	<i>Melicope elleryana</i> (Pink-flowered Doughwood)	0.1	3		N
	<i>Murraya paniculata</i>	1	60		E
	<i>Ochna serrulata</i> (Mickey Mouse Plant)	2	1000		HTE
Grass & grasslike (GG)	<i>Oplismenus</i> spp.	0.1	20		N
	<i>Oxalis corniculata</i> (Creeping Oxalis)	0.1	10		E
Other (OG)	<i>Pandorea pandorana</i> (Wonga Wonga Vine)	0.1	10		N
Other (OG)	<i>Parsonsia straminea</i> (Common Silkpod)	0.1	20		N
	<i>Passiflora suberosa</i> (Cork Passionfruit)	0.1	10		HTE
	<i>Phyllanthus tenellus</i> (Hen and Chicken)	0.1	20		E
	<i>Poaceae</i> indeterminate (Grasses, reeds and bamboos)	0.1	50		E
Forb (FG)	<i>Solanum americanum</i> (Glossy Nightshade)	0.1	2		N
Forb (FG)	<i>Solanum</i> spp.	0.1	1		N
Tree (TG)	<i>Streblus brunonianus</i> (Whalebone Tree)	0.1	10		N
Tree (TG)	<i>Syzygium luehmannii</i> (Small-leaved Lilly Pilly)	0.1	1		N

BAM Site – Field Survey Form

Plot ID:	BAMPLOT2MH	Date:	01/10/22	Project number:	E210679			Plot dimensions:	25x20, 20x20m
Datum:	GDA94	Easting:	538,411	Recorders:	Gus Daly				
Zone:	56	Northing:	6,865,671	IBRA region:	Burringbar-Conondale Ranges			Midline bearing:	170
Plant Community Type:	1275: Tuckeroo - Riberry - Yellow Tulipwood littoral rainforest of the NSW North Coast Bioregion				Condition class:	low		PCT confidence:	low
Vegetation Class:	Littoral Rainforests				EEC:	no		EEC confidence:	low

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	25
	Shrubs:	2
	Grasses etc.:	2
	Forbs:	1
	Ferns:	0
	Other:	3
Sum of Cover of native vascular plants by growth form group	Trees:	19.2
	Shrubs:	0.2
	Grasses etc.:	0.2
	Forbs:	0.1
	Ferns:	0
	Other:	0.7
High Threat Weed cover:		1.8

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	6
80 + cm:	0		
50 – 79 cm:	2		
30 – 49 cm:	1		
20 – 29 cm:	1	Tree hollow count	0
10 – 19 cm:	1		
5 – 9 cm:	1		
< 5 cm:	1		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	99	99	80	95	0
Average litter cover (%):	74.6				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features
Loamy soil - dark brown with high moisture content. Patch on relatively flat area at base of small hill.

Plot Disturbance
High weed encroachment in groundcover.

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
 Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	E210679				
Recorders:	Gus Daly	Plot ID:	BAMPLOT2MH	Date:	01/10/22

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Tree (TG)	<i>Acmena smithii</i> (Lilly Pilly)	0.5	1		N
Tree (TG)	<i>Ailanthus triphysa</i> (White Bean)	0.1	1		N
Other (OG)	<i>Amylothea dictyophleba</i>	0.1	1		N
	<i>Araucaria bidwillii</i> (Bunya Pine)	5	5		E
Tree (TG)	<i>Araucaria cunninghamii</i> (Hoop Pine)	5	1		N
Other (OG)	<i>Archontophoenix cunninghamiana</i> (Bangalow Palm)	0.5	1		N
	<i>Ardisia crenata</i> (Coralberry)	0.1	2		E
	<i>Bidens pilosa</i> (Cobbler's Pegs)	0.1	5		HTE
Tree (TG)	<i>Brachychiton acerifolius</i> (Illawarra Flame Tree)	0.2	1		N
	<i>Canna indica</i> (Tous-les-mois Arrowroot)	0.1	5		HTE
Tree (TG)	<i>Castanospermum australe</i> (Black Bean)	5	12		N
	<i>Celtis sinensis</i> (Japanese Hackberry)	0.1	10		E
Forb (FG)	<i>Centella asiatica</i> (Indian Pennywort)	0.1	40		N
	<i>Cestrum parqui</i> (Green Cestrum)	0.1	2		HTE
	<i>Cinnamomum camphora</i> (Camphor Laurel)	1	200		HTE
	<i>Commelina benghalensis</i>	0.1	1		E
Tree (TG)	<i>Cryptocarya obovata</i> (Pepperberry)	0.1	2		N
Tree (TG)	<i>Cryptocarya triplinervis</i> var. <i>triplinervis</i>	0.5	3		N
Tree (TG)	<i>Cupaniopsis anacardioides</i> (Tuckeroo)	2	7		N
Grass & grasslike (GG)	<i>Digitaria</i> spp. (A Finger Grass)	0.1	100		N
Tree (TG)	<i>Diploglottis australis</i> (Native Tamarind)	0.5	1		N
Tree (TG)	<i>Diploglottis campbellii</i> (Small-leaved Tamarind)	1	2		N
Shrub (SG)	<i>Ficus coronata</i> (Creek Sandpaper Fig)	0.1	1		N
Tree (TG)	<i>Flindersia xanthoxyla</i> (Yellowwood)	0.2	1		N
Tree (TG)	<i>Gmelina leichhardtii</i> (White Beech)	1	1		N
Tree (TG)	<i>Gossia punctata</i>	0.1	1		N
Tree (TG)	<i>Grevillea robusta</i> (Silky Oak)	0.5	1		N
Tree (TG)	<i>Guioa semiglauca</i> (Guioa)	0.1	1		N
	<i>Hypochaeris</i> spp. (A Catsear)	0.1	1		E
	<i>Jacaranda mimosifolia</i> (Jacaranda)	0.1	1		E
Tree (TG)	<i>Jagera pseudorhus</i> var. <i>pseudorhus</i> (Foambark Tree)	0.1	3		N
	<i>Koelreuteria</i> spp.	0.1	5		E
Tree (TG)	<i>Lepiderema pulchella</i> (Fine-leaved Tuckeroo)	0.5	5		N
Other (OG)	<i>Maclura cochinchinensis</i> (Cockspur Thorn)	0.1	3		N
Tree (TG)	<i>Mallotus philippensis</i> (Red Kamala)	0.1	1		N
Tree (TG)	<i>Mischocarpus australis</i>	0.1	1		N
	<i>Murraya paniculata</i>	0.1	15		E
	<i>Ochna serrulata</i> (Mickey Mouse Plant)	0.1	30		HTE
Tree (TG)	<i>Owenia cepiodora</i> (Onion Cedar)	0.1	1		N
	<i>Passiflora suberosa</i> (Cork Passionfruit)	0.1	1		HTE
	<i>Poaceae</i> indeterminate (Grasses, reeds and bamboos)	0.1	30		E
	<i>Poaceae</i> indeterminate (Grasses, reeds and bamboos)	0.1	30		E
Tree (TG)	<i>Podocarpus elatus</i> (Plum Pine)	0.1	1		N
Tree (TG)	<i>Rhodospaera rhodanthema</i> (Deep Yellowwood)	0.1	1		N
Tree (TG)	<i>Rhodospaera rhodanthema</i> (Deep Yellowwood)	0.1	1		N
	<i>Schefflera actinophylla</i> (Umbrella Tree)	0.2	12		HTE
Grass & grasslike (GG)	<i>Scleria</i> spp.	0.1	1		N
	<i>Senna pendula</i>	0.1	6		HTE

Project name:	E210679				
Recorders:	Gus Daly	Plot ID:	BAMPLOT2MH	Date:	01/10/22

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
	<i>Senna septemtrionalis</i> (Arsenic Bush)	0.1	1		E
	<i>Syagrus romanzoffiana</i> (Cocos Palm)	0.1	3		E
	<i>Syngonium podophyllum</i> (Arrowhead vine)	50	4000		E
Tree (TG)	<i>Syzygium luehmannii</i> (Small-leaved Lilly Pilly)	0.2	2		N
Shrub (SG)	<i>Syzygium</i> spp.	0.1	1		N
Tree (TG)	<i>Toechima dasyrrhache</i>	1	2		N

Appendix B

Planted vegetation documentation

(<https://fitz.com.au/about-us/in-the-community/>)



Foundation

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By Brian Fitzpatrick

I know several people who have won Olympic Gold medals. I know others who have saved lives, been federal or state parliamentarians, or been members of United Nations Humanitarian Relief teams. I see the media stories of people who have succeeded in researching medical breakthroughs that could save millions of lives worldwide. What amazing achievements!

Our history is filled with outstanding people who made tremendous personal sacrifices to make things better. Look at the response that the Anzacs can generate a century after the Gallipoli landing. I stand in awe of their achievements and feel somewhat unworthy when I look at my ordinary life. But this month I want to share the story of an ordinary man, doing ordinary things, in an ordinary life but leaving an extraordinary legacy.

Bruce Chick was born in the 1920's. He became an English/History teacher. A kind, knowledgeable teacher who gave every kid a chance. He finished his working life as the school librarian at Murwillumbah High School in northern NSW. He had already been involved in small reforestation projects at the school, but on retirement he began a life of extraordinary service to the planet.

Bruce would drive around the Tweed Valley collecting seeds from rare and endangered trees. He would propagate them and when they had grown big enough, he would take them back into the bush and plant them. All across the valley he could be seen working in his determined manner, rebuilding what had been known as the Big Scrub before the cedar cutters moved in. He was well known for hugging trees. He would put his arms around the trunk to measure its growth rate. I have even seen him kiss a tree as he planted it. He loved trees.

Single-handedly Bruce built a rainforest on the banks of the Tweed River. It is the only man-made rainforest on the national heritage list. He also inspired others to form the Richmond-Tweed Reforestation Society, and this group spreads his message to wider circles.

We were able to convince Bruce to be the patron of Wollumbin High School. The school was built on the site of a degraded banana plantation. His vision for the school was to transform this barren land. For the first five years, every student that went to the school planted a tree. Bruce charged every student with caring for their own tree. Every teacher was given the same gift. And Bruce provided every tree from seeds he had collected and nurtured in his back yard.

There was never any fanfare, never any need for fame or recognition. It was as if his work was payment enough. At any time of day, Bruce who was then in his mid-eighties could be seen tending, watering and loving the trees – humble and committed to doing what he loved to do. He so inspired the kids by his actions that they set up an Environment group. These students then set about building gardens, solar powered water features and raised the money to establish a bush tucker orchard of over five hundred native trees.

Twenty years later, I visited the patch of first planting. Where once was a bare hillside, there is a true forest, a rich ecosystem full of birds, animals and insects. The trees are over five metres high.

Bruce did not chase accolades, but he was an adviser to Prime Ministers and premiers. He was awarded the SAGE Award as the Senior Australian for the Generation of the Environment. He was awarded the OAM medal. He died at the age of 97, having lived a life of small daily achievement. His legacy throughout the valley that he loved is unmissable.

Sometimes we achieve great things by single actions. But most of the time greatness is achieved by thousands of small ones. What seeds can you plant daily that will amount to something special?

‘Continuous, unflagging effort, persistence and determination will win. Let not the man be discouraged who has these.’
– James Whitcomb Riley

Supporting Carevan

(<https://fitz.com.au/supporting-carevan/>)

Grandchildren – Don't S...

(<https://fitz.com.au/grandchildren-dont-spoil-them/>)



Tweed Regional Museum

17 October · 🌐

👉 Fight for the Right, the Museum's newest exhibition, explores activism and protest in the Tweed Shire, including the personal stories of locals involved in campaigns and their quest to stand up for what they believe is right!

👉 Bruce Chick OAM was an avowed "Greenie" and became known as the "Tree Man" after organising the planting of the Captain Cook Bicentenary Forest at Murwillumbah High School in May 1970. This joint venture with the Forestry Commission and the Murwillumbah Chamber of Commerce involved the whole school. The students and staff planted seven hundred and fifty Hoop Pine, Slash Pine and Flooded Gum in twelve minutes, and this wonderful feat of organisation was seen on TV.

👉 Bruce was a foundation member and Vice President of the Tweed-Brunswick Reafforestation Committee, formed in 1976 and responsible for distributing about two million subsidised tree seedlings to local landowners.

👉 Bruce was an active supporter of the struggle to get World Heritage recognition of Wollumbin / Mt Warning and the Border Ranges and was involved in the protests to save Terania Creek.

👉 Bruce joined the Tweed Valley Conservation Trust's attempts to save Ukerebagh Island from development. When he became President of the Trust in 1981, he promoted the protection of Stotts Island by the planting of trees in the area. This became a cooperative effort with Tweed Shire Council and many volunteers. Council named the two-kilometre corridor of native rainforest species the "Bruce Chick Conservation Park" in recognition of his work.

👉 In 1984, he was awarded "NSW Tree Farmer of the Year" by the Australian Forest Development Institute and their President's special award of "Man of the Trees". In 1988 he received the Order of Australia Medal (OAM) for conservation and, in 1998, the title of Senior Australian Guardian of the Environment (SAGE). Sadly, Bruce passed away in 2007.

📷 Bruce Chick, Stotts Island, year unknown.

[#FightfortheRight](#) [#TweedRegionalMuseum](#)

Murwillumbah High School

From Wikipedia, the free encyclopedia

Murwillumbah High School, (abbreviated as **MHS**) is a [government-funded co-educational comprehensive secondary day school](#), located on Riverview Street in [Murwillumbah](#), in the [Northern Rivers](#) region of [New South Wales](#), Australia.

Established in 1929, the school enrolled approximately 440 students in 2018, from [Year 7](#) to [Year 12](#), of whom nine percent identified as [Indigenous Australians](#) and six percent were from a [language background other than English](#).^[2] The school is operated by the [NSW Department of Education](#); the [principal](#) is Peter Howes.^{[1][3]}

Contents [hide]
1 History and campus
1.1 1924
1.2 1928
1.3 Symbols
2 Notable alumni
3 See also
4 References
5 External links

History and campus [[edit](#)]

1924 [[edit](#)]

After much deliberation and discussion, the Department has resumed an area of about eight acres on Hartigan's Hill as the site for the new High School. Every day the optimists make a trip to the site to see what progress has been made with buildings, but, so far, the Department has not seen fit to make any use of the newly acquired site.

1928 [[edit](#)]

The foundation stone of the new High School buildings was laid on March 17 in the presence of a large gathering of parents and students. An untimely thunderstorm just failed to mar the proceedings, for when the Minister of Education inspected the Guard of Honour, comprising Girl Guides and Boy Scouts, the sun had just broken through.

Murwillumbah High School was made a "full" high school in 1929 and moved into its current site in that year with the opening of a three-storey complex which has become a well-known landmark in Murwillumbah.^[4]

Since 1929 many buildings have been added with major development beginning in the 1960s. In 1992 a new Library was opened and in mid-1997 the Multi-Purpose Centre/Hall was opened and dedicated as "*The Elliott Centre*", after a previous Principal of the school, Joe Elliott.

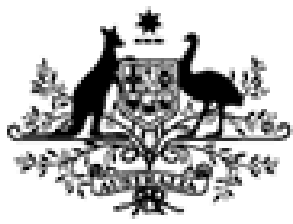
The school is built on the side of a hill, creating several floor levels across the school. Construction began in 1969 and continued over the following 3 years, culminating in a school that would meet the needs of the years to come. During this time the school's librarian and careers advisor **Bruce** Chick initiated the planting of a large [Hoop Pine](#) forest on the southern edge of the school. It was planted in 1970 as a [Cook Bicentennial](#) project. Students from the school were given the opportunity to plant a tree as a part of the commemoration. The original intention was to sell the timber from the plantation when the trees had reached maturity. The leadership of the school during these years fell to Joe Elliot and Bill Dowdell. The latter, in particular, is remembered with great affection by former students.

Captain [James Cook](#) had sighted, mapped and named [Mount Warning](#) in the Murwillumbah area as he sailed up the coast in 1770 and the fortnightly school newsletter 'Endeavour', is named in honour of his ship.^[4]

Development became the focus of attention during the early 1990s, when the school population peaked at 1,300 before the opening of Wollumbin High School, which then relaxed school capacity numbers.^[4]

Appendix C

Protected Matters Search Tool (PMST) Report



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 06/08/21 14:55:56

[Summary](#)

[Details](#)

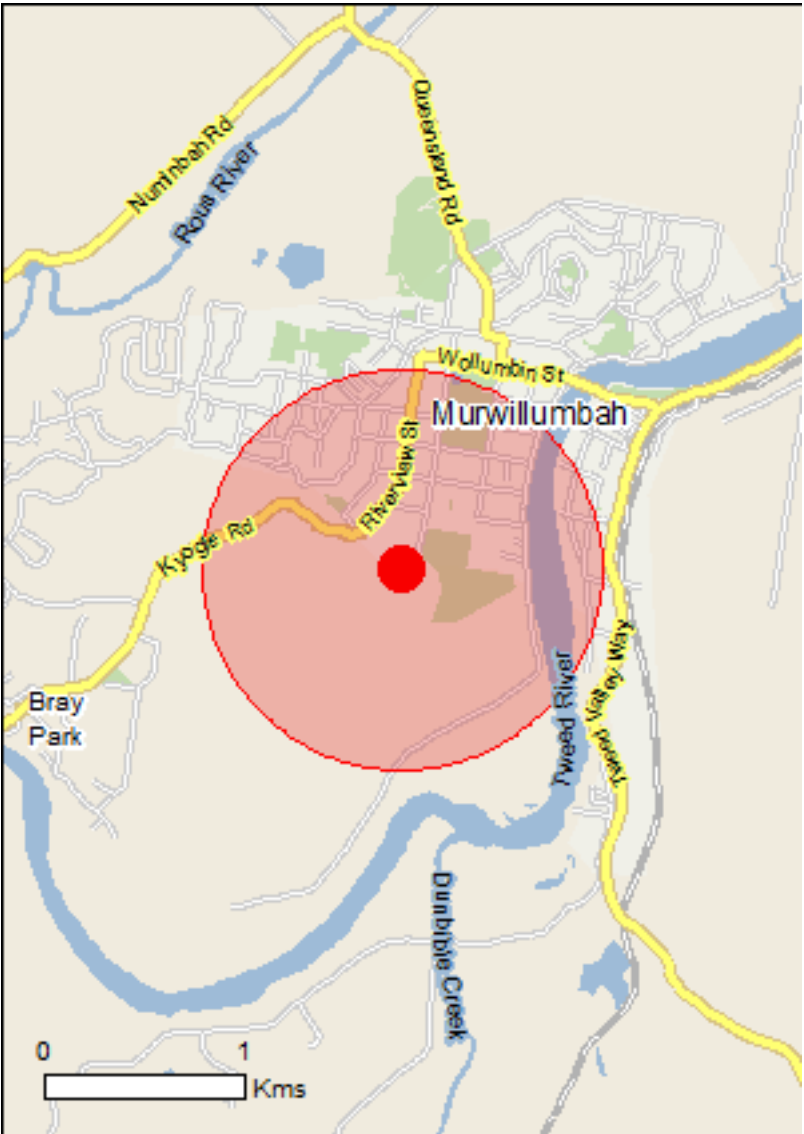
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

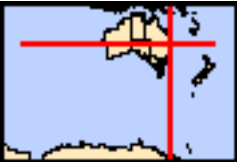
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

[Buffer: 1.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	72
Listed Migratory Species:	37

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	42
Whales and Other Cetaceans:	1
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	35
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat likely to occur within area
Thinornis cucullatus cucullatus Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat may occur within area
Frogs		
Mixophyes fleayi Fleay's Frog [25960]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within area
Insects		
Argynnis hyperbius inconstans Australian Fritillary [88056]	Critically Endangered	Species or species habitat likely to occur within area
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Acronychia littoralis Scented Acronychia [8582]	Endangered	Species or species habitat may occur within area
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat likely to occur within area
Baloghia marmorata Marbled Balogia, Jointed Baloghia [8463]	Vulnerable	Species or species habitat likely to occur within area
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat may occur within area
Davidsonia jerseyana Davidson's Plum [67219]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Desmodium acanthocladum Thorny Pea [17972]	Vulnerable	Species or species habitat likely to occur within area
Diploglottis campbellii Small-leaved Tamarind [21484]	Endangered	Species or species habitat likely to occur within area
Endiandra floydii Floyd's Walnut [52955]	Endangered	Species or species habitat likely to occur within area
Fontainea australis Southern Fontainea [24037]	Vulnerable	Species or species habitat likely to occur within area
Gossia fragrantissima Sweet Myrtle, Small-leaved Myrtle [78867]	Endangered	Species or species habitat likely to occur within area
Hicksbeachia pinnatifolia Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Boppel Nut, Ivory Silky Oak [21189]	Vulnerable	Species or species habitat likely to occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat may occur within area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat may occur within area
Marsdenia longiloba Clear Milkvine [2794]	Vulnerable	Species or species habitat may occur within area
Ochrosia moorei Southern Ochrosia [11350]	Endangered	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Randia moorei Spiny Gardenia [10577]	Endangered	Species or species habitat known to occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat likely to occur within area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat likely to occur within area
Syzygium hodgkinsoniae Smooth-bark Rose Apple, Red Lilly Pilly [3539]	Vulnerable	Species or species habitat likely to occur within area
Syzygium moorei Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple [12284]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Tylophora woollsii [20503]	Endangered	Species or species habitat likely to occur within area

Reptiles

Name	Status	Type of Presence
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Coeranoscincus reticulatus Three-toed Snake-tooth Skink [59628]	Vulnerable	Species or species habitat may occur within area
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat likely to occur within area
Migratory Marine Species		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur

Name	Threatened	Type of Presence
Motacilla flava Yellow Wagtail [644]		within area Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area

Extra Information

Regional Forest Agreements	[Resource Information]
Note that all areas with completed RFAs have been included.	
Name	State
North East NSW RFA	New South Wales

Invasive Species	[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.	

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species

Name	Status	Type of Presence
Sturnus vulgaris Common Starling [389]		habitat likely to occur within area Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-28.33557 153.39139

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Appendix D

BCD correspondence



Our Ref: DOC21/334516
Your Ref: SSD 16848913

Team Leader Infrastructure Assessments
Planning and Assessment Group
Locked Bag 5022
Parramatta NSW 2124

Attention: Mr Dimitri Gotsis, Senior Planning Officer

Dear Mr Maslen

RE: Revised BDAR Waiver Request - Murwillumbah Education Campus (SSD-16848913)

Thank you for your e-mail dated 27 September 2021 about the revised Biodiversity Development Assessment Report (BDAR) Waiver Request for the Murwillumbah Education Campus at Murwillumbah 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 Department's guidance on how to apply for a BDAR waiver for Major Projects, available [here](#), advises that a BDAR waiver will only be issued in limited circumstances where it is clearly demonstrated, based on information provided in accordance with the fact sheet, that the proposed development is not likely to have any significant impact on biodiversity values. For example, internal works to an existing building or development on a brownfield site with no threatened species habitat. Development that requires clearing of native vegetation is likely to require a BDAR. If there is doubt regarding potential impacts, or where information is not made available, a BDAR waiver will not be issued.

We have reviewed the BDAR Waiver Request and identified several areas where further information is required to demonstrate that the proposed development is not likely to have any significant impact on biodiversity values. These are discussed in detail in **Attachment 1** to this letter.

We recommend that further information is provided in the Request as outlined below. However, based on our review it appears that there will be biodiversity impacts arising from the proposal given the extent of clearing, even though this involves landscaped areas and a hoop pine plantation. Further, there may be impacts on microbats resulting from the demolition of existing buildings.

In summary, the BCD recommends:

1. The BDAR Waiver Request is updated to:
 - a. document the extent of clearing required including for bushfire asset protection zones, the new building footprints, carparking, bus stops, driveways, roads, and other infrastructure.
 - b. clearly identify what native species/vegetation communities are to be removed, including the plantation plantings and their locations and all threatened plant species.

- c. discuss whether the vegetation areas such as 'strips of vegetation' should have a PCT assigned.
- d. include evidence, such as historical imagery, to demonstrate that the vegetation has been planted within the study area.
- e. confirm that a thorough assessment of tree habitat features (tree hollows, fissures, loose bark and the like) has been undertaken and any trees that could provide habitat for threatened species such as microbats have been considered.
- f. demonstrate that appropriate survey effort for microbats has been undertaken. This must be done during suitable survey conditions and reference should be made to the Department's relevant survey guidelines to ensure the survey effort and techniques employed are adequate to consider the likelihood of threatened microbats being present at the site and the associated impacts. The survey should be undertaken over three nights with minimum temperatures 12 degrees or above. The Request should include an expert analysis of the bat detector recordings.

2. Based on the revised information above the BDAR Waiver Request should:

- a. consider the impacts on potential food resources for threatened species (including the Koala, Grey-headed Flying fox and Rose-crowned Fruit Dove) as a result of the proposal.
- b. consider any increases in traffic and the potential for vehicle strikes on threatened animals including Koala.
- c. consider impacts on the existing connectivity along the south western boundary of the site, particularly its importance for Koala.
- d. consider the potential for any impacts on the third order stream to the south of the site and the likelihood and extent of any remaining impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.

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



1 October 2021

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

Enclosure: Detailed BCD Comments – Revised BDAR Waiver Request for the Murwillumbah Education Campus

Attachment 1: Detailed BCD Comments – Revised BDAR Waiver Request for the Murwillumbah Education Campus

The Biodiversity and Conservation Division (BCD) has reviewed the Revised Biodiversity Development Assessment Report (BDAR) Waiver Request for the Murwillumbah Education Campus at Murwillumbah prepared by EMM dated 3 September 2021.

Comments are provided below with reference to the Department's guidance on how to apply for a BDAR waiver for Major Projects.

Vegetation Abundance 1.4(b) BC Regulation

The assessment requires a description of the areas that will be directly impacted (including non-native vegetation) by all aspects of the proposal. It should consider how the proposed development avoids impacts on native vegetation and should identify the likelihood and extent of any remaining impacts, including removal of isolated or cultivated native plants.

There is insufficient information in the BDAR Waiver Request to document this. The Request includes a flora species inventory and mapping of vegetation zones in Figure 1, but it does not describe or quantify what vegetation will be retained and what vegetation will be impacted, including for bushfire protection. We question, for example, the species composition of the areas labelled 'strips of vegetation' and 'planted native vegetation' in Figure 1 and whether these should be assigned a Plant Community Type (PCT).

We note the Arborist Report states that *"conclusions reached during a bushfire assessment were to reduce the parcel size to less than one hectare of the Bruce Chick Pine Forest. Specifically, the recommendations are to remove at least 200 square metres of vegetation on the eastern side of the plantation, avoiding removal on steep slopes (>18 degrees). The vegetation contained within this parcel has been noted as 'to be confirmed' (TBC)".* Table 1 in the Arborist Report lists approximately 110 Hoop Pines (*Araucaria cunninghamii*) as TBC under the Retain column.

The Request should document the extent of clearing required, including for bushfire asset protection zones, the new building footprints, carparking, bus stops, driveways, roads and other infrastructure. It should clearly identify what native species are to be removed and their locations and justify whether the vegetation areas such as 'strips of vegetation' should have a PCT assigned.

The total numbers and locations of the seven threatened plant species recorded on the site should be identified and mapped, and information provided on the number(s) of each threatened plant that will be retained and removed. We note there are numerous BioNet records for *Diploglottis campbellii* and *Macadamia tetraphylla* across the Tweed River to the east of the site. Macadamia species can be hard to distinguish. These species are naturally found in riverine rainforest in the Tweed Valley and the vegetation on the site could form part of remnant native vegetation rather than being planted. The Request should also justify the nature of this vegetation.

Vegetation integrity 1.5(2)(a) BC Act

This requires an assessment of the vegetation integrity and any impacts on vegetation integrity of identified plant communities. We note the Request states that no naturally occurring native vegetation occurs at the site and it has been highly modified from its natural state. However, as above, the Request should include details on the vegetation that will be impacted, including planted native vegetation, and any changes that will impact on the vegetation integrity of these areas, such as increased mowing and resulting loss of understorey species. It could also discuss the positive improvements that may result from the project such as increased weed control or enhancements to planted areas.

Habitat suitability 1.5(2)(b) BC Act

This requires an assessment of the degree to which the habitat needs of threatened species are present at a particular site. It must identify any threatened species, ecological communities, or their habitats, on the development site, describe how the proposed development avoids impacts on habitat suitability and identify the likelihood and extent of any remaining impacts. This includes the impacts of development on human-made structures and non-native vegetation that could provide habitat for threatened species, and includes modification (e.g. noise, light, etc.) of the habitat.

The proposal includes the demolition of Building Blocks B, C, D, E, G, H, M, P, S and AW and refurbishment of Buildings A and F. Such human-made structures can provide habitat for microchiropteran bats (microbats). The survey for microbats occurred on two dates in August 2021. We note it included searching for evidence of microbat activity around the building perimeters, with an endoscope camera and then hand-held bat detector and dusk emergence survey. However, no evidence of microbats was found including using the bat detector. The use of the handheld bat detector and dusk emergence survey occurred between 5:20pm and 6:30pm on 26th August 2021.

Microbats are inactive in cool weather and should be surveyed in warmer months (October to March). The Department's Threatened Biodiversity Survey Guidelines Working Draft 2004 (available [here](#)) states that even if sampling can only be carried out in one season, it must be undertaken over a reasonable time period to maximise the chance of detecting microbat species. The fact that no microbats at all were recorded indicates that the surveys were not undertaken at a suitable time to detect them. Several other microbats could be present and utilise the structures on the site including the Little Bent-winged bat (*Miniopterus australis*).

The BCD considers greater survey effort for microbats is required under suitable survey conditions to demonstrate that there are no threatened microbats utilising habitat on the site. Advice from a BCD bat specialist is that a bat detector and dusk emergence survey should be undertaken over three nights. This should record minimum temperatures, which should be 12 degrees or above, and weather conditions. Surveys should not be undertaken if there is strong wind, heavy rain or a full moon. Echolocation call detection should be conducted for a minimum of four hours on each night, however recording for the entire night is recommended. The surveys should target all structures likely to harbour roosting microbats. The echolocation call detection results should be analysed by an expert in bat detector recording analysis.

The Request identifies seven threatened flora species but does not describe if they will be retained. It states that although these species are indigenous to northern NSW, they are also widely cultivated and planted in northern NSW and that evidence from construction of existing buildings, landscape gardening and historical imagery indicates these species have been planted within the study area. However, the Request does not provide any evidence such as historic imagery to support the conclusion that these threatened species were planted.

Southern myotis (*Myotis macropus*) is a species credit species. As the proposed development is within 200m of a waterbody that is greater than 3 m in width according to Nearmap imagery (i.e. the third order stream to the south of the site), consideration should be given to the likelihood of this species using habitat on the site. If permanent water is present in this waterbody and any of the PCTs associated with the species occur on the site, then targeted bat surveys for this species in accordance with the Department's 'Species Credit' threatened bats survey guide (available [here](#)) should be undertaken.

Flying foxes feed on a variety of native and introduced plants but preferentially on the pollen of native eucalypts. The Request states that fauna habitat is highly limited, with a lack of structural attributes, tree hollows and foraging resources, owing to the cleared and modified nature of the site. However, numerous species listed in the flora species inventory in the Request are species that are known to be part of the diet of flying-foxes in northern NSW according to the Department's Best practice guidelines for the grey-headed flying-fox (available [here](#)). The flora species listed are also likely to provide foraging resources for frugivorous birds such as the Rose-crowned Fruit Dove. The Request states that Koalas are unlikely to occur at the site despite some suitable feed trees species being

present. We note there are recent Koala BioNet records (2018 and 2019) with 1 km of the site to the west and north west and the flora species list includes several Koala feed trees.

As the Request does not identify which flora species will be removed, and which will be retained, the potential food resources for threatened species (including the Koala, Grey-headed Flying fox and Rose-crowned Fruit Dove) that will be impacted as a result of the proposal cannot be assessed. Further information is required to address this section.

The Request states no hollow bearing trees are present. Tree hollows and tree crevices can provide habitat for microbats. The Arborist Report identifies some larger diameter trunk trees being Camphor laurel (over 2m) and Jacaranda (over 1m) but does not provide any age class information or tree hollow assessment. Further information on the assessment of tree habitat features such as hollows and tree fissures for the trees to be removed should be provided to support the conclusion that these habitat features are not present and therefore will not be impacted.

Threatened species abundance 1.4(a) BC Regulation

This requires an assessment of the occurrence and abundance of threatened species, threatened ecological communities, or their habitat, at a particular site. It should consider how the proposed development avoids impacts on threatened species abundance and identify the likelihood and extent of any remaining impacts including:

- impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community
- Impacts on threatened species, for example, microbats, associated with the demolition of humanmade structures
- Impacts on threatened species habitat associated with non-native vegetation
- Impacts on threatened species habitat associated with non-natural water bodies

As discussed above, the Request does not provide sufficient information on what vegetation (both native and non-native) will be removed and what will be retained. Therefore, there is insufficient justification that there will be no impacts on threatened species abundance. Consideration should be given to any increases in traffic and the potential for vehicle strikes on threatened animals including Koala.

Habitat connectivity 1.4(c) BC Regulation

This requires an assessment of the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range. The assessment should describe how the proposed development avoids impacts on habitat connectivity and should identify the likelihood and extent of any remaining impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.

The Request suggests the planted vegetation is isolated and is not considered important to the movement of threatened species across their range. Although the plantation area does not contain Koala feed trees, the Koala is known to use other trees for shelter and this area forms part of a corridor to the Tweed River. The Request should document how much vegetation will be retained in the plantation area and consider how this will impact on the existing connectivity of this area, particularly in the connections to the Tweed River and vegetation in the north west, and its importance for Koala.

Threatened species movement 1.4(d) BC Regulation

This requires consideration of threatened species movement and the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle. As noted above there is potential for impacts on connectivity. The proposal could also result in obstructions to fauna movement (for example if the perimeter of the Campus is to be fenced).

The Request should describe how the proposed development avoids impacts on threatened species movement and identify the likelihood and extent of any remaining impacts of development on movement of threatened species that maintains their lifecycle.

Water sustainability 1.4(f) BC Regulation

This requires an assessment of the degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site. The Request states that no waterbodies or waterways supporting threatened species occur in the vicinity of the site. However, a third order stream is within 100 m of the site to the south.

The Request should consider the potential for any impacts on water sustainability and the likelihood and extent of any remaining impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.

BCD Recommendations

In conclusion, the BCD recommends the BDAR Waiver Request is updated to:

- a. document the extent of clearing required including for bushfire asset protection zones, the new building footprints, carparking, bus stops, driveways, roads, and other infrastructure.
- b. clearly identify what native species/vegetation communities are to be removed including the plantation plantings and their locations, and all threatened plant species.
- c. discuss whether the areas vegetation such as 'strips of vegetation' should have a PCT assigned.
- d. include evidence, such as historical imagery, to demonstrate that the vegetation has been planted within the study area.
- e. confirm that a thorough assessment of tree habitat features (tree hollows, fissures, loose bark and the like) has been undertaken and any trees that could provide habitat for threatened species such as microbats have been considered.
- g. demonstrate that appropriate survey effort for microbats has been undertaken. This must be done during suitable survey conditions and reference should be made to the Department's relevant survey guidelines to ensure the survey effort and techniques employed are adequate to consider the likelihood of threatened microbats being present at the site and the associated impacts. The survey should be undertaken over three nights with minimum temperatures 12 degrees or above. The Request should include an expert analysis of the bat detector recordings.

2. Based on the revised information above, the BDAR Waiver Request should be updated to consider:

- a. the impacts on potential food resources for threatened species (including the Koala, Grey-headed Flying fox and Rose-crowned Fruit Dove) as a result of the proposal.
- b. any increases in traffic and the potential for vehicle strikes on threatened animals including Koala.
- c. impacts on the existing connectivity along the south western boundary of the site and threatened species movement, particularly its importance for Koala.
- d. the potential for any impacts on the third order stream to the south of the site and the likelihood and extent of any remaining impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.

Appendix E

Anabat analysis



CORYMBIA ECOLOGY

Amy Rowles
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ABN 61854031078

BAT CALL ANALYSIS RESULTS

EMM – Murwillumbah- 1-3/11/2021

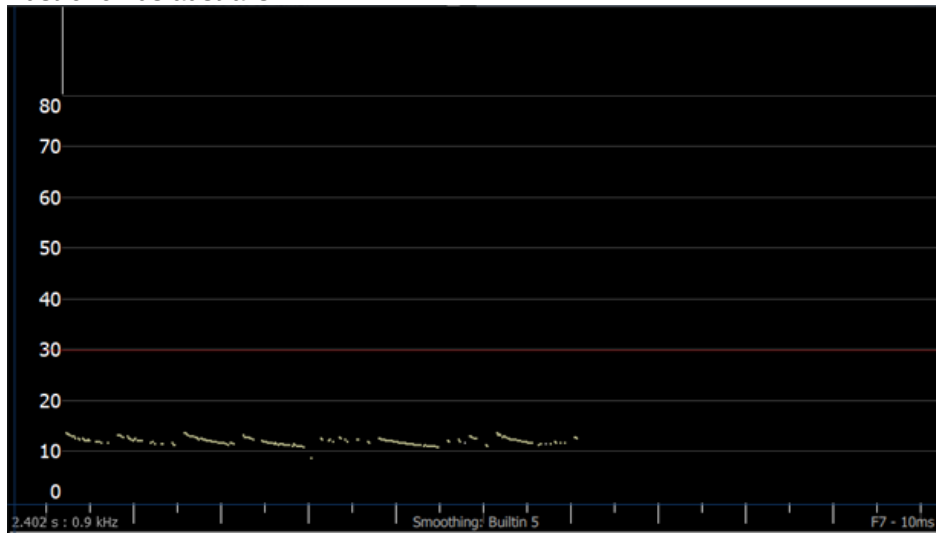
Species	ID confidence for each detector (number of passes)			Overall ID Confidence for the site	Notes
	A1	A2	A4		
<i>Austronomus australis</i>	D (3)	Pr (1)		D	
<i>Chalinolobus morio</i> / <i>Vespadelus</i> <i>sp.</i>			E(1)	E	Poor quality pass
<i>Scotorepens orion</i> / <i>Scoteanax</i> <i>rueppellii</i>		E(1)		E	
<i>Miniopterus australis</i>	Pr (2)	D(7); Pr (1)		D	
<i>Miniopterus orianae oceanensis</i>	D(1); Pr(7)	D(6); Pr(1)		D	
<i>Mormopterus (Ozimops) ridei</i> (previously species 2)	D(19); Pr(21)	D(5)		D	
<i>Mormopterus (Ozimops)</i> <i>lumsdenae</i>	D(48)	D (31)		D	Passes between this species and <i>Saccolaimus flaviventris</i> can be difficult to distinguish. Some passes and even pulses within passes satisfy diagnostic characteristics of both species. The harmonics recorded on a few pulses do not resemble <i>S. flaviventris</i> . A large number of the passes are quite flat at about 20, with the more curved ones mainly up a bit higher 22-23, which is a little high for <i>S. flaviventris</i> . The pulses are not highly consistent from one to the next, more like a freetail bat. Overall the passes more closely resemble <i>O. lumsdenae</i> , but I am unable to confidently give an ID due to my lack of experience with <i>O. lumsdenae</i> calls. A sample of passes were sent to Greg Ford for a second opinion, of which the calls were given a positive identification of <i>Ozimops lumsdenae</i> . Earliest pass was recorded at 18-29-06.
<i>Rhinolophus megaphyllus</i>		D(1)		D	

Note: only calls identified a definite should be entered in Bionet

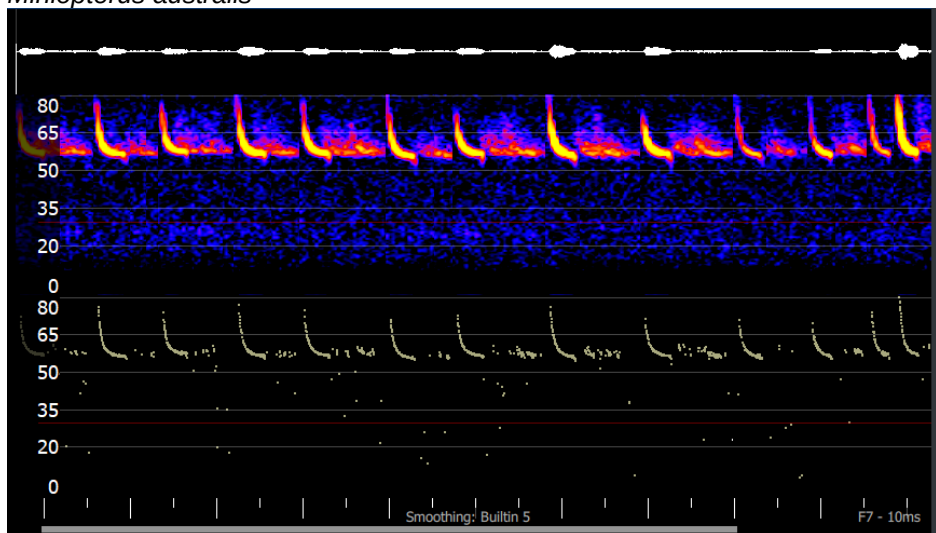
- D – definite; Pr – probable; Po – possible; E-either.
- Calls were analysed using Anabat Insight.
- Example calls presented below are displayed in this report at F7.
- Analysis was completed on the 27 November 2021.
- The following resources were consulted during analysis:
 - Pennay M., Law B., and Reinhold L. (2004) Bat Calls of NSW. DEC of NSW.
 - Corben C. (2009) Anabat Techniques Workshop, Titley Scientific.
 - Personal experience analysing calls and collection of reference calls in NSW
 - Anabat Insight Workshop (2019), Titley Scientific and Balance Environmental.
 - Reinhold et.al. (2001) Key to the Bat Calls of South-East Queensland and North-East New South Wales.
 - Milne D. (2002) Key to the Bat Calls of the Top End of the Northern Territory.
 - Personal communication with Greg Ford and Anna McConnville.

Examples of calls for definite and probable identified species

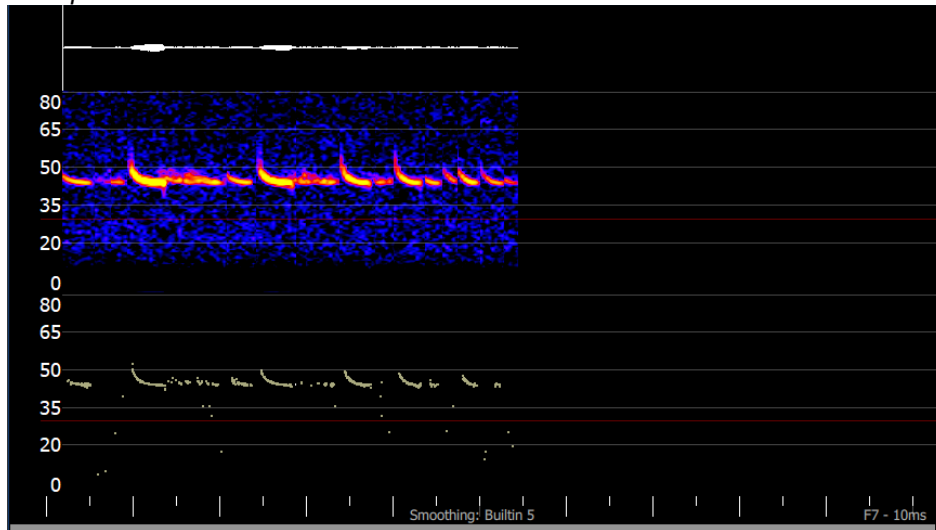
Austronomus australis



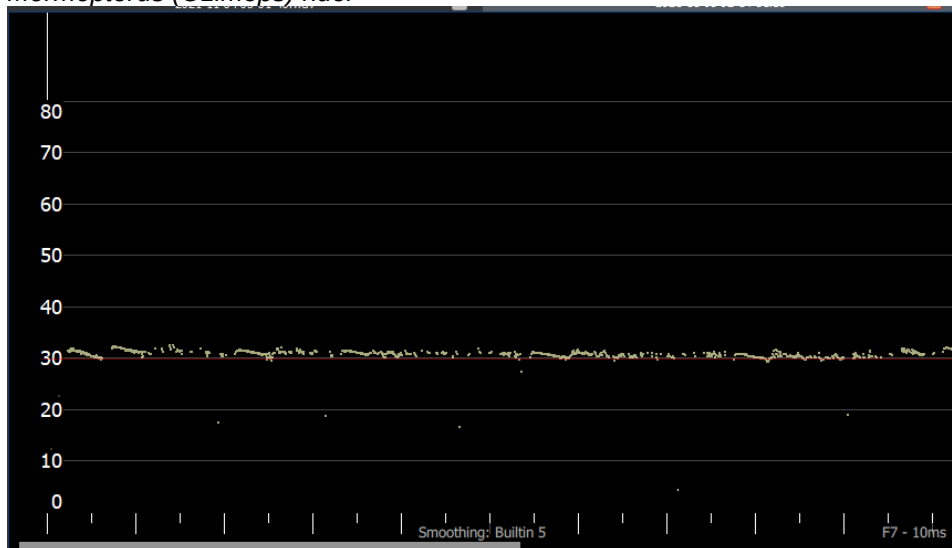
Miniopterus australis



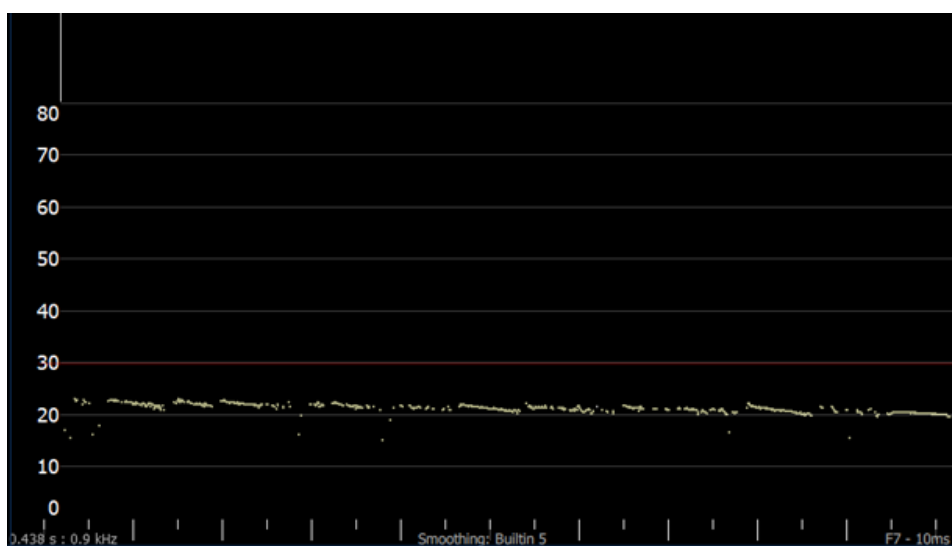
Miniopterus orianae oceanensis

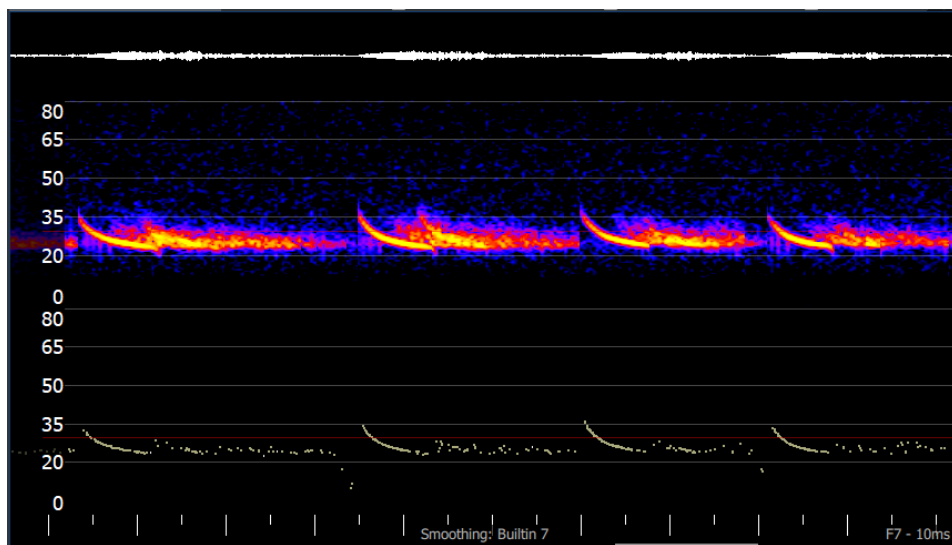
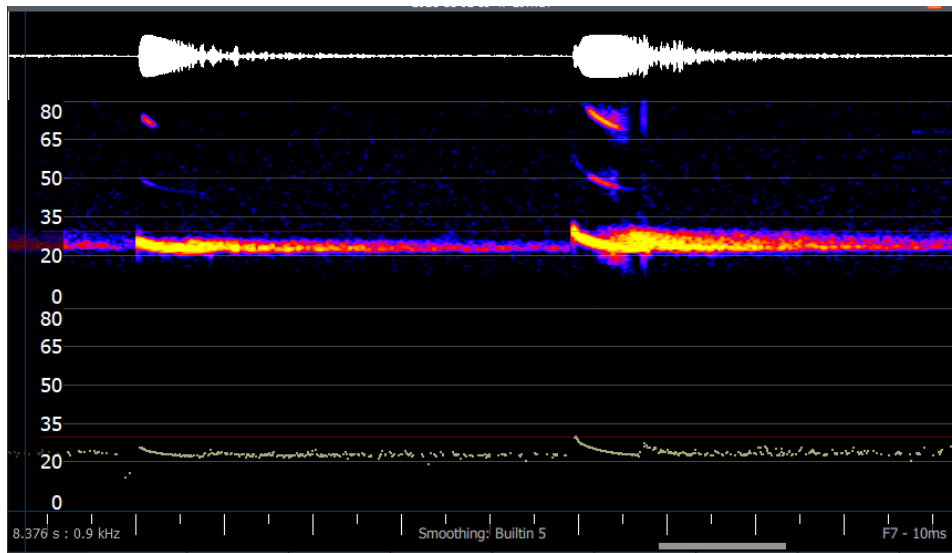


Mormopterus (Ozimops) ridei



Mormopterus (Ozimops) lumsdenae





Rhinolophus megaphyllus

