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**Skala Australasia Pty Ltd
Byron Bioenergy Facility
Environmental Impact Assessment
45 Wallum Place, Byron Bay**

Jackson Environment and Planning Pty Ltd
Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060
T: 02 8056 1849 | E: admin@jacksonenvironment.com.au
W: jacksonenvironment.com.au

This Environmental Impact Statement has been prepared by the following staff of Jackson Environment and Planning Pty Ltd, Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060; in association with Trinity Consultants (Air Noise Environment), Land Eco Consulting, Bushfire Risk Pty Ltd, Benbow Environmental, Everick Heritage, Waves Acoustic Consulting Pty Ltd, Douglas Partners Pty Ltd, Varga Traffic Planning Pty Ltd, Moir Landscape Architecture Pty Ltd and Northern Tree Care.

Author 1: Erik Larson, Senior Consultant, B.Sc., CPESC.

Author 2: Chloe Rich, Senior Consultant, B.Mrnc.Sc (Hons I).

Author 3: Angus Johnston, Principal Consultant, B.Eng. (Hons), Masters Environmental Management (UNSW).

Author 4: Dr Mark Jackson, Director and Principal Consultant, B.Sc (Hons), PhD, Grad. Cert. Mgmt., Exec. Masters Public Admin.

We declare that: The statement has been prepared in accordance with clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

The statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and the information contained in the statement is neither false nor misleading.

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Executive Summary

This Environmental Impact Statement (EIS) has been prepared by Jackson Environment & Planning on behalf of Byron Shire Council (BSC) to support the development application for a resource recovery facility (anaerobic digestion and composting) and associated electricity generation works. This EIS has been prepared pursuant to the Secretary's Environmental Assessment Requirements (SEARs) for the proposed development (1471), which was issued by the NSW Department of Planning, Industry and Environment on 3 August 2020.

BSC proposed to construct and operate a best practice Bioenergy Facility (BEF) that can receive and process up to 28,000 tonnes of organic wastes from local communities and biosolids from the Byron Bay Sewage Treatment Plant (BBSTP). During operation, the BEF will capture biogas (the result of organic waste processing) and generate sustainable energy for use at the BBSTP and the BEF itself. It will also produce various soil amendments suitable for use in landscaping and agricultural production.

The proposed BEF is in Byron Shire on the Far North Coast of New South Wales, about 800 kilometres north of the Sydney CBD and 200 kilometres south of the Brisbane CBD. The BEF will be located on the southern side of Wallum Place, Byron Bay, to the west of Bayshore Drive and adjacent to the existing infrastructure of the BBSTP, which is owned and operated by Byron Shire Council (BSC). The main BEF site comprises a small 100 by 60 metre portion (approximately 0.8 ha including access road) of the 104 ha contained in Lot 2, DP 706286.

Bioenergy production is attractive to BSC and its residents because it reduces organic waste disposed to landfill while using biogas derived from waste in place of fossil fuels to generate electricity. It therefore reduces greenhouse gas emissions from landfilling and from energy use, thus making a significant contribution towards local and state government net zero emissions targets.

BSC operates a composting facility located at the Byron Resource Recovery Centre that, under its Environmental Protection Licence (EPL), is restricted to processing green waste. There are no alternative solutions for the processing of source separated putrescible organic wastes, including food wastes, in the Byron Shire, resulting in this waste being transported long distances to neighboring shires and interstate for resource recovery or being landfilled (where it is not source separated).

Byron Shire Council has identified the need for a safe, economic, durable and functional solution for the waste management of Byron Shire Council's biosolids and other municipal organic wastes whilst offsetting electrical costs of operating the Byron Bay STP. A comprehensive site and technology selection process occurred over the last eight years to carefully consider the opportunity for local bioenergy production from organic waste in Byron Shire.

This EIS describes the environmental and social impacts of the proposed development and makes a comprehensive assessment of those impacts. The potential impacts were identified through and detailed review of the proposed site and development, review of the SEARs, and consultation with key stakeholders including the local community. The key potential impacts relate to:

1. Biodiversity
2. Air quality and odour
3. Traffic and Transport
4. Noise
5. Bushfire

Biodiversity

The original development design required the clearing of small patches of native vegetation within the lot. However, the design was altered to avoid clearing this vegetation. The retention and protection of all trees surrounding the proposed BEF site has been confirmed by an experienced, qualified Consulting Arborist. As a result, the development will only require the clearing of 0.52 hectares of non-native vegetation from the perimeter of the development footprint. No clearing of trees is required.

Mitchells Rainforest Snail is the only endangered species that occurs within the development footprint, with an additional four vulnerable species known or predicted to occur. An assessment of whether the proposed impacts on these species are serious and irreversible has been undertaken as part of this EIS. No threatened ecological communities occur within the development footprint. There will be no loss of any extent of threatened ecological community because of the proposed development.

It is unlikely there will be any appreciable indirect impacts on biodiversity arising from the proposal that have not been addressed in this EIS, especially when considering the nature and scale of the proposed development; the character of the study area; the historic disturbance and fragmentation, and maintenance of vegetation within the property in conjunction with the proposed impact mitigation measures. Only the direct impacts associated with vegetation clearing and construction of the proposed BEF will require biodiversity offsets according to the Biodiversity Assessment Method.

To provide legal certainty that the impacts on the Mitchells Rainforest Snail will not be considered significant under the *Environment Protection and Biodiversity Conservation Act 1999*, BSC submitted a referral to the Commonwealth Department of Agriculture, Water and the Environment on 7 June 2021.

Air quality and odour

The closest neighbours (not owned by BSC) are in a mixed-use development just under 500 meters east of the development that includes apartments and commercial premises. The nearest rural residential dwellings are over 1 km to the west and the closest low-density residential area is approximately 800 meters away on the eastern side of Bayshore Drive. A large buffer is provided by a nature reserve to the north, and wetlands and playing fields to the south associated with the Cavanbah Sport and Recreation Centre. A light industrial estate around Centennial Circuit is around 600m to the south east.

An Air Quality Impact Assessment was undertaken. CALPUFF Modelling System and The Air Pollution Model was used. This is based on *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW DEC, 2005). The odour impact assessment found impacts from the proposed development would be low and would not lead to a level of odour likely to be noticed in the surrounding environment. If cumulative odour impacts from the BBSTP and BEF do occur, the BEF biofilter can be retrofitted to increase its odour removal performance and increase odour dispersion.

Traffic and Transport

A Traffic and Transport Impact Assessment was undertaken for the proposed BEF. The SIDRA analysis of the Bayshore Drive/Wallum Place intersection indicated that it currently operates at Level of Service “A” during the morning and afternoon peak times. The additional traffic flows from the BEF development will not change the current Level of Service and will not result in any increase in total average vehicle delays.

The analysis indicates that the projected increase in traffic activity as a consequence of the proposed development will not have any unacceptable traffic implications in terms of road network capacity. The traffic volumes associated with construction of the BEF are expected to be lower than the operational traffic volumes. Therefore, construction traffic is unlikely to impact the surrounding road network.

Noise

A Noise and Vibration Impact Assessment (NVIA) was undertaken for the proposed BEF (Appendix H). Noised modelling using SoundPLAN v7.4 predicted no impacts from mechanical noise on nearby sensitive receivers. Mechanical services noise levels are mitigated by enclosure in technical corridors that attenuate the noise. Mechanical services noise levels will be reviewed during the detailed design of the facility to confirm compliance with *NSW Noise Policy for Industry* (NPI) 2017.

During standard construction hours minor exceedances of the noise management levels (< 4 dB) are predicted at the closest residential and commercial receivers surrounding the site. These small NML exceedances do not trigger the need for specialist noise control measures under the *Interim Construction Noise Guideline* (DECC, 2009); however, the construction contractor should develop a Construction Noise and Vibration Management Plan.

The impact of increased traffic noise along Wallum Place and Bayshore Drive was calculated using traffic volume data from a 2019 traffic study conducted by Rytenskild Traffic Engineering for the Habitat development on Wallum Place. The traffic in this area already exceeds the *NSW Road Noise Policy* (DECCW 2011) criteria; therefore, traffic associated with this project must not result in an increase of more than 2 dB. Given the relatively small increase in vehicle traffic to be caused by the project the predicted noise increase associated with operational and construction vehicle movements is expected to be less than 0.1 dB, satisfying the RNP criteria.

Bushfire

A Bushfire Risk Assessment (BRA) has been prepared (Appendix K) to determine category of bushfire attack and construction level in support of the Proposal. 'Bushfire attack level', or BAL, quantifies the level of bush fire risk for a development. The vegetation surrounding the proposed BEF is protected due to its biodiversity values. A small part of the proposed BEF sits within BAL-FZ (direct exposure to flames from fire front). Additional clearing is not proposed as the area is considered to have high biodiversity value. This EIS presents a range of mitigation measures to manage the bushfire risks identified.

The biogas storage dome is being constructed from a polyurethane membrane and thus is not consistent with general BAL-29 requirements as set out in the Building Codes of Australia. Therefore, additional bushfire suppression systems have been adopted to mitigate bushfire risk. The position of proposed BEF is the most suitable location considering bushfire threat, the size of the facility, APZ and infrastructure whilst still being able to retain the native vegetation. The largest setbacks are incorporated around the administration building and delivery areas where occupants will be furthest from the fire hazard. The APZ will be managed in perpetuity.

Justification

The proposed Byron Bioenergy Facility (BEF) will provide local processing capacity for the organic wastes already being source separated by the community, while making additional capacity available for the diversion of more waste from landfill as the population and economic activity in the area grows. It will also provide a secure supply of zero emission electrical energy that will meet the entire electrical energy demands of the BBSTP and export additional electricity to the grid.

By installing a long term, reliable, locally based organics recycling solution, the Byron Community will reduce their waste management costs and their impact on the environment. The proposed BEF will produce composted soil amendments locally. The nutrient value and quality of these soil amendments will exceed those produced at BSC's existing garden waste composting facility and will deliver significant soil health benefits to nearby agricultural lands.

CONTENTS

1. Introduction	10
1.1. Project Summary	10
1.2. The Proponent	10
1.3. Project Objectives.....	10
1.4. Site History and Approvals.....	11
1.5. Alternatives Assessment.....	11
1.5.1. Background Investigations.....	11
1.5.1. Design Development	13
1.5.2. Design Changes Informed by the EIS	13
1.6. Secretary’s Environmental Assessment Requirements (SEARs)	14
2. Project Description.....	19
2.1. Local and Regional Context.....	19
2.2. Project Site.....	19
2.3. Overview of Proposed Development.....	23
2.4. Process Description.....	26
2.4.1. Anaerobic Digestion Tunnels	28
2.4.2. Aerobic Composting Tunnels	28
2.4.3. Percolate storage and reuse	28
2.4.4. Gas Storage, CHP unit and flare.....	29
2.4.5. Other site features and services	29
2.4.6. Sustainability features	29
2.4.7. Quantities and sources of waste materials to be received.....	29
2.4.8. Power requirements	31
2.4.9. Water requirements	32
2.4.10. Sewerage requirements.....	33
2.4.11. Operational Hours and Access.....	33
2.4.12. Weighbridge operations	34
2.4.13. Operational Plant and Equipment	34
2.5. Construction	34
2.5.1. Construction Plant and Equipment.....	36
3. Planning and Legislative Requirements	38
3.1. Approval Pathway.....	38
3.2. Licenses and permits required.....	38
3.3. Commonwealth policy and legislation.....	38
3.3.1. Environment Protection and Biodiversity Conservation Act 1999	38
3.4. NSW Statutory Legislation and Policy	39
3.4.1. Environmental Planning and Assessment Act 1979.....	39
3.4.2. Environmental Planning and Assessment Regulation 2000.....	39
3.4.3. State Environmental Planning Policy (Infrastructure) 2007	40
3.4.4. State Environmental Planning Policy (State and Regional Development) 2011	41
3.4.5. Protection of the Environment Operations Act 1997	41
3.4.6. Biodiversity Conservation Act 2016	42
3.4.7. Protection of the Environment Operations (Waste) Regulation 2014	43

3.4.8.	State Environmental Planning Policy No 33: Hazardous and Offensive Development Assessment	43
3.4.9.	State Environmental Planning Policy (Koala Habitat Protection) 2019	44
3.4.10.	State Environmental Planning Policy No 55: Remediation of Land	44
3.4.11.	State Environmental Planning Policy (Primary Production and Rural Development) 2019	44
3.4.12.	State Environmental Planning Policy (Coastal Management) 2018	45
3.4.13.	Biosecurity Act 2015	45
3.4.14.	NSW Energy from Waste Policy Statement	46
3.4.15.	National Parks and Wildlife Act 1974 (NPWS Estate)	46
3.4.16.	Roads Act 1993	46
3.5.	Local Environmental Planning Instruments	47
3.5.1.	Byron Local Environmental Plan 2014 (Byron LEP 2014)	47
3.5.2.	Exception Request for Section 4.3 Height of Buildings	48
3.5.3.	Byron Development Control Plan 2014 (Byron DCP)	48
3.6.	Strategic drivers	57
	Environmental Assessment	59
4.	Social Impact Assessment and Consultation	59
4.1.	Methodology	59
4.2.	SEARs Consultation Requirements	60
4.3.	Community Consultation	60
4.4.	Existing Environment	61
4.5.	Results of Consultation	65
4.6.	Impact Assessment	67
4.7.	Recommendations	69
5.	Waste Management	70
5.1.	Methodology	70
5.2.	Existing Environment	70
5.3.	Impact Assessment	70
5.3.1.	Demolition and construction phase	70
5.3.2.	Construction phase	70
5.4.	Operational Phase	72
5.4.1.	Site Operations	72
5.4.2.	Biogas	73
5.4.3.	Resource Recovery Order and Exemption (RROE)	73
5.5.	Mitigation Measures	74
6.	Air Quality and Odour	76
6.1.	Methodology	76
6.2.	Existing Environment	76
6.3.	Impact Assessment	78
6.3.1.	Air Emission Sources	78
6.3.2.	Assessment Criteria	79
6.3.3.	Potential Emissions	80
6.3.4.	Results	81
6.4.	Mitigation Measures	85
7.	Noise and Vibration	88

7.1.	Methodology	88
7.1.1.	Baseline measurements.....	88
7.1.2.	Operational Noise Modelling.....	89
7.1.3.	Construction Noise Modelling	90
7.1.4.	Construction Vibration Assessment.....	92
7.2.	Existing Environment	92
7.3.	Impact Assessment	94
7.3.1.	Operational Activities/Equipment	94
7.3.2.	Construction Activities/Equipment.....	95
7.3.3.	Construction and Operational Vibration Impacts.....	96
7.4.	Mitigation Measures.....	96
8.	Soil and Water.....	98
8.1.	Methodology	98
8.2.	Existing Environment	99
8.3.	Impact Assessment	100
8.3.1.	Acid Sulfate Soil (ASS)	101
8.3.2.	Contamination	102
8.3.3.	Groundwater	103
8.4.	Mitigation Measures.....	104
9.	Hazard and Risk.....	106
9.1.	Scope.....	106
9.2.	Methodology	106
9.3.	Risk management	107
9.4.	Risk Criteria.....	107
9.5.	Qualitative measurement of consequence, likelihood and risk	108
9.6.	Site description	109
9.7.	Process.....	109
9.8.	Hazardous materials stored on-site.....	109
9.8.1.	Biogas.....	110
9.8.2.	Compost.....	110
9.8.3.	Other.....	111
9.9.	Further hazard identification, scenarios, consequence, likelihood analysis and risk assessment	113
9.10.	Conclusion.....	114
9.11.	Risks to the environment, people and property to be investigated in this EIS	125
10.	Bushfire	126
10.1.	Methodology	126
10.2.	Existing Environment	126
10.3.	Impact Assessment	128
10.4.	Mitigation Measures.....	131
11.	Traffic and Transport.....	132
11.1.	Methodology	132
11.2.	Existing Environment	133
11.2.1.	Road Network.....	133

11.2.2.	On-site Conditions	133
11.2.3.	Local Transport	134
11.3.	Impact Assessment	134
11.3.1.	Proposed Traffic Volumes	134
11.3.2.	Haulage Routes	134
11.3.3.	Road Network Capacity	136
11.3.4.	Parking Assessment	137
11.3.5.	Pedestrian/Cycling Infrastructure	137
11.3.6.	Construction Impacts	137
11.4.	Mitigation Measures	138
11.4.1.	Construction Traffic Management Plan	138
12.	Biodiversity	139
12.1.	Methodology	139
12.1.1.	Characterisation of Landscape and Floral Communities	140
12.1.2.	Fauna Survey Methods	140
12.2.	Existing Environment	141
12.2.1.	Landscape Features	141
12.2.2.	Native Vegetation	141
12.2.3.	Threatened Species	142
12.3.	Impact Assessment	143
12.3.1.	Serious and Irreversible Impacts	143
12.3.2.	Indirect Impacts	144
12.3.3.	Prescribed and Uncertain Impacts	144
12.4.	Mitigation Measures	148
12.4.1.	Biodiversity Offset Credits	151
13.	Landscape and Visual Assessment	153
13.1.	Methodology	153
13.2.	Existing Environment	155
13.3.	Impact Assessment	158
13.4.	Mitigation Measures	159
14.	Aboriginal Cultural Heritage	160
14.1.	Methodology	160
14.1.1.	Aboriginal Consultation	160
14.2.	Existing Environment	161
14.3.	Impact Assessment	161
14.3.1.	Heritage Register Searches	161
14.3.2.	Ethnohistorical Summary	163
14.3.3.	Previous Archaeological Assessments	163
14.3.4.	Values Assessment	163
14.3.5.	Summary of Impacts	163
14.4.	Mitigation Measures	164
15.	Compilation of Mitigation Measures	165
15.1.	Cleaner Production Principles	165
15.2.	Mitigation Measures and Strategies	165

15.3. Environmental Monitoring and Reporting.....	171
15.1. Continual Improvement.....	171
15.2. Ecological Sustainable Development.....	172
16. Cumulative Impacts	172
16.1. Assessment of stress level of existing environment and long-term impacts of the BEF	173
16.1.1. Social and community.....	173
16.1.2. Waste and sustainability.....	173
16.1.3. Air Quality	173
16.1.4. Noise and Vibration	173
16.1.5. Soil and Water	174
16.1.6. Visual and Landscape Character	174
16.1.7. Traffic.....	174
16.1.8. Bushfire, Hazards and Risk.....	174
16.1.9. Biodiversity	175
16.1.10. Heritage.....	175
16.2. Infrastructure requirements flowing from the proposal	175
16.3. Conclusion.....	175
17. Justification of the Proposal.....	176
Appendices.....	177
Appendix A – Secretary’s Environmental Assessment Requirements (SEAR 1471)	177
Appendix B – Site and Civil Plans.....	178
Appendix C – Capital Investment Valuation.....	179
Appendix D – Social Impact Assessment and Consultation Report.....	180
Appendix E – Site Waste Minimisation and Management Plan (SWMMP)	181
Appendix F – Traffic Impact Assessment.....	182
Appendix G – Air Quality Impact Assessment	183
Appendix H – Noise and Vibration Impact Assessment	184
Appendix I – Preliminary Site Investigation and Groundwater Assessment	185
Appendix J – Geotechnical Report	186
Appendix K – Bushfire Assessment	187
Appendix L – Visual Impact Assessment	188
Appendix M –Request for an exception to the building height limit	189
Appendix N – Biodiversity Report	190
Appendix O – Arborist Report	191
Appendix P – Aboriginal Cultural Heritage Assessment.....	192
Appendix Q – Concept Erosion and Sediment Control Plans	193
Appendix R – Acid Sulphate Soil Management Plan	194

1. Introduction

1.1. Project Summary

The proposed development will involve the construction and operation of a best practice Bioenergy Facility (BEF) that can receive and process organic waste from local communities and biosolids from the Byron Bay Sewage Treatment Plant (BBSTP). During operation, the BEF will capture biogas (the result of organic waste processing) and generate sustainable energy for use at the BBSTP and the BEF itself. A site plan is provided in Figure 2.4 and in Figure 2.5 showing an overview of the proposed development and operational areas.

Key features of the development include:

- A Receival Hall;
- Four Anaerobic Digestion Tunnels with biogas storage;
- Three Aerobic Composting Tunnels;
- A Biofilter;
- A Percolate Storage Tank with sand filter;
- A Combined Heat and Power (CHP) unit with biogas treatment and flare;
- Office and education facilities; and
- A car park to assist in traffic flow on the site.

The BEF will be located on the southern side of Wallum Place, west of Bayshore Drive, adjacent to the existing infrastructure of the BBSTP, which is owned and operated by Byron Shire Council (BSC). The main BEF site comprises a small 100 by 60 metre portion (approximately 0.8 ha including access road) of the land contained in Lot 2, DP 706286.

1.2. The Proponent

The proponent is Byron Shire Council (BSC).

1.3. Project Objectives

The main objective of the BEF is to achieve a safe, economic, durable and functional solution for the waste management of Byron Shire Council's biosolids whilst offsetting electrical costs of operating the Byron Bay STP. While similar projects are commonplace in the northern hemisphere, the BEF would represent a first for Australia because it uses dry fermentation to generate electricity from a wide range of organic feedstocks.

In summary, the objective of the proposed development is to construct and operate a state-of-the-art bioenergy facility that:

- Conforms with all applicable laws, regulations, and codes;
- Accepts and beneficially processes all the feedstocks proposed by Byron Shire Council;
- Produces beneficial composted products that (at a minimum) meet the Contamination Grade B and Stabilisation Grade A definitions within the NSW EPA *Environmental Guidelines: Use and Disposal of Biosolids Products*;

- Provides for controlled public exhibition of the facility (e.g. school tours, planned public visits) to enable greater public awareness and acceptance of these types of facilities;
- Considers future master planning of the existing STP site;
- Is designed to be easy to build, with low maintenance and operating costs.

1.4. Site History and Approvals

The lot where the BEF is proposed includes three existing developments:

- A sewage treatment plant, owned and operated by BSC;
- A solar array and supporting infrastructure, owned and operated by BSC; and
- A herb nursery, operated by Byron Bay Herb Nursery, a not for profit disability service charity.

The Byron STP was commissioned in 1990. The solar array was granted consent by BSC in August 2019 (DA 10.2019.216.1), with an occupation certificate issued in January 2020.

No previous development application has been made for a BEF or similar organic recycling facility on the proposed site.

1.5. Alternatives Assessment

Bioenergy production is attractive to BSC and its residents because it reduces organic waste disposed to landfill while using biogas derived from waste in place of fossil fuels to generate electricity. It therefore reduces greenhouse gas emissions from landfilling and from energy use, thus making a significant contribution towards local and state government net zero emissions targets.

BSC operates a composting facility located at the Byron Resource Recovery Centre that, under its Environmental Protection Licence (EPL), is restricted to processing green waste. There are no alternative solutions for the processing of putrescible organic wastes, including food wastes, in the Byron Shire, resulting in this waste being transported long distances to neighboring shires and interstate for resource recovery or being landfilled (where it is not source separated).

A comprehensive site and technology selection process occurred over the last eight years to carefully consider the opportunity for local bioenergy production from organic waste in Byron Shire.

The Byron Bay STP was identified as the preferred site for many reasons, with the preferred site access along the existing Wallum Place roadway.

1.5.1. Background Investigations

There have been a variety of studies and reports prepared in the last eight years that look at the opportunity of bioenergy production in Byron Shire through various technologies.

In 2013, a study was prepared that assessed bioenergy options for the northern rivers area.¹ The study looked at the main bioenergy technologies – direct combustion, pyrolysis and anaerobic digestion, as well as the main development models – at different scales including site specific, regional and by industry or sector. The study was based partly on feedstock types and availability. Anaerobic digestion was listed as a best fit technology for feedstock from some

¹ Regional Development Australia – Northern Rivers and University of Technology, Sydney, April 2013.

agricultural industries (piggeries and dairy), and for food processing wastes (coffee, dairy, meat, poultry, waste-water sludges).

In February 2016, Sustain Energy, a working group of Sustain Northern Rivers, held two workshops followed by a study that identified the forms of bioenergy that are most likely to be supported in a Biomass Hub in the Region. High regional community support for bioenergy emerged during this process, with anaerobic digestion being the most sought-after technology, followed by pyrolysis. Municipal garden waste and agricultural waste were the categories of feedstock that received the strongest support.²

In 2017, Byron Shire Council commissioned a Biomass Sources and Siting Assessment to identify potentially viable biomass streams in Byron Shire, consider preliminary siting options for a Biomass Hub, and to initiate community engagement for the development of social licence for this project. A Multi Criteria Assessment (MCA) considered a range of factors including site location, physical, social, environmental and economic criteria, then applied a weighting to each. The study reviewed preferred technology options for application in a Byron Shire Biomass Hub including anaerobic digestion (both wet and dry), combined heat and power (combustion), composting and/or thermal processes such as gasification or pyrolysis³.

The four sites that were initially deemed potentials were as follows:

- Myocum Transfer Station and quarry;
- Brunswick Valley STP;
- Bangalow STP; and
- Tyagarah Council/RMS property.

Upon further consideration, Council also deemed the Byron STP as a valid potential site.

An additional pre-feasibility study⁴ was commissioned by Council in early 2018 to evaluate BEF feedstocks, locations and processing technologies considering Council's objectives and the current bioenergy technology market. The study reviewed three primary bioenergy technology processes, potential Council facility locations and project execution pathways to carry forward to the end goal of a viable BEF.

The Byron Bay STP (BBSTP) and the Brunswick Valley STP (BVSTP) sites were evaluated and the Byron Bay STP site was identified as the preferred location for the BEF. Principally, the remote location of the BVSTP and its poor access through residential land made it less preferable to the BBSTP's central Shire location and existing placement adjacent to the Byron Arts and Industry Estate. A BEF located at the BBSTP would also be beneficial due to a decrease in overall regional transport of biomass waste and would be more compatible with surrounding land use and owners.

The study reviewed dry and wet anaerobic digestion (AD) options as the base processes for waste to energy (WtE) production utilising the available biomass. In addition to these core technologies, it also reviewed thermal processing technologies to be integrated into the core systems. As a result of this analysis the preferred option to carry forward into feasibility-level design and construction phases was the dry AD process.

During the pre-feasibility study, a Request for Expressions of Interest was issued to the market requesting proponents to come forward with proposals for BEF development. Sixteen (16) submissions were received, and five Proponents shortlisted. In early 2019 two of the five shortlisted proponents were selected to prepare Bankable Feasibility Studies, including detailed options analysis and a business case for the preferred option. As part of the due diligence process

² Northern Rivers Biohubs Project: A Project Looking To Optimise The Position Of The Northern Rivers Region In The Emerging Bio-Economy - 'First Order' Pre-Feasibility Study, Eco Waste Pty Ltd, May 2016.

³ Byron Shire Biomass Sources And Siting Assessment, Planit Engineering Pty Ltd, December 2017.

⁴ Byron Shire Bioenergy Project Pre-Feasibility Study, Byron Shire Council, May 2018

BSC staff inspected ten international bioenergy facilities where the proponents' technologies had been successfully implemented. The learnings and outcomes of this process were reported⁵ to council and led to the selection of the Bekon batch tunnel fermenter as the preferred technology.

1.5.1. Design Development

As part of a Bankable Feasibility Study, a Project Feasibility Risk / HAZID Workshop was conducted on 26 March 2019 by the Skala Australasia project team (Australian distributor of Bekon/Eggersmann technology). The residual risks were provided in the Project Feasibility Risk/HAZID Workshop Report, have been considered during concept design development, including the following:

- Grid export market access;
- Site Road Access;
- Feedstock(s) Quality (& Contamination);
- Product(s) Quality (& Contamination); and
- Product(s) Market access and reliability.

Skala Australasia also developed an engineering concept design report to look at multiple facility design scenarios based on an options analysis. Based on Council's requirements that the facility conform with all applicable laws, regulations, and codes, and that it can receive biosolids and other specific available feedstock, several technology options were developed using dry anaerobic digestion and aerobic composting.

In 2020, Byron Shire Council (BSC) commissioned a Concept Options Analysis Report to analyse associated cost estimates for various utility and road access alignments required to service the proposed Bioenergy Facility within the Byron Bay Sewage Treatment Plant (BBSTP)⁶ located adjacent to the proposed BEF.

To manage the risk that the outputs from the facility cannot be legally used as fuel or fertiliser after the BEF is built, Byron Shire Council commissioned the preparation of Resource Recovery Order and Exemption applications (RRO/RRE) for review and approval by the NSW EPA in parallel with the development application process⁷. The RRO/RRE application will be based on existing and historic characterisation of the waste inputs and the performance of a reference facility in Europe using the same technologies and similar inputs. If development consent is granted the intent is to obtain an in-principal approval for the specific RRO/RRE before the BEF is constructed.

1.5.2. Design Changes Informed by the EIS

During development of this EIS, changes to the BEF design were introduced to respond to issues raised in the specialist studies. Those studies that provided substantial influence into BEF design changes are outlined in Table 1.1 below.

An alternative dedicated truck access road was considered during the facility design process. The road would run along the eastern boundary of the lot to connect Wallum Place with Ewingsdale Road near the entrance to the Cavanbah Centre. It was found that this route would require significant clearing of vegetation and construction in area of high biodiversity value coastal wetlands and would therefore result in greater overall environmental impact than using Bayshore Drive and Wallum Place for truck access. It would also require over 1 km of road construction and a new

⁵ Byron Shire Bioenergy Facility Summary Report: Technical Site Inspections to Operational Dry Anaerobic Digestion Facilities, Byron Shire Council, October 2019.

⁶ Byron Bay Sewage Treatment Plant Bioenergy Facility Utilities and Road Options Analysis, Willow & Sparrow Pty Ltd, April 2020.

⁷ A Specific Resource Recovery Order and Exemption application is a requirement under Section 92 of the *Protection of the Environment Operations (Waste) Regulation 2014* to permit certain products manufactured from a waste material to be used as a fuel, fill or fertiliser on land.

intersection with Ewingsdale Road, impacting on traffic flow down Ewingsdale Road and the commercial viability of the project. For these reasons, this design option does not form a part of the proposed facility design.

Table 1.1. Design changes to the BEF based on EIS development and specialist studies.

Specialist Study	Issues that impact design	Design changes
Biodiversity	Biodiversity mapping showed high biodiversity value land and survey found critically endangered species.	The development was adjusted to remain inside the existing southern fence. Development was extended to no more than 15 m beyond western fence to avoid areas of high biodiversity value and existing trees in the northwest corner of the site.
Traffic	Corner of Wallum Place and Bayshore drive not suitable for >19m trucks. Internal access to receival hall and product storage area needed to be designed and reviewed.	Use of >19m trucks not proposed. Additional detailed design for internal roads to allow truck access and adequate swept paths whilst maintaining access to product storage area.
Air Quality	Initial concern about odour at nearest neighbour.	Detailed design of biofilter to ensure <500 OU/m ³ is consistently achieved to avoid any odour impacts on neighbours.
Noise and Vibration	Night-time noise exceedances for blowers are a risk.	Mitigated by suitable enclosure of the technical corridors which contain the blowers (attached to the compost and AD tunnels).
Preliminary Site Investigation, Sulfate Assessment, Baseline Groundwater & Acid Soil	High groundwater and potential acid sulfate soils.	Civil design minimised disturbance of groundwater and export of fill. Prepared Acid Sulphate Soil Management Plan (Appendix R). Where dewatering is required, additional water quality testing and treatment to occur prior to discharge.
Bushfire	Proximity to native vegetation that cannot be cleared. Potentially flammable material in biofilter might be too close to vegetation.	Location of the carpark and the office/education room were switched. Access along perimeter of BEF were adjusted to 6m width to allow access for fire trucks and maintain Asset Protection Zone. Flare was moved to the north side of tunnels near CHP (>10 m from retained vegetation).

1.6. Secretary's Environmental Assessment Requirements (SEARs)

The SEAR for the proposed development (SEAR 1471) was issued by the NSW Department of Planning, Industry and Environment on 3 August 2020 to enable the EIS to commence.

The key project issues identified by the Secretary for consideration in the EIS are given in **Table 1.2**. Note that all these requirements have been addressed in the EIS, and the relevant sections are highlighted for easy cross-referencing.

Table 1.2. SEAR 1471 from NSW Planning Industry & Environment

Aspect	Requirements	EIS Addressed	Section
Planning Secretary's Environmental Assessment Requirements			
General	The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i> .	This EIS	
Key issues	The EIS must include an assessment of all potential impacts of the proposed development on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts. As part of the EIS assessment, the following matters must also be addressed:	Environmental Assessment Sections 4 through 14 Section 16	
Strategic and statutory context	- A detailed justification for the proposal and suitability of the site for the development - A demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, development control plans (DCPs), or justification for any inconsistencies - A list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out - A description of how the proposed expansion integrates with existing onsite operations - A description of any amendments to and/ or additional licence(s) or approval(s) required to carry out the proposed development.	Section 17 Section 3 Section 3.2 Section 2 Section 3.2	
Suitability of the site	- A detailed justification that the site can accommodate the proposed processing capacity, having regard to the scope of the operations and its environmental impacts and relevant mitigation measures - Floor plans depicting and proposed internal and external layout, including the location of machinery and equipment.	Section 5 and Appendix E Appendix B	
Waste management	- Details of the type, quantity and classification of waste to be received at the site - Details of the resource outputs and any additional processes for residual waste - Details of waste handling including, transport, identification, receipt, stockpiling and quality control - The measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the NSW Waste Avoidance and Resource Recovery Strategy 2014-21.	Section 5 and Appendix E Section 3.6	2.4.7, and
Air quality and odour	- A description of all potential sources of air and odour emissions - A quantitative assessment of the potential air quality, dust and odour impacts of the development in accordance with relevant Environment Protection Authority guidelines - A description and appraisal of air quality and odour impact mitigation and monitoring measures, in line with International Best Practice.	Section 6 and Appendix G	
Soil and water	- A description of local soils, topography, drainage and landscapes - Details of water usage for the proposal including existing and proposed water licencing requirements in accordance with the Water Act 1912 and/or the <i>Water</i>	Section 8 and Appendices I & J Section 2.4.9	

Aspect	Requirements	EIS Addressed	Section
Planning Secretary's Environmental Assessment Requirements			
	<i>Management Act 2000</i> - An assessment of potential impacts on floodplain and stormwater management and any impact to flooding in the catchment - Details of sediment and erosion controls - A detailed site water balance - An assessment in accordance with ASSMAC Guidelines for the presence and extent of acid sulfate soils (ASS) and potential acid sulfate soils (PASS) on the site and, where relevant, appropriate mitigation measures - An assessment of potential impacts on the quality and quantity of surface and groundwater resources - Details of the proposed stormwater and wastewater management systems (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts - A description and appraisal of impact mitigation and monitoring measures.	Section 8 Appendix Q Section 2.4.9 Section 8 and Appendices I & J Section 8 and Appendices I & J and Appendix B Section 15	
Hazards and risk	- A preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011) - Any geotechnical limitations that may occur on the site and if necessary, appropriate design considerations to address this.	Section 9 Appendix J	
Fire and incident management	- An assessment of bushfire risks and asset protection zones (APZ) in accordance with NSW Rural Fire Service guidelines - Technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment, fire management (including the location of fire hydrants and water flow rates at the hydrants) and containment measures - Details of the size and volume of stockpiles and their arrangements to minimise fire spread and facilitate emergency vehicle access - The measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the NSW Fire and Rescue guideline Fire Safety in Waste Facilities dated 27 February 2020.	Section 10 and Appendix K Section 15 and Section 10 and Appendix K Section 5 and Appendix E Appendix E	
Traffic and transport	- Details of road transport routes and access to the site - Road traffic predictions for the development during construction and operation - Swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site - An assessment of impacts to the safety and function of the road network and the details of any road upgrades required for the development.	Section 11 and Appendix	

Aspect	Requirements	EIS Addressed	Section
Planning Secretary's Environmental Assessment Requirements			
Biodiversity	- Accurate predictions of any vegetation clearing on site or for any road upgrades - A detailed assessment of the potential impacts on any threatened species, populations, endangered ecological communities or their habitats, groundwater dependent ecosystems and any potential for offset requirements - Details of weed management during construction and operation in accordance with existing State, regional or local weed management plans or strategies - A detailed description of the measures to avoid, minimise, mitigate and/or offset biodiversity impacts.	Section 12 and Appendix N	
Visual	Including an impact assessment at private receptors and public vantage points.	Section 13 and Appendix L	
Heritage	Including Aboriginal and non-Aboriginal cultural heritage.	Section 14 and Appendix P	
Environmental Planning Instruments, policies, guidelines and consultation			
Plans and policies	The EIS must assess the proposal against the relevant environmental planning instruments, including but not limited to: - State Environmental Planning Policy (Infrastructure) 2007 - State Environmental Planning Policy (Koala Habitat Protection) 2019 - State Environmental Planning Policy (Primary Production and Rural Development) 2019 - State Environmental Planning Policy No. 33 – Hazardous and Offensive Development - Byron Local Environmental Plan 2014 - Relevant development control plans and section 7.11 plans.	Section 3	
Guidelines	During the preparation of the EIS you should consult the Department's Register of Development Assessment Guidelines which is available on the Department's website at https://www.planning.nsw.gov.au/Assess-and-Regulate/DevelopmentAssessment/Industries. Whilst not exhaustive, this Register contains some of the guidelines, policies, and plans that must be considered in the environmental assessment of the proposed development.	Section 3	
Consultation	During the preparation of the EIS, you must consult the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult with the: - Department of Planning, Industry and Environment, specifically the: - Biodiversity and Conservation Division - Environment Protection Authority - Crown Lands Division - Transport for NSW - Fire & Rescue NSW - NSW Rural Fire Service - Tweed Byron Local Aboriginal Land Council	Section 4 and Appendix D	

Aspect	Requirements	EIS Addressed	Section
Planning Secretary's Environmental Assessment Requirements			
	- Byron Shire Council - the surrounding landowners and occupiers that are likely to be impacted by the proposal. Details of the consultation carried out and issues raised must be included in the EIS.		
Further consultation after 2 years	If you do not lodge an application under Section 4.12(8) of the <i>Environmental Planning and Assessment Act 1979</i> within 2 years of the issue date of these SEARs, you must consult with the Planning Secretary in relation to any further requirements for lodgement.	This EIS	

2. Project Description

2.1. Local and Regional Context

The proposed BEF is located in Byron Shire on the Far North Coast of New South Wales, about 800 kilometres north of the Sydney CBD and 200 kilometres south of the Brisbane CBD (Figure 2.1). Byron Shire is bounded by Tweed Shire in the north, the Coral Sea in the east, Ballina Shire in the south, and Lismore City in the west. Byron Shire lands are spread geographically across various Traditional Owners. Arakwal traditional lands extend south from the Bruns River. Minjungbal People are to the north of the Bruns River. Both are part of the Bundjalung Nation. The Bundjalung of Byron Bay Aboriginal Corporation ('BoBBAC') are the primary Aboriginal stakeholders within the Native Title Determination Area.

The closest neighbours (not owned by BSC) are located in a mixed-use development just under 500 meters east of the development that includes apartments and commercial premises. A large buffer is provided by a nature reserve to the north, and wetlands and playing fields to the south associated with the Cavanbah Sport and Recreation Centre. A light industrial estate around Centennial Circuit is around 600m to the south east.

The site is in West Byron Bay, an area dominated by a highly valued wetland (including the Tyagarah Nature Reserve) to the north, open rural landscapes and pockets of light industrial, commercial and mixed-use development to the east and south east (Figure 2.2).

The nearest rural residential dwellings are over 1 km to the west and the closest low-density residential area is approximately 800 meters away on the eastern side of Bayshore Drive. There are two childcare centres approximately 1 km to the east and south east of the development.

2.2. Project Site

The proposed site location of the Byron BEF is on the southern side of Wallum Place, west of Bayshore Drive, within the BBSTP. The development site is immediately to the south and west of existing infrastructure within the BBSTP (Figure 2.4). The main BEF site comprises a small 100 m by 60 m portion (approximately 0.8 ha including access road) of the land contained in Lot 2, DP 706286. While large portions of the lot are undeveloped the selected site has previously been cleared and currently forms part of the landscaped grounds of the BBSTP.

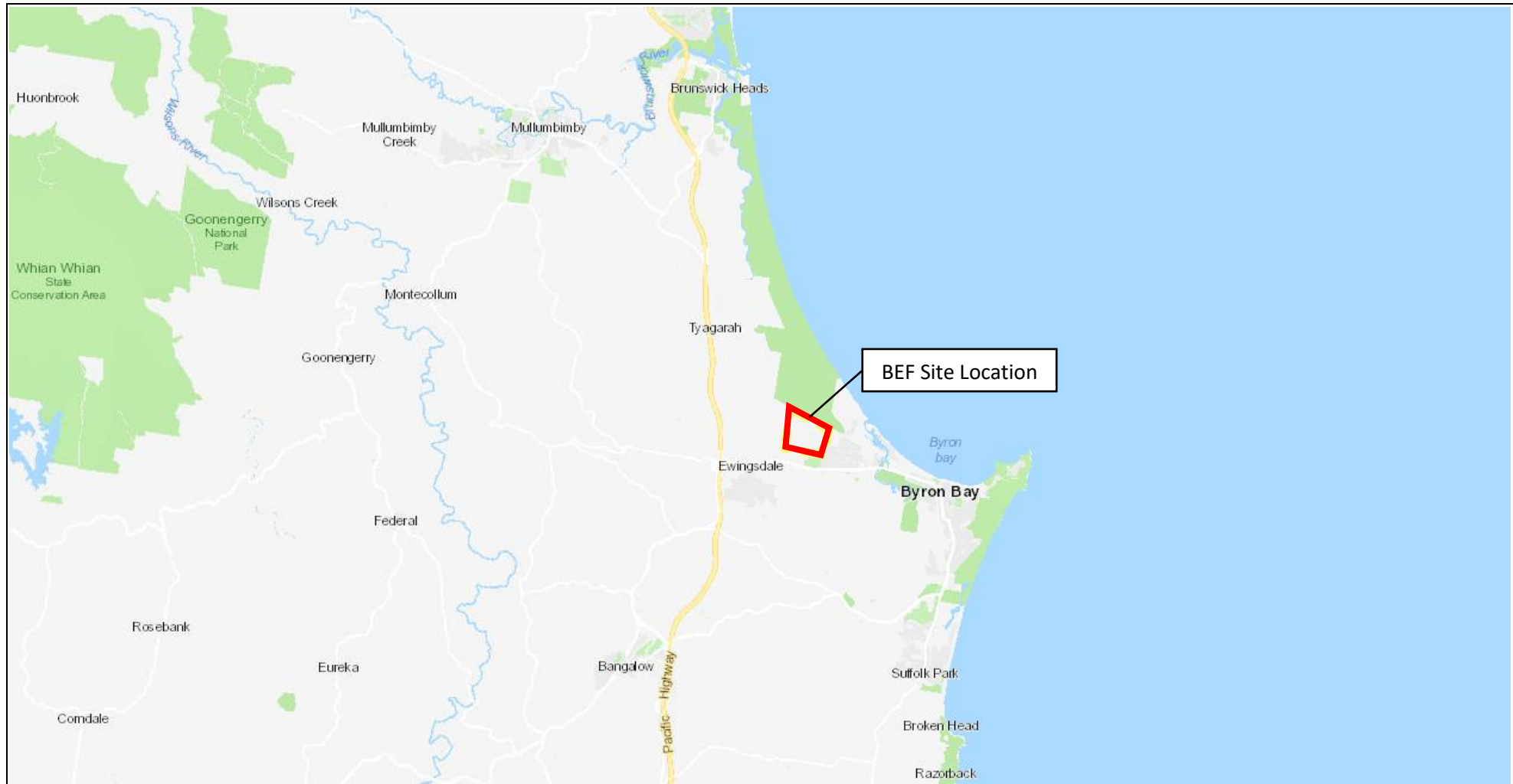
The lot is irregular in shape and has:

- A frontage of some 600m to the constructed part of Wallum Place;
- A main body with dimensions of approximately 1,200m x 1,000m; and
- An area of some 104 hectares.

The subject land is zoned (RU2) Rural Landscape and (DM) Deferred Matter under the *Byron Local Environmental Plan 2014* (Byron LEP). For DM zoned areas the *Byron Local Environmental Plan 1988* applies. The DM land is zoned (5a) Special Uses, which is equivalent to (SP2) Infrastructure zoning.

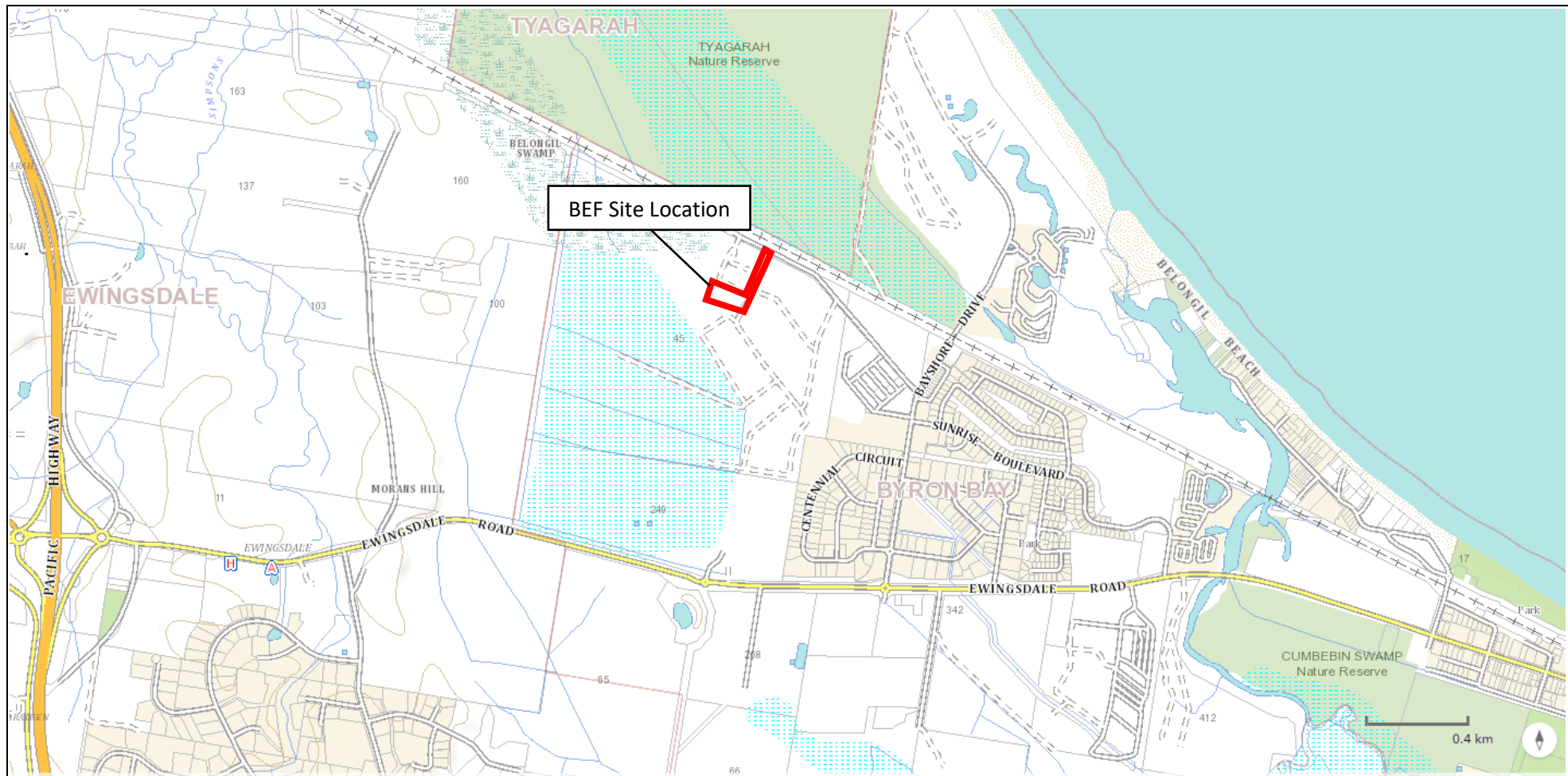
The Byron LEP does not specifically permit use of the land for the proposed Byron BEF. However, the *State Environmental Planning Policy (Infrastructure) 2007* overrides the Byron LEP and therefore the proposed Byron BEF is permitted with consent (see Section 3.4.3 and 3.5 of this EIS).

Figure 2.1 BEF Site Location.



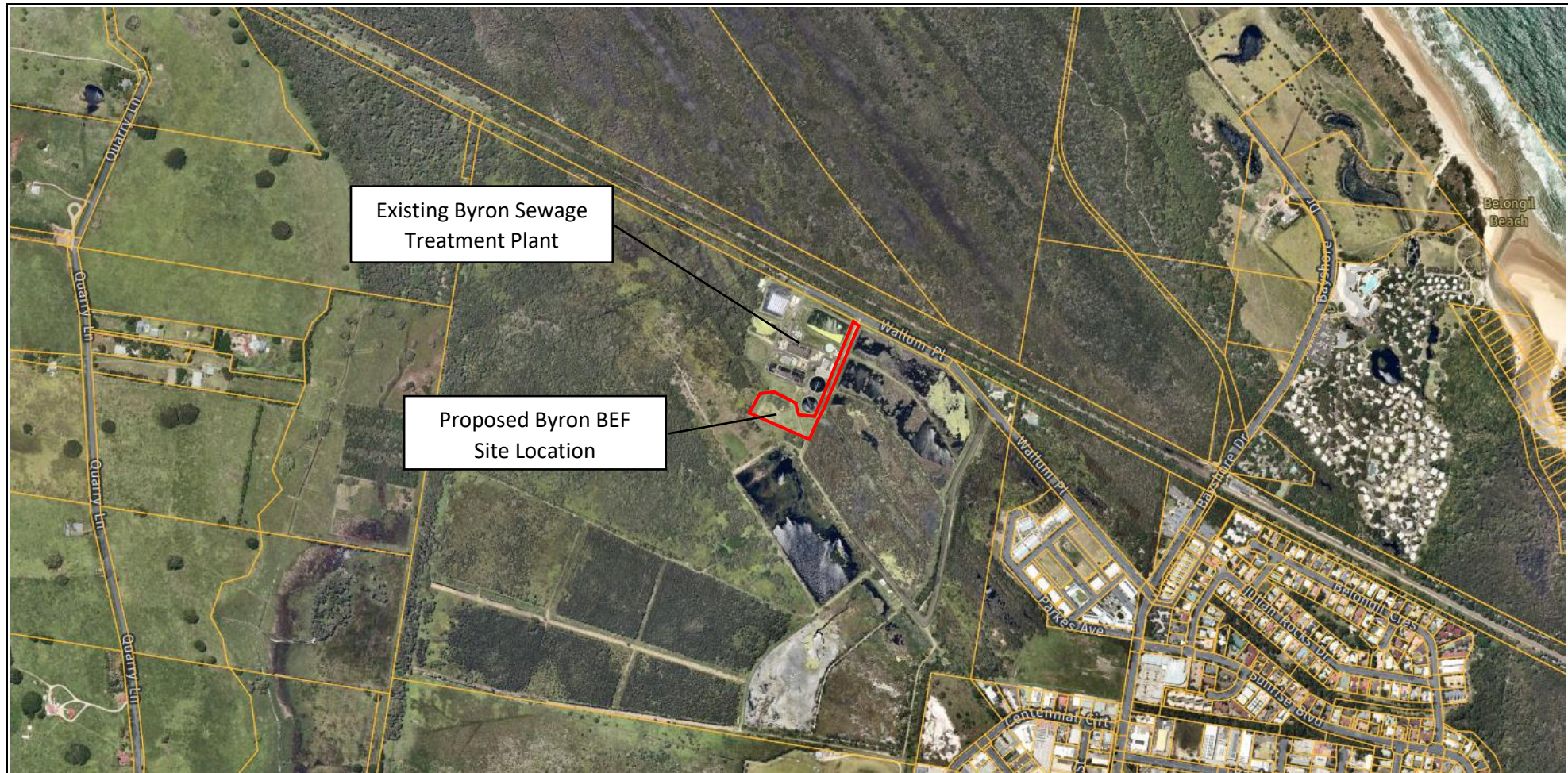
Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd Strategy Infrastructure Compliance Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	 JACKSON ENVIRONMENT AND PLANNING STRATEGY INFRASTRUCTURE COMPLIANCE PROCUREMENT	Client	Byron Shire Council
24/04/21	Revision A	E. Larson	45 Wallum Place, Byron Bay			Project	Byron Bioenergy Facility
						Title	Site Location
						Scale	Per map
						Source	NSW Espatial Planning Viewer

Figure 2.2. BEF Site Local Context.



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd		Client	Byron Shire Council
24/04/21	Revision A	E. Larson	45 Wallum Place, Byron Bay	Strategy Infrastructure Compliance Procurement		Project	Byron Bioenergy Facility
				A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060		Title	Site Local Context
				E: admin@jacksonenvironment.com.au		Scale	Per map
				T: 02 8056 1849		Source	NSW Espatial Planning Viewer
				W: http://www.jacksonenvironment.com.au			

Figure 2.3. Aerial imagery of the Byron BEF site.



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd		Client	Byron Shire Council
10/05/21	Revision A	E. Larson	45 Wallum Place, Byron Bay	Strategy Infrastructure Compliance Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	 JACKSON ENVIRONMENT AND PLANNING STRATEGY INFRASTRUCTURE COMPLIANCE PROCUREMENT	Project	Byron Bioenergy Facility
						Title	Aerial image of the site
						Scale	Per image
						Source	Nearmap

2.3. Overview of Proposed Development

The proposed development will involve the construction and operation of a best practice Bioenergy Facility (BEF) receiving organic waste materials from households and businesses in the Byron and neighbouring local government areas. The facility will be enclosed and operate under negative pressure to ensure all emissions from the process are treated before release. Biogas will be collected and consumed onsite to generate electricity. No biogas will be exported from the site.

Key operational features of the development within the 4,000 m² footprint includes:

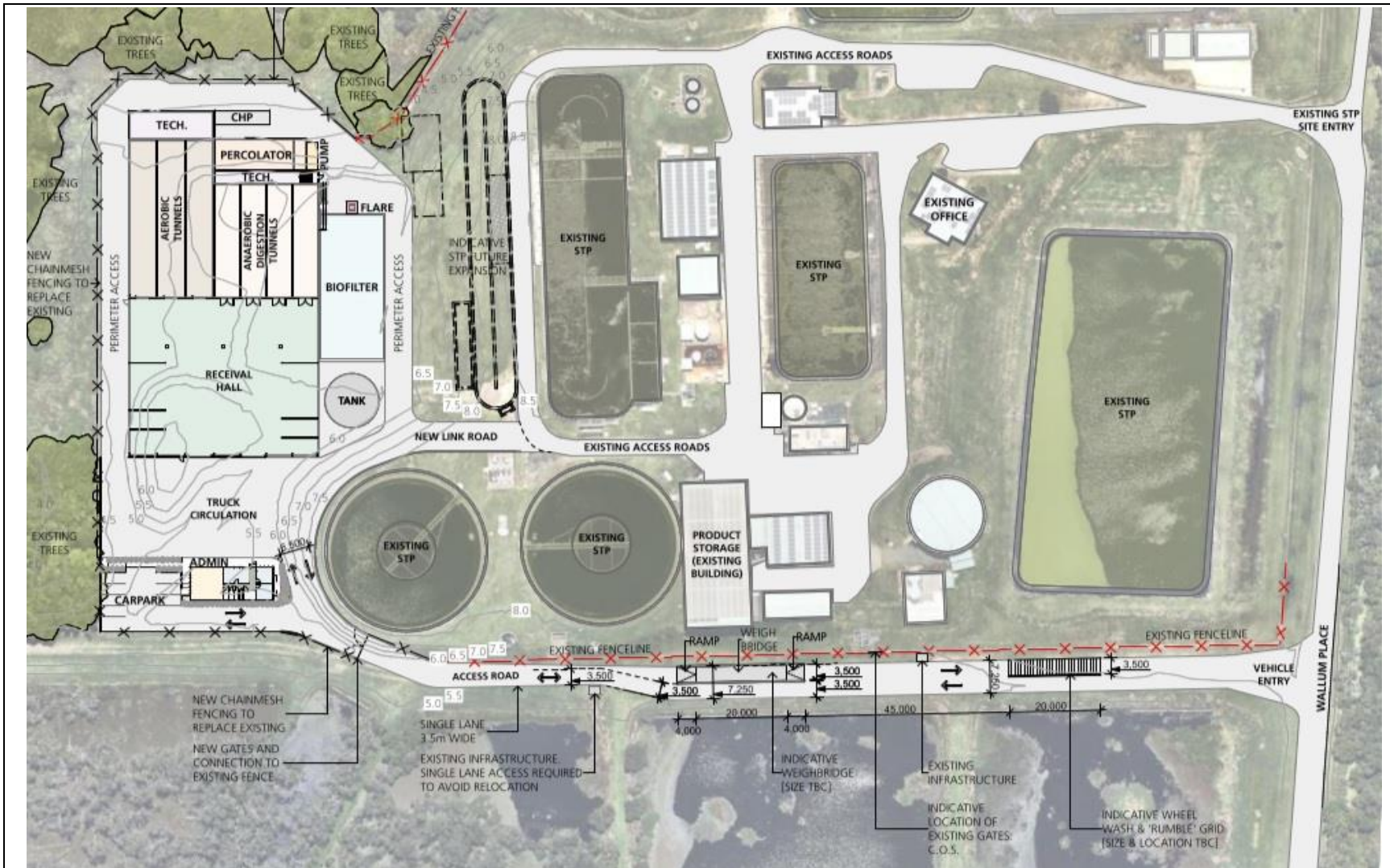
- A Receival Hall;
- Four Anaerobic Digestion Tunnels with gas storage;
- Three Aerobic Composting Tunnels
- A Biofilter;
- A Percolate Storage Tank with sand filter;
- A Combined Heat and Power (CHP) unit with gas treatment and flare;
- Office and education facilities; and
- A car park to assist in traffic flow on the site.

An additional approximately 4,000 m² is occupied by the main access road, a perimeter access road, and a weighbridge. The existing STP biosolids storage area will be repurposed to store products from the BEF. Site plans providing an overview of the proposed development and operations is given in Figure 2.4 and Figure 2.5.

The internal access road within the STP will be constructed under a separate approved Byron Bay STP project and will proceed independently.

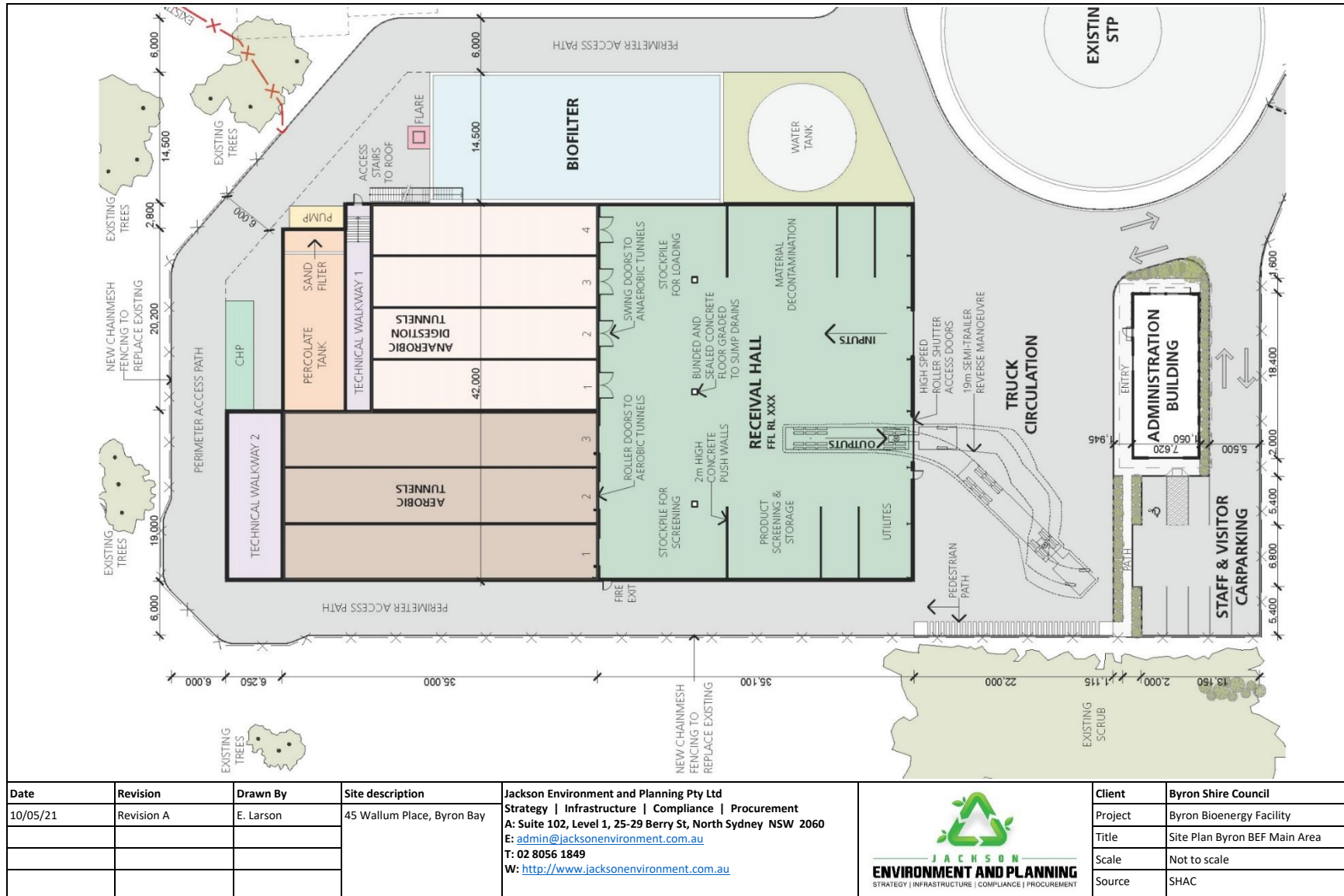
The proposed Byron BEF will provide improvements to the internal access to include a wheel wash and a weighbridge.

Figure 2.4. General layout of the BEF including entrance and weighbridge (full details are included in Appendix B Site Plans).



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd Strategy Infrastructure Compliance Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	Client	Byron Shire Council
10/05/21	Revision A	E. Larson	45 Wallum Place, Byron Bay		Project	Byron Bioenergy Facility
28/06/21	Revision B	A. Johnston			Title	Site Plan Byron BEF
					Scale	Not to scale
					Source	SHAC

Figure 2.5. General layout of the Receive Hall, Tunnels, Office and Associated Plant and Equipment (full details are included in Appendix B Site Plans).



2.4. Process Description

An overview of operations within each functional area of the site is provided below:

- Vehicles enter the site from Wallum Place via the weighbridge and enter the Receival Area through the designated entry fast open and close door on the north eastern side of the building;
- Separate internal bays are provided, with the front of the bay for tipping, spreading and identification of any hazardous materials (e.g. gas bottles, batteries, paints, chemicals and asbestos) or any other in-organic contamination (e.g. plastic, metal, and glass);
- Separate bays are provided for:
 - food waste and mixed garden and food organics (FOGO);
 - dewatered biosolids and shredded garden organics;
 - coppice crops and dewatered Fats, Oils and Grease (FOG);
- FOG will be delivered in a dewatered state from a separate licenced facility;
- Shredded garden organics or other high carbon absorbent organic materials will be spread in bays designated for temporarily storing organic materials that are wet and/or high in nitrogen;
- Any hazardous materials (e.g. gas bottles, batteries, paints, chemicals) are moved and stored in the existing STP chemical storage area;
- If required, specialised decontamination equipment will be installed and operated in the receival area;
- Vehicles then exit the Receival Area through the designated exit fast open and close door and proceed over a shaker grid and wheel wash;
- Vehicles then exit the site to Wallum Place via the weighbridge or via the slip lane if truck weight is known. The net weight of materials dropped off for recycling or disposal will be recorded in the weighbridge software; and
- Any inspected, clean, or decontaminated putrescible organics will be transferred from the Receival Area to an operational Tunnel using a front-end loader (holding times can be limited to reduce odour and WHS risks).

An operational flow diagram of the receival area is provided in Figure 2.6.

Figure 2.6. Process flow chart for the operation of the Receival Area.



2.4.1. Anaerobic Digestion Tunnels

The proposed dry Anaerobic Digestion (AD) technology for the BEF is a BEKON dry fermentation batch process that transforms solid organic waste into organic digestate while producing biogas which can be turned into electricity and heat. Four AD tunnels and three aerobic composting tunnels are required to process up to 28,000 tonnes/year.

The proposed plant consists of seven tunnels that are made of concrete. Each tunnel has a door at the front through which the waste material is loaded by front end loader. Where necessary, a slow-speed shredder will be used to optimise material sizing of woody material. No dedicated mixing equipment will be required. The extent of up-front contamination does not impact the AD process; however, space will be allowed within the Receiving Hall to install a mechanical pick line if required. Up to one week of input material (550 tonnes) may be stored in the Receiving Hall.

Once an AD tunnel is filled, the tunnel door is closed, and the tunnel is purged with exhaust gas from the combined heat and power unit to render the tunnel oxygen-free. In parallel, the waste material is heated via the integrated heating coils inside the floor and walls of the tunnels. Percolate is then sprayed on the material through the percolate nozzles on the tunnel ceiling. Percolate is the liquid draining off the waste material which is collected at the rear of the tunnel and pumped to the percolate tunnel at the back of the service room. Both the heating of the waste to optimal process temperature (mesophilic 40-42°C or thermophilic range of 50 to 55°C) and the percolation serves to create ideal process conditions in a very short time, so the biogas production can start, and pathogen destruction can be achieved.

While the waste material resides inside the tunnel for approximately three weeks, biogas is produced and brought to the combined heat and power unit (CHP) via a gas storage facility. The latter serves to even out the biogas quality and bridge maintenance works at the CHP. Before the biogas enters the CHP, it is cooled, compressed, and run through an activated carbon filter if required.

After approximately 3 weeks have passed, the tunnel is once again purged with exhaust gas from the CHP to displace any remaining biogas in the tunnel. Once there is virtually no biogas left, the tunnel door is opened and the digestate is loaded into an aerobic composting tunnel. Any residual gas escaping into the Receiving Hall will be collected for treatment through the biofilter.

2.4.2. Aerobic Composting Tunnels

The digestate will then be further stabilised using 3 weeks of aerobic composting in tunnels followed by screening. Upon discharge from the screen, the product can be transferred by tipper truck to the (former) biosolids covered storage area located within the adjacent STP for additional storage. Up to 2 weeks of compost production (600 tonnes) may be stored in the Receiving Hall. A minimum of 2 weeks product storage (600 tonnes or 1,000 m³) will be available in the (former) biosolids covered storage area located within the adjacent STP.

A Specific Resource Recovery Order and Exemption (RROE) will be obtained from the NSW EPA for the compost so that it can be transported to a site for land application as a quality fertiliser and soil conditioner in accordance with that RROE.

2.4.3. Percolate storage and reuse

The BEKON Dry Fermentation Process is designed to reduce liquid excess as much as possible. Nevertheless, during the process, it is possible that some surplus liquid (percolate) will be generated. Using percolate to inoculate each newly filled tunnel is likely to enable a neutral water balance for the facility. Surplus percolate can be recycled within the AD process. The BEF can store excess percolate for up to six months, allowing for infrequent disposal at the most opportune time if required.

Beneficial application of the percolate to land (whether liquid or not) will require a new specific RROE. None of the current general RROE apply. If an RROE for direct application to land cannot be obtained, any excess percolate could be treated at the BBSTP or transported to a suitably licensed organic recycling facility for further processing.

2.4.4. Gas Storage, CHP unit and flare

The biogas from the tunnels is collected in a central collection line and then directly routed through stainless steel pipes into an intermediate gas storage dome on top of the fermenters. The roof mounted biogas storage holder capacity is approximately 1,000m³, which corresponds to around 6 hours biogas production. In case of a failure of the combined heat and power unit, the biogas is stored in the gas dome or is safely eliminated as it is burned by the installed flare, which is also used to dispose of low-quality gas when the tunnels are purged prior to opening tunnel doors.

2.4.5. Other site features and services

The BEF will be supported through other site features, as follows:

- Weighbridge;
- Office area, bathroom and lunchroom facilities;
- An education room;
- Appropriate fire protection throughout the buildings;
- Stormwater treatment system to service the carpark, access road and other impervious surfaces;
- Receival Hall will be under negative pressure and air will be directed to a covered biofilter for odour treatment and odour removal; and
- A car park for up to 7 vehicles to separate incoming truck movements from staff and visitor passenger vehicles.

2.4.6. Sustainability features

The following sustainability features will be built into the overall design of the facility:

- Water sensitive urban design features will be included in the development. The BEF will include a stormwater treatment system to avoid impacts on neighbouring wetlands;
- Water from the 200-kilolitre rainwater harvesting system will be used as process water for digestion, for dust suppression (misting) and amenities (toilet flushing);
- Concrete bunding to be used around perimeter of Receival Hall to contain 90 minutes of firewater; and
- The biogas will generate sufficient electricity to power the Byron Bay Sewage Treatment Plant (BBSTP) and the BEF.

2.4.7. Quantities and sources of waste materials to be received

The proposed waste materials to be accepted and recycled at the site are given below. The waste classification of each material under the NSW EPA's *Waste Classification Guidelines* (2014) is also given (Table 2.1).

Table 2.1 Types, quantities and classification of waste materials to be accepted at the BEF.

NSW EPA Waste Classification	Material description	% of waste received (estimated)	Tonnes waste received per year
General solid waste (putrescible)	Food and garden waste (mixed)	35	9,800
	Food waste (commercial)	7	1,960
	Fats, oil and grease (FOG)	3	840
General solid waste (non- putrescible)	Garden waste	25	7,000
	Biosolids	20	5,600
	Coppice crops	5	1,400
	Wood waste	3	840
General solid waste (non- putrescible)	Glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal (contamination to be separated for lawful off-site management)	0.5	140
	Paper or cardboard ¹	1	280
General solid waste (non- putrescible) or hazardous waste	Materials such as asbestos, tyres, batteries, gas bottles, fire extinguishers and motor oils (unexpected finds to be separated for lawful off-site management)	0.5	140
Total (tonnes per annum)		100	28,000

¹ Note that paper or cardboard is part of the processed food and garden waste and is not disposed of offsite.

Sources of waste inputs to the BEF are summarised in Table 2.2. Depending on actual availability of waste inputs, the proportions and quantities may vary from what is shown in Table 2.1 and 2.2. However, the maximum general solid waste (putrescible) that would be received is 14,000 tpa, allowing a minimum of 6 weeks processing for all general solid waste (putrescible) received.

Food organics and garden organics will be sourced from municipal kerbside collections in Byron Shire Council and neighbouring local government areas. Some food wastes will be accepted from commercial collections and drop-offs. There will be no private drop-off at the BEF. Byron Shire Council (BSC) has been operating its FOGO collection service since August 2015.

Self-haul garden organics will continue to be collected at the BSC Resource Recovery Centre located at Myocum, NSW. Garden organics will be shredded at the Myocum Resource Recovery Centre before being delivered to the BEF in bulk loads.

The grease trap waste, as fats, oil and grease (FOG) will be sourced from grease traps pumped out by commercial operators. Commercial liquid tankers that have removed the grease trap contents from various sites within the area transport the grease trap waste to the Solo Ballina Treatment Plant (SBTP), which is an EPA licensed facility (EPL 10055), or equivalent licensed facilities. At SBTP the grease trap waste is screened to remove physical contaminants and the solids recovered using Dissolved Air Flotation (DAF). Liquid from the DAF is further treated using an activated sludge process. The activated sludge is recovered using a filter-press. The FOG to be received by the BEF is a dry firm cake at approximately 70% w/w solids and includes both the DAF solids and the dewatered activated sludge from the SBTP. This material is currently being transported long distances for composting in interstate facilities.

Biosolids will be derived from the wastewater sludge (mainly a mix of water and organic materials that are a by-product of the sewage treatment processes) from the neighbouring BBSTP. From time to time biosolids may also be supplied from STPs in Brunswick Valley, Bangalow and Ocean Shores. Dewatered sludge from the BBSTP will be conveyed the short distance to the dry digestion facility receive hall by truck.

Table 2.2 Waste input materials part of the proposed BEF composting process.

Feedstock type	Material description	Source	Quantity (tonnes)	Percentage of total input
Garden organics	Garden waste	- Supervised public drop-off at local government operated Resource Recovery Centres - Shredded and transported in bulk	7,000	25%
	Coppice crops	Agricultural production from farms (not a waste)	1,400	5%
	Wood waste (untreated)	- Supervised public drop-off at local government operated Resource Recovery Centres - Shredded and transported in bulk	840	3%
Food organics / garden organics	Food and garden waste	- Municipal kerbside collections in Byron Bay and neighbouring shires - Delivered by side lift vehicles	10,080	36%
	Food waste	Source separated collection services delivered commercial operators	1,960	7%
Grease trap waste	Fats, oil and grease (FOG)	- Commercial dewatering facility located near Ballina, NSW - Filter pressed and transported in bulk	840	3%
Biosolids	Biosolids	- Byron Bay STP - Brunswick Valley STP - Bangalow STP - Ocean Shores STP	5,600	20%
Total Inputs			27,720	99%
Total contamination (to be separated for lawful off-site management)			280	1%

2.4.8. Power requirements

Electricity generated by the BEF will be used to power the BBSTP and the BEF itself, thereby offsetting electricity costs for the plant. Surplus electricity generated is anticipated to be sold, most likely via an arrangement negotiated with the site's electricity retailer.

The BEF design, including the capacity of electrical generation and gas storage, has been developed in conjunction with a cost estimate and modelling of revenue opportunities including:

- Renewable Energy Certificates;
- Electricity sales to the STP – this includes offsetting;

- Additional electricity sales to Council – this would not offset network or other market charges;
- Wholesale spot market; and
- Power Purchase Agreement.

Preliminary modelling has shown that the facility will offset all grid consumption for the BBSTP (1,300 MWh/year) and therefore offsets both volume charges (\$/kWh) and network peak demand charges (\$/kVA).

The proposed capacity of the CHP is 450 kW. When processing 28,000 tonnes/year, it will produce approximately 3,000 MWh/year of electricity energy in addition to a small amount of surplus heat energy. The operation of the BEF will use 1,000 MWh/year of the electrical energy generated.

2.4.9. Water requirements

Water-sensitive urban design features have been considered in the design of the BEF. The BEF has been developed on the small footprint and therefore minimises the impervious area where stormwater will be generated. Rainwater falling on impervious roof and road surfaces will be managed by:

1. Collection of roof water in a 250-kilolitre water tank for use as process water or diversion to;
2. An underground onsite stormwater detention tank and filtration system that collects all stormwater before filtration and diversion to the neighbouring wetlands; and
3. A small stormwater detention basin at the intersection of the access road and Wallum Place.

A preliminary engineering design of the Onsite Stormwater Detention (OSD) tank and filtration system is shown in the Civil Plans (Appendix B). Table 2.3 summarises the results of the OSD design calculations. The increase in peak stormwater flows created by the development will be controlled using an OSD tank and basin. Allowance has been made for double the OSD capacity required to ensure that stormwater flows rates are less than they are on the current, undeveloped site.

Table 2.3. Onsite Stormwater Detention Design Parameters.

Design Parameters	Peak Flows		
	Minor Storm ARI 10 years	Major Storm ARI 100 years	Units
Catchments flowing to OSD tank	351	619	L/s
Catchment flowing to basin at intersection	37	66	L/s
Catchments flowing directly off-site	75	132	L/s
Total uncontrolled flow post-development	464	817	L/s
Minimum OSD storage required - OSD tank	96	168	m ³
Minimum OSD storage required - basin	8	14	m ³
Total controlled flow post-development	115	212	L/s
Total uncontrolled flow pre-development	161	295	L/s
Design OSD storage - OSD tank		320	m ³
Design OSD storage - basin		30	m ³

Water will be required during the operational phase of the development for the digestion processes, fire water, and dust control. Both reticulated potable water and roof water will be available for those purposes. Depending on the moisture content of feedstocks, operations will consume a large portion of roof water generated. A small amount of

water will be required for irrigation of landscaped areas, and for toilet flushing in staff amenities. Any additional water will be diverted to the OSD system.

All operational and storage areas where wastes are processed or stored are covered or enclosed so no leachate will be generated during rainfall events. By using automated process control systems, and controlling the water added to the process, the tunnel digestion processes (both aerobic and anaerobic) are not expected to generate more process water (percolate) than can be stored in the installed percolate storage tank. Any excess percolate will be transferred by truck to BBSTP or other licensed treatment facility. As a result, water balance calculations to ensure leachate is not discharged to the environment are not necessary. Evidence that sufficient process water is available and excess percolate will not be generated is provided by the mass Balance shown in the Waste Minimisation and Management Plan (Appendix E).

Based on the mass balance prepared by the equipment supplier, approximately 560,000 litres per annum (approximately 2.3 kilolitres/day) of water will be required for processing 28,000 tpa of organic wastes. This will be sourced first from the roof water collection tank on site, then from recycled water generated by the BBSTP. A potable water supply line will be extended from the BBSTP will be used for process water as a last resort. No water licensing is required under the *Water Act 1912* or the *Water Management Act 2000*.

2.4.10. Sewerage requirements

Sewage from the BEF amenities would connect with the readily available access to the nearby sewer line at the Bryon STP and managed internally with the Byron STP system. Details of the sewer connection will be considered during detailed design.

2.4.11. Operational Hours and Access

The anaerobic digestion tunnels and the composting tunnels including associated plant (fans and pumps) will be functioning 24 hours per day and 7 days per week.

However, the facility will be staffed 6 days per week between the hours of 7am to 5pm Monday through Friday and 8am to 1pm on Saturday, as summarised in Table 2.4. Five full-time equivalent staff will be required to operate the facility (when operating at capacity) during these times. Activities during this timeframe will include waste receipt and dispatch, unloading and loading of the tunnels, decontamination, screening and related activities.

Table 2.4. Existing and Proposed Operational Hours.

Operational	Staff Hours / Deliveries	Tunnel Operation
Monday - Friday	7am - 5pm	24 hours / 7 days per week
Saturday	8am – 1pm	
Sunday or public holidays	No times / NA	

Access to the facility during operational staff hours will be through a secure gate. The facility will include a securely fenced perimeter with no access for the general public. No unplanned drop-off of materials will be accepted from the general public. Any pre-arranged access to the facility by the public will be controlled by facility staff through the secure gate.

There will be a small facility attached to the office area to host small community group or school workshops that are planned in advance.

2.4.12. Weighbridge operations

A weighbridge will be located near the entrance to the BEF. Trucks entering from Wallum Place via the site access road will register weight on the entry weighbridge. If truck weights are unknown, weight will be registered upon exit.

2.4.13. Operational Plant and Equipment

Proposed operational equipment is detailed in Table 2.5.

Table 2.5. Primary operational equipment for the BEF (included in the noise assessment in Appendix G).

Location	Description
Receival Hall	Air Desulphurisation Fan
Digestion Tunnels	High Performance Fans (x3)
	Exhaust Fan
	Acid Washer
	Biofilter Fan
	Digestate Mixer
	Fermenter Supply Fan
Bio Gas Storage	Air Blower
	Circulation Fan
Technical Walkway	Wall Fan
Pump Room	Exhaust Fan
	Spray Pump
	Wall Fan
	Sanitiser Pump
Combined Heat and Power units	CHP 1
Gas Flare	Flare
Administration Building	Air Conditioning
	Exhaust Fans
Operational Plant	Front End Loader (Volvo L90 F or equivalent)
	Picking Machine (SKALA 1500 Conveyor or equivalent)
	FORUS Electrical Shredder
	Screen (Terra Select or equivalent)

2.5. Construction

The construction phase will occur over approximately 10 months and can be divided into 6 stages detailed below. Prior to the commencement of works on-site a complete services search including a Dial Before You Dig (DBYD) search will be undertaken to identify any services which could be affected by the construction works.

Site mobilisation:

- Services search;
- Relocation of endangered fauna;
- Establishment of environmental management measures including erosion and sediment controls;
- Establish site access, laydown areas ; and
- Establishment of site compound and stockpile sites.

Ancillary and enabling works:

- Connection of temporary services to site; and
- Securing the construction site from the rest of the STP (fencing).

Excavation & Civil works:

- Site stripping, clearing and rubbish removal;
- Vegetation removal (existing pasture and weeds);
- Cut and fill earthworks;
- Construction of stormwater detention; and
- Trench, backfill site wide reticulation of services (HV, LV, hydraulic, fire).

New building works:

- Detailed excavation;
- Form reinforcement, pour concrete foundations;
- Form reinforcement, power concrete blinding layers;
- Install aeration equipment & in-situ services;
- Form reinforcement, power fermenter tunnels;
- Place aeration tunnels (pre-cast);
- Erection of structural steel (receival hall);
- Cladding;
- Install mechanical services, tunnel doors;
- Installation of plant technical corridors;
- Form reinforcement, power biofilter structure;
- Construction of administration building; and
- Installation of mechanical fit out items, gas storage, CHP, flare etc.

Pavement works:

- Construction of site wide truck turning area and internal roads;
- Construction of car park; and

- Connection to STP access roads.

External and miscellaneous works:

- Fire services;
- Water storage tanks;
- Water reticulation;
- Weighbridge;
- Wheel wash;
- Perimeter lighting;
- Security fencing;
- Plumbing and on-site sewage management system installation, and
- Landscaping.

Services for the construction phase will be supplied as follows:

- Telecommunications – no service required;
- Electricity – on-site generators (minimal, better to tap into existing infrastructure); and
- Sewer – temporary toilets (portaloos) with offsite disposal of waste.

An average of 6-8 truck movements per day (including all deliveries of equipment and materials) are expected during construction of the proposed facility, with a peak period of up to 20 trucks per day during concrete pour of pavements. These movements will primarily be related to delivery of materials and movements on-site for a short-term period. Some light vehicles for construction workers travelling to and from the Site are also expected.

The construction works would be undertaken in accordance with the Interim Construction Noise Guideline (DECCW 2009) and would typically occur during the standard working hours between:

- 0700 to 1800 hrs Monday to Friday; and
- 0800 to 1300 hrs on Saturdays.

There will be no construction works on Sundays or public holidays.

2.5.1. Construction Plant and Equipment

The construction phase will utilise the plant and equipment described in Table 2.6 below.

Table 2.6. Construction plant and equipment proposed during construction.

Equipment	Estimated days on site	Use
Small excavator	35	Site side services reticulation and detailed excavation
Large Excavator	30	Bulk earthworks
Bobcat	35	Site side services reticulation and detailed excavation
Water truck	20	Road construction & bulk earthworks
Grader	15	Road construction & bulk earthworks
Scraper	20	Road construction
Compactor	20	Road construction
Paver	10	Pavement wearing course

Equipment	Estimated days on site	Use
Crane	90	Primary steel vertical construction, roofing & tunnel construction
Diesel Generator	Up to 20	Until power to site is established

3. Planning and Legislative Requirements

3.1. Approval Pathway

The BEF development will occupy land that is already largely cleared. Only 0.88 hectares of grassland will need to be cleared to allow space for all aspects of the development, including access to the perimeter of all buildings.

The maximum waste processing capacity will be 28,000 tonnes per annum. Under Section 4.10 of the *Environmental Planning and Assessment Act 1979* the proposed development is a Designated Development, requiring an EIS to be submitted with the development application. In this regard, pursuant to Part 2, Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, BSC obtained the Secretary's Environmental Assessment Requirements with respect to the proposed Environmental Impact Statement.

The approval authority for this proposed development is the Northern Regional Planning Panel.

3.2. Licences and permits required

The proposed BEF is also considered to be an Integrated Development, requiring a licence from the NSW EPA under Schedule 1 of the *Protection of the Environment Operations Act 1997*. In addition to development consent, the BEF will need to obtain the licences and approvals listed in Table 3.1.

Table 3.1. Licences and approvals required for the BEF.

Licence/Approval Required	Government Authority	Activity
Environment Protection Licence (EPL)	NSW Environment Protection Authority (EPA)	- Processing >200 tonnes of putrescible organics - Receives more than 5,000 tonnes per year of non-putrescible organics - Energy recovery from general waste - Storage of > 60 tonnes grease trap waste
Specific Resource Recovery Order and Exemption (RROE)	NSW Environment Protection Authority (EPA)	- End compost product that includes biosolids in tunnel processing - Biogas produced from the anaerobic digestion tunnels for use in the CHP.

3.3. Commonwealth policy and legislation

3.3.1. Environment Protection and Biodiversity Conservation Act 1999

A referral to the Commonwealth has been prepared by the proponent to assess impacts of the development upon any occurring Matters of National Environmental Significance (MNES), such as Mitchell's Rainforest Snail.

The referral report provides an assessment of the likelihood of occurrence of MNES listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) along with an assessment of the significance of impact of the proposed development upon all MNES that are confirmed present or considered likely to occur in the location of the proposed BEF.

The referral is in exhibition for a period of 20 business days including a public comment period of 10 business days.

The report concluded that the proposed BEF is not likely to incur a significant impact upon any MNES listed under the EPBC Act.

3.4. NSW Statutory Legislation and Policy

3.4.1. Environmental Planning and Assessment Act 1979

The proposed development is consistent with the overall objectives of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as follows:

- a) *to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,*
- b) *to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,*
- c) *to promote the orderly and economic use and development of land, and*
- d) *to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.*

The proposed development is consistent with the nominated objectives of the Act and is considered capable of fulfilling the statutory requirements. This EIS has been prepared to assess whether the proposed development will result in any significant negative impacts that cannot be adequately mitigated or managed.

The proposed project is considered 'designated development' requiring assessment under Part 4 of the *Environmental Planning and Assessment Act 1979*.

3.4.2. Environmental Planning and Assessment Regulation 2000

While the EP&A Act provides the overarching framework for the planning system in NSW, the *Environmental Planning and Assessment Regulation 2000* (the EP&A Regulation) supports the day-to-day requirements of this system.

Under Schedule 3 of the *Environmental Planning and Assessment Regulation 2000*, the Byron BEF is characterised as a 'composting facility or works'. Clauses 13(a) and 13(b) of the EP&A Regulation states that 'composting facilities or works' that process organic materials are considered Designated Development if they are:

Composting facilities or works (being works involving the controlled aerobic or anaerobic biological conversion of organic material into stable cured humus-like products, including bioconversion, biodigestion and vermiculture)—

- (a) *that process more than 5,000 tonnes per year of organic materials, or*
- (b) *that are located—*
 - (i) *in or within 100 metres of a natural waterbody, wetland, coastal dune field or environmentally sensitive area, or*
 - (ii) *in an area of high watertable, highly permeable soils, acid sulphate, sodic or saline soils, or*
 - (iii) *within a drinking water catchment, or*
 - (iv) *within a catchment of an estuary where the entrance to the sea is intermittently open, or*
 - (v) *on a floodplain, or*

(vi) within 500 metres of a residential zone or 250 metres of a dwelling not associated with the development and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, visual impacts, air pollution (including odour, smoke, fumes or dust), vermin or traffic.

The proposal is considered designated development under Schedule 3 of the EP&A Regulation as the following triggers are activated:

- Processing capacity is >5,000 tonnes per annum;
- Within 100 metres of a wetland, coastal dune field and environmentally sensitive area; and
- In an area of high water table and potential acid sulfate soils.

As designated development, Clause 4.12(8) of the *Environmental Planning and Assessment Act 1979* applies, and an Environmental Impact Statement (EIS) in the form prescribed by the Regulations must accompany the development application (this report).

3.4.3. State Environmental Planning Policy (Infrastructure) 2007

The aim of the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) is to facilitate the effective delivery of infrastructure across the State by improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and by providing greater flexibility in the location of infrastructure and service facilities.

Other key aims of the policy are to allow for the efficient development, redevelopment or disposal of surplus government owned land, and identify the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development). The Infrastructure SEPP also seeks to help proponents identify matters to be considered in the assessment of development adjacent to particular types of infrastructure development and providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.

Section 120 of the Infrastructure SEPP defines a ‘*resource recovery facility*’ as the following:

‘resource recovery facility means a building or place used for the recovery of resources from waste, including works or activities such as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from gases and water treatment, but not including re-manufacture or disposal of the material by landfill or incineration.’

‘*Resource recovery facilities*’ are defined as a type of ‘*waste or resource management facility*’.

Section 120 defines a Prescribed Zone as including RU2 Rural Landscape and SP2 Infrastructure zoning or a land use zone that is equivalent to them. The subject land is zoned partly RU2 Rural Landscape and partly 5(a) Special Uses (Sewage Treatment Works). The 5(a) zone is equivalent to the SP2 Infrastructure zone.

Under Section 121 of the Policy, the following activities are permitted with consent:

(1) Development for the purpose of waste or resource management facilities, other than development referred to in subclause (2), may be carried out by any person with consent on land in a prescribed zone.

3.4.4. State Environmental Planning Policy (State and Regional Development) 2011

A regionally significant development needs to be notified and assessed by a council and then determined by the relevant Planning Panel, which is the Northern Regional Planning Panel for the Shire of Byron. A project is considered regionally significant development as defined in Schedule 7 of the *State Environmental Planning Policy (State and Regional Development) 2011* if it is:

(3) Council related development with a CIV over \$5 million and:

- A council for the area in which the development is to be carried out is the applicant for development consent, or
- The council is the owner of any land on which the development is to be carried out, or
- The development is to be carried out by the council, or
- The council is a party to any agreement or arrangement relating to the development (other than any agreement or arrangement entered into under the Act or for the purposes of the payment of contributions by a person other than the council).

As the Capital Investment Value (CIV) of the project is approximately \$16.5 million, and the project is council related. The consent authority therefore will be the Northern Regional Planning Panel.

3.4.5. Protection of the Environment Operations Act 1997

The *Protection of the Environment Operation Act 1997* (POEO Act) prohibits any person from causing pollution of waters, or air and provides penalties for air, water and noise pollution offences. Section 48 of the Act requires a person to obtain an Environment Protection License (EPL) from the NSW Environment Protection Authority before carrying out any of the premise-based activities described in Schedule 1 of the Act.

Schedule 1 of the Act (clause 12) details “Composting” as an activity. The relevant activity which applies to this development is:

- Composting, meaning the aerobic or anaerobic biological conversion of organics into humus-like products by methods such as bioconversion, bio digestion or vermiculture or by size reduction of organics by shredding, chipping, mulching or grinding

This activity is declared to be a scheduled activity if it meets the following criteria:

If the premises are in the regulated area:

- (a) it has on site at any time more than 200 tonnes of organics received from off site, or
- (b) it receives from offsite more than 5,000 tonnes per year of non-putrescible organics or more than 200 tonnes per year of putrescible organics.

Schedule 1 of the Act also details “Energy recovery” under clause 18 as an activity. This activity is declared to be a scheduled activity if it meets the following criteria:

(1) *This clause applies to the following activities—*

energy recovery from general waste, meaning the receiving from off site of, and the recovery of energy from, any waste (other than hazardous waste, restricted solid waste, liquid waste or special waste).

As the proposed facility is located in the regulated area, will process more than 200 tonnes of putrescible organics, and will recover energy from general waste, an Environment Protection Licence (EPL) for the facility will be required from the NSW EPA.

3.4.6. Biodiversity Conservation Act 2016

The purpose of this Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development, to:

- Conserve biodiversity at bioregional and State scales;
- Maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change and provide for the needs of future generations;
- Improve, share and use knowledge, including local and traditional Aboriginal ecological knowledge, about biodiversity conservation;
- Support biodiversity conservation in the context of a changing climate;
- Support collating and sharing data, and monitoring and reporting on the status of biodiversity and the effectiveness of conservation actions;
- Assess the extinction risk of species and ecological communities, and identify key threatening processes, through an independent and rigorous scientific process;
- Regulate human interactions with wildlife by applying a risk-based approach;
- Support conservation and threat abatement action to slow the rate of biodiversity loss and conserve threatened species and ecological communities in nature;
- Support and guide prioritised and strategic investment in biodiversity conservation;
- Encourage and enable landholders to enter into voluntary agreements over land for the conservation of biodiversity;
- Establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity;
- Establish a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values;
- Establish market-based conservation mechanisms through which the biodiversity impacts of development and land use change can be offset at landscape and site scales;
- Support public consultation and participation in biodiversity conservation and decision-making about biodiversity conservation; and
- Make expert advice and knowledge available to assist the Minister in the administration of this Act.

The *Biodiversity Conservation Act* 2016 and the supporting Regulations establish a modern and integrated legislative framework for land management and biodiversity conservation. Biodiversity elements include major innovations to offsetting and private land conservation, as well as improvements to threatened species conservation and how we manage human-wildlife interactions. The Act and its Regulations are administered by the Office of Environment and Heritage.

A Biodiversity Development Assessment Report (BDAR) was prepared for the project and is included in Appendix N. The proposed development will require the clearing of approximately 0.52 ha of historically cleared vegetation. No remnant vegetation will be impacted for the proposed development to proceed. No Ecosystem Credits are required to be retired to offset the biodiversity impacts of the proposed development. However, an offset for loss of foraging habitat (albeit degraded weed-infested) for species credit species that were recorded in the Subject Land during the assessment. A total of five (5) Species Credits will be retired.

3.4.7. Protection of the Environment Operations (Waste) Regulation 2014

As a licensed waste facility, the Byron BEF will be required to accurately measure via a weighbridge all waste received and leaving the facility. The amount of waste received and transported off-site will need to be reported to the EPA through the Waste and Resource Reporting Portal (WARRP).

A Waste Characterisation Methodology has been prepared to help inform an application for specific Resource Recovery Order and Exemption (RROE). RROE are being sought for the biogas to be used as an eligible waste fuel and for the compost to be applied to land as a soil amendment or fertiliser. The NSW EPA has been consulted to ensure that the methodology for sampling, testing and monitoring of the BEF inputs and outputs are sufficient to inform detailed specific RROE applications.

The Methodology provides a summary of the Dry Anaerobic Digestion process and a summary of the chemical, physical and biological contaminants potentially of concern in the raw feedstocks. The chemical, physical and biological characteristics of the compost has been evaluated for its suitability as a soil conditioner to ensure that human / animal health and the environment are always protected.

3.4.8. State Environmental Planning Policy No 33: Hazardous and Offensive Development Assessment

State Environmental Planning Policy No 33: Hazardous and Offensive Development (SEPP 33) outlines the requirements for a Preliminary Hazard Analysis screening test, required to be undertaken for hazardous and potentially hazardous industries.

A potentially hazardous industry is defined within SEPP 33 as a development for the purpose of any industry which, if the development were to operate without employing any measures to reduce or minimise its impact, would pose a significant risk to human health, life or property, or to the biophysical environment.

A Preliminary Hazard Analysis (Chapter 9) has been prepared for the proposed Byron BEF to address the requirements of SEPP 33; the *Hazardous and Offensive Development Application Guidelines - Applying SEPP 33* (NSW Department of Planning, 2011), AS/NZ ISO 31000: 2009 Risk Management Principles and Guidelines ; and the *Hazardous and Offensive Development Application Guidelines – Risk Criteria for Land Use Safety Planning* (NSW Department of Planning, 2011).

The objective of the assessment was to identify the risks posed to people, property and the environment. The assessment also considers off-site risks to people, property and the environment (in the presence of controls) arising from atypical and abnormal hazardous events and conditions (i.e. equipment failure, operator error and external

events). The hazard treatment measures that have been proposed assist in producing a 'low' to 'moderate' level of risk in accordance with the risk acceptance criteria.

3.4.9. State Environmental Planning Policy (Koala Habitat Protection) 2019

The State Environmental Planning Policy (SEPP) – Koala Habitat Protection applies to all local government areas (LGAs) listed on Schedule 1 of the policy, except land dedicated under the National Parks and Wildlife Act 1974 or the Forestry Act 1916. The identification of an area of land as SEPP 44 Potential Koala Habitat is determined by the presence of Koala feed tree species listed within Schedule 2 of the policy. The proposed BEF is situated within Byron Shire LGA, which is listed on Schedule 1 of the policy.

Koala Habitat Protection only applies to land which:

- Has an area of more than 1 hectare; or
- Has, together with any adjoining land in the same ownership, an area of more than 1 hectare whether or not the development application applies to the whole, or only part, of the land.

The proposed BEF site does support >15% Potential Koala feed trees, however, the property is not identified as or Core Koala Habitat under the '*Byron Coast Comprehensive Koala Plan of Management*' (Byron Shire Council 2015) therefore a Koala Plan of Management is not required for the Subject Property.

Koalas browse trees are absent on the proposed BEF site. No further action is required under this SEPP.

3.4.10. State Environmental Planning Policy No 55: Remediation of Land

Under State Environmental Planning Policy, No 55: Remediation of Land (SEPP 55), applicants for consent must carry out a preliminary site investigation for any development consent sought on land previously used for activities that may cause contamination.

A preliminary site investigation (PSI) was undertaken for the proposed BEF (see Chapter 7, Appendix I). The principal aim of a PSI is to identify any past or present potentially contaminating activities and to provide a preliminary assessment of the extent and nature of site contamination if it exists. It typically includes an appraisal of the site history and may include some initial site sampling.

The PSI concluded that the site poses a low risk of contamination and is suitable for the proposed BEF.

3.4.11. State Environmental Planning Policy (Primary Production and Rural Development) 2019

The State Environmental Planning Policy (Primary Production and Rural Development) 2019 supports NSW's agricultural sector, which is a major contributor to the success of the NSW economy, providing exports and jobs.

The proposed BEF does not require subdivision of land or development of agricultural land.

3.4.12. State Environmental Planning Policy (Coastal Management) 2018

The Coastal Management Act 2016 identifies four coastal management areas that comprise the coastal zone. These are:

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

State Environmental Planning Policy (Coastal Management) 2018, known as the Coastal Management SEPP, imposes targeted development controls for these areas, to guide appropriate development within the coastal zone.

The coastal wetlands and littoral rainforests area are defined in the *Coastal Management Act 2016* as land which displays ‘the hydrological and floristic characteristics of coastal wetlands or littoral rainforests and land adjoining those features.’ The mapped area includes a 100-metre proximity area, applying to all land zones, around coastal wetlands and littoral rainforests.

The proposed Byron BEF site sits within the mapped Proximity Area for Coastal Wetlands. Development within the mapped proximity area cannot be approved by a consent authority unless they satisfied that the development will not significantly impact on the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

The subject land is not mapped as being located with land identified as Coastal Use, Coastal Environment or Littoral Rainforest.

A Biodiversity Development Assessment Report (BDAR) has been prepared for the project and is included in Appendix N.

3.4.13. Biosecurity Act 2015

The Biosecurity Act 2015 (Biosecurity Act) is in place for the prevention, minimisation and management of biosecurity risks such as pests, weeds, diseases and contaminants. The Biosecurity Act provides the framework to protect the community, environment, and economy from adverse effects from biosecurity risks. This proposed BEF involves the transportation of organic material for processing to produce a compost product for commercial sale. This compost material will be applied to land in other areas.

The processed output (products) is a beneficial and safe material to handle and transport. All materials will be handled as per relevant guidelines and standard operating procedures in separate buildings and hardstand areas as per the design of the BEF.

Organic material will be from local and regional sources and will not be sourced from interstate or other regions. The transport routes to and from the Site will pass through agricultural, commercial, industrial, and residential areas. Processing the organic material quickly within the enclosed facility and ensuring delivery trucks are properly sealed will minimise any biosecurity risks. The material received will be processed for 3 weeks inside sealed anaerobic digestion tunnels, and a further 3 weeks inside sealed aerobic composting tunnels to ensure pasteurisation of the material to destroy pathogens and denature seeds.

No organic material is expected to be carried to the Site from infested areas as the input material will be sourced from local domestic and commercial supplies.

The Biosecurity Act will be taken into consideration when planning the detailed design of the facility and quality operational process controls to ensure biosecurity measures are upheld.

3.4.14. NSW Energy from Waste Policy Statement

The *NSW Energy from Waste Policy Statement 2015* identifies the relevant policy framework and principal criteria that apply to facilities in NSW that propose to thermally treat waste or waste-derived fuels for the recovery of energy, and in doing so, providing regulatory clarity to industry and the community. In accordance with Schedule 1 of the POEO Act 1997, thermal treatment means the processing of waste by burning, incineration, thermal oxidation, gasification, pyrolysis, plasma or other thermal treatment processes.

Under the NSW Energy from Waste Policy Statement, the BEF is not defined as an ‘energy recovery facility’ because it will combust an ‘Eligible Waste Fuel’. Biogas is recognised as an Eligible Waste Fuel as defined in Section 3 of the policy:

“Gas generated during anaerobic digestion, either naturally in the decomposition of organic waste materials contained in landfills, or in an anaerobic digester.”

The policy refers to the *Eligible Waste Fuels Guidelines 2016* for details on how to apply for a resource recovery order and exemption for the use of an eligible waste fuel. As per the Eligible Waste Fuel Guidelines the biogas combusted by the CHP to produce electricity will be generated during anaerobic digestion in an anaerobic digester, thus meeting the definition of an EPA approved eligible waste fuel.

A combined Eligible Waste Fuel and RRO/RRE application will be submitted for the biogas derived from waste in accordance with the Eligible Waste Fuel Guidelines (Part 4).

3.4.15. National Parks and Wildlife Act 1974 (NPWS Estate)

The NPW Act is the primary legislation concerning the identification and protection of Aboriginal cultural heritage. It provides for the management of both Aboriginal Objects and Aboriginal Places. Under the NPW Act, an Aboriginal Object is any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area, regardless of whether the evidence of habitation occurred before or after non-Aboriginal settlement of the land. This means that every Aboriginal Object, regardless of its size or seeming isolation from other Objects, is protected under the Act. An Aboriginal Place is an area of particular significance to Aboriginal people which has been declared an Aboriginal Place by the Minister.

An Aboriginal Cultural Heritage Assessment (‘ACHA’) was prepared (Appendix P) to identify any archaeological or cultural heritage constraints on the site. The ACHA included field inspections and consultation with representatives from Bundjalung of Byron bay Aboriginal Corporation. No issues were identified for that would potentially impact Aboriginal cultural heritage or historic heritage.

The site is adjacent to the Tyagarah Nature Reserve and Belongil Swamp. A Biodiversity Development Assessment Report (BDAR) was prepared to consider potential impacts to this area (see Section 12 and Appendix N).

3.4.16. Roads Act 1993

The Roads Act 1993 provides for several issues including the establishment of procedures for opening and closing public roads, acquisition of land for roadways in addition to regulating the carrying out of various activities on public roads including roadwork and road widening operations.

No closure of public roads would be required to gain access to the subject site. The site access road, Wallum Place, is constructed. The project does not seek to alter the access arrangements from the public roadway.

The internal access roadway (within the STP) is slated for construction under a separate approval. As Council is the proponent of the work, construction of the access roadway has been assessed as 'development permissible without consent' under Part 5 of the EP&A Act.

The proposed Byron BEF will provide improvements to the internal access to include a wheel wash and a weighbridge.

3.5. Local Environmental Planning Instruments

3.5.1. Byron Local Environmental Plan 2014 (Byron LEP 2014)

Permissibility and Land Zoning

The proposed Byron BEF proposes a development for the purposes of a 'resource recovery facility'. Under the *Byron Local Environmental Plan 2014* (Byron LEP), 'composting' and 'energy generation from gases' both fall under the definition of 'resource recovery facility'. A 'resource recovery facility' is also considered to be a type of 'waste or resource management facility'.

The subject land is zoned Rural Landscape (RU2) and Deferred Matter (DM) under the Byron LEP. For DM zoned areas the *Byron Local Environmental Plan 1988* applies. The DM land is zoned (5a) Special Uses, which is equivalent to (SP2) Infrastructure zoning. LEP Practice note (Ref No. PN 10-001, 2010) from NSW Planning advises that "*If currently zoned 'special use', the following infrastructure land should remain zoned for a 'special purpose' – special purposes such as cemeteries, sewage treatment plants, waste disposal or landfill sites (rezone as SP2 Infrastructure).*"⁸

The Byron LEP does not specifically state that 'composting facilities' or 'waste management facilities or works' are permissible forms of development on RU2 or DM zoned land. However, Section 120 of the *State Environmental Planning Policy (Infrastructure)* 2007 defines 'Waste or Resource Management Facilities' as a form of development which is permissible with development consent in RU2 and SP2 zones.

When there is an inconsistency between the provisions in a Local Environmental Plan and the *State Environmental Planning Policy (Infrastructure)* 2007, under clause of 8(1) of the SEPP, the SEPP takes precedence and overrides the provisions of the LEP.

Byron LEP Provisions

The *Byron Local Environmental Plan 2014* also contains clauses that determine various requirements for building and development. Table 3.2 provides an overview of how the proposed Byron BEF addresses relevant provisions of the Byron LEP.

The information presented in this EIS addresses the relevant matters of the Byron LEP and should enable meaningful consideration of the proposal. The assessment undertaken has been multi-disciplinary and involved consultation with various government agencies, including Byron Shire Council, and stakeholders. Emphasis has been placed on anticipation and prevention of potential environmental and social impacts, with various management and mitigation measures and monitoring activities proposed to minimise adverse impacts.

⁸ NSW Planning (14 December 2010). LEP practice note: Zoning for Infrastructure in LEPs (Ref No. PN 10-001) Page 2.

Table 3.2 Byron LEP Provisions.

Byron LEP Provision	Comment
4.3 Height of buildings	Height of the proposed BEF exceeds the standard. See Section 3.5.2 of this EIS below for a variation request under Section 4.6 of the Byron LEP.
4.4 Floor space ratio	Accounted for in architectural plans (see Appendix B)
5.6 Architectural roof features	Material and textures of new structure are sympathetic to the surrounding environment.
5.10 Heritage conservation	Cultural Heritage Assessment (Appendix P) found the site does not contain any historic value and there is low potential for Aboriginal archaeological sites.
6.1 Acid sulfate soils	A geotechnical report includes preliminary acid sulfate soils testing was undertaken for the site (Appendix J). An acid sulfate soils management plan will be developed prior to construction.
6.2 Earthworks	A Soil and Water Management Plan has been prepared for the site (Appendix Q). A preliminary site investigation and geotechnical report have also been prepared (Appendix I and Appendix J, respectively).
6.3 Flood planning	The site is not located in a mapped flood planning area.
6.4 Drinking water catchment	The site is not located in a mapped drinking water catchment area.

3.5.2. Exception Request for Section 4.3 Height of Buildings

Under the *Byron Local Environmental Plan 2014* the maximum building height limit for the development site is 9 meters from ground level. The proposed BEF requires an exception to height limitations under Section 4.3 of the Byron LEP.

Appendix M of this EIS contains a request for an exception to the building height limit, which outlines key exception requirements under Section 4.6 of the Byron LEP 2014 and discusses how the proposed BEF responds to these requirements. The request outlines why the consent authority can reasonably be satisfied that the proposed development will be in the public interest and not inconsistent with the objectives of the building height development standard and zoning objectives.

3.5.3. Byron Development Control Plan 2014 (Byron DCP)

The general objectives of the *Byron Development Control Plan 2014* are:

- Provide development controls and guidelines that will assist in achieving the Aims and Guiding Principles of Byron LEP 2014.
- Ensure that development is consistent with the Council's established Vision and its adopted planning policies and strategies.
- Ensure that development incorporates the Principles of Sustainable Development and delivers balanced social, economic and environmental outcomes.
- Encourage quality, innovative and sustainable design.
- Manage change in a way that ensures an ecologically, socially and economically sustainable urban and rural environment in which the needs and aspirations of the community are recognised.

- Provide for public participation in the development application and determination process.
- Provide a framework of considerations against which development proposals can be consistently measured.

An assessment of the proposal against the requirements of the *Byron Development Control Plan 2014* is given in Table 3.3.

Table 3.3 Byron Shire Development Control Plan Requirements.

CHAPTER	DCP CONTROLS	WHERE ADDRESSED IN EIS	COMPLIANCE
PART A			
A13.1 Context and Site Analysis	Development applications must be accompanied by a comprehensive site and context analysis. The information contained within the Site and Context Analysis Plan(s) must be diagrammatically represented where possible and must be drawn to a scale appropriate to the development proposal. It must address: - The zoning; environmental constraints; spot levels and contours; vegetation type, species, canopy and height; drainage paths and drainage management systems; easements; known hazards; heritage values and physical characteristics of the site and adjoining properties. - Existing development on the site and surrounds, including existing buildings on the site and adjoining land; location of adjoining windows, doors and open space; the location, height and materials of fences and walls; elevations of adjoining buildings if more than single storey; overshadowing of and by adjoining buildings; advertising structures and signage. - Adjoining street or public land characteristics such as subdivision pattern, streetscape features and trees, pedestrian networks, kerb and gutter, drainage systems, service poles, bus stops and underground services. - Potential sources of nuisance such as noise, odour, light spill and the like. - Views, vistas and view corridors to and from the site. - Where relevant to the development proposal, the direction and distance to local shops, public transport, schools, parks and community facilities. - synopsis of opportunities and constraints for the proposed development, having regard to the results of the Site and Context Analysis process.	Relevant studies and plans have been prepared to accompany the EIS and development application. These include: - Site analysis plan set including civil plans (Appendix B) - Visual Impact Assessment (Appendix L) - Traffic Impact Assessment (Appendix F) - Noise and Vibration Assessment (Appendix H) - Social Impact Assessment (Appendix D)	Compliant
A13.2 Perspectives and Models	Certain large-scale or potentially high impact developments require the submission of additional drawings, perspectives and models to assist the community and council to understand the implications and potential impact of the project.	Architectural perspectives are included in Appendix B. Whilst not mandatory for “Industrial Development”, two photomontages and multiple viewpoint analyses have been developed and are included in	Compliant

CHAPTER	DCP CONTROLS	WHERE ADDRESSED IN EIS	COMPLIANCE
		the Visual Impact Assessment (Appendix L).	
A13.4 Community consultation prior to development application lodgement	As a community significant development (regional development), consultation with the community is required prior to the lodgement of the development application. Pre-lodgement community consultation must include (at a minimum) a facilitated community meeting or workshop. Further requirements include: - Advertisements must be undertaken a prior to the consultation period, giving at least 10 days' notice of the above meeting or workshop, including: Advertisement in a weekly Shire wide newspaper; site notice; letter to any known community groups and/or landowners within 500m of the proposed development; use of social media platform. - Advertisements must include: an explanation of the proposed application, noting that it has not yet been lodged with Council; details of where further information can be found; information, including the date and time, on the arranged community meeting or workshop; alternative avenues for feedback to be shared – email, telephone etc.; final date feedback will be received and considered. - It is the responsibility of the applicant to collect and collate the submissions and/or feedback received. - A report on the pre-lodgement consultation must be submitted to council with the DA (further detailed requirements in the DCP) - It is recommended that community consultation is designed, prepared for and executed as early as possible.	Extensive community consultation has been undertaken by Byron Shire Council and as part of the development of the EIS. A Social Impact Assessment is included in Appendix D. A summary of the consultation results is provided in Section 4 of this EIS.	Compliant
A13.4.2 Minimum Documentation Required upon Lodging the Development Application	The developer must submit a report to Council as part of the development application at the time of lodgement. At a minimum, submitted information must include: a statutory declaration that consultation was undertaken in accordance with this DCP	Extensive community consultation has been undertaken by Byron Shire Council and as part of the development of the EIS.	Compliant

CHAPTER	DCP CONTROLS	WHERE ADDRESSED IN EIS	COMPLIANCE
	- accurate details of the nature and extent of the consultation - copies of what the community was shown during the consultation process - copies of all submissions and/or written feedback received - a summary of how the community responded to the proposal and the main comments received - an outline on how the submitted application has responded to the community's concerns with meaningful changes highlighted. If the application being submitted is substantially different to what the community was shown during the consultation period detailed reasons are to be given for how and why the proposal is different. Where there are significant changes that do not respond to community feedback, further pre-consultation may be required. - This report will be made publicly available through the statutory notification period for the development application.	A Social Impact Assessment is included in Appendix D. A summary of the consultation results is provided in Section 4 of this EIS.	
PART B			
B1 Biodiversity	This chapter applies to development on, or adjacent to, any land with natural features such as; High Environmental Value (HEV) vegetation, red flagged areas (areas of land with high biodiversity conservation value which should be excluded from the development envelope), koala use trees, watercourses, wetlands, threatened species and their habitat, threatened ecological communities, threatened populations, wildlife corridors, areas identified under the Coastal Management SEPP 2018, Koala Habitat Protection SEPP 2019 and the Byron Coast Comprehensive Koala Plan of Management. It further applies to vegetation clearing requiring development consent where: - The vegetation clearing is ancillary to development, or - It is a heritage item or located in a heritage conservation area, or - It is an Aboriginal object or in an Aboriginal place of significance or conservation area.	Disturbance to adjacent native vegetation has been avoided through redesign of the proposed BEF and in consultation with Skala, Byron Shire Council and the biodiversity specialist. No significant heritage features or Aboriginal objects were found on the proposed BEF site. The following studies were prepared: - Biodiversity Impact Assessment (Appendix N) - Aboriginal Cultural Heritage Assessment (Appendix P)	Compliant

CHAPTER	DCP CONTROLS	WHERE ADDRESSED IN EIS	COMPLIANCE
B3 Provision of Services	This chapter provides detailed guidelines on the provision of water, electricity, sewage, drainage, road and telecommunications facilities. Civil designs are to be completed in accordance with the Northern Rivers Development and Design Manual and other guidelines and standards referred to in this chapter. A Soil and Water Management Plan will be required (development over 2,500 square meters) to manage erosion and sedimentation created by the development.	Requirements for utilities are described in Section 2 of this EIS. The following has been prepared for this EIS: - Civil plans (Appendix B) - Soil and Water Management Plan (Appendix Q)	Compliant
B4 Traffic Planning, Vehicle Parking, Circulation and Access	This chapter provides guidelines, controls and standards for traffic planning, vehicle access, circulation and parking for developments. It also sets out driveway grade, size and signage requirements to ensure that driveways have a suitable surface treatment and are not too steep or poorly located. For warehouse or distribution centre developments, the minimum is 1 carpark per 300m ² of gross floor area. The Receival Hall building, which comprises a warehouse floor area of approximately 1,460m ² , requires an off-street car parking requirement of 5 parking spaces. A total of 7 car spaces, including a disabled space, have been provided for the Bioenergy Facility, thereby satisfying Council's DCP 2014 parking requirements.	The proposed development will have a low impact on traffic (maximum 10 truck trips per day). Seven (7) parking are designed into the project. The following studies have been prepared for the EIS: - Traffic Impact Assessment (Appendix F) - Landscape Concept Plan (Appendix B and Appendix L)	Compliant
B6 Buffers and Limiting Land Use Conflict	This chapter provides advice and guidance on planning for land use compatibility, avoiding land use conflict and the use of buffers. All development applications must identify any potential for land use conflicts and the means proposed to address those conflicts. Where buffer distances are less than recommended minimums, the proposed development must incorporate management measures to ensure impacts are addressed.	The recommended buffer distance for this proposed waste facility to all other types of land uses is 300m. Distance to the nearest sensitive receivers is greater than 300m. Studies prepared for the EIS conclude the project will not have significant impacts on surrounding land uses with employment of appropriate mitigation measures. The following relevant studies have been prepared to support the EIS: - Social Impact Assessment	Compliant

CHAPTER	DCP CONTROLS	WHERE ADDRESSED IN EIS	COMPLIANCE
		(Appendix D) - Noise and Vibration Assessment (Appendix H) - Air Quality Impact Assessment (Appendix G)	
B8 Waste management	This chapter aims to facilitate sustainable waste management within the Byron Local Government Area in a manner consistent with the principles of ESD. It sets out objectives and provides guidance on waste minimisation and management.	The proposed BEF aims to provide organic waste resource recovery and produce biogas for use at the Bryon STP and BEF. A Waste Management Plan (Appendix E) has been prepared for the project.	Compliant
B9 Landscaping	This Chapter provides advice, guidelines and controls relating to design, construction and maintenance of landscape and vegetation associated with all developments. A Landscape Plan must be submitted with the DA. For Industrial Development, a minimum 2m width of landscaping is required at the street frontage. The garden bed must contain low shrubs and ground covers and clear trunked canopy shade trees with a minimum spacing of 6m between each tree. At least 80% of the planting of industrial sites is to be at the front of the site.	Landscaping has been designed into the proposed BEF. A Landscape Concept Plan has been prepared as part of the Visual Impact Assessment and is included in Appendix B and Appendix L.	Compliant
B12 Social Impact Assessment	This chapter provides guidance on when and how a Social Impact Assessment (SIA) is to be undertaken, and who should conduct and certify the SIA. As a designated development the proposed development will require preparation of a SIA. This will include a mandatory pre-lodgement meeting, research, consultation and analysis.	Extensive community consultation has been undertaken by Byron Shire Council and as part of the development of the EIS. A Social Impact Assessment is included in Appendix D. A summary of the consultation results is provided in Section 4 of this EIS.	Compliant
PART D			

CHAPTER	DCP CONTROLS	WHERE ADDRESSED IN EIS	COMPLIANCE
D5.2.1 Building Lines	This section limits the setback from boundaries. From road frontage the relevant setback for the proposed development is 10m.	Not applicable as the proposed BEF sits adjacent to the Byron STP and >250m from Wallum Place.	
D5.2.2 Building Criteria	This section provides guidance on the appearance of the building, mainly when viewed from the road. The building must be compatible with adjoining and nearby development, and with the character of the precinct. The development and associated buildings must be designed to be functional, to provide adequate employee facilities and to complement the character of existing development within the locality.	The proposed BEF has been designed to accommodate staff amenities and office space and is set back far from the main road. See the following documents: - Architectural Plans - Perspectives - Site Plans - Visual Impact Assessment	Compliant
D5.2.3 Water and Sewer Services	Performance Criteria All development must be consistent with the provisions of Chapter B3 Services. Prescriptive Measures 1. All development must be serviced by reticulated water supply. 2. All development must discharge wastewater to mains sewer. 3. A Trade Waste Agreement is required prior to industrial users connecting to sewer. The agreement must detail the necessary pre-treatment of waste.	All required services will be provided to the proposed BEF. A description of the project utilities required is provided in Section 2. Civil plans are provided in Appendix B.	Compliant
D5.2.3 Energy Efficient Industrial Development	This section sets criteria for maximising environmental sustainability and energy efficiency while ensuring that industrial development provides for convenient and safe movement of people between areas and facilities by walking, cycling and public transport use. The building is to be configured to maximise passive solar energy and minimise energy use in artificial lighting. This may include the use of skylights to capture natural light through the roof. It should also be orientated to utilise prevailing winds to enhance the opportunity for cross ventilation. The use of energy efficient appliances and equipment are encouraged to minimise energy usage and greenhouse gas generation. There is no requirement for bicycle parking.	Biogas will be harvested and used for the Combined Heat and Power unit for electricity use at Byron STP and proposed BEF. The design also includes rainwater harvesting tanks and stormwater capture and treatment systems. See Site, architectural and civil plans are provided in Appendix B.	Compliant
D5.2.5 Water Sensitive Urban Design	This section requires that the development integrate and allow for water sensitive urban design (WSUD) measures to be implemented into lot layouts and drainage systems. This can be incorporated through:	The reception hall and processing tunnels at the proposed BEF will all be	Compliant

CHAPTER	DCP CONTROLS	WHERE ADDRESSED IN EIS	COMPLIANCE
	a) storage rather than conveyance of stormwater; b) maintenance and enhancement of water quality; c) permeable surfaces, soak-wells and landscaped swales in site layout to increase onsite infiltration and treatment; d) water conserving landscaping; e) localised water supply for irrigation; and f) use of rainwater tanks for stormwater re-use.	enclosed and internal in a controlled environment. Other parts of the facility will include stormwater capture and treatment and water harvesting. See Site plans (Appendix B), Landscape concept plans (Appendix B and Appendix L).	
D5.2.9 Fencing	Objectives 1. To provide for the security of the premises and outdoor storage areas. 2. To ensure that fencing does not detract from the streetscape of the industrial area.	Site is within the fenced and secure Byron STP premises.	Compliant
D5.2.10 Outdoor Storage Areas	Prescriptive Measures 1. Outdoor storage areas must be sealed, drained and designed to minimise dust generation and to avoid adverse visual impacts on the locality. Drainage of outdoor storage areas must comply with the requirements of Chapter B3 Services. 2. Outdoor storage areas must be designed and landscaped to ensure that when used for storage purposes they will not adversely impact on the character and appearance of the site or the surrounding locality. Details of the types of goods or materials to be stored, manner of storage (e.g., stockpiling), maximum storage height, methods of protection of stored goods or materials and proposals to screen the stockpiles from view from public areas must be submitted with the development application.	All waste received is stored inside the receival hall in designated areas. Product storage is in the receival hall and undercover at the Byron STP. Storage is interior to sealed building and in designated STP area (previously biosolids storage). See the site and civil plans (Appendix B).	Compliant

3.6. Strategic drivers

NSW EPA's Strategic Plan and the WARR Strategy 2014-2021

In NSW, the State Government has committed to ambitious targets for recycling across the State. These targets are published in the NSW Waste Avoidance and Resource Recovery Strategy. By 2021–22, the NSW Government intends to increase recycling rates for:

- Municipal waste from 52% (in 2010–11) to 70%;
- Commercial and industrial waste from 57% (in 2010–11) to 70%;
- Construction and demolition waste from 75% (in 2010–11) to 80%; and
- Waste diverted from landfill from 63% (in 2010–11) to 75%.

A critical pathway to achieving these recycling targets is investment in new infrastructure. To encourage investment in new recycling facilities, the NSW Government is investing \$337 million between 2017 and 2021 to build new recycling facilities. This investment is required to capture an additional 3.3 million tonnes of waste per year and have this material sustainably diverted from landfill⁹.

NSW Waste Less, Recycle More Initiative

The NSW Government's \$337 million Waste Less, Recycle More program includes \$48 million to support the development of new infrastructure for both municipal, commercial and construction and demolition waste materials. A further \$57 million is allocated to establishment and servicing of Community Recycling Centres across NSW to collect household problem wastes.

NSW EPA Waste and Resource Recovery Infrastructure Strategy 2017-2021

In August 2017, the NSW EPA published the State's first draft strategy for prioritising new recycling infrastructure required across NSW by regional council groupings. The NSW EPA recognises that to achieve the diversion from landfill targets, significant investment in new infrastructure is still needed.

Net Zero Emissions Strategy for Council Operations 2025

The Net Zero Emissions Strategy for Council Operations 2025 sets the climate change context and maps out a dynamic, high-level pathway for Council to achieve its aspirational climate change mitigation goals of net zero emissions by 2025 and sourcing 100% of its energy from renewable sources by 2027 (for council operations). Council has committed to following its strategic decision-making hierarchy at every step of the way:

- Avoid using energy in the first place;
- Reduce energy use of operations where possible;
- Replace existing fossil fuel-based energy supplies with renewables;
- Invest in high-quality offsets; and
- Review and optimise processes and projects.

⁹ NSW EPA (2014). NSW Waste Avoidance and Resource Recovery Strategy: 2014 – 2021. Internet publication: <http://www.epa.nsw.gov.au/wastestrategy/warr.htm>

Council is actively researching a wide variety of new projects to reduce emissions and transition to renewable energy for its operations. As the largest single consumer of power in the Shire, providing zero emissions power to the BBSTP is a high priority. The proposed BEF addresses this priority.

Net Zero Plan Stage 1: 2020-2030

The Net Zero Plan Stage 1: 2020-2030 is the foundation for NSW's action on climate change and goal to reach net zero emissions by 2050. It outlines the NSW Government's plan to grow the economy, create jobs and reduce emissions over the next decade.

The plan aims to enhance the prosperity and quality of life of the people of NSW, while helping the state to deliver a 35% cut in emissions by 2030 compared to 2005 levels. The plan will support a range of initiatives targeting electricity and energy efficiency, electric vehicles, hydrogen, primary industries, coal innovation, organic waste and carbon financing.

As part of the plan, the NSW Government has set a target of net zero emissions from organic waste by 2030. To deliver on this goal, the NSW Government will establish world-leading landfill diversion policies to apply to the waste industry. It will:

- Support local councils to provide communities with best-practice food and garden waste management infrastructure;
- Ensure composts or other organic soils are of the highest quality for land application;
- Facilitate the development of 'waste to energy' facilities in locations that have strong community support, provided those facilities meet strict environmental standards; and
- Update regulatory settings to ensure residual emissions from the organic waste industry are offset.

These policies are designed to ensure opportunities for local processing are fully utilised and disposal costs for local councils and ratepayers are minimised. The BEF will assist the NSW Government meet the goal. It also has the potential to provide guidance for other council work towards the same goal.

Food Waste for Healthy Soils Fund

The Australian Government is investing \$67 million to establish a Food Waste for Healthy Soils Fund over four years commencing in 2021-22. The Fund will put organic waste to productive use on our agricultural soils, rather than going to landfill. The Fund aims to increase Australia's organic waste recycling rate from 49 per cent to 80 per cent by 2030.

Achieving an 80 per cent recovery rate for organic waste will add approximately \$400 million in industry value to the Australian economy while creating over 2,600 new jobs. It will also avoid over two million tonnes of unnecessary greenhouse gas emissions each year (the equivalent of taking nearly 500,000 cars off the road).

Together with co-contributions from participating state and territory governments and industry, the Fund will leverage over \$170 million to build new and improve existing infrastructure to turn organic waste into nutrient rich compost and soil enhancers. These infrastructure upgrades will improve the quantity and quality of compost available for use in agriculture. The Fund also includes initiatives to reduce contamination in our organic waste streams and to promote the benefits of using compost on soils to the agricultural sector.

Environmental Assessment

4. Social Impact Assessment and Consultation

4.1. Methodology

A social impact assessment report (Appendix D) has been prepared for the Byron Shire Bioenergy project to assess potential social impacts. The SIA has been prepared in accordance with:

- SEARs requirements; and
- BSC's Social Impact Assessment Policy (Policy No. 09/008) (the Policy).

Whilst the Department of Planning and Environment *Community and Stakeholder Engagement – Draft Environmental Impact Assessment Guidance Series June 2017* apply to state significant developments, these guidelines have also been considered to inform the SIA.

Byron Shire Council prepared a Communication and Engagement Plan (CEP) for the Byron Shire Bioenergy project in November 2020. This plan has supported the delivery of the social impact assessment for the project. This detailed plan outlines a strategy for managing communications between Council and its stakeholders. The CEP identifies key stakeholders and includes a detailed stakeholder analysis to help structure the communication and engagement activities during the life cycle of the project.

Figure 4.1 provides an overview of the methodology for preparing the SIA.

Figure 4.1. Structure of the community consultation program to inform the social impact assessment.



Direct local engagement with neighbours comprising residents and business owners / operators within a 1km radius of the project site was done. Engagement via direct mail was considered the most appropriate method given the COVID-19 pandemic, with a letter of introduction to the project and a supporting information sheet provided. Further detailed information was made available on Council's project website. The focus was to seek feedback from neighbours on key matters that need consideration in the environmental assessment phase of the project.

Direct engagement with key local community and environment groups was also done, with a letter of introduction to the project and a supporting information sheet provided. The focus was to seek feedback on issues of concern to community and environmental groups to help inform the environmental assessment phase of the project.

In addition to the consultation program, a qualitative assessment of broader social impacts arising from the development was conducted. As a result, further work that will need to be conducted as part of the EIS process to ensure that the proposed development does not impact the local community has been highlighted.

4.2. SEARs Consultation Requirements

As required by the SEAR's, and further detailed in the SIA (Appendix D), the following consultation was undertaken:

- Commonwealth Department of Environment and Energy;
- Department of Planning, Industry and Environment, specifically the:
 - Biodiversity and Conservation Division;
 - Environment Protection Authority;
 - Crown Lands Division;
- Transport for NSW;
- Fire & Rescue NSW;
- NSW Rural Fire Service;
- Tweed Byron Local Aboriginal Land Council;
- Byron Shire Council;
- The surrounding landowners and occupiers that are likely to be impacted by the proposal; and
- Details of the consultation carried out and issues raised must be included in the EIS.

4.3. Community Consultation

Feedback was sought from neighbours comprising residents and business owners / operators from a wide consultation area, within a 1km radius of the development (169 property owners). This involved the preparation and issue of a letter to introduce the project together with an information sheet requesting owners to provide feedback on the proposed development.

The following neighbours were prioritised for inclusion in the consultation program:

- Business neighbours

The following businesses located within approximately 1km of the project site will be consulted to seek their views on the proposed development. This includes:

- Habitat retail precinct;
- Elements;
- Byron Bay Fair (IGA and other businesses);
- Bayshore Drive and Centennial Circuit businesses; and
- Other Arts and Industry Estate businesses.
- Residential neighbours

The following residential areas located within approximately 1km of the project site will be consulted to seek their views on the proposed development. This includes:

- Bayshore Drive; and
- Sunrise residential estate.

- Community and environment groups:
 - North East Forest Alliance;
 - Belongil Catchment Drainage Board;
 - Byron Environment Centre; and
 - Community Alliance for Byron Shire (CABS).

4.4. Existing Environment

Byron Shire is located on the Far North Coast of New South Wales, about 800 kilometres north of the Sydney CBD and 200 kilometres south of the Brisbane CBD. Byron Shire is bounded by Tweed Shire in the north, the Coral Sea in the east, Ballina Shire in the south, and Lismore City in the west.

Byron Shire lands are spread geographically across various Traditional Owners. Arakwal traditional lands extend south from the Bruns River. Minjungbal People are to the north of the Bruns River. Both are part of the Bundjalung Nation.

In 2020, the population of Byron Shire was estimated to be 35,773². The NSW Department of Planning, Industry and Environment published a fact sheet on predicted population changes in the Byron Shire Council area between 2019 and 2041. The 2019 Population Projections indicate that the population of Byron is estimated to increase to about 37,950 by 2041¹⁰.

The Census usual resident population of Byron Bay in 2016 was 5,599, living in 3,224 dwellings with an average household size of 2.19. The estimated residential population in Byron in 2020 is 6,460.

The main occupations of people living in Byron Bay are 23.8% Professionals, 16.8% Managers, 13.4% Technicians & trades workers, 12.9% Community & personal service workers, 9.5% Sales workers, 9.7% Labourers, 8.8% Clerical & administrative workers and 3.2% Machinery operators & drivers¹¹.

The main industries people from Byron Bay work in are 22.2% Accommodation and food services, 10.7% Retail trade, 10.2% Health care and social assistance, 8.6% Education and training, 6.9% Manufacturing, 6.6% Construction, 6.5% Professional, scientific and technical services, 4.0% Administrative and support services, 3.7% Other services.

The full extent of the COVID-19 pandemic in demographic shifts within the town are not fully known, though housing affordability and provision of affordable residential land for the community is a priority of Council. As part of Council's affordable housing initiatives, Council is proposing to rezone some of its land holdings on Stuart St, Mullumbimby to provide for additional residential development.

In May 2019, Byron Shire Council adopted the 'Our Byron Arts and Industry Estate Precinct Plan'¹² to deliver a shared vision that celebrates the rich history of the Byron Arts and Industry Estate, south of the proposed development, as a lively hub for innovation, industry and creativity. The Byron Arts and Industry (A&I) Estate was established in the early 1970s and by 1975 there were businesses operating out of what was then an isolated, industrial area well away from the heart of town. The Estate has evolved from a local service centre to an eclectic mix of businesses and residential uses, moulded by its users.

¹⁰ NSW Department of Planning, Industry and Environment (2019). Byron Shire Council – 2019 NSW Population Projections. Internet publication: <https://www.planning.nsw.gov.au/-/media/Files/DPE/Factsheets-and-fags/Research-and-demography/Population-projections/2019-Byron-Bay.pdf>

¹¹ Australian Bureau of Statistics (2016). 2016 Census Quickstats. Internet publication: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SSC10733

¹² Byron Shire Council (2019). Precinct Plan – Byron Arts & Industry Estate. Internet publication: <https://www.byron.nsw.gov.au/Community/Place-planning/Byron-Arts-and-Industry-Estate>

Although the Arts & Industry Estate is located more than 500m from the Site, heavy vehicles entering the Byron Shire Bioenergy Facility will do so via Bayshore Drive, which also receives vehicular flows from Centennial Circuit that services the Arts & Industry Estate. This will need to be considered in the planning of the Byron Shire Bioenergy Facility.

It is noted that the West Byron Urban Land release area is located 2.5 km west of Byron Bay and is located approximately 1.08 km to the south of the project site (fronting Ewingsdale Road). The West Byron development application is for lands totalling 58 ha. The development application seeks approval to subdivide the land into 31 hectares zoned for conservation and 27 hectares to be for low- and medium-density housing, light industrial and a neighbourhood centre. Whilst the project site is located at significant distance from the proposed West Byron Urban Land release area, heavy vehicles will access the Byron Shire Bioenergy Facility via Ewingsdale Road. This will need to be considered in the planning of the Byron Shire Bioenergy Facility.

The proposed lot is located on the southern side of Wallum Place, west of Bayshore Drive, within the Byron Bay Sewage Treatment Plant (BBSTP). The development site is immediately to the south and west of existing infrastructure within the BBSTP.

The lot includes three existing developments:

- A sewage treatment plant, owned and operated by BSC;
- A solar array and supporting infrastructure, owned and operated by BSC; and
- A herb nursery, operated by Byron Bay Herb Nursery which is a not-for-profit disability service charity;

The closest neighbours (not owned by Byron Shire Council) are located in a mixed-use development just under 500 meters east of the development that includes apartments and commercial premises. A large buffer is provided by a nature reserve to the north, and wetlands and playing fields to the south associated with the Cavanbah Sport and Recreation Centre. A light industrial estate around Centennial Circuit is around 600m to the south east.

The site is in West Byron Bay, an area dominated by a highly valued wetland (including the Tyagarah Nature Reserve) to the north, open rural landscapes and pockets of light industrial, commercial and mixed-use development to the east and south east. The types of activities of the nearby businesses include:

- Restaurants and bars;
- Retail stores;
- Hotel
- Auto repairs;
- Manufacturing;
- Health and fitness; and
- Offices.

The nearest rural residential dwellings are over 1 km to the west and the closest low-density residential area is approximately 800 meters away on the eastern side of Bayshore Drive. There are two childcare centres approximately 1km to the east and south east of the development.

Figure 4.2 shows an aerial view of the site, surrounding areas, neighbours, and potential sensitive land uses. Figure 4.3 shows the area of consultation activities, and land owners and occupiers located within the yellow shaded area that were invited by letter to provide feedback on the project.

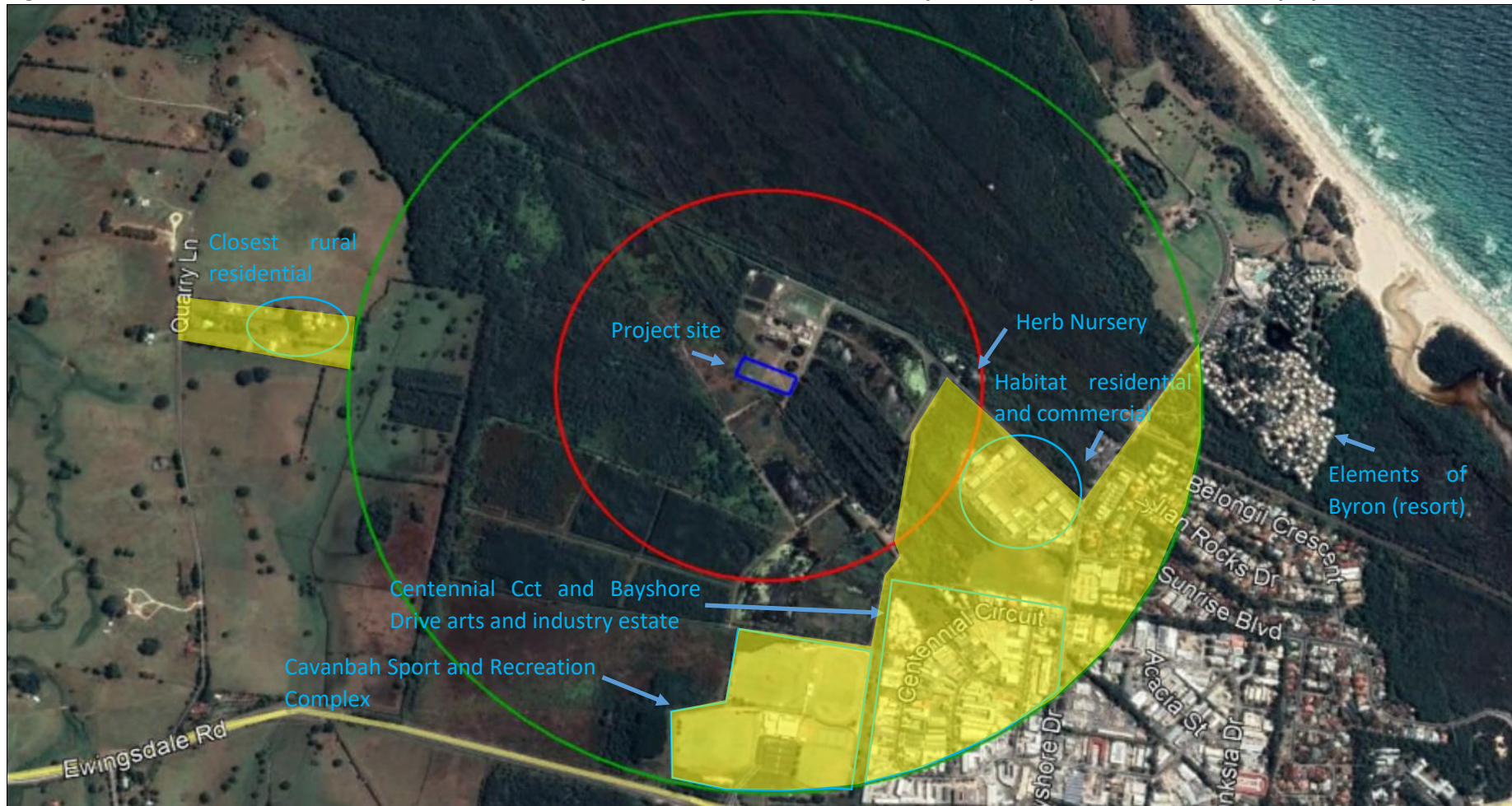
Figure 4.2. Aerial view of the subject site showing neighbours and potential sensitive receptors. Red circle 500m, green circle 1,000m from site.



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd
19/03/20	Revision A	A.Johnston	45 Wallum Place,	Strategy Infrastructure Compliance Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au
05/04/21	Revision B	M.Jackson	Byron Bay	

Client	Byron Shire Council
Project	Byron Bioenergy Facility
Title	Neighbouring developments / receptors
Scale	Not to Scale
Source	Google Maps

Figure 4.3. Consultation area. Owners located within the yellow shaded area were invited by letter to provide feedback on the project.



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd
19/03/20	Revision A	A.Johnston	45 Wallum Place,	Strategy Infrastructure Compliance Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au
05/04/21	Revision B	M.Jackson	Byron Bay	

Client	Byron Shire Council
Project	Byron Bioenergy Facility
Title	Consultation area
Scale	Not to Scale
Source	Google Maps

4.5. Results of Consultation

A summary of the findings from the social impact assessment is presented in Table 4.1 and 5.2. Table 5.1 summarises the specific feedback from the community in relation to key matters of concern relating to the proposed development. This table also contains a summary of feedback from agencies.

The principal issues of concern to the local community relate to:

- Noise, traffic and safety impacts associated with residences and sensitive land uses along Bayshore Drive (main haul route into the project site);
- Impacts on Council rates;
- Alternative uses of the lands; and
- Potential impacts of lighting on nocturnal wildlife associated with the wetlands and surrounding areas.

No additional feedback (beyond feedback contained in the SEARs) was received from NSW Government agencies.

The matters outlined above are detailed further in Table 4.1, along with suggested measures how these matters should be addressed within the Environmental Impact Statement (EIS).

Table 4.1. Feedback from government agencies, adjoining and nearby businesses, residential receptors.

Neighbour / Organisation	Reason for consultation	Distance from project site	Issue	How issue has been addressed in EIS
26 Bayshore Drive	Within 1km consultation area	795m	Site includes 14 residential townhouse dwellings. Main concerns are noise from truck movements transporting organics wastes into and out of the facility.	Traffic and Parking Assessment Report and Noise Impact Assessment to consider potential impacts, mitigation measures and/or alternative access arrangements.
38, 40 and 42 Bayshore Drive	Within 1km consultation area	~803m	Residential dwellings associated with three separate lots. Main concerns are noise from truck movements transporting organics wastes into and out of the facility. Concern over cyclist and pedestrian safety, and sensitive businesses such as cafes, IGA supermarket and a medical centre.	Traffic and Parking Assessment Report and Noise Impact Assessment to consider potential impacts, mitigation measures and/or alternative access arrangements. Majority of truck movements to occur via Bayshore Drive south, rather than north, meaning that impacts on these properties can be avoided.
Not given	Within 1km consultation area	Not known	Resident concerned over the cost of the development and potential impact on rates.	Financial assessment of project and potential impacts on ratepayers is out of scope of the EIS.
Not given	Within 1km consultation area	Not known	Resident proposes to use land for an alternative community development purpose.	Use of the lands for an alternative purpose is not within the scope of the EIS.
Residential property located on Sunrise Blvd	Within 1km consultation area	Not known	Request that any existing infrastructure (sports centre) around the wetlands be modified to produce little to no light at night in order to protect nocturnal wildlife in the area and preserve the dark skies. Secondary outcome of reducing energy usage to save money and reducing the overall local carbon	Lighting use around the Cavanbah Sports Centre is not within scope of the EIS for the proposed development. Detailed design process to consider minimum security lighting to prevent impacts on nocturnal fauna located on neighbouring wetlands and the surrounding area.

Neighbour Organisation	Reason for consultation	Distance from project site	Issue	How issue has been addressed in EIS
			footprint, which are also documented council goals.	
Not given – Individual on behalf of 6 residents	Within 1km consultation area	Not known	Concerns relate to traffic. The density of the arts and industry estate is increasing at a high rate. Bayshore Drive already carries a significant amount of traffic and despite the introduction of the roundabout on Ewingsdale Road, long traffic queues occur on weekdays. During heavy rain events, Bayshore Drive floods. Vehicles passing through flood water on Bayshore Drive create waves which have previously caused damage to retail tenancies fronting Bayshore Drive. The Wallum Place, Bayshore Drive, Bayshore Lane intersection is not easy to navigate and near misses are common. Council's own Arts & Industry Precinct Plan calls for a reduction in vehicle movements throughout the estate in order to support businesses and transition to a low carbon precinct. Is it not possible to provide access to the Sewerage Treatment Plant via the Cavanbah Centre?	Traffic and Parking Assessment Report to evaluate suitability of proposed access route into the facility via Bayshore Drive then Wallum Place. Alternative access routes to mitigate against impacts on Bayshore Drive to be considered.
Commonwealth Department of Environment, Water and Energy	SEARS Requirement	N/a	A potential matter of National Environmental Significance under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> was identified during filed surveys.	Biodiversity assessment to note potential MNES and related mitigation measures to avoid significant impact. Referral to Commonwealth to confirm that it is not a controlled action.
NSW Department of Planning and Environment	SEARS Requirement	N/a	No further feedback beyond SEARS requirements	SEARS requirements to be addressed in EIS
NSW EPA	SEARS Requirement	N/a	No further feedback beyond SEARS requirements	SEARS requirements to be addressed in EIS
Transport for NSW	SEARS Requirement	N/a	No further feedback beyond SEARS requirements	SEARS requirements to be addressed in EIS
Rural Fire Service	SEARS Requirement	N/a	No further feedback beyond SEARS requirements	SEARS requirements to be addressed in EIS
NSW Fire and Rescue	SEARS Requirement	N/a	No further feedback beyond SEARS requirements	SEARS requirements to be addressed in EIS

Neighbour Organisation	Reason for consultation	Distance from project site	Issue	How issue has been addressed in EIS
Tweed Byron Local Aboriginal Land Council	SEARS Requirement	N/a	No further feedback beyond SEARs requirements	SEARs requirements to be addressed in EIS
Byron Shire Council	SEARS Requirement	N/a	No further feedback beyond SEARs requirements	SEARs requirements to be addressed in EIS

4.6. Impact Assessment

A qualitative assessment of broader social impacts arising from the development is provided in Table 4.2. It identifies further work that has been conducted as part of the EIS process to ensure that the proposed development does not impact the local community.

The assessment of broader potential social impacts suggests that the proposed development is likely to have a low impact on the surrounding community. The development will be integrated within the Byron Bay Sewage Treatment Plant facility, and is surrounded by lands conserved as wetlands, which will act as a long term buffer between the development and neighbouring land uses. Although areas of the south of the project site are important and growing industrial, arts and residential areas, the proposed development, if well managed, will have very low impact on the local environment and the surrounding community.

Table 4.2. Identification and measurement of likely impacts associated with the development across a range of social impact criteria.

Social impact criterion identified	Outcomes from the assessment	Measurement of impacts required
Transport	Access to the site via public transport is of minor importance as the site is not subject to high visitation by the community. There are currently two bus services that operate within 800m walking distance of the site, with the closest bi-directional bus stop located along Julian Rocks Drive. Number of employees at the facility is low (3-5), with private transport likely to be the dominant mode of transport to/from the facility by staff.	Impact of the proposed development on need for public transport in the area is likely to be low. Matter assessed further in the Traffic and Parking Assessment study (Appendix F of this EIS)
Safety	The potential for security risks to persons or property as a result of the proposed development is considered to be very low. Site to be secured through security fencing to prevent unauthorised access after-hours when facility is not staffed.	The potential for security risks to persons or property as a result of the proposed development is considered to be very low. Appropriate security fencing as part of the Byron Bay Sewage Treatment Plant to be considered to ensure that unauthorised access is prevented.
Diversity	The impacts of the proposed development on cultural or demographic differences in the local community is expected to be low. The proposed development is not likely to impact housing affordability or community diversity as long as the project has negligible impact on local air quality and local traffic.	The potential for transport impacts, particularly along Bayshore Drive needs to be assessed as part of the Traffic and Parking Assessment study (Appendix F of this EIS) to avoid any diversity impacts on the local community, including the Arts & Industry Estate along Centennial Circuit.

Social impact criterion identified	Outcomes from the assessment	Measurement of impacts required
Amenity	<i>Traffic:</i> Movement of heavy vehicles on Bayshore Drive into Wallum Place appears to be the main concern relating to the proposed development. Potential for impacts on residential dwellings along this route. Whilst the West Byron Urban Land Release Area is not yet approved, residential and commercial development in this area will increase traffic on Ewingsdale Rd, which will also be used by heavy vehicles transporting organics into the facility. <i>Noise:</i> The proposed development will involve recycling operations that will occur indoors, however, there is potential for some noise impacts from truck movements along Bayshore Drive. <i>Odour:</i> The proposed development will involve treatment of all process air through a biofilter prior to discharge. Whilst odour impacts are not expected, this is to be confirmed through modelling of worst case conditions. <i>Pedestrian safety:</i> Whilst additional truck movements along Bayshore Drive are low, consideration should be given to measures that may assist in improving pedestrian and cyclist safety for people that live and use community facilities associated with the Habitat precinct.	Traffic and Parking Assessment study has considered the additional traffic generation by the development, which will involve up to 10 trucks and 5 light vehicles per day accessing the facility. The Study has found that there will be no unacceptable impact on road network capacity. (Appendix F of this EIS) Noise study considers noise impacts from truck movements during the day. (Appendix H of this EIS) Air quality impact assessment considers worst case scenario conditions to ensure no impacts on local air quality. (Appendix G of this EIS) Pedestrian and cyclist safety on main haul route is considered in the Traffic and Parking study.
Employment and training	The project will create up to 25 jobs in construction over a 10-month period and 5 new full-time jobs during the operational phase. The project will also generate potential training opportunities for the local community in facility operations.	Impacts are not likely to be significant, and further measurement is not required.
Culture	The proposed development is to be co-located within the existing Byron Bay Sewage Treatment Plant, which has a long history of successful operation with no complaints from the local community. The proposed development is surrounded by wetlands, which will act as a buffer between the development and existing / future development within the area. The proposed development is unlikely to have any impact on the emerging and vibrant arts and mixed industrial precinct associated with Centennial Cct and Bayshore Drive arts and industry estate.	Impacts are not likely to be significant, and further measurement is not required.

4.7. Recommendations

To minimise the potential for social impacts on the local community, the following recommendations have been proposed in the SIA. As a result, these matters have been considered in the Environmental Impact Assessment process as follows:

1. Traffic and Parking Assessment Report (Appendix F) and Noise Impact Assessment (Appendix H) have considered potential impacts, mitigation measures and/or alternative access arrangements into the proposed development. Consideration was also given to alternative access routes to mitigate against impacts on Bayshore Drive (see Section 1.5.2);
2. Minimum security lighting to be considered during detailed design to prevent impacts on nocturnal fauna located on neighbouring wetlands and the surrounding area;
3. Appropriate security fencing as part of the Byron Bay Sewage Treatment Plant to be considered during detailed design to ensure that unauthorised access is prevented;
4. Air quality impact assessment (Appendix G) has considered worst case scenario conditions to ensure no impacts on local air quality; and
5. The Traffic and Parking study (Appendix F) has considered potential impacts on traffic and parking, including pedestrian and cycle routes along Bayshore Drive (Section 11.3.5 in this EIS, and Section 3.6 in the Traffic and Parking study).

5. Waste Management

A Waste Management Plan was prepared by Jackson Environment and Planning Pty Ltd. A brief summary of the plan is provided in this chapter. The full Waste Management Plan is provided as Appendix E.

5.1. Methodology

The waste management plan was compiled using the following steps:

1. Estimate waste stream types and amounts based on the site activities – during both construction and operational phases;
2. Identify management options for each waste stream suitable within the regulatory framework;
3. Select most appropriate waste management option for each waste stream, aiming to recover as much waste as possible.

5.2. Existing Environment

The current site is vacant and adjacent to the Byron STP. Therefore, there are currently no waste management systems on the site.

5.3. Impact Assessment

5.3.1. Demolition and construction phase

The development phase of the project does not involve the demolition of any built structures.

5.3.2. Construction phase

The waste streams generated on site during the construction phase is summarised in Table 5.1 below.

No Trees/shrubs need to be removed during initial works. The grassed area is known to contain weeds so all grass, roots and associated soil will be removed for composting at a suitably licensed site.

It is projected that soil from the limited amount of excavation proposed can all be used as fill on-site (to create a level site). Where site soil is surplus to requirements and cannot be used on site, this waste will be classified under the NSW EPA's *Waste Classification Guidelines Part 1: Classifying Waste* (2014). This soil will be placed in labelled hook lift bins and sent off-site for lawful disposal.

The technical corridors, gas storage facility, CHP, flare, and plant are prefabricated and delivered to the site, thus minimising construction waste. Minor amounts of concrete, timber, metal and plastics will be generated during the construction of the administration building, receival hall and tunnels, and while connecting various components of the development (ducting, water reticulation etc.). These wastes will be segregated to maximise recycling, stored separately in hook lift bins, and will be transported off-site for recycling at a lawful facility.

The overall waste recovery rate during the construction phase will be >85%. Residual waste will be collected in a separate hook lift bin and regularly removed from the site for disposal in a licensed landfill. Other recovered materials will be sent to EPA licenced recycling facilities in the region.

Table 5.1. Estimated waste generation during the construction phase.

Waste Type	Waste Identified	Waste Description	Reuse/recycling/ Disposal Method	Suggest Receiving Facility	Tonnes	Recycling rate
General Solid Waste (non- putrescible)	Grasses and roots	Grasses, roots and associated topsoil These will be mulched and used on-site around the perimeter of the site for soil erosion control	Off-site recycling	Use on-site as an erosion control mulch	350	100%
	Soil	Earthworks spoil to prepare the access road, parking, building pad and weighbridge construction areas.	Off-site disposal	Byron Resource Recovery Centre - Myocum	50	0%
	Construction waste - heavy	Asphalt, concrete, bricks from the installation of foundations, retaining walls and underground services and above mechanical and electrical plant and equipment	Off-site recycling	Byron Resource Recovery Centre - Myocum	30	95%
	Construction waste - metal	Ferrous metal off-cuts, mainly from shed construction	Off-site recycling	Byron Resource Recovery Centre - Myocum or Ballina Shire Council Waste Management Centre	0.3	100%
	Construction waste - light	Timber, packaging, glass, plastic, rubber, plasterboard, and ceramics	Off-site disposal	Byron Resource Recovery Centre - Myocum	8	0%
	Grit, sediment, litter and gross pollutants	Collected in, and removed from, stormwater treatment devices and/or stormwater management systems	Off-site disposal	Byron Resource Recovery Centre - Myocum	5	0%
	Site office waste	Paper, cardboard and co-mingled recycling.	Off-site recycling	Byron Resource Recovery Centre - Myocum	1.5	100%
Hazardous	Waste oils, fuels, lubricants and chemicals	Waste oils and containers that previously contained Class 1, 3, 4, 5 or 8 substances used for construction plant	Off-site recycling / disposal	Byron Resource Recovery Centre - Myocum	0.1	0%
General Solid Waste (putrescible)	Site office waste	Generated from worker's lunches.	Off-site disposal	Byron Resource Recovery Centre - Myocum	0.1	0%
TOTAL Amount of waste generated (tonnes)					445	
TOTAL Amount of waste recycled (tonnes)					380	
Overall recycling rate					85.5%	

5.4. Operational Phase

5.4.1. Site Operations

The site operations will generate very little waste itself. The vast bulk of organic “waste” materials will be brought onto site for processing and off-site transport to land and other facilities for sale and distribution. While some material will be non-recyclable “residual” waste, most material will be processed and then moved off site for use in agricultural and other applications that require soil amendments.

The organics recycling operations will be established within on the Site and will process up to 28,000 tonnes of solid and liquid waste materials per annum. The overall waste recovery rate during the operation phase is expected to be more than 95% and will be up to 99% if the oversize fraction (after screening) can be cost effectively decontaminated.

The expected waste volumes including incoming material and sources and waste classifications are presented in Table 2.1 and Table 2.2. in Section 2.4.7 of this EIS. The procedures for receipt and management of wastes is presented in Section 2.4 and is depicted graphically in Figure 2.6.

Figure 2.4 and Figure 2.5 in Section 2.3 provide a general site layout for the BEF facility including the location of waste storage areas and truck access. Complete site plans are presented in Appendix B.

The Byron Bioenergy Facility will recycle more than 95% of the waste received and up to 99% if the oversize fraction (after screening) can be cost effectively decontaminated. The remainder of the waste received will be recovered at the Byron Resource Recovery Facility in Myocum or disposed at a licenced landfill (<1,400 tonnes per annum). The coarse mulch in some batches may not be cost effective to decontaminate.

Outgoing compost products are presented Table 5.2 below. These products will be mainly sold into the region’s landscaping and agricultural markets as a soil amendment or as part of a manufacturer soil.

Table 5.2. Composted products.

Product	Proportion of composted output	Estimated quantity at full capacity (tonnes/year)
Soil Conditioner	65%	10,130
Fine Mulch	20%	3,000
Coarse Mulch	15%	2,100
TOTAL	100%	15,230

The office operations associated with the Byron BEF will generate waste from office administration and staff lunch activities. Whilst waste generation from these activities are considered minor, they need to be appropriately managed to ensure that waste is minimum and recycled in accordance with the waste hierarchy in the NSW Government’s *Waste Avoidance and Resource Recovery Strategy 2014-2021* and the *Waste Avoidance and Resource Recovery Act 2011*.

The operation will generate minimal waste as part of the office operations. A co-mingled recycling system will be introduced into the office. The separate co-mingled recycling bin and general waste bin will be stored in the office waste storage area and emptied into the on-site residual waste bins at the BEF. Separate food waste kitchen caddy bins will be introduced in the office, and food waste disposed at the BEF.

5.4.2. Biogas

The biogas developed by the facility is expected to be an eligible waste fuel as per Section 3 of the *NSW Energy from Waste Policy Statement*. As such, for the BEF to use eligible waste fuels, the following criteria must be met:

- Demonstrate to the EPA that the proposed waste consistently meets the definition of an EPA approved eligible waste fuel;
- Ensure there are no practical, higher order reuse opportunities for the waste;
- Fully characterise the waste and/or undertake proof of performance (where required), and
- Meet the relevant emission standards as set out in the Clean Air Regulation.

Based on their experience at a reference bioenergy facility in Gütersloh, Germany and other facilities using the Bekon technology to treat municipal waste, the typical composition of the Biogas is:

- Methane 52%-55%
- CO₂ 43%-46%
- N₂ 1-1.5%
- Other gases 0.5%-1%

5.4.3. Resource Recovery Order and Exemption (RROE)

There is a Resource Recovery Order and Exemption (RROE) available for all waste inputs that will be accepted at the BEF. Therefore, all waste inputs have previously been conditionally approved for application to land. However, there is no general RROE published for the mix of waste inputs and the treatment proposed at the BEF. In particular, the actual BEF compost process does not necessarily fit within the definition of composting under The *Compost Order* 2016 requires biological transformation:

- To achieve pasteurisation; and
- For a period of not less than a total of 6 weeks of composting and curing at an adequate moisture level (>40 % by weight), and/or until an equivalent level of biological stability can be demonstrated.

Manufacturing products to meet the EPA's Resource Recovery Orders under the *Protection of the Environment Operations (Waste) Regulation* 2014 is critical to ensure all products can be used in a manner lawfully that protects human health and the environment.

An application for a trial Specific RRO/RRE under Section 92 of the *Protection of the Environment Operations (Waste) Regulation* 2014 is being prepared for:

1. Byron Bioenergy Facility Compost; and
2. Byron Bioenergy Facility Biogas (in conjunction with and eligible waste fuels application).

The application will be structured to address all requirements under NSW EPA (2018) *Guidelines on resource recovery Orders and Exemptions - For the land application of waste materials as a fertiliser or soil amendment* and the *Eligible Waste Fuels Guidelines*.

The application for the BEF Compost will also identify suitable environments for the land application of compost as a fertiliser. The process will aim to ensure compliance with the Environmental Guidelines: Use and Disposal of Biosolids Products to allow application to land as restricted use 1 (contaminant grade B and stabilisation grade A). Application to land as restricted use 1 includes application to public contact sites, urban landscaping, agriculture, forestry and soil and site rehabilitation. Compost will not be stored on site for long periods of time and will not be disposed of to landfill.

The potential benefits to soils and crop productivity will be considered, to demonstrate that the benefits of land application outweigh the risks.

A Waste Characterisation Methodology will help inform an application for a specific RRO/RRE for the biogas to be used as a fuel and a specific RRO/RRE for the compost to be applied to land as a soil amendment or fertiliser.

The Specific RRO/RRE applications will aim to show that the waste material:

- Is fit for purpose in its proposed use;
- Poses minimal risk of harm to the environment or human health; and
- Is not intended to be land applied as a means of disposal (i.e., a landfilling activity).

NSW EPA endorsement of the proposed waste characterisation program has been sought to ensure that all relevant matters are considered in the Specific RRO/RRE application for the materials listed in Table 5.3 below.

Table 5.3. Selected products to be manufactured and sold from the Byron Bioenergy Facility, including relevant regulatory requirements and industry specifications / standards.

Product or waste exported from site	EPA Resource Recovery Order
Compost	Specific RRO/RRE
Fine/Coarse Mulch	
Biogas (for onsite electricity generation via CHP)	

5.5. Mitigation Measures

With the implementation of the waste minimisation and management measures provided in Table 5.4 below, the proposed BEF is expected to comply with all applicable legislation and guidelines with respect to potential waste impacts and is therefore suitable for construction and operation.

Table 5.4. Waste minimisation and management measures.

Control Measures and Safeguards	Timing	Responsibility
Waste management and minimisation will form part of the induction program (which includes environmental due diligence training). All Project and site personnel will be trained in the requirements of this document including minimising wastes, recognising which types of materials are recyclable and their obligations to use recycling facilities provided on site.	Prior to starting on site / Ongoing	Operations Manager
Clearly assign and communicate responsibilities to ensure that those involved in the construction are aware of their responsibilities in relation to the waste management plan	Prior to starting on site / Ongoing	Operations Manager
Engage and educate personnel on how the various elements of the waste management plan will be implemented	Prior to starting on site / Ongoing	Operations Manager
Specific locations for waste management (e.g. sorting area locations, recycling bin locations, material stockpile locations) will be established on site and signposted appropriately.	Weekly checks	Operations Manager
Waste management areas will be adequately managed to prevent sediment runoff and dust generation.	Daily	Operations Manager
Construction Method Statements (CMS) will include practices to minimise waste generation and to maximise recycling and reuse of materials including oils, greases, lubricants, timber, glass, and metal.	Prior to start of construction and ongoing	Operations Manager

Control Measures and Safeguards	Timing	Responsibility
Packaging minimisation and reuse initiatives will be implemented as part of the procurement.	Ongoing	Operations Manager
Development of an unexpected finds environmental procedure should any contamination be found during construction works.	Prior to starting on site	Operations Manager
Spill kit to be present on site in the case of any fuel leaks of plant and equipment during the construction phase of the development	Prior to start of demolition	Operations Manager
Segregated waste disposal containers for the collection and recycling /disposal of all waste streams generated during the construction and operation phases will be provided onsite. Waste disposal containers will have clear signage and instructions for use to avoid cross-contamination. No rubbish shall be disposed of on site.	Daily	Operations Manager
Waste will be disposed to an appropriate licensed facility. A Waste Management Register of all waste collected for disposal and / recycling, including amounts, data and time and details and location of disposal will be maintained at all times.	Daily	Operations Manager
All waste being transported off site must be covered. The transportation must be appropriately licensed to carry that material.	Daily	Operations Manager
Storage of all hazardous substances and dangerous goods will located at the Byron STP workshop in accordance with SDS requirements in a bunded area. Any solid and hazardous wastes will be contained and separated from organic waste.	Daily	Operations Manager
Any hazardous material found will be managed and handled by an appropriately licensed contractor and transported for disposal to a licensed facility approved site.	Daily	Operations Manager
Any material contaminated material (e.g. from fuel, oil, lubricants etc., including empty fuel, oil and chemical containers, will be separated and sealed in a secure bunded area for transport to a waste disposal site approved by the NSW EPA to accept such material.	Daily	Operations Manager
Incompatible wastes will not be mixed.	Daily	Operations Manager
Storage areas will be covered and located away from waterways and the stormwater system.	Daily	Operations Manager
Receival hall doors will open only upon entry and exit of trucks, so air emissions are reduced. Waste and wastewater management systems will be regularly inspected and audited.	Daily	Operations Manager
Conduct regular litter patrols on-site to ensure litter is effectively controlled on site.	Daily	Operations Manager

6. Air Quality and Odour

An air quality assessment (AQIA) has been prepared (Appendix G) to assess potential air quality impacts on the nearest sensitive receptors from construction and operation of the proposed BEF. The AQIA has been prepared in accordance with the requirements of Byron Shire Council and the following:

- SEAR 1471;
- NSW Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017);
- NSW Assessment and Management of Odour from Stationary Sources in NSW (November 2006); and
- Generic Guidance and Optimum Model Setting for the Calpuff Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'.

Computational modelling was used to assess potential air quality and odour impacts including level 2 dispersion modelling assessment (also equivalent to a Level 3 odour assessment). Level 2 impact assessments require at least one year of site-specific meteorological data that is 90% complete¹³.

6.1. Methodology

Modelling of meteorological data used TAPM (The Air Pollution Model) and CALMET to predict localised meteorological conditions. The meteorological data derived from these models provides inputs to the CALPUFF dispersion modelling.

CALPUFF models emission sources for both the proposed BEF and the existing Byron STP. Area and point sources are adopted in CALPUFF to represent air emissions from the biofilter and CHP unit, respectively.

Atmospheric dispersion modelling involves the mathematical simulation of air contaminant dispersal into the environment. The modelling uses a range of information to estimate how pollutants disperse if released from a source (i.e. the BEF or the STP) including the following:

- Meteorological data for surface and upper air winds, temperature and pressure profiles, as well as humidity, rainfall, cloud cover and ceiling height information;
- Emissions source location and height, source dimensions and physical parameters (e.g. exit velocity and temperature) along with pollutant emission rates;
- Terrain elevations and land use both at the source and throughout the surrounding region;
- The location, height and width of any obstructions (such as buildings or other structures) that could significantly impact on the dispersion of the plume; and
- Sensitive receptor locations and heights.

6.2. Existing Environment

The nearest permanent air quality monitoring station to the subject site is located over 100 km to the south west. Given this large distance, region specific background air quality monitoring was not included in the AQIA.

¹³ Environment Protection Authority (2016), Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.

Meteorological data was derived from the Cape Byron automatic weather station (AWS). The area is dominated by northerly and south westerly winds. North westerly winds are minimal. Average wind speeds at the Cape Byron AWS are 5.6 m/s. Calms are not considered a major feature of the area, which is expected given its generally windy coastal location.

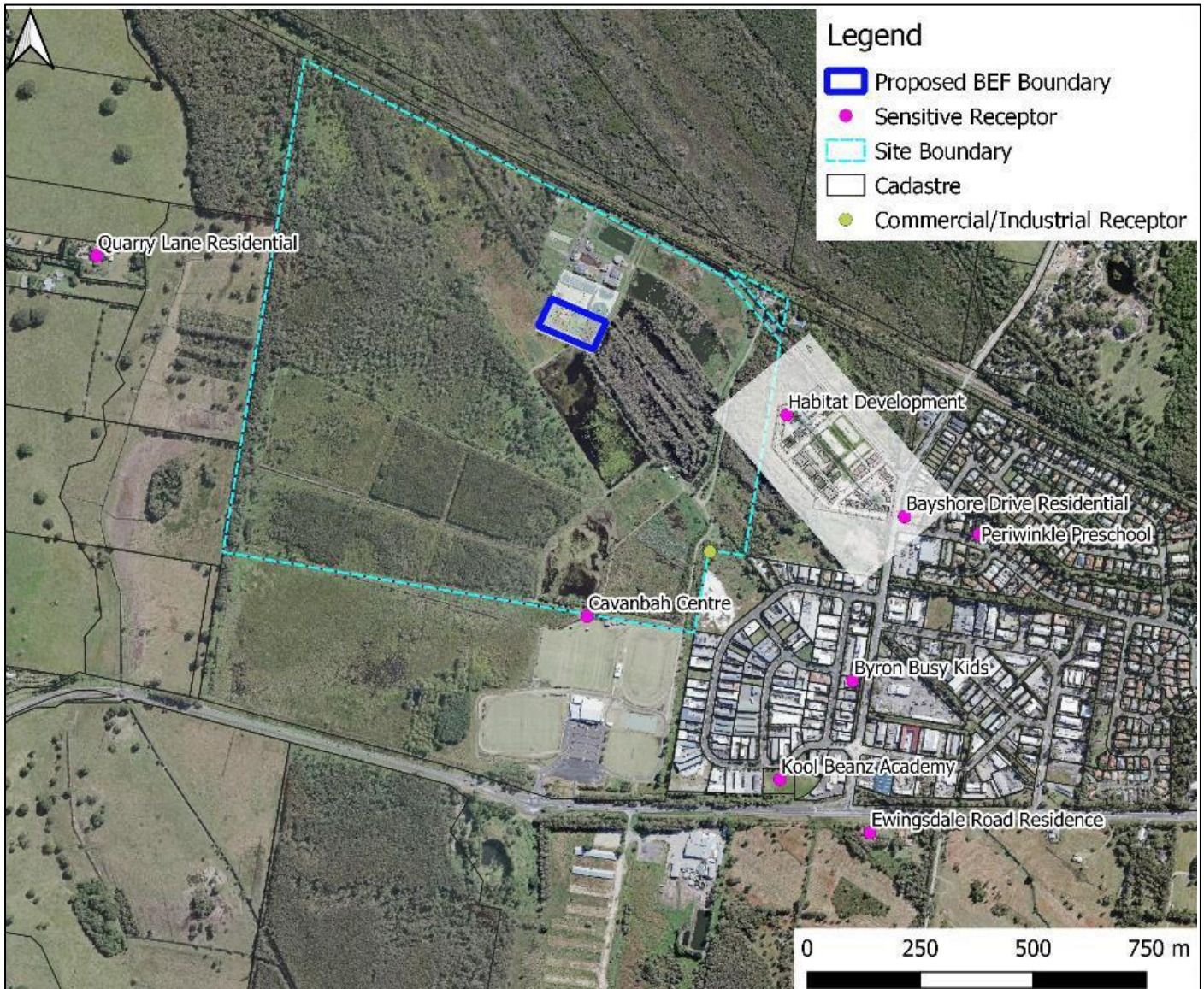
The industrial area to the south east of the subject site contributes to ambient particulate concentrations in the Byron Bay region area. Other primary sources include local traffic and the Pacific Motorway.

PM₁₀ is particulate matter suspended in the air column and has an equivalent (aerodynamic) diameter of less than 10 micrometres. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments. Typical suburban PM₁₀ concentrations tend to range between 10 – 20 micrograms per cubic metre for 24-hour averages and annual averages. Predicted results in the AQIA show 0.3% of the 24 hour PM₁₀ criteria and 0.03% of the annual PM₁₀ criteria.

The Byron Bay STP sits immediately to the north and adjacent to the proposed Bioenergy Facility. The treatment plant has a design capacity of 29,000 Equivalent Persons (EP), at approximately 6.95 ML/day. Given the close proximity of the treatment plant to the site, cumulative odour impacts have been considered.

Figure 6.1 presents the existing sensitive receptors used for modelling purposes. A total of 10 discrete receptors have been modelled at ground level. An additional receptor has been modelled at 4.5 m above ground level to account for first storey sensitive uses. A receptor has also been modelled at the north-western boundary of the commercial/industrial precinct to the south west to represent any potential commercial or industrial uses. Additionally, receptors have been modelled around the proposed development boundary.

Figure 6.1. Modelled Discrete Receptors.



6.3. Impact Assessment

6.3.1. Air Emission Sources

During operation of the proposed facility, sources of potential emissions primarily include combustion of the CHP and odour emissions from the biofilter. Therefore, modelling the CHP exhaust emissions and odour emissions from the biofilter are expected to define air quality compliance for the project. The modelling has not specifically included the flare, which will be used infrequently when the CHP is not in use and to briefly burn off residual low quality biogas prior to opening AD tunnels. Emissions from the flare are likely to be similar to the CHP (i.e. emissions from combustion of the same biogas) and doubling the results from the CHP combustion pollutants to account for flare operation, results in predicted compliance with air quality goals.

There is also the potential for particulate emissions associated with material unloading and handling, material sorting, shredding and truck movements over paved surfaces. These processes will occur within a fully enclosed receivals hall and all on-site surfaces will be paved, and therefore particulate emissions are anticipated to be minimal.

Potential odour emissions are associated with activities inside the receival hall (i.e. material storage, material handling and digestate unloading), anaerobic digestion tunnels and aerobic tunnels. The building will be under constant negative pressure to draw all process air through an appropriately sized biofilter located outside the main building. Fast open and close doors will be used for the receival hall to further minimise potential emissions via access doors.

A flare will be used if the CHP is not operating (e.g. in the event of a CHP break-down). Given the limited frequency of use of the flare, and assuming it provides complete combustion of the biogas, the potential air quality impacts associated with flare use are expected to be low.

Particulate emissions are also associated with the construction phase of the proposed development. However, impacts from construction are anticipated to be low due to minimal earthworks being required.

6.3.2. Assessment Criteria

The impact assessment modelling results have been compared to ambient air quality goals defined in the *NSW Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017)*. Table 6.1 summarises the air quality criteria.

Table 6.1. Air Quality Criteria

Compound	Air Quality Criteria ($\mu\text{g}/\text{m}^3$)	Averaging Period
PM ₁₀ (particulates)	50	24-hour
	25	Annual
PM _{2.5} (particulates)	25	24-hour
	8	Annual
Sulfur Dioxide (SO ₂)	712	10 minutes
	570	1 hour
	228	24-hour
	60	Annual
Nitrogen Dioxide (NO ₂)	246	1 hour
	62	Annual
Carbon Monoxide (CO)	100,000	15 minutes
	30,000	1 hour
	10,000	8 hours
Formaldehyde (CH ₂ O)	20	1 hour
Ammonia (NH ₃)	33	1 hour

In addition to the above, odour from the proposed facility has been assessed in accordance with the odour criteria presented in *Assessment and Management of Odour from Stationary Sources in NSW (November 2006)*. Potentially odorous emissions rates are expressed in terms of odour units, which are determined by techniques compatible with EPA procedures.

The affected population is the number of people potentially experiencing odour concentrations above 2 Odour Units (OU). Below 2 OU is not considered a nuisance even for individuals particularly sensitive to odour. Above 2 OU the

potential for odour to be considered a nuisance depends on a variety of factors. An important factor is population size, as highlighted in Table 6.2.

A total affected population of 1,000 has been adopted based on the properties impacts by the peak 2 OU, 99th percentile odour contour. An affected population of 1,000 corresponds to an odour criterion of 2.5 OU. This is a conservative estimated of affected population as it accounts for people occupying temporary uses (e.g. sports facility to the south) and non-residential uses (e.g. industrial use to south-east).

For comparison to the assessment criteria, impacts in OU are reported as peak concentrations (i.e. approximately one second average) and as the 99th percentile of predicted concentration based on a Level 3 odour assessment methodology.

Table 6.2. NSW EPA Odour Criteria.

Population of affected community	Odour Assessment Criteria (OU)
Rural single residence (≤ 2)	7
~10	6
~ 30	5
~ 125	4
~ 500	3
~ 1,000	2.5 (this EIS criteria)
Urban area (> 2000) and/or schools and hospitals	2

6.3.3. Potential Emissions

Odour emissions data for the biofilter and used in the modelling are sourced from Bekon (the BEF equipment supplier) for similar existing overseas bioenergy facilities. Incoming air to the biofilter is sourced from the receivals hall and digestion tunnels and treated by the biofilter. Treated biofilter gases range between 400 to 1200 OU/m³. Based on previous experience of commercial composting facilities, an effectively managed biofilter should not exceed 500 OU/m³ emissions.

Combustion emissions from the CHP unit have been sourced from information provided by Bekon. Upper limits for the CHP unit are used for the modelling, and actual measured emissions are expected to be lower. To calculate an emissions rate, the pollutant concentration has been multiplied by an applicable flow rate. A flow rate of 15 m³/s has been adopted based on an exit velocity of 20 m/s and diameter of 1 m for the CHP Unit exhaust stack.

To account for cumulative odour impacts of the bioenergy facility, emissions from the existing Byron Bay Sewage Treatment Plant have been included in the modelling. This includes odour emission rates for the inlet works, bioreactor, clarifiers, biosolids storage, anaerobic tank and aerobic digester at the Byron STP.

All source emissions assumptions can be found in the complete AQIA in Appendix G.

6.3.4. Results

Figure 6.2 presents the predicted peak 99th percentile ground level OU concentration plot for the proposed BEF only.

Table 6.3 presents the predicted results for the proposed BEF only, without the impacts of the existing sewage treatment plant. Compliance with the 2.5 OU criteria is predicted by a significant margin for all modelled combustion pollutants associated with the CHP unit. Compliance is predicted for odour concentrations for all modelled receptors.

Figure 6.2. Byron Bay Proposed Bioenergy Facility Source Only Predicted Peak 1 Hour, 99th Percentile Ground Level Odour Concentrations (Odour Units, OU).

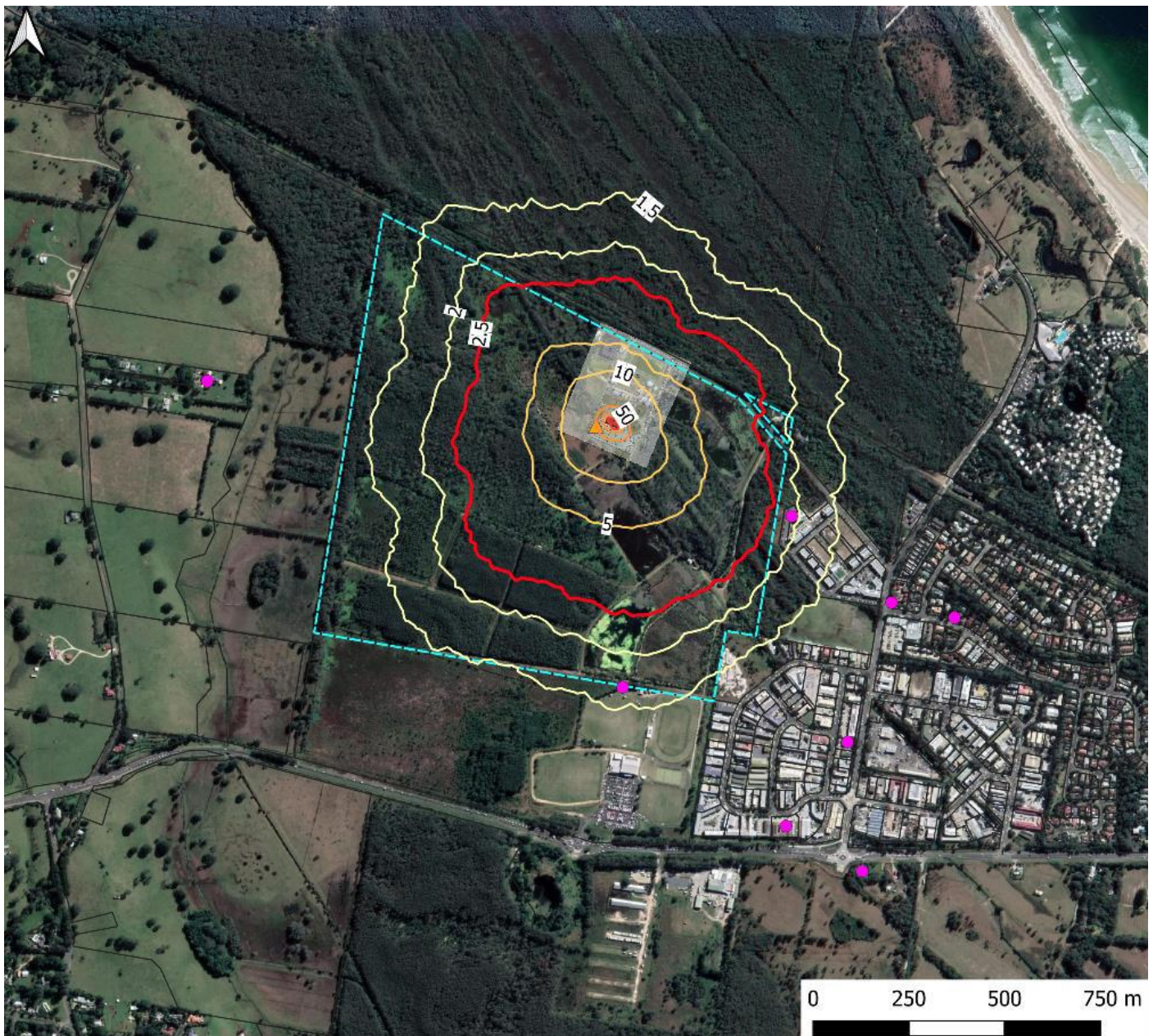


Table 6.3. Predicted Results - Bioenergy Facility Only.

Receptor	Odour	NO ₂		CO			SO ₂				CH ₂ O	NH ₃	PM ₁₀	
	Peak 1 Hour, 99th Percentile	1 Hour	Annual	15 Minutes	1 Hour	8 Hours	10 Minutes	1 Hour	24 Hours	Annual	1 Hour	1 Hour	24 Hour	Annual
CRITERIA	2.5	246	62	100,000	30,000	10,000	712	570	228	60	20	33	50	25
Commercial/Industrial	1.8	11.23	0.10	74.08	56.14	19.21	14.46	10.11	2.09	0.09	2.25	3.37	0.02	0.001
Quarry Lane Residence	0.76	14.71	0.16	97.06	73.56	19.01	18.95	13.24	1.89	0.15	2.94	4.41	0.02	0.002
Habitat Ground Level	2.15	13.53	0.10	89.26	67.65	42.81	17.42	12.18	2.91	0.09	2.71	4.06	0.03	0.001
Habitat Level 1	1.90	13.52	0.10	89.22	67.62	42.76	17.42	12.17	2.91	0.09	2.71	4.06	0.03	0.001
Bayshore Drive Residential	0.97	9.86	0.05	65.07	49.32	16.05	12.70	8.88	1.27	0.05	1.97	2.96	0.01	0.001
Periwinkle Preschool	0.61	9.62	0.05	63.45	48.09	11.33	12.39	8.66	0.96	0.04	1.92	2.88	0.01	0.000
Byron Busy Kids	0.62	6.76	0.05	44.62	33.81	9.12	8.71	6.09	0.98	0.04	1.35	2.03	0.01	0.000
Kool Beanz Academy	0.55	7.86	0.07	51.88	39.32	11.32	10.13	7.08	0.95	0.06	1.57	2.36	0.01	0.001
Ewinsdale Road Residential	0.40	5.88	0.04	38.76	29.38	8.32	7.57	5.29	0.85	0.04	1.18	1.76	0.01	0.000
Cavanbah Centre	1.64	20.53	0.31	135.43	102.64	58.24	26.44	18.48	4.86	0.28	4.11	6.16	0.05	0.003
Site Boundary	4.63	33.96	0.76	224.04	169.79	93.33	43.73	30.56	13.61	0.68	6.79	10.19	0.15	0.008

Table 6.4 presents the predicted cumulative odour concentrations for the proposed BEF and the Byron STP. Figure 6.3 presents the predicted peak 99th percentile ground level OU concentration plot for the combined impacts of the proposed BEF and the Byron STP.

A small area of exceedance is predicted for the Habitat receptors, Cavenbah Centre and the commercial/industrial receptor. However, the *NSW Assessment and Management of Odour from Stationary Sources in NSW (November 2006)* guideline states the following:

'Once a facility is operational the benchmark for the facility is no longer the odour assessment criteria but whether the emission of odour is:

- *'Offensive' (for scheduled activities), or*
- *Being prevented or minimised using best management practices (for scheduled and nonscheduled activities).*

'It is not intended that existing activities will routinely have their operations assessed against the odour assessment and ground-level concentration criteria; they have been developed as a design tool, to predict the odour impacts, rather than as a regulatory tool. Nevertheless, these criteria may be used to help with assessing the likely impacts when odour complaints or problems do arise and to develop odour mitigation strategies as required'.

Given the above, the 2.5 OU criteria is not strictly applicable for the assessment of the combined impacts of the proposed BEF and existing Byron STP. The key indicator for assessing the odour impacts from an existing activity is whether or not it can be defined as 'offensive'. The results of a dispersion model need to be interpreted in the context of any odour compliance data to determine whether odour emissions from an existing operation can be deemed offensive.

Based on the review of odour complaints data for the Byron STP, only one complaint over the past 10 years was related directly to the sewage treatment plant. The nearest sensitive receptors (The Habitat) have only been constructed in the last few years – no complaints have been received in this period of time.

The Byron STP has also recently (April 2021) instituted a program of ferrous dosing that reduces hydrogen sulfide and installed headworks air filtration. This will lower odorous emissions from the Byron STP and assist in reducing cumulative emissions.

Overall, the results of the modelling indicate that odour emissions from the proposed BEF can be minimised to within an acceptable level using an appropriately sized biofilter. Furthermore, while the cumulative scenario suggests a predicted exceedance of the 2.5 OU limit, the lack of odour complaints suggests that the potential for cumulative impacts would be minimal.

The BEF would employ air pre-treatment and the biofilter in accordance with the (German) VDI 3477 guideline. Odour that comes out of the biofilter cannot be distinguished from a background odour of the biofilter material itself. Similar facilities show odour emission rate of approximately 500 OU/m³, with an odour that can be characterised as inoffensive (e.g. typical forest floor odour). The odour is so inoffensive that emissions from biofilters designed to this standard are not required to be included in German dispersion modelling (air quality impact assessment) when neighbours are greater than 200m from the facility.

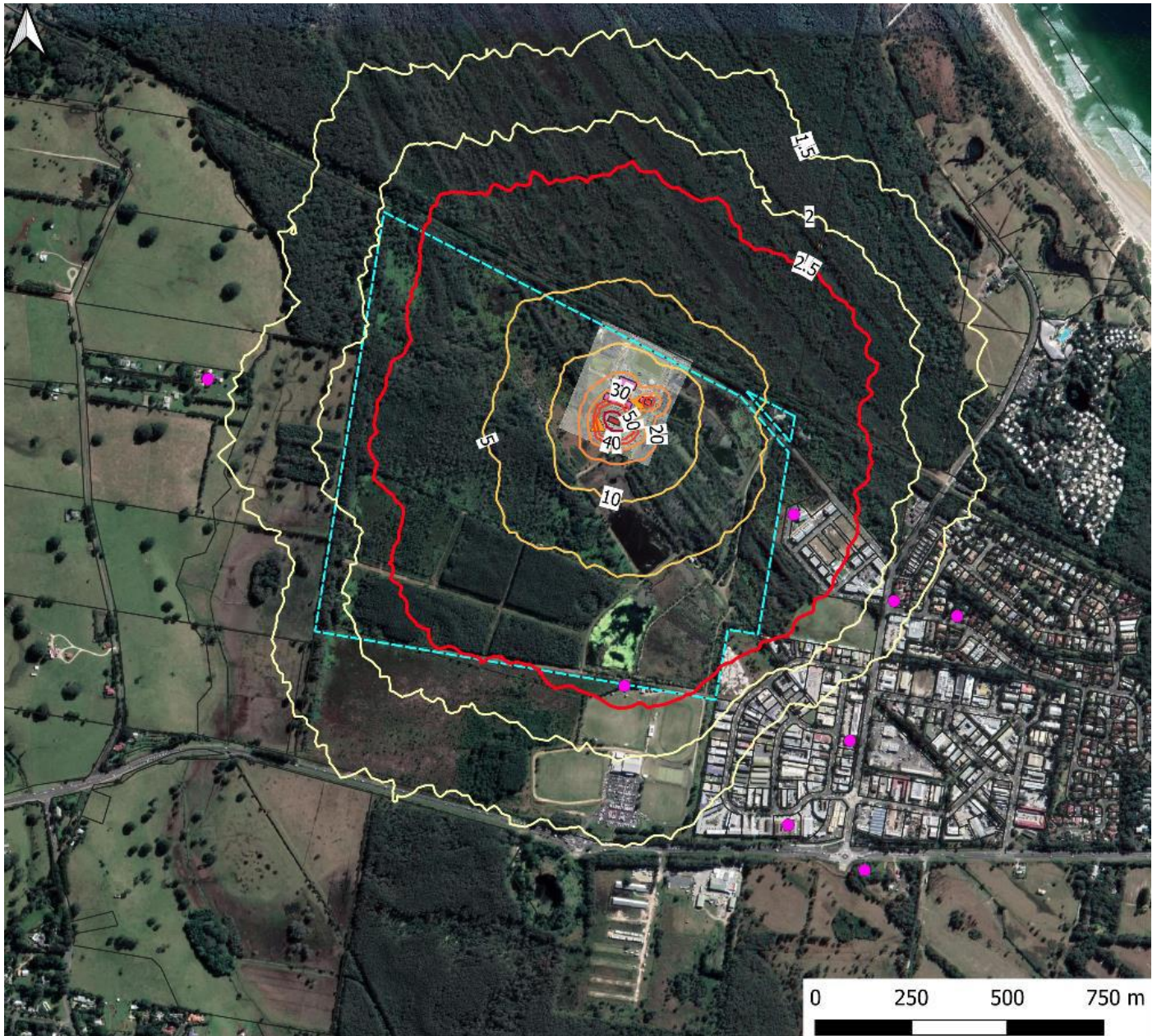
The two stage system includes an air washing system (scrubber with washing water), which lowers the dust load and the load of low ammonia concentrations and maintains humidity near 100%. Stage two is the biofilter system fitted with an automated humidification system to hold the biofilter material at the ideal moisture content.

In addition to the proposed biofilter, contingency mitigation measures have been adopted should odour issues arise. If increased dispersion of the treated air is required (to further reduce impact on neighbours) the biofilter can be retrofitted with a cover and a chimney (stack). Whilst ammonia levels for the exhaust air are anticipated to be low given the size of the biofilter (440 m²) and the inclusion of a water scrubber in the design, the system could be retrofitted with an acid scrubber to remove ammonia from the air stream prior to the biofilter if ammonia levels are higher in the exhaust air than expected.

Table 6.4. Cumulative Predicted Odour Concentrations.

Receptor	Odour Peak 1 Hour, 99th Percentile		
	Bioenergy Facility	Sewage Treatment Plant	Combined
Commercial/Industrial	1.80	1.19	2.94
Quarry Lane Residence	0.76	0.59	1.37
Habitat Ground Level	2.15	1.68	3.70
Habitat Level 1	1.90	1.52	3.22
Bayshore Drive Residential	0.97	0.77	1.71
Periwinkle Preschool	0.61	0.53	1.14
Busy Kids	0.62	0.50	1.10
Kool Beanz Academy	0.55	0.44	0.96
Ewingsdale Road Residential	0.40	0.31	0.72
Cavanbah Centre	1.64	1.13	2.75
Site Boundary	4.63	1.50	9.34
Criteria		2.5	

Figure 6.3. Byron Bay Proposed Bioenergy Facility Cumulative Predicted Peak 1 Hour, 99th Percentile Ground Level Odour Concentrations (Odour Units, OU).



6.4. Mitigation Measures

With the implementation of the air quality mitigation and management measures provided in Table 6.5 below, the proposed BEF is expected to comply with all applicable legislation and guidelines with respect to potential air quality impacts and is therefore suitable for construction and operation.

Table 6.5. Air Quality Mitigation Measures.

Element	Description
Biofilter	A biofilter is proposed for the facility to treat odorous air from the receivals hall and digestion tunnels before release to the atmosphere. Biofilters are typically comprised of a bed of biological material, such as wood chips, peat moss, compost or soil. The organic material absorbs odorous gases which are broken down by microbial aerobic action to non-odorous compounds. Where biofilters are operating effectively they are capable of achieving reduction to odour emission rates of greater than 90%. The biofilter needs to be well maintained, otherwise the performance can deteriorate over time. Adopted best practice management methods for maintaining biofilters (subject to supplier design requirements) will be: • Moisture content of 30% - 60% is maintained for the filter media (irrigation system may be necessary) • Humidity of the inlet area is greater than 95% humidity (this can be achieved through humidification for the inlet air) • pH between 6 and 8 is maintained (lime may be added to maintain the required pH) • Temperature of approximately 35°C is maintained and that 40°C is not exceeded for the biofilter bed • Temperature of incoming air is between 15°C - 30°C • Maintenance of the biofilter bed seal so that untreated area does not leak • Ensure rodent activity is controlled as this may lead to breaks in the seal of the biofilter • Minimum biomass depth of 1 m is maintained for the biofilter In addition to the above measures the biofilter will be monitored weekly and records taken of the following: • Weather conditions including temperature, wind speed and direction • Visual inspection of the biofilter bed to identify dry area of channeling of irrigation water. • Observations of any odour at the biofilter itself and downwind of the biofilter including characteristics of the odour • Location of any odour leaks in the biofilter • Observations of the condition of associated infrastructure including sprinkler systems and air supply systems • Actions taken to correct any issues which may have been identified
Waste Receival and Sorting	• Receival area will be indoors and paved in a controlled environment with rapidly closing doors • All waste material and digestate will be handled/sorted inside the building • The building will be under negative pressure • Remove spilled organic waste daily
Haul Route	• On-site haul route access will be regularly cleaned to minimise silt loading content, ultimately reducing the particulate emissions from the paved surface. • All delivery and collection trucks will be covered. Trucks containing food waste or biosolids should be fitted with leachate catchment • Delivery and collection vehicle wheels and loading area will be cleaned prior to vehicle leaving the facility
General Management	• The facility has been appropriately sized to ensure waste received can be processed promptly • The types and quantities of organic waste accepted by the facility will be monitored and ensure no in-organic or hazardous wastes are loaded into the digestion tunnels • Ongoing qualitative monitoring of odour emissions will be completed with staff trained in

Element	Description
	recognising odorous conditions and understanding the required corrective measures. • Implement procedures for odour complaint recording and management.
Contingency Measures (should odour issues arise with the community)	• Retrofit the biofilter with a cover and a chimney (stack). • Addition of an acid scrubber to remove ammonia from the air stream prior to the biofilter if ammonia levels are higher in the exhaust air than expected.

7. Noise and Vibration

Waves Consulting conducted a Noise and Vibration Impact Assessment (NVIA) for the proposal. The objective of the investigation was to assess the potential noise and vibration impacts associated with the construction and operation of the proposed BEF on any nearby sensitive receptors.

This chapter summarises the findings of the NVIA. The NVIA report is contained in Appendix H. This chapter should be read in conjunction with Appendix H.

7.1. Methodology

The NVIA was conducted in accordance with the following policies and guidelines:

- Noise from the operation of the proposal has been assessed in accordance with the NSW Noise Policy for Industry (NPI) 2017.
- Noise from additional traffic movements on the local road network has been assessed in accordance with the NSW Road Noise Policy (RNP), NSW EPA 2011.
- Vibration from the operation and construction of the proposal has been assessed in accordance with Assessing Vibration: a technical guideline (DEC 2006).
- Construction Noise Impacts have been assessed in accordance with the NSW Interim Construction Noise Guideline (ICNG).

The methods used to assess the noise and vibration impacts of the proposal are described in full in Appendix X.

7.1.1. Baseline measurements

The NVIA investigated the potential noise and vibration impacts resulting from facility construction works, ongoing facility operations and vehicle movements associated with the proposed facility. Sound power levels for standard machinery and equipment involved in the construction and/or operation of the facility were obtained from Waves Consulting's existing noise database for similar activities and equipment. For project-specific equipment, sound power levels were based on similar facilities built overseas.

Unattended noise monitoring was conducted between 28 January and 8 February 2021 adjacent to the closest residential properties on Gallagher Road. The logger was sited based on location of other noise sources, security issues and access permission. Continuous ambient noise levels were recorded with a sample interval of 15 minutes. Erroneous data and data recorded during adverse weather conditions were removed.

Attended ambient noise measurements were taken at representative locations on 8 February 2021. For each measurement, the observer noted the various noise sources and contributing noise level. Each measurement was performed for up to 15 minutes at a height of 1.5 m above ground level.

Measured ambient noise levels from attended and unattended loggers were used to calculate the *project intrusiveness noise level* and the *project amenity noise level*. The lower of the two levels was adopted as the Project Noise Trigger Level (PNTL) as per the NSW Noise Policy for Industry 2017. Table 7.1 details the adopted PNTLs.

Table 7.1. Project Noise Trigger Levels (PNTLs) for the operation of the Byron Bay Bioenergy Facility.

Receiver Type	Time of Day	Project Noise Trigger Levels LAeq, 15 min
Suburban Residential	Day	45
	Evening	43
	Night	38
	Sleep Disturbance	45
Hotel/Temporary Accommodation	Day	45
	Evening	45
	Night	43
	Sleep Disturbance	45
Place of Worship	When in use	48
Active Recreation	When in use	53
Commercial	When in use	63
Industrial	When in use	68

7.1.2. Operational Noise Modelling

Noise modelling of the site was undertaken using SoundPLAN v7.4 modelling software. The model considered the local terrain, design of the development, receiver buildings and structures, and noise enhancing meteorological conditions detailed in the NPI. For all conditions, the worst-case wind direction for each receiver was assessed. Table 7.2 describes the operational scenarios considered in the model.

Table 7.2. Proposed operational scenarios used to undertake noise modelling.

Time of Day	Description of Operational Noise Sources in Worst-Case 15-minute Period
Day (0700 to 1800 hrs)	Deliveries / Truck Movements – Up to two (2) Semi articulated trucks moving throughout the site. Full load (ie max engine revs) operation for 50% of the time Materials Handling / Stockpiling – Front end loader full load (ie max engine revs) operation for 50% of the time inside the Receiving Hall. Processing – constant processing activities inside the new building with all facades and openings CLOSED. Mechanical Services – All mechanical equipment operating at full load. Staff Vehicles – Staff cars entering and exiting the site during normal work hours.
Evening (1800 to 2200 hrs)	Mechanical Services – All mechanical equipment operating at full load.
Night-time (2200 to 0700 hrs)	Mechanical Services – All mechanical equipment operating at full load.

The simulated worst-case operational noise sources include:

- Processing activities inside the new buildings comprise:
 - Internal reverberant sound pressure levels for up to 50% of the time in the Receiving Hall building.
 - All doors are CLOSED during processing activities. The doors are only opened to accept deliveries or removal of waste. All processing activities will cease when doors are open.
 - The minimum sound insulation performance of the building facade is assumed to be at least 25 dB

Rw. This is a conservative assumption based on the 1 mm corrugated steel facade construction of the Receival Hall. The Digestion Tunnel buildings are heavy duty concrete constructions with a facade performance greater than 50 dB Rw.

- Mechanical services plant associated with the site operates 24 hrs a day 7 days a week with nominal Sound Power Levels.
- For mobile noise sources, the loudest vehicle has been assessed which is the 19m long articulated semi-trailers. Delivery trucks were assumed to operate at full load (i.e., max engine revs) for 50% of the time while maneuvering around the site.

Based on the information available all mechanical services plant items are located inside buildings with the exception of CHP Gas Flare, Pump Room and the plant associated with the administration building. Mechanical services plant located inside buildings (typically the technical corridor building) is not acoustically treated and has an average Sound Power Level of 103.8 dB Lw. Noise from internal plant will propagate through the external facade of the building (minimum 25 dB Rw) and will be attenuated accordingly. This assumption should be reviewed by a suitably qualified acoustic consultant during the detailed design of the building to ensure compliance with the criteria.

Operational traffic noise impacts were calculated as per the NSW Road Noise Policy 2011 (RNP) and used traffic data obtained in 2019 for the Habitat development on Wallum Place. Table 7.3 demonstrates the traffic volume increases predicted for the operation of the BEF.

Table 7.3. Summary of current and predicted operational traffic volumes on surrounding roads.

Road	Existing Traffic Volume		Expected Increase in Traffic Volume	
	Volume per Day	% Heavy Vehicles	Volume per Day	% Heavy Vehicles
Wallum Place	~4,300	10	40	65
Bayshore Drive	~27,500	10		

7.1.3. Construction Noise Modelling

Noise modelling of the site was undertaken using SoundPLAN v7.4 modelling software. Noise modelling simulating a “worst-case” scenario was conducted to assess the impacts of construction noise on surrounding sensitive receptors. This scenario assumes all construction equipment is present on site and that each piece of equipment is operating at full load for 50% of the time. It is assumed construction works would be undertaken in accordance with the Interim Construction Noise Guideline (DECCW 2009) (ICNG) and would typically occur during the standard working hours between:

- 0700 to 1800 hrs Monday to Friday.
- 0800 to 1300 hrs on Saturdays.
- There will be no construction works on Sundays or public holidays.

Measured ambient noise levels from attended and unattended loggers were used to calculate the Noise Management Levels (NMLs) for construction activities. Calculations were in accordance with the ICNG, with the determined NMLs presented in Table 7.4 and Table 7.5 illustrates the anticipated construction activities/plant items proposed during the construction of the facility.

Table 7.4. Noise Management Levels for the construction of the Byron Bioenergy Facility.

Receiver Type	Time of Day	Construction NMLs LAeq, 15 min (dB)		
		Standard Hours	Out-of-Hours	Highly Noise Affected
Residential	Day	50	45	75
	Evening	N/A	45	75
	Night-time	N/A	45	75
Place of Worship	Day	55	55	75
	Evening	N/A	55	75
	Night-time	N/A	55	75
Active Recreation	Day	65	65	75
	Evening	N/A	65	75
	Night-time	N/A	65	75
Commercial	Day	65	65	75
	Evening	N/A	65	75
	Night-time	N/A	65	75

Table 7.5. Proposed construction plant information and sound power levels.

Construction Item	Estimated Sound Power Level LWA (dB re 1pW)	No. of Days	Construction Scenario
Small Excavator	105	35	Services reticulation and detailed excavation
Large Excavator	118	30	Bulk earth works
Bob Cat	105	35	Services reticulation and detailed excavation
Water Truck	105	20	Road construction & bulk earth works
Grader	114	15	Site side services reticulation and detailed excavation
Scraper	114	20	Road construction and bulk earthworks
Compactor	106	20	Road construction and bulk earthworks
Paver	112	10	Road construction
Crane	110	90	Primary vertical steel construction, roofing, tunnel construction
Diesel Generator	110	20	Only needed until power to site established

The ICNG does not provide specific guidance in relation to acceptable noise levels associated with construction traffic. For assessment purposes, guidance is taken from the RNP; however, it is noted that these are taken as noise goals only and are not mandatory. Construction traffic NMLs set at 2 dB above the existing road traffic noise levels during

the daytime and night-time periods are considered appropriate to identify the onset of potential noise impacts. Table 7.6 summarises the predicted traffic volumes associated with construction of the facility.

Table 7.6. Summary of current and predicted construction traffic volumes on surrounding roads.

Type of Vehicle	Total Vehicles per Day
Semi-Trailer	4

7.1.4. Construction Vibration Assessment

The impacts of vibration resulting from construction activities were considered using the worst-case scenario presented for the construction noise modelling. The distance from the source of vibration is the main determining factor in whether impacts are to be experienced. As all residential and commercial receivers are more than 300 m from the construction zone, the potential impacts are effectively nil. Therefore, the impacts on these receivers were not considered in the assessment.

Existing buildings within the STP are located within 20 m of the construction site, so may have potential for vibration impacts. The assessment reviewed applicable Standards and vibration criteria for the minimisation of nuisance and building risk which included:

- NSW DECCW *Interim Construction Noise Guidelines* (ICNG)
- Australian Standard AS 2187: *Explosives – Storage and use, Part 2 Use of explosives*.

7.2. Existing Environment

Consistent with its current use as a STP, the site has very few near neighbours. The closest neighbours (not owned by Byron Shire Council) are located in a mixed-use development just under 500 m east of the development that includes apartments and commercial premises. A large buffer is provided by the Tyagarah Nature Reserve to the north, and wetlands and playing fields to the south. A light industrial estate around Centennial Circuit is approximately 600 m to the south east. The area to the west of the site is dominated by rural properties. As a result of the surrounding land use, environmental noise in the area is dominated by local flora and fauna, road traffic and distant commercial/industrial hum.

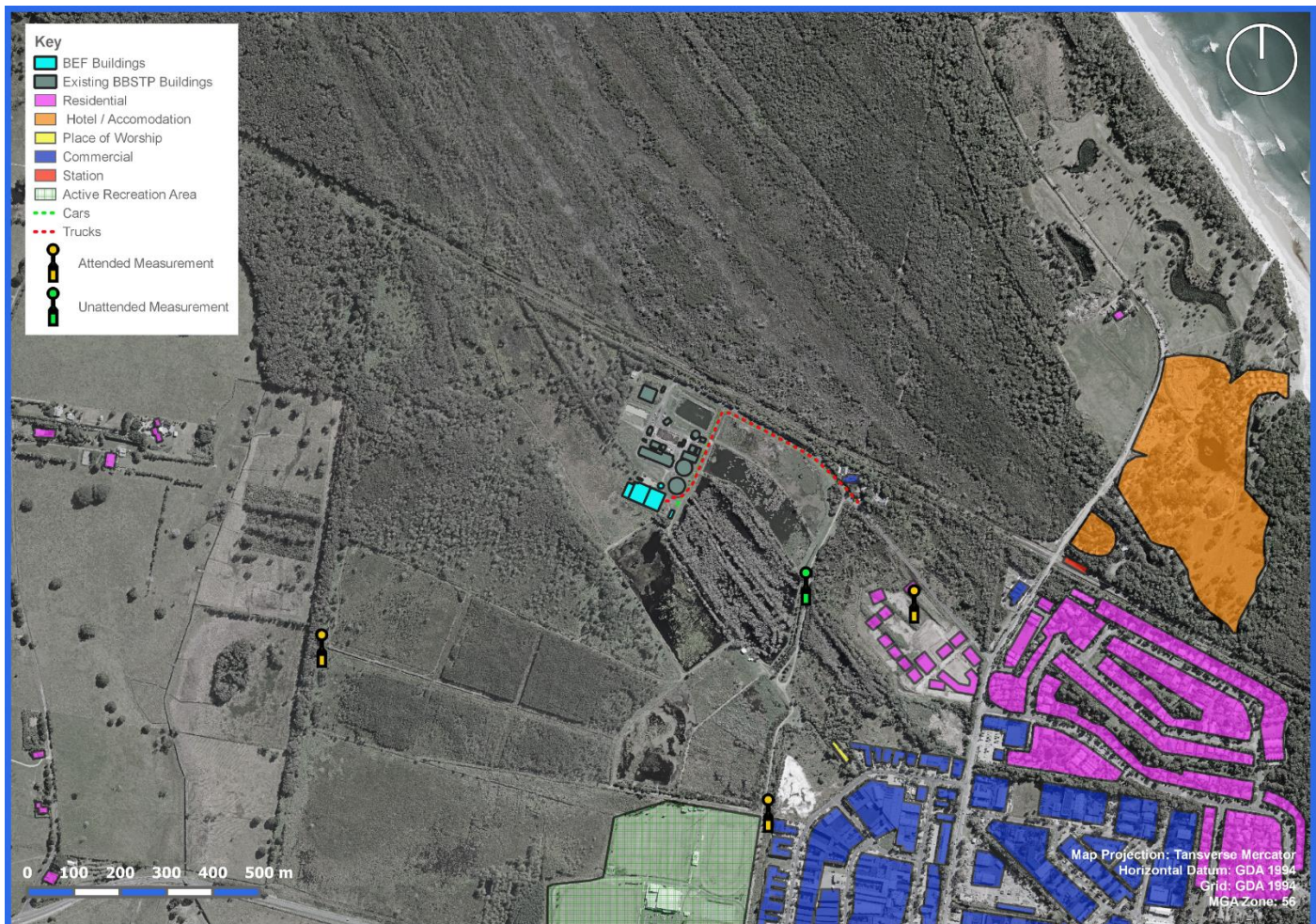
Nearby sensitive receptors include commercial and residential properties, a public recreation area, hotel accommodation and a place of worship. Table 7.7 and Figure 7.1 describe the location of these sensitive receptors relative to the Project Area.

Table 7.7. The relative location of all sensitive receptors within a 1.5 km radius of the Project Area.

Receiver Type	Description	Distance (m)	Direction
Commercial	Byron Bay Herb Nursery	360	East
	The Sun Bistro, 61 Bayshore Drive	740	East
	Centennial Cct, Commercial Zone	635	South East
Active Recreation	Byron Regional Sporting and Cultural Complex, 249 Ewingsdale Road	600	South
Residential	Gallagher Street	440	East
	Parkes Avenue	515	South East
	Porter Street	640	South East

Receiver Type	Description	Distance (m)	Direction
	Sunrise Boulevard	780	South East
	Bayshore Lane	780	South East
	Julian Rock Drive	870	South East
	Belongil Crescent	870	South East
	10 Quarry Lane	1450	South West
	25 Quarry Lane	1410	South West
	35 Quarry Lane	1360	South West
	106 Quarry Lane	1230	West
	108 Quarry Lane	1100	West
	110 Quarry Lane	1000	West
	146 Bayshore Drive	1000	North East
Hotels / Temporary Accommodation	Elements of Byron, 144 Bayshore Drive	940	East
	Bayshore Bungalows, 112 Bayshore Drive	840	East
Place of Worship	East Gate Community Church	625	South East

Figure 7.1. Site Location, Surrounding Area and Noise Logging Location.



7.3. Impact Assessment

7.3.1. Operational Activities/Equipment

The facility has been designed to minimise noise emissions by enclosing noisy equipment with technical corridors and siting noisy equipment on the side of the facility furthest from residential sensitive receivers. Potential noise impacts from operation of the proposed development include:

- Noise emission from the fixed noise sources associated with the development to any nearby sensitive receivers i.e., mechanical services and processing activities noise emission through the facade of the buildings.
- Noise emission from vehicle movements on site to any nearby sensitive receivers i.e., delivery trucks.
- Additional noise emission from vehicle movements on the adjacent roads to any nearby sensitive receivers.

Operational plant and equipment proposed for the BEF, and modelled in the NVIA, are listed in Table 2.5 in Section 2.4.13 of this EIS. Noise modelling of the fixed and mobile noise sources has been used to predict the noise emissions from the typical operation of the facility to the surrounding sensitive receivers with no mitigation. A selection of the predicted worst-case operational noise levels due to onsite noise sources with the recommended mechanical noise control measures are summarised and compared against the NPI project noise trigger levels in Table 7.8 below.

Table 7.8. Predicted Operational Noise Levels Compared to Project Noise Trigger Levels (PNTLs).

Receiver	Worst-Case $L_{Aeq, 15m}$			
	Day	Evening	Night	Sleep Disturbance
Commercial				
<i>PNTLs Exceedance $L_{Aeq, 15m}$</i>	63	63	63	-
Byron Bay Herb Nursery	63	30	30	
Other Commercial	<40	<30	<30	
Active Recreation				
<i>PNTLs Exceedance $L_{Aeq, 15m}$</i>	53	53	-	-
Byron Regional Sporting and Cultural Complex, 249 Ewingsdale Road	34	<20	<20	
Residential				
<i>PNTLs Exceedance $L_{Aeq, 15m}$</i>	45	43	38	45
Gallagher Street	41	23	23	
Parkes Avenue	39	<20	<20	
Porter Street	38	21	21	
Sunrise Boulevard	35	<20	<20	
Bayshore Lane	37	<20	<20	
Julian Rock Drive	33	<20	<20	
Belongil Crescent	35	<20	<20	
10 Quarry Lane	23	<20	<20	
25 Quarry Lane	24	<20	<20	
35 Quarry Lane	23	<20	<20	

Receiver	Worst-Case $L_{Aeq, 15m}$			
	Day	Evening	Night	Sleep Disturbance
106 Quarry Lane	27	<20	<20	
108 Quarry Lane	27	<20	<20	
110 Quarry Lane	28	<20	<20	
146 Bayshore Drive	35	<20	<20	
Hotels / Temporary Accommodation				
PNTLs Exceedance $L_{Aeq, 15m}$	45	45	43	45
Elements of Byron, 144 Bayshore Drive	33	<20	<20	
Bayshore Bungalows, 112 Bayshore Drive	35	<20	<20	
Place of Worship				
PNTLs Exceedance $L_{Aeq, 15m}$	48	48	48	-
East Gate Community Church	38	<20	<20	

The results in Table 7.8 show low noise emissions from the site to the surrounding environment when the recommended mechanical noise control measures are implemented. The proposed development satisfies the PNTLs at all nearby residential receivers. Table 7.8 also demonstrates that the potential for sleep disturbance impacts during the night-time are nil, and sleep disturbance PNTLs are satisfied. The PNTLs at all nearby places of worship, active recreational and commercial receivers are also satisfied.

Modelling predicts no impacts from mechanical noise on nearby sensitive receivers. However, mechanical services noise levels should be reviewed during the detailed design of the facility.

The impact of increased traffic noise along Wallum Place and Bayshore Drive was calculated using traffic volume data from a 2019 traffic study conducted by Rytenskild Traffic Engineering for the Habitat development on Wallum Place. The traffic in this area already exceeds the Road Noise Policy (RNP) criteria; therefore, traffic associated with this project must not result in an increase of more than 2 dB. Given the relatively small increase in vehicle traffic to be caused by the project (Table 7.3), the predicted noise increase associated with operational vehicle movements is expected to be less than 0.1 dB, satisfying the RNP criteria.

7.3.2. Construction Activities/Equipment

Potential noise impacts from construction of the proposed development include:

- Noise emission from construction activities and vehicle movements on site to any nearby sensitive receivers i.e., delivery trucks, bulldozers, loaders and excavators.
- Additional noise emission from construction vehicle movements on the adjacent roads to any nearby sensitive receivers.

During standard construction hours minor exceedances of the noise management levels (< 4 dB) are predicted at the closest residential and commercial receivers surrounding the site. These small NML exceedances do not trigger the need for specialist noise control measures under the ICNG; however, the construction contractor should develop a Construction Noise and Vibration Management Plan which implements the ICNG standard mitigation measures as

described in Section 9.1.1 of the NVIA in Appendix H. Note that the modelling only considered noise impacts during standard construction hours (Monday to Friday 0700 to 1800 and Saturday 0800 to 1300).

The ICNG does not provide acceptable noise criteria for road traffic associated with construction activities. As a result, this study adopted the RNP criteria of less than 2 dB increase above existing traffic noise levels. Given the relatively small increase in vehicle traffic to be caused by the project, the predicted noise increase associated with construction vehicle movements is expected to be less than 0.1 dB, satisfying the RNP criteria.

7.3.3. Construction and Operational Vibration Impacts

The offset distances (in all directions) between any vibrationally intensive equipment and residential receivers is large (> 300 m). The potential for vibration impacts at residential receivers due to the construction or operation of the development are effectively nil. All vibration criteria with respect to cosmetic damage to buildings and human comfort impacts will be satisfied as a result. However, the smallest offset distance between any vibration intensive equipment and the existing STP buildings is approximately 20 m.

The construction scenarios provided in Table 7.5 show that no vibrationally intensive equipment is proposed during the construction works. The closest STP buildings with offices / permanent staff are approximately 100 m from the proposed construction works. At this distance, no exceedances of the Ground Borne Noise or the Human Comfort targets are predicted. No remedial measures are required as a result.

The nearest STP buildings (which are unoccupied) are all concrete reinforced buildings. This means the most applicable screening criterion for cosmetic building damage is 25.0 mm/s. The construction scenarios provided in Table 7.5 shows that equipment with the highest potential to generate vibration is the large excavator. If this equipment is used with a hydraulic hammer (i.e., as a rock breaker) the minimum offset distance to the existing STP buildings should be no less than 10 m. At distances of 10 m or greater the risk of cosmetic damage to the STP buildings is low.

7.4. Mitigation Measures

Due to the high Sound Power Level of some equipment to be used in the operation of the facility (namely the high performance and exhaust fans and the digestate mixer), the facility has been specifically designed to enclose this equipment. Noisy equipment will be located within technical corridors to reduce noise emissions from operations. Additionally, the technical corridors are to be located on the western side of the facility providing further noise attenuation as the facility acts as a physical noise barrier between the equipment and most sensitive receivers. The NVIA notes that the final mechanical services noise levels should be reviewed during the detailed design of the facility.

Whilst no impacts from construction related traffic are expected to occur, the following standard construction noise mitigation measures are recommended:

- Development of a Construction Noise and Vibration Management Plan;
- Construction is to be limited to standard construction hours (Monday to Friday 0700 to 1800 and Saturday 0800 to 1300). Any works proposed outside the standard hours will require assessment;
- Avoiding the coincidence of noisy plant working simultaneously close together would result in reduced noise emissions;
- Equipment which is used intermittently is to be shut down when not in use;
- Where possible, equipment with directional noise emissions should be orientated away from sensitive receivers;

- Regular compliance checks on the noise emissions of all plant and machinery used for the proposal would indicate whether noise emissions from plant items were higher than predicted. This also identifies defective silencing equipment on the items of plant;
- Non-tonal reversing alarms should be used on all items of plants and heavy vehicles used for construction; and
- If the large excavator (with a hydraulic hammer) must be used within 10 m of an STP building, then continuous vibration monitoring should be performed during construction.

With the implementation of the above mitigation measures, it is the opinion of Waves Consulting (the authors of the NVIA) that the proposed Bioenergy Facility (BEF) is a complying development with respect to noise and vibration impacts and is therefore suitable for construction and operation.

8. Soil and Water

8.1. Methodology

A preliminary site investigation (Appendix I), geotechnical investigation and acid sulfate soil (Appendix J) assessment were carried out for the proposed BEF. Groundwater was also assessed as part of the investigations.

The following key guidelines were consulted in the preparation of the preliminary site investigation (PSI) and geotechnical investigation:

- *NEPC National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013) [NEPM] (NEPC, 2013);
- *NSW EPA Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020); and
- *Acid Sulfate Soil Manual* (ASSMAC 1998).

The PSI assesses the potential for contamination at the site based on past and present land uses. On site activities for the geotechnical report and PSI comprised drilling and sampling of 13 boreholes, a constant head permeability test, followed by laboratory assessment, engineering analysis and reporting.

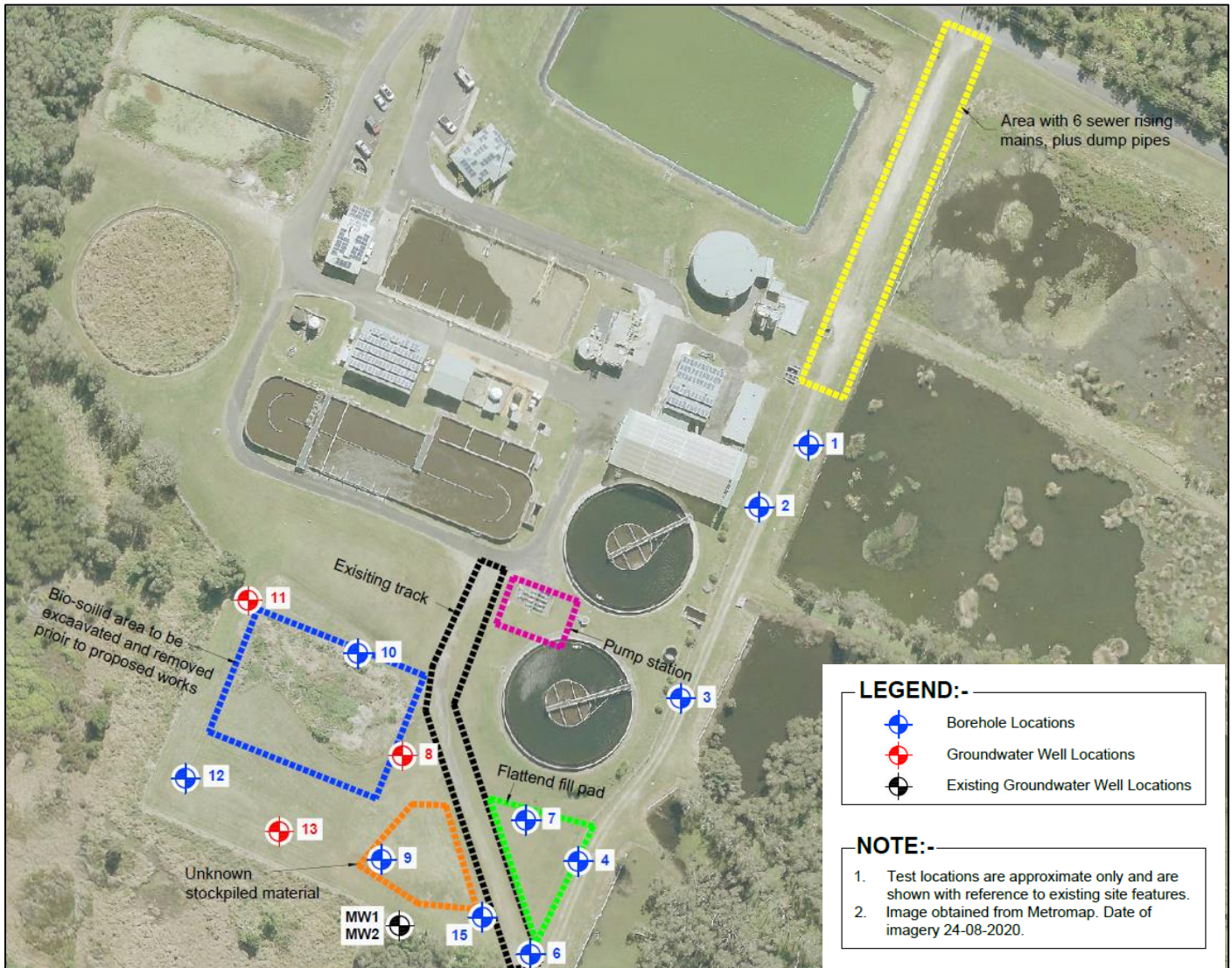
A conceptual site model (CSM) was developed that identifies possible contamination sources, sensitive receptors and potential contamination migration pathways.

A site walkover was undertaken for the PSI on 2 February 2021. Field investigations were undertaken on 8 and 9 February 2021. Site activities included:

- Drilling of 13 boreholes using a mechanical drilling rig;
- Collection of representative soil samples at each borehole from depth intervals of 0.2 m, 0.5 m and every 0.5 m thereafter into natural soils;
- Collection of additional soil samples for QC and background soil conditions purposes;
- Laboratory analysis for the contaminants of potential concern (CoPC);
- Extension of three boreholes to a maximum depth of 6.0m below ground level (bgl) for the installation of three groundwater monitoring wells;
- Collection of representative groundwater samples from each monitoring well; and
- Additional groundwater sampling for QC purposes.

Bore drilling locations are shown on Figure 8.1, and groundwater monitoring wells were installed at BH8, BH11, BH13. Groundwater wells were sampled on 10 February 2021.

Figure 8.1. Borehole and groundwater well locations.



8.2. Existing Environment

Local topography is characterised by coastal sand dunes interspersed with low-lying wetlands. Mean surface elevation is approximately 4.0 m above Australian Height Datum (AHD). An artificial wetland tied to the Byron STP is located to immediately east of the site. These constructed wetlands form part of the 100 ha Byron Bay Integrated Water Management Reserve.

Treated effluent from the adjacent Byron STP is discharged through the constructed wetland and then enters the agricultural drainage system. The agricultural drainage system discharges into the Belongil Creek which in turn empties into the ocean east of the proposed BEF.

The site is outside of flood planning areas and does not fall into any areas of mapped by Byron Shire Council as a 1 in 100 year flood affected area.

The site is underlain by Quaternary aged coastal dune deposits comprising of coastal dunes, beach ridges, barrier dunes, foredunes and shoreface sands.

Local environmental planning instrument mapping classify the site as Soil Class 2, which indicates: “works below natural ground surface present an environmental risk. Works by which the water-table is likely to be lowered present an environmental risk.”

Characteristics of the proposed BEF site include:

- Imported fill material was used to construct the STP. The proposed BEF site consists largely of fill overlaying native soil;
- Two groundwater monitoring wells were previously installed and located in the southern edge of the site;
- No indications of fuel storage infrastructure;
- No obvious indications of soil staining, odours and/or non-organic wastes; and
- No obvious indications of asbestos (PACM).

A summary of soil and groundwater conditions encountered is provided in Table 8.1. Groundwater was encountered in Bore 1, Bore 6, and Bores 8 through 14. The site is affected by tidal action. Further, groundwater depths are affected by climatic conditions, soil permeability and human influences, and will therefore vary with time.

Table 8.1. Summary of subsurface conditions.

Bore	Uncontrolled Fill Silt/Sand/Clay/Gravel Mix	Sandy Silt - firm to stiff	Sand – medium dense (or denser)	Groundwater
1	0.0 – 1.2	1.2 – 1.9	1.9 – 3.0	2.5
2	0.0 – 1.2 ⁽ⁱⁱ⁾	-	-	NE
3	0.0 – 1.45	-	1.45 – 5.0	NE
4	0.0 – 0.9	0.9 – 1.5	-	NE
6	0.0 – 1.2	-	1.2 – 6.0	0.85
7	0.0 – 1.4 ⁽ⁱⁱ⁾	-	-	NE
8	0.0 – 1.6	-	1.6 – 6.0	1.4
9	0.0 – 2.4	-	2.4 – 6.4	2.9
10	0.0 – 1.9	1.9 – 2.4	2.4 – 6.0	2.1
11	0.0 – 1.4	-	1.4 – 6.0	1.1
12	0.0 – 0.4	-	0.4 – 6.0	0.95
13	0.0 – 1.5	-	1.5 – 3.45	1.25
15	0.0 – 1.2	-	1.2 – 1.5	1.3

Note i) All above depths were measured from existing site level at the time of the investigation

ii) TC Bit refusal on obstruction in fill

iii) NE – Not Encountered with drilled depth limit.

8.3. Impact Assessment

Fill associated with construction of the Byron STP was identified as the primary potential source of contamination. Associated CoPC potentially include metals/metalloids, persistent organic pollutants, hydrocarbons, polyfluoroalkyl substances (PFAS) and asbestos.

Any contamination, if present, could potentially impact human “receptors”. These “receptors” include current users of the Byron STP, future proposed BEF employees, construction and maintenance workers, and adjacent site users

(e.g. wetland recreation). Environmental receptors include surface water (e.g. adjacent artificial and natural wetlands), groundwater, and associated land and water habitats.

Human and environmental receptors could be affected by contamination in the following ways:

- Ingestion and dermal contact;
- Inhalation of dust and/or vapours;
- Surface water run-off;
- Lateral migration of groundwater providing base flow to water bodies;
- Leaching of contaminants and vertical migration into groundwater; and
- Contact with terrestrial ecology.

The potential for sediment laden runoff during rainfall events impacting local waterways and wetlands throughout construction will need to be managed. Concept erosion and sediment control plans have been developed for construction and are included in Appendix Q.

8.3.1. Acid Sulfate Soil (ASS)

To assess potential evidence of ASS, field screening and chemical laboratory tests were carried out on a set of soil samples taken from the site. Sixteen (16) samples were screened by measurement of pH after the addition of distilled water (pH_F) and peroxide (pH_{FOX}).

pH in distilled water (pH_F) measures the existing acidity of the soil and is used to help identify whether actual ASS is present. A pH_F between 4 and 5.5 indicates acidic soils. If pH_F is less than 4, it is considered that either actual ASS is present, or soils contain a high organic content. All samples recorded pH_F values greater than 4, but several were still less than 5.5.

A pH peroxide test (pH_{FOX}) value less than 3 (pH) combined with a pH_{FOX} reading at least one pH unit below pH_F (a change in pH greater than 1), along with a strong reaction with peroxide, strongly indicates the presence of potential ASS.

Of the 16 samples tested, 12 recorded pH_{FOX} levels of less than 3.

Based on the results of the screening tests and visual inspection of the samples, eight samples were submitted for more rigorous Chromium Suite analytical testing. Based on the results of the testing, six of the eight samples tested indicated that ASS was present.

Results of the screening tests (pH_F and pH_{FOX}) and Chromium Suite tests are presented in Table 8.2 with results indicating presence of ASS shaded in red.

The preliminary analytical results show ASS was detected and therefore an acid sulfate soils management plan (ASSMP) will be required because greater than 100m³ of material will be disturbed. An Acid Sulfate Soils Management Plan has been prepared and is included in Appendix R.

Table 8.2. ASS test results for pH_F, pH_{FOX} and Chromium Suite.

Depth (m)	Sample Description	Field Screening Test Results				Chromium Suite Test Results (%S)				
		pH _F	pH _{FO x}	ΔpH	Reaction (0,1,2,3) F	pH _{KCl}	Chromium Reducible Sulfur (S _{CR})	Total Actual Acidity (TAA)	Retained Acidity (S _{NAS})	Existing plus potential Acidity
Bore 1										
0.25	Fill	5.5	2.9	2.6	3	-	-	-	-	-
0.75	Fill	5.7	2.8	2.9	3	-	-	-	-	-
1.25	Sandy Silt	6.0	1.9	4.1	3	-	-	-	-	-
1.75	Sandy Silt	5.9	2.5	3.3	3	-	-	-	-	-
Bore 6										
0.50	Fill	5.4	3.5	1.9	1	4.4	0.013	0.08	0.05	0.14
1.0	Fill	4.9	2.5	2.1	3	4.0	0.021	0.16	<0.02	0.18
1.5	Sand	5.6	2.3	3.3	3	5.4	0.019	<0.02		<0.02
2.0	Silty Sand	5.6	2.3	3.3	3	5.4	0.019	<0.02	-	0.03
Bore 11										
0.50	Fill	5.5	2.6	2.9	3	5.1	0.017	0.03	-	0.04
1.0	Fill	4.7	2.2	2.5	3	4.5	0.013	0.08	-	0.10
1.50	Silty Sand	6.7	2.9	3.8	3	7.5	0.052	<0.02	-	<0.02
2.00	Silty Sand	6.6	3.0	3.6	3	6.4	0.049	<0.02	-	0.05
Bore 12										
0.25	Fill	4.7	3.1	1.6	3	-	-	-	-	-
0.75	Silty Sand	4.7	2.2	2.5	3	-	-	-	-	-
1.25	Sand	4.9	3.1	1.8	1	-	-	-	-	-
1.75	Silty Sand	6.0	2.4	3.6	3	-	-	-	-	-

8.3.2. Contamination

National Environment Protection Measures (NEPMs) are legal instruments that specify national standards for a variety of environmental issues. Government, industry and academic experts achieve consensus in developing appropriate standards. The *Site Contamination NEPM* provides a process for investigating contaminated land and sets national health-based standards for determining the risk of contamination to human and environmental health.

Short for Health Investigation Level, HILs are the national health-based levels set in the *Site Contamination NEPM* for a range of contaminants that trigger the need for further investigation. There are HILs for many different contaminants including lead and mercury, hydrocarbons such as diesel and petrol, pesticides, herbicides and organics such as chlorinated chemicals used in household plastics.

Based on the proposed land use, soil characteristics of the site, and the *Site Contamination NEPM*, the following criteria were adopted for the PSI:

- Health Investigation/Screening Levels (HIL/HSL) D – Commercial/industrial land uses;
- Ecological Investigation Levels (EILs) for selected metals were calculated using site specific soil parameters for pH (4.7), cation exchange capacity (0.5 meq/100g) and clay content (5%);
- NEPM HIL/HSL A – Residential with garden/accessible soil;
- NEMP PFAS HHSV – residential with accessible soil; and
- NEMP PFAS EIE– Interim soil – ecological indirect exposure – All land uses.

Soil samples selected for laboratory analysis was based on the conceptual site model (CSM)¹⁴.

The analytical soil results indicated that there were trace concentrations of metals/metalloids and PFAS. There were no exceedances of the HIL D criteria (Commercial/industrial land use scenario) under NEPM. Some exceedances of EIL criteria were reported, including nickel and PFAS in soil, and arsenic, copper, nickel and zinc in groundwater samples.

Groundwater pH tested neutral as shown in Table 8.3 below.

Notwithstanding the above conclusions, some potential exists for isolated pockets of contamination in parts of the site not investigated. An Unexpected Finds Protocol (UFP) will be prepared and included in early works/bulk earthworks environmental management plans for the site.

8.3.3. Groundwater

The following guidelines were applied to assess groundwater data in the following order of priority:

- ANZG (2018: Default Guideline Values (DGVs) for toxicants to protect 95% of slightly disturbed ecosystems for south-east Australia, Fresh waters);
- ANZG (2018: Default Guideline Values (DGVs) for toxicants to protect 95% of slightly disturbed ecosystems for south-east Australia, Marine waters);
- ADWG (2011: Monitoring for Specific Characteristics in Drinking Water, v 3.5, updated August 2018, Table 10.5 Guideline Values for Physical and Chemical Characteristics);
- NEPC (2013: Schedule B1 Table 1C Groundwater Investigation Levels (GILs) for marine waters);
- NEPC (2013: Schedule B1 Table 1C Groundwater Investigation Levels (GILs) for fresh waters); and
- NEPC (2013: Schedule B1: Table 1a (4) Groundwater Health Screening Levels (HSLs) for vapour intrusion of TRH and/or BTEXN from a source in sandy soils located 2 m to <4 m bgl on commercial/industrial premises.

Laboratory results have been compared against theses adopted thresholds.

Analytical groundwater results indicate that for the majority of samples there were no exceedances of the adopted criteria. However, there were exceedances of:

- The ADWG (2011) criteria for arsenic in MW13, with a concentration of 10 µg/L;
- The NEPM GIL and the ANZG 95% protection criteria for copper in all wells (3 - 110 µg/L), as well as both nickel (15 and 18 µg/L) and zinc (143 and 223 µg/L) in MW11 and MW13; and

¹⁴ Analytes tested included metals/metalloids, TRH, BTEX, PAH, PCB, OC/OP pesticides, PFAS and phenols.

- Concentrations of copper, nickel and zinc did not exceed the ADWG (2011) criteria.

Elevated concentrations of metals in groundwater are ubiquitous in urban environments across Australia from a wide range of sources and the concentrations of arsenic, copper, zinc and nickel detected are not considered to represent contamination and are likely to reflect regional groundwater quality conditions. If during works, groundwater is extracted, treatment and additional analysis will be required before disposal into local waterways.

Table 8.3 shows field measurement results of groundwater. Based on the groundwater level measurements, groundwater is interpreted to be flowing to the southeast towards Belongil Creek.

Table 8.3. Summary of groundwater measurements and field parameters.

GW Well ID	Standing Water Level (SWL) in metres below ground level (m bgl)	Temperature (C)	Electrical Conductivity (µS/cm)	pH
GW 8	1.41	23.9	870	6.9
GW 13	1.25	24.2	1030	6.8
GW 11	1.76	23.4	1017	6.9

The presence of acidic soils could potentially lead to leaching of acid and metals during and after rainfall events. Accordingly, groundwater from excavations or surface water should be captured and not be discharged off site without prior testing in order to assess the suitability of the water quality. Treatment of water will be applied where required prior to discharge.

8.4. Mitigation Measures

With the implementation of the soil and water mitigation and management measures provided in Table 8.4 below, the proposed BEF is expected to comply with all applicable legislation and guidelines with respect to potential soil and water quality impacts and is therefore suitable for construction and operation.

Table 8.4. Soil and water mitigation measures.

Element	Mitigation Measures
Acid sulfate soil	An acid sulfate soils management Plan (ASSMP) will be required (Appendix R).
Contamination	An Unexpected Finds Protocol (UFP) for contamination will be prepared and included in early works/bulk earthworks environmental management plans.
Groundwater	If during works, groundwater is extracted or surface water captured, additional testing and treatment (if required) will be provided before discharge into local waterways.
Soil and water	A Soil and Water Management Plan will be prepared and implemented for construction in accordance with Northern Rivers Local Government Development Design and Construction Manuals, Byron Shire Council Comprehensive Guidelines for Stormwater Management and 'Managing Urban Stormwater: Soils and Construction' (Landcom, Sydney, 2003).

Element	Mitigation Measures
Stormwater	An operational stormwater management system will be designed and constructed for the project to capture and treat runoff generated from the development to BSC and EPA standards.

9. Hazard and Risk

A Preliminary Hazard Analysis and Environmental Risk Assessment has been prepared to identify key potential impacts of the proposed BEF, as well as potentially offensive or hazardous issues that need to be considered as part of the Development Application process.

The assessment has been performed according to AS/NZS ISO 31000: 2009 Risk Management – Principles and Guidelines and the Preliminary Hazardous Analysis has been informed by the *Hazardous and Offensive Development Application Guidelines - Applying SEPP 33*¹⁵. We have also considered the following guidelines published by the NSW Department of Planning in 2011:

- *Hazardous Industry Planning Advisory Paper No 2 - Fire Safety Study Guidelines*¹⁶
- *Hazardous Industry Planning Advisory Paper No 3 - Risk Assessment*¹⁷
- *Hazardous Industry Planning Advisory Paper No 4 - Risk Criteria for Land Use Safety Planning*¹⁸
- *Hazardous Industry Planning Advisory Paper No 6 - Hazard Analysis*¹⁹.

9.1. Scope

The assessment has been performed to identify the risks posed to people, property and the environment, and to identify potential hazardous and offensive issues that need to be addressed as part of the development to ensure compliance with SEPP 33. The assessment also considers off-site risks to people, property and the environment (in the presence of controls) arising from atypical and abnormal hazardous events and conditions (i.e. equipment failure, operator error and external events). The hazard treatment measures that have been proposed assist in producing a 'low' level of risk in accordance with the risk acceptance criteria.

9.2. Methodology

The methodology used to inform preliminary hazard analysis and environmental risk assessment has included the following steps:

- Identify and screen the hazards associated with the proposed development;
- Examine the maximum reasonable consequence of identified events;

¹⁵ NSW Department of Planning (2011). Hazardous and Offensive Development Application Guidelines - Applying SEPP 33. Published by the NSW Department of Planning. Internet publication: <http://www.planning.nsw.gov.au/en/Policy-and-Legislation/~media/3609822D91344221BA542D764921CFC6.ashx>

¹⁶ NSW Department of Planning (2011). Hazardous Industry Planning Advisory Paper No 2 - Fire Safety Study Guidelines. Published by the NSW Department of Planning. Internet publication: <http://www.planning.nsw.gov.au/Policy-and-Legislation/~media/CCC734E980C4427DB95D319DF073C41A.ashx>

¹⁷ NSW Department of Planning (2011). Hazardous and Offensive Development Application Guidelines- Risk Criteria for Land Use Safety Planning. Published by NSW Department of Planning. Internet publication: <http://www.planning.nsw.gov.au/Policy-and-Legislation/~media/0D39F08E7889409BBA1FA88D5FB859FD.ashx>

¹⁸ NSW Department of Planning (2011). Hazardous Industry Planning Advisory Paper No 4 - Risk Criteria for Land Use Safety Planning. Published by the NSW Department of Planning. Internet publication: <http://www.planning.nsw.gov.au/Policy-and-Legislation/~media/0D39F08E7889409BBA1FA88D5FB859FD.ashx>

¹⁹ NSW Department of Planning (2011). Hazardous Industry Planning Advisory Paper No 6 - Hazard Analysis. Published by NSW Department of Planning. Internet publication: <http://www.planning.nsw.gov.au/Policy-and-Legislation/~media/3ACC37BE3EFE4BAAB3EBA5872AFBA8BD.ashx>

- Qualitatively estimate the likelihood of events;
- Proposed risk treatment measures;
- Qualitatively assess risks to the environment, members of the public and their property arising from atypical and abnormal events and compare these to applicable qualitative criteria;
- Recommend further risk treatment measures if considered warranted; and
- Qualitatively determine the residual risk assuming the implementation of the risk treatment measures.

It is important to note that this preliminary hazard analysis and environmental risk assessment has been undertaken at an early stage of the proposed development to help inform key issues to be considered in the EIS. All hazards need to be identified, and an assessment of the resultant risk levels on a cumulative basis is also undertaken as part of the study.

9.3. Risk management

The environmental risk assessment has been informed by AS/NZ 31000: 2009 *Risk Management Principles and Guidelines* and *Hazardous Industry Planning Advisory Paper No 3 - Risk Assessment* (NSW Department of Planning, 2011). The risk management process has been informed by the following elements:

- Establish the context;
- Identify the risks;
- Analyse the risks;
- Evaluate the risks; and
- Treat risks.

9.4. Risk Criteria

The following principles have been adopted to identify and assess risk in this study. This has been informed by the *Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning*²⁰.

- The avoidance of all avoidable risks;
- The risk from a major hazard should be reduced wherever practicable, even where the likelihood of exposure is low;
- The effects of significant events should wherever possible be contained within the site boundary; and
- Where the risk from an existing installation is already high, further development should not pose any incremental risk.

²⁰ NSW Department of Planning, 2011, *Hazardous Industry Planning Advisory Paper No. 4*, internet publication: <http://www.planning.nsw.gov.au/~media/Files/DPE/Other/hazardous-industry-planning-advisory-paper-no-4-risk-criteria-for-land-use-safety-planning-2011-01.ashx>

9.5. Qualitative measurement of consequence, likelihood and risk

To undertake a qualitative risk assessment, it is useful to describe the levels of consequence of a particular event, and the likelihood or probability of such an event occurring. Risk assessment criteria have been developed in AS/NZS ISO 31000: 2009 which allows the risk assessor to develop risk criteria during the establishment of the context.

In accordance with AS/NZS ISO 31000: 2009, the following tables have been reviewed as part of establishing the context of the proposed development. These tables were considered to be consistent with the specific objectives of the preliminary hazard analysis and environmental risk assessment.

Table 9.1. Qualitative measures of probability.

Event	Likelihood	Description
A	Almost certain	Happens often
B	Likely	Could easily happen
C	Possible	Could happen and has occurred elsewhere
D	Unlikely	Hasn't happened yet but could
E	Rare	Conceivable, but only in extreme circumstances

Table 9.2. Qualitative measures of maximum reasonable consequence.

Event	People	Environment	Asset / Production
1	Multiple fatalities	Extreme environmental harm (e.g. widespread catastrophic impact on environmental values of an area)	More than \$1B loss or production delay
2	Permanent total disabilities, single fatality	Major environmental harm (e.g. widespread substantial impact on environmental values of an area)	\$100M to \$1B or production delay
3	Minor injury or health effects (e.g. major lost workday case / permanent disability)	Serious environmental harm (e.g. widespread and considerable impact on environmental values of an area)	\$5M - \$100M loss or production delay
4	Minor injury or health effects (e.g. restricted work or minor lost workday case)	Material environmental harm (e.g. localised and considerable impact on environmental values of an area)	\$250K to \$5M loss or production delay
5	Slight injury or health effects (e.g. first aid / minor medical treatment needed)	Minimum environmental harm (e.g. minor impact on environmental values of an area)	Less than \$250K or production delay

Combining the probability and consequence tables, Table 9.3 provides a qualitative risk analysis matrix to assess risk levels.

Table 9.3. Qualitative risk analysis matrix used in this preliminary hazard analysis and environmental risk assessment.

Consequence	Probability ¹					
		A	B	C	D	E
	1	1 (H)	2 (H)	4 (H)	7 (M)	11 (M)
	2	3 (H)	5 (H)	8 (M)	12 (M)	16 (L)
	3	6 (H)	9 (M)	13 (M)	17 (L)	20 (L)
	4	10 (M)	14 (M)	18 (L)	21 (L)	23 (L)
	5	15 (M)	19 (L)	22 (L)	24 (L)	25 (L)

¹ Legend – L: low; M: Moderate; H: high; Risk numbering: 1 – highest; 25 – lowest risk. Colour coding: Green: tolerable risk; orange: ALARP – as low as reasonably practicable; red: intolerable risk.

Risk acceptance criteria for the proposed development have been formulated following consideration of the *Hazardous Industry Planning Advisory Paper No 4 - Risk Criteria for Land Use Safety Planning* (NSW Department of Planning and Environment, 2011d) and AS/NZS ISO 31000 2009 – *Risk Management Principles and Guidelines*.

In assessing the tolerability of risk from potentially hazardous development, both qualitative and quantitative aspects need to be considered. Relevant general principles considered in this study are documented in the *Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning*²¹.

9.6. Site description

The facility is to be developed on premises at 45 Wallum Place, Byron Bay, NSW. The site is also identified at Lot 2 / DP706286 in industrial land located in the Byron Shire Council local government area.

A full site description is given in Section 2.

9.7. Process

A detailed overview of current and proposed operations is given in Section 2.4.

9.8. Hazardous materials stored on-site

The NSW Department of Planning (2011) in the SEPP 33 sets out a process for screening potentially hazardous materials that are stored on site as part of a proposed development.

Potential risk typically of holding certain types of hazardous materials on site depends on:

- The properties of the substance(s) being handled or stored;
- The conditions of storage or use;
- The quantity involved;
- The location with respect to the site boundary; and
- The surrounding land use.

²¹ NSW Department of Planning, 2011, *Hazardous Industry Planning Advisory Paper No. 4*, internet publication: <http://www.planning.nsw.gov.au/~media/Files/DPE/Other/hazardous-industry-planning-advisory-paper-no-4-risk-criteria-for-land-use-safety-planning-2011-01.ashx>

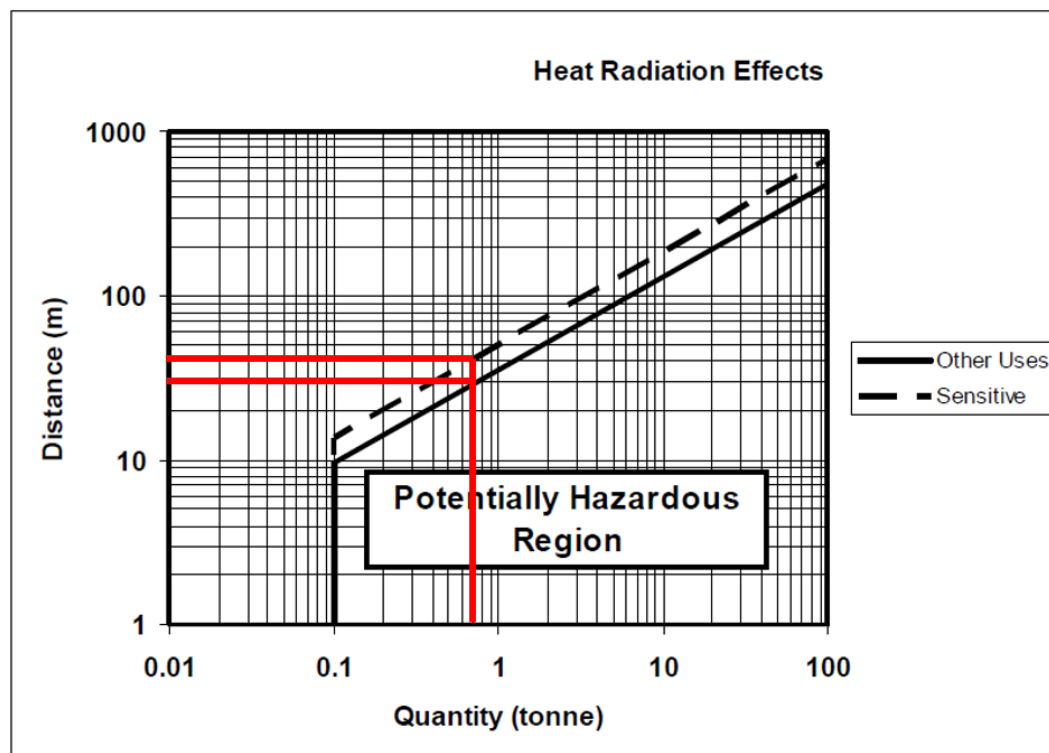
Risk screening needs to be undertaken as part of the SEPP 33 guidelines based on an estimate of the consequences of fire, explosion or toxic release from material(s) being handled. It takes into account information from the proponent on the properties of the materials, quantity, type of storage or use, and location. A risk screening analysis for the proposed development is given in

Table 9.4.

9.8.1. Biogas

The biogas storage tank can hold 1,000m³ of biogas with an average density of 1.28kg/m³, equal to approximately 1.28 tonnes of biogas maximum storage. Factoring in the methane percentage, maximum 55%, this equates to 0.704 tonnes. According to *Figure 6: Class 2.1 Flammable Gases Pressurised (Excluding LPG)* in the *Hazardous and Offensive SEPP*, a distance of 30m is required to the nearest “other uses” near the development. In this case, other uses include the STP oxidation ponds.

Figure 9.1. Biogas storage assessment against SEPP 33.



The biogas tank sits directly above the anaerobic digester tunnels and is located greater than 30m from the STP oxidation ponds and other STP infrastructure. The biogas is greater than 40m from the access road and approximately 250m from the entrance to the STP. Sensitive uses fall outside of the 40m threshold.

Therefore, the biogas storage amount and location are below the Class 2.1 thresholds set forth in *Figure 6: Class 2.1 Flammable Gases Pressurised (Excluding LPG)* in the *Hazardous and Offensive SEPP*.

9.8.2. Compost

Digestate from the anaerobic digestion tunnels will be put into the aerobic composting tunnels for several more weeks. Once removed from the tunnels, the compost will be screened within the receival hall, then transported to the product storage area at the STP. A maximum of two weeks product storage (up to 600 tonnes or 1,000m³) will be stored at the

receival hall at any one time. In addition, a maximum of 600 tonnes (or 1,000m³) will be stored at the STP product storage area (former biosolids storage area) at any one time.

The *Environmental Guidelines: Composting and Related Organics Processing Facilities* recommendations for fire safety and stockpile management will be followed to reduce the risks of potential fire in the any on-site stockpiles of product. This will include development of a fire management strategy prior to construction and operation of the BEF.

9.8.3. Other

All other hazardous materials and liquids used for plant and equipment including diesel, hydraulic oil, engine oil, gear oil, transmission oil, brake fluid, grease drum cartridges, degreasers and engine coolant are stored at in the existing maintenance workshop at the STP. This existing workshop is a bunded area and will also be used for maintenance of any BEF plant/equipment.

Table 9.4 Risk screening analysis of potentially hazardous materials held on site as part of the development.

Material / potential pollutant	Storage location	Dangerous Goods Class ¹	Packing Group ²	Maximum quantity on site	Screening method ³	Threshold ⁴	Notes
Biogas (methane)	1000m ³ storage container above anaerobic digestion tunnels	2.1	n/a	2.56 tonnes	Figure 6 graph if greater than 100kg	30m from the site boundary	The biogas storage container distance to the STP infrastructure is under the threshold.
Compost	Receival Hall / Storage at STP (former biosolids storage)	NA	NA	600 tonnes / 600 tonnes	NA	NA	Not a dangerous good but is flammable given quantities held on site

¹ Class 2.1 Dangerous Goods are classified as 'flammable gases'. ³ Screening method is the methodology used to assess dangerous goods in Table 1 of the NSW Department of Planning (2011) *Hazardous and Offensive Development Application Guidelines - Applying SEPP 33*. ⁴ Where dangerous goods are stored on-site which exceed the nominated thresholds as per Department of Planning (2011) *Hazardous and Offensive Development Application Guidelines - Applying SEPP 33*, the proposed development is considered to be hazardous and requires detailed assessment under SEPP 33.

9.9. Further hazard identification, scenarios, consequence, likelihood analysis and risk assessment

To help understand further hazards possible as part of the proposed development, a series of potential worst case scenarios have been assessed to determine possible consequences, likelihood and risk. The NSW Department of Planning's (2011) *Hazardous Industry Planning Advisory Paper No 6 - Hazard Analysis* has been used to assist in guiding this analysis.

As per the above guidelines, a qualitative assessment of the impacts of the largest possible event on people, plant and the environment has been conducted. The worst-case scenarios reflect any foreseeable factors that could exacerbate the severity of an accident, including abnormal process conditions, out of hours manning levels, and the potential for control measures to be disabled or rendered inoperable by the accident.

The worst case scenarios we have assessed include the following:

- Severe weather resulting in compromise of the biogas storage leading to odour or fire;
- Odour from the anaerobic digestion and composting tunnels leading to staff health problems or offsite odour impacts;
- Control system, software or operator failures leading to biogas leakage and onsite staff health effects or offsite odour impacts;
- Vehicle collision on entry to the site, resulting in fire and possible death;
- Leaks / spills on vehicle entry to the site, with potential impacts on stormwater and fire risk;
- Vehicle theft and malicious damage, leading to equipment failure and injury to person(s);
- Leaks / spills in processing Facility, with potential impacts on stormwater and fire risk;
- Vehicle theft and malicious damage in the facility, leading to equipment failure and injury to person(s);
- Vehicle collision between delivery vehicles with other on-site vehicles through driver error, or pedestrian, resulting in possible fire or death near the product storage shed;
- Leak / spill from vehicle collision with potential impacts on stormwater and fire risk;
- Fire caused by ignition source (e.g. cigarette);
- Fire caused by excessive biological heat generation in stockpiles and tunnels.
- Leakage of fuel and oil containers in receival hall, potentially igniting and/or moving into stormwater, through human error or malicious act; and
- Fire caused by ignition source (e.g. cigarette, hot work such as welding) and flammable materials (e.g. fuels, oils) catch fire due to spark from cigarette or hot work.

Prevention and treatment measures to reduce the likelihood and resulting consequences from these worst-case scenarios are mapped out in Table 9.5 below. A risk rating category has been prepared to understand the significance of these risks – on the environment and human health. The risk ratings estimated as part of the qualitative analysis are specified after implementation of the risk prevention, treatment and detection measures.

As a result of this analysis, it is suggested that the worst-case scenarios modelled with risk prevention, treatment and detection measures are all moderate or low risks. All risks are low except those that involve fire or explosion of the biogas, either in storage or from the tunnels.

The proposed project is not considered a potentially hazardous development as per Figure 11 of SEPP33 Guidelines, so no further Preliminary Hazard Analysis or Multi-Level Risk Assessment has been performed.

However, we have identified a number of moderate risks to the environment, people and property, and these have been evaluated in this EIS or will be evaluated further. These risks are described in Section 9.11.

9.10. Conclusion

The proposed development is not considered a potentially hazardous development as per Figure 11 of SEPP33, so no further Preliminary Hazard Analysis or Multi-Level Risk Assessment has been performed.

Table 9.5. Hazard identification, scenario, consequence, prevention/treatment measures and risk rating table.

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
Severe weather, hail, lighting, wind	Bushfire or severe weather leads to biogas vessel compromise	Bushfire or severe weather (could include – high winds, damaging lighting, large hailstones) resulting in biogas storage breakage and biogas leak, fire or odours.	• Ensure biogas storage is designed and built to meet adequate standards for regional weather patterns. • Firefighting equipment • Emergency management / response plan • Pollution incident response management plan / Environmental management plan • Traffic management plan • Work health and safety plan • Hazardous material management plan • Operator and driver training • Spill response equipment and training • Contact emergency services (NSW Fire Service) • Implement recommendations of bushfire study.	Possible (D) 3	17 (Low risk)
Odours / difficulty breathing	Biological and microbiological (viral or bacterial) substance or dust from biogas system or operations.	Breathing difficulty / suffocation / offsite odours.	• Proper operation and maintenance of the mechanical ventilation and biofilter system • Ensure staff training and compliance with	Possible (C) 3	18 (Low risk)

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
			- operational procedures - Regular equipment maintenance and safety inspections - Dust minimisation practices - Emergency management / response plan - Contact emergency services (NSW Fire Service)		
Failure of control system / software / energy supply or operator error leading to biogas leakage	Through mechanical, equipment, computer or operator errors/failures, biogas leak that leads to personal injury or injury to assets and surrounding area.	Biogas leak or backflow leading to breathing difficulties, offsite odour, explosion and/or fire. Possible spread to surrounding bushland or STP.	- Correct operational procedures are implemented. - Regular staff training and compliance with operational procedures - Regular equipment maintenance, monitoring and safety inspections and checks - Emergency management / response plan - Pollution incident response management plan / Environmental management plan - Work health and safety plan - Hazardous material	Possible (C) 3	13 (Med risk)

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
			management plan • Implement recommendations of Air Quality Study.		
Vehicle collision	Possible collision of delivery vehicles with other on-site vehicles through driver error, or pedestrian, resulting in possible fire or death	Fire possible outside of processing Facility, potentially spreading to STP with flammable liquid. Possible impacts on stormwater from discharge of fire water. Death or injury to personnel	• Ensure vehicle speed limits and regular driver education • Firefighting equipment • Emergency management / response plan • Pollution incident response management plan / Environmental management plan • Traffic management plan • Work health and safety plan • Hazardous material management plan • Operator and driver training • Spill response equipment and training • Contact emergency services (NSW Fire Service)	Unlikely (D) 3	17 (Low risk)
Fuel Leak / spill	Vehicle collision / damage causes spill / leak of hazardous material	Collision causes leakage of vehicle fuel or oil onto handstand and possible stormwater impacts and a fire risk	• Ensure vehicle speed limits and regular driver education • Firefighting equipment • Emergency management /	Possible (C) 5	22 (Low risk)

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
			response plan • Pollution incident response management plan / Environmental management plan • Traffic management plan • Work health and safety plan • Hazardous material management plan • Operator and driver training • Spill response equipment and training • Emergency response • Communications • Spill containment and sweeping of hardstand • Contact emergency services (NSW Fire Service)		
Fire caused by biological heat generation in compost stockpiles	Heat from biological activity generation in compost stockpiles / tunnels leads to fire.	Fire spreads to other areas/buildings and/or environment with possible safety risks off and on site.	• Maintain control of moisture content and aeration within tunnels and stockpiles. • Operator training • Firefighting equipment • Emergency management / response plan	Unlikely (D) 3	17 (Low risk)

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
Vehicle theft / malicious damage	Vehicle or material within truck stolen	Components of a truck are stolen and leads to equipment failure and possible safety risk to staff	• Ensure staff compliance with site security measures • Emergency management / response plan • Traffic management plan • Work health and safety plan • Contact emergency services (Police) • Site security / limited access	Possible (C) 5	22 (Low risk)
Excess noise and vibration from truck movements on site	Increase truck vehicle movements results in excess noise and vibration impacts on neighbours	Increased truck movements results in excess noise and vibration nuisance impacts on neighbours	• Ensure vehicle speed limits and regular driver education • Traffic management plan • Implement recommendations of the noise and vibration study	Possible (C) 5	22 (Low risk)
Excess dust and fire	Fire caused by excess dust and build-up of electrostatic electricity or spark and fire	Excess build-up of dust during organics receipt and moving operations, and spark through electrostatic electricity or spark through electrical failure	• Ensure staff compliance with hot work procedures • Regular machinery maintenance and safety inspections • Dust minimisation practices • Firefighting equipment • Emergency management / response plan • Pollution incident response management plan /	Possible (C) 4	18 (Low risk)

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
			- Environmental management plan - Traffic management plan - Work health and safety plan - Hazardous material management plan - Operator and driver training - Spill response equipment and training - Contact emergency services (NSW Fire Service)		
Equipment breakdown and excess stockpiling	Excess stock increases stored in receival area increases risk of vehicle collision or fire	Collision of vehicles due to constrained operational area, possible fire as a result	- Cease receipt of organics on the site and divert trucks to other facilities - Firefighting equipment - Emergency management / response plan - Pollution incident response management plan / Environmental management plan - Traffic management plan - Work health and safety plan - Hazardous material management plan - Operator and driver training	Unlikely (D) 5	24 (Low risk)

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection	Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
			• Spill response equipment and training • Contact emergency services (NSW Fire Service)			
Storage and harvesting of biogas from the anaerobic digestors - explosion	Explosion caused during operation by defective devices, electrical sources, or a failure to heed notices / instructions.	Atmosphere becomes prone to explosion with combustible biogas during operation. Potential fire spread.	• Use of gas detectors and gas warning devices • Operating instructions • Regular inspection of pipes for leakages. • Installation of ATEX components • Inspection labels for readability. • Ensure strict non-smoking policy is enforced at all times • Firefighting equipment • Emergency management / response plan • Pollution incident response management plan / Environmental management plan • Hazardous material management plan • Operator and driver training	Possible (C)	3	13 (Med risk)

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Required	Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
			Contact emergency services (NSW Fire Service)			
Storage of fuels and hydrocarbons	Leakage of fuel	Spill of fuel, and potentially ignite and/or move into stormwater, through human error or malicious act	- Ensure fuels stored in fully bunded container at the STP Workshop. - Staff training on safe storage of fuel. - Emergency management / response plan - Pollution incident response management plan / Environmental management plan - Traffic management plan - Work health and safety plan - Hazardous material management plan - Spill response equipment and training - Emergency response - Communications - Spill containment and sweeping of hardstand - Contact emergency services (NSW Fire Service)	Possible (C)	4	18 (Low risk)

Facility / event	Cause / comment	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Required	Likelihood	Consequence	Risk rating and category (after treatment measures) ¹
Fire	Fire caused by ignition source (e.g. spark)	Flammable materials (e.g. solvents, oils) catch fire due to spark from cigarette or hot work)	• Ensure strict non-smoking policy is enforced at all times • Follow correct procedures for full containment of any hot work • Staff training on correct storage and handling of flammable liquids • Firefighting equipment • Emergency management / response plan • Pollution incident response management plan / Environmental management plan • Traffic management plan • Work health and safety plan • Hazardous material management plan • Operator and driver training • Spill response equipment and training • Contact emergency services (NSW Fire Service)	Possible (C)	4	18 (Low risk)

Risk rankings: 1, highest risk; 25, lowest risk. Colour coding: Green: tolerable risk; orange: ALARP – as low as reasonably practicable; red: intolerable risk.

9.11. Risks to the environment, people and property to be investigated in this EIS

In addition to the SEAR's requirements to be addressed as part of this EIS, the following issues have been identified for further analysis and assessment. These principal issues have already been identified as part of the Preliminary Environmental Assessment to inform the SEAR's requirements, however the Preliminary Hazard Analysis and Environmental Risk Assessment has identified a number of sub-issues which need to be addressed in the EIS.

The list of issues below (Table 9.6) have all been classified as moderate risk according to the risk assessment done. All risks that have been identified as low risk are within acceptable limits and will be controlled through the mitigation measures as defined in Section 15.

Table 9.6. Key risks to the environment, people and property to be considered in addition to the SEAR's requirements as part of this EIS.

Principal issue or risk	Description	Study to assess issue or risk
Odour / Fire	Failure of control system / software / energy supply or operator error leading to biogas leakage, including potential odour impacts or explosion/fire	Air Quality Study (Appendix G) Bushfire Risk Assessment (Appendix K)
Hazardous weather and Bushfire	Storage and harvesting of biogas from the anaerobic digestors - explosion	Air Quality Study (Appendix G) Bushfire Risk Study (Appendix K)

10. Bushfire

10.1. Methodology

A Bushfire Risk Assessment (BRA) has been prepared (Appendix K) to determine category of bushfire attack and construction level in support of the Proposal. 'Bushfire attack level', or BAL, quantifies the level of bush fire risk for a development. BAL is affected by the characteristics of the local area, including vegetation, distance from the vegetation to the development, and slope steepness. The BAL influences how buildings are constructed (e.g. materials, doors, windows, etc) to meet minimum standards for fire protection.

A desktop assessment was performed and a site visit (3 February 2021) was undertaken for the BRA.

The National Construction Code (NCC) contains Performance Requirements and Deemed-to-Satisfy provisions relating building on Bushfire Prone Land (BFPL). Construction on BFPL must comply with:

- AS3959-2018 – *Construction of buildings in bushfire prone areas* (AS3959), or the
- National Association of Steel Framed Housing (2014) *Steel Framed Construction in Bush Fire Areas* (NASH Standard) as varied in NSW.

The Proposal will include Class 5 – 8 buildings (defined as factories, offices, warehouses, carparks, other industrial and commercial facilities). The NCC does not provide specific performance requirements for Class 5 – 8 buildings, and as such AS3959 and NASH Standards do not apply as a set of 'deemed to satisfy' provisions. However, they must be considered when meeting the aims and objectives of *Planning for Bush Fire Protection*²² (PBP).

The aims and objectives of the PBP include providing for the protection of human life and minimising impacts on property from the threat of bush fire. The PBP also considers a property's development potential and site characteristics, and environmental protection.

The BRA takes into consideration access, water supply and services, and emergency and evacuation planning, and demonstrates how bushfire requirements can be met by ensuring suitable measures are put in place appropriate to the level of risk and to protect people using the site.

10.2. Existing Environment

'Bush Fire Prone Land' (BFPL) mapping for the site is shown below in Figure 10.1. Vegetation types in the vicinity of the site is shown in Figure 10.2.

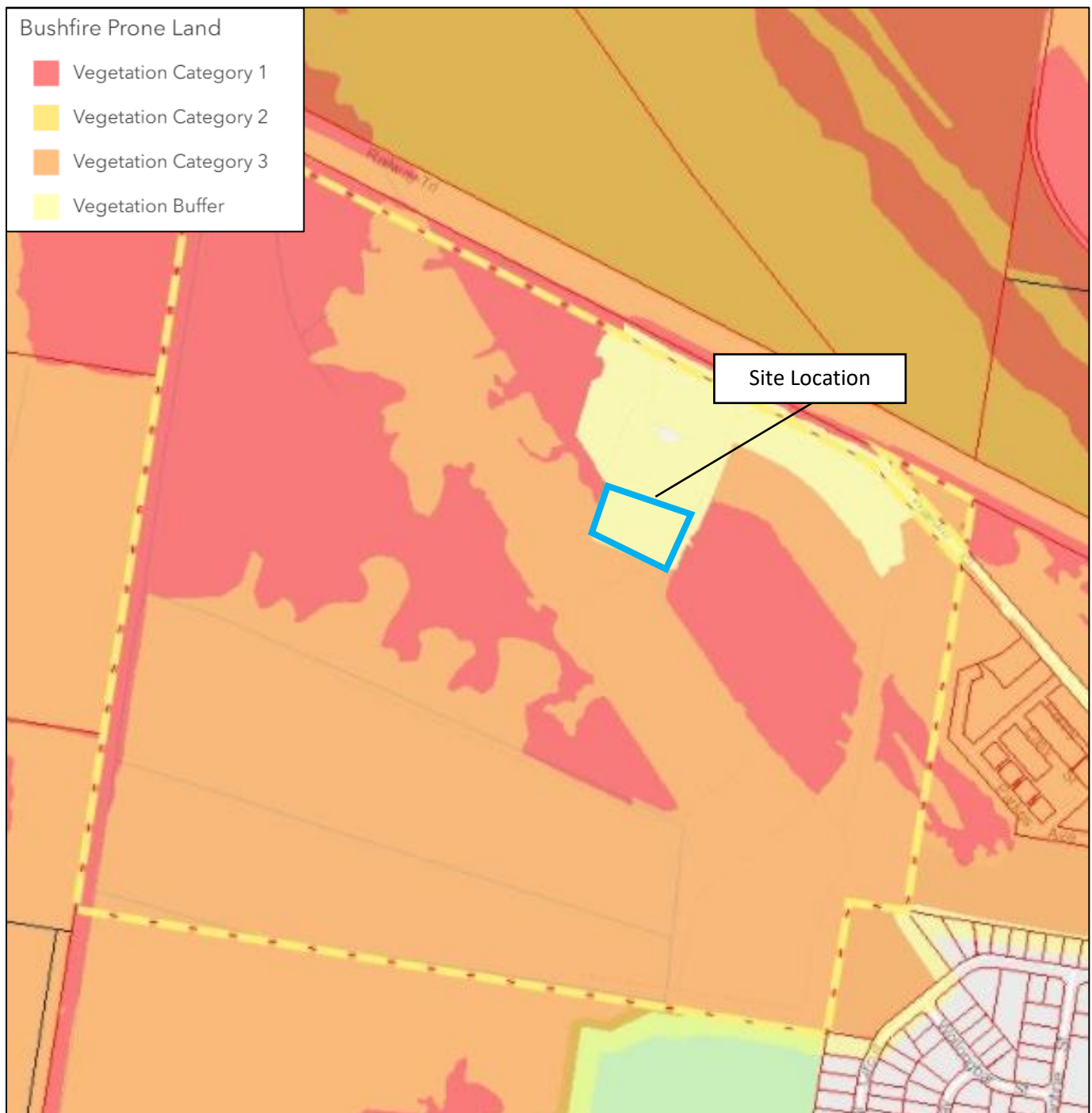
To the northwest and approximately 6m from the proposed BEF sits Coastal Swamp forest vegetation. This vegetation type and its proximity to the site are considered the greatest bushfire hazard.

Northeast of the site is the Byron STP ponds and buildings. The land is professionally managed with grass kept short to a minimal height (<100mm).

To the east of the site are constructed wetlands comprising Coastal Swamp forest vegetation. The wetland is managed by BSC for absorption of process water from the adjoining STP. Occasionally (every 4-5 years) the wetland is allowed to dry out and BSC undertakes slashing and other management works. This forest is greater than 20m from the proposed administration building and approximately 62m from the proposed BEF on level ground.

²² NSW Rural Fire Service (November 2019). *Planning for Bushfire Protection: A guide for councils, planners, fire authorities and developers.*

Figure 10.1. Bushfire Prone Land (Source: NSW Government 2021)



To the south and southwest about 6m from the site on level ground are Coastal Freshwater Wetlands and lagoons regularly inundated with water. Beyond this is a strip of Coastal Heath Swamp about 75m from the proposed BEF. This area is not considered a bushfire threat.

Approximately 6m from proposed BEF in the southeast corner is a small patch of Coastal Swamp Forest, 20m from the administration building on level ground. Classified as a small low fuel area, with a short fire run, this patch is considered similar to Rainforest vegetation.

Figure 10.2. General vegetation types in the vicinity of the proposed BEF (in relation to fire hazard).



10.3. Impact Assessment

Minimum asset protection zone setbacks (APZ) are the separation distances between a development site and fire hazards. They contain reduced or no fuel (e.g. flammable vegetation) for bush fires and provide a buffer zone between a bush fire and an asset.

A BAL is the basis for establishing the requirements for construction (under the *Australian Standard AS 3959-2009 Construction of Buildings in Bushfire Prone Areas*), to improve protection of building elements from bushfire attack. Figure 10.3 shows graphically how BAL is determined relative to potential ember attach and heat flux (in kW/m²).

The APZ and BAL are presented in Table 10.1 for the main BEF (which includes the receival hall, tunnels, technical walkways, biogas storage, biofilter and CHP).

Table 10.2 presents the APZ and BAL for the office building and parking area. BAL is depicted graphically in Figure 10.4 for the main BEF and for the ancillary office building and parking.

The vegetation surrounding the proposed BEF is protected due to its biodiversity values. A small part of the proposed BEF sits within BAL-FZ. Additional clearing is not proposed as the area is considered to have high biodiversity value. An ecological assessment has also been undertaken and is provided in Appendix N.

The biogas storage dome is being constructed from a polyurethane membrane and thus is not consistent with general BAL-29 requirements as set out in the Building Codes of Australia. Therefore additional bushfire suppression systems are recommended to compensate for the shortfall in the system. These are outlined in the mitigation measures.

The position of proposed BEF is the most suitable location considering bushfire threat, the size of the facility, APZ and infrastructure whilst still being able to retain the native vegetation. The largest setbacks are incorporated around the administration building and delivery areas where occupants will be furthest from the fire hazard. The APZ will be managed in perpetuity.

Figure 10.3. How bushfire attack level (BAL) is determined.

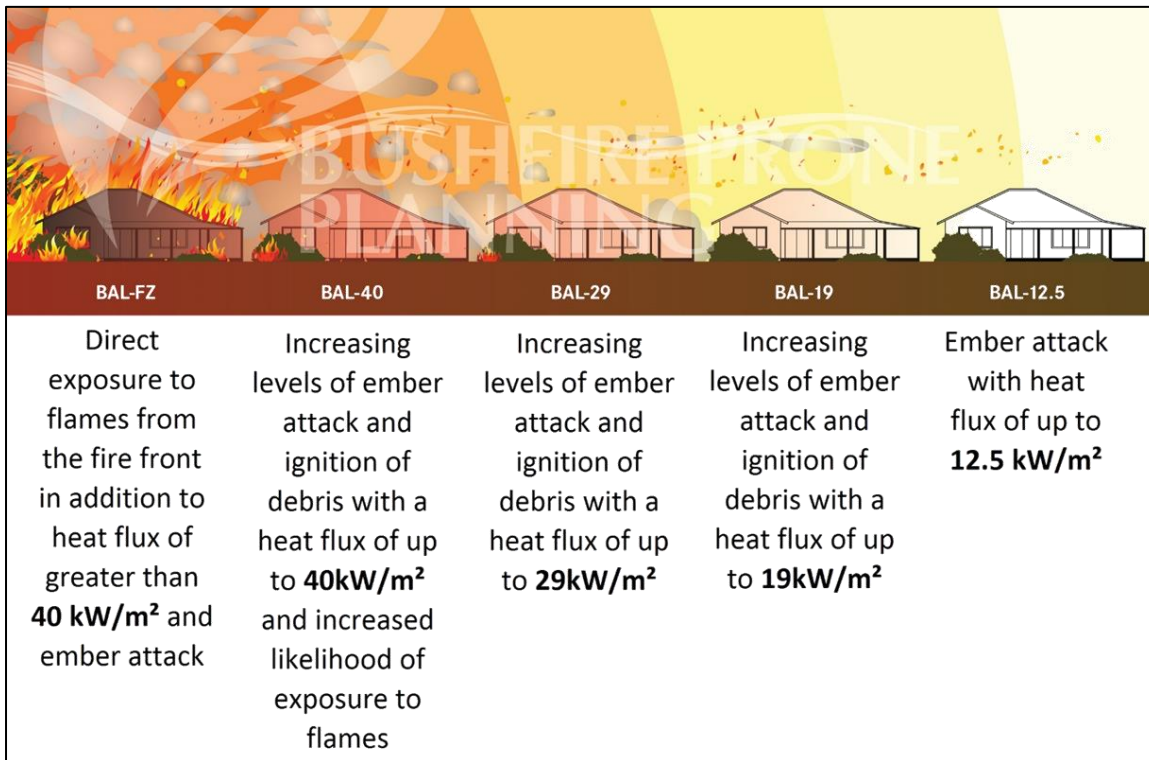


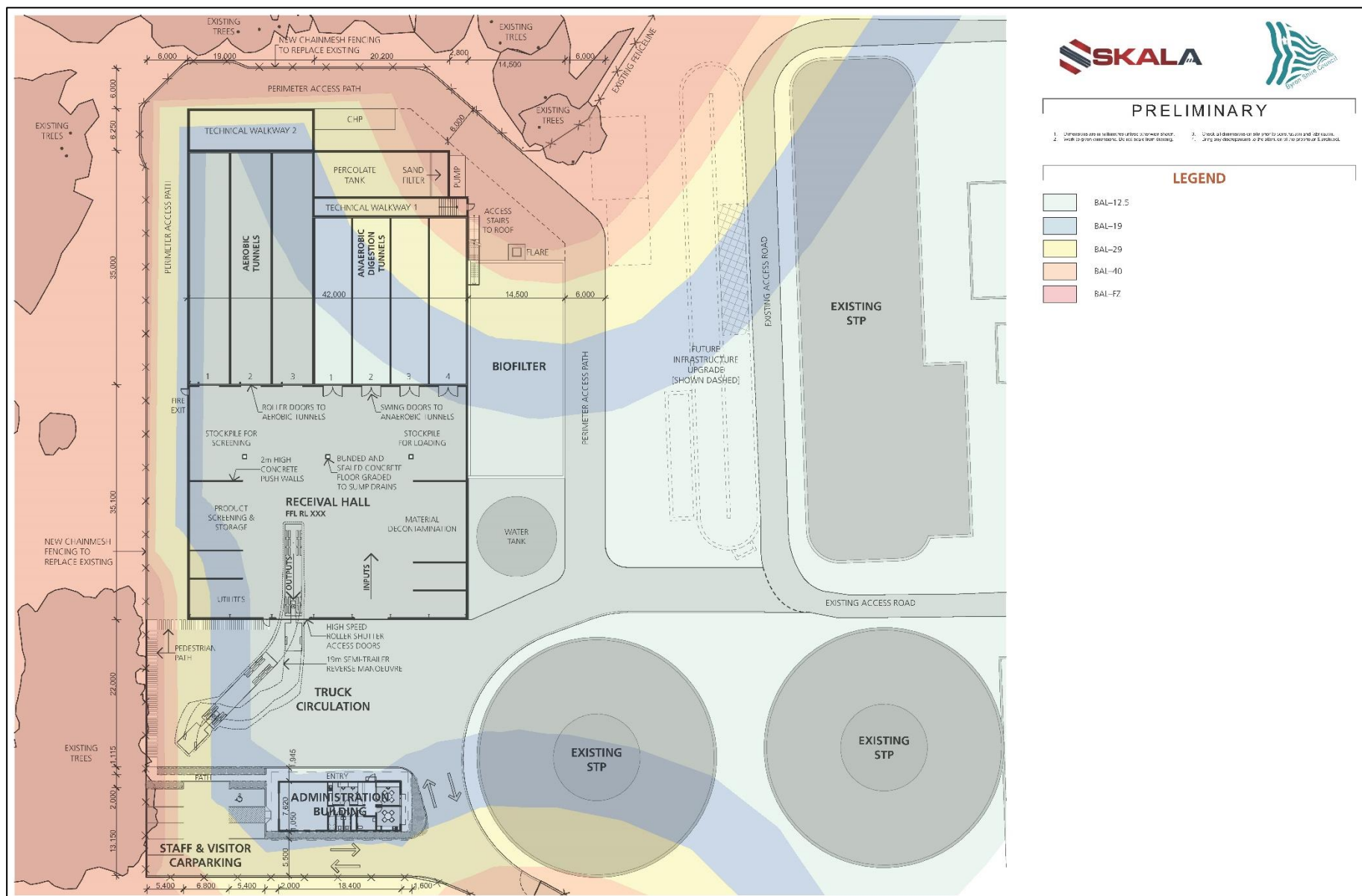
Table 10.1. Minimum recommended APZ and BAL for the main BEF facility.

Direction from the proposed BEF	BAL Analysis		
	APZ (m)	IPA (m)	Highest BAL
Northwest	6	6	BAL-FZ
Northeast	20	20	-
East	20	20	-
South	6	6	BAL-29
Southeast	9	9	BAL-29

Table 10.2. Minimum recommended APZ and BAL for the office building.

Direction from the proposed BEF	BAL Analysis		
	APZ (m)	IPA (m)	Highest BAL
North & Northwest	20	20	-
East	20	20	BAL-19
South	20	20	-
Southwest	20	20	-

Figure 10.4. Bushfire attack level (BAL) analysis.



10.4. Mitigation Measures

With the implementation of the bushfire hazard mitigation and management measures provided in Table 10.3 below, the proposed BEF is expected to comply with all applicable legislation and guidelines with respect to potential bushfire hazard impacts and is therefore suitable for construction and operation.

Table 10.3. Bushfire mitigation measures.

Element	Description
APZ and BAL	- The APZ will be managed in perpetuity as an Inner Protection Area (IPA) as per Table 10.1 - Construction will be in accordance with the BAL given in Table 10.1 - An engineered water sprinkler system is installed on the roof of the biogas storage dome that: - is constructed from non-combustible components; - is designed to create a curtain of water to cover/protect the entire dome; - includes a water supply in addition to the firefighting supply, sufficient to run the sprinkler system for 30 minutes, in a non-combustible tank or underground supply; and - includes an activation system by both automated and manual means from a safe location i.e. from the receival hall or areas of low bushfire threat.
Construction	- Doors are screened from flame zone on the hazard side of the building. - Exits will be located in areas of lower bushfire threat where feasible.
Access	- A minimum 6m wide trafficable defensible space (perimeter, operational access road) traverses the entire facility. - A secondary property access road will be identified to connect to the road system which then traverses to the main entry for emergency use.
Emergency Plan	- An emergency management and evacuation plan will be provided pursuant to the RFS document 'A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan'. - A leave early strategy will be considered as a priority action in the emergency evacuation plan.
Utilities	Water, electricity and gas shall be provided pursuant to the acceptable solutions.
Hazardous materials storage	Storage of additional hazardous materials are stored separate from the main hazard and away from emergency occupant/staff areas (e.g. at the Byron STP)

11. Traffic and Transport

The Traffic and Transport Impact Assessment for the proposed BEF was conducted by Varga Traffic Planning Pty Ltd. The objective of the investigation was to assess the potential impacts from traffic generated for the construction and operation of the proposed BEF on the local road network.

This chapter summarises the findings of the Traffic and Transport Impact Assessment. The full report is contained in Appendix F. This chapter should be read in conjunction with Appendix F.

11.1. Methodology

The Traffic and Transport Impact Assessment involved the following:

- Summary of traffic types and volumes to be generated during construction and operation of the facility;
- Review of background traffic data to establish current traffic volumes along the transport route – Wallum Place, Bayshore Drive and Ewingsdale Road;
- Capacity analysis using SIDRA traffic engineering analysis of the Wallum Place/Bayshore Drive and Bayshore Drive/Ewingsdale Road intersections to identify acceptable Levels of Service and any potential upgrade requirements;
- The capacity analysis modelled the morning and afternoon peak traffic flows for the existing traffic conditions, the proposed conditions resulting from the BEF construction and operation, and the 10-year design horizon;
- Review of road geometry including current and predicted road safety issues and any plans for future road upgrades, infrastructure works or new roads.

Peak period traffic volumes for the road network surrounding the site were obtained from traffic surveys undertaken in December 2019 by Rytenschild Traffic Engineering for the Habitat Retail and Residential Precinct development on Wallum Place²³. Traffic surveys were conducted at the Bayshore Drive/Wallum Place intersection and the Ewingsdale Road/Bayshore Drive intersection. The surveys were located such that traffic generated by the Byron Bay STP was captured. The proposed scenario from the Rytenschild modelling (i.e., the existing traffic volume plus the expected additional volume from the Habitat development) was adopted as the new existing scenario for the BEF development.

The existing traffic movements associated with the operation of the STP on a typical day contribute up to 13 vehicles during peak hour. When sludge is being removed from the STP (every six weeks), vehicle movements can generate up to 28 vehicles during the peak hour periods. However, the arrival and departure of these staff / service vehicles are typically dispersed over a period of several hours, allowing for shift work arrangements and the like, which generates approximately 30 vehicle movements per day.

This assessment is based on the following operational vehicle movements in addition to the existing movements associated with the STP operation:

- 3-5 staff vehicles arriving and departing during the morning and afternoon peak periods;
- 2 truck movements during the morning and afternoon peak periods;
- 10 trucks per day with a maximum of 2 trucks onsite at any one time.

²³ Rytenschild Traffic Engineering (2020). *Traffic Impact Assessment: Habitat Development – Stage 5, 248 Bayshore Drive, Byron Bay*

For this assessment, it has been assumed that all 7 vehicle movements (resulting from BEF operation) are arriving and departing the site during the road network peak periods. However, in practice it is likely that vehicle movements will be dispersed over a longer period to allow for shift work arrangements.

11.2. Existing Environment

11.2.1. Road Network

The roads in the immediate vicinity of the project area to include Wallum Place, Bayshore Drive and Ewingsdale Road. Wallum Place and Bayshore Drive are both local, unclassified roads that primarily provide vehicle and pedestrian access to residential and commercial properties in the area. Kerbside parking is generally permitted along both sides of the road, with signposted restrictions along Bayshore Drive. Ewingsdale Road is classified as a Regional Road, providing a key east-west link between the Pacific Motorway and the Byron Bay town centre. Typically, the road carries one lane of traffic in each direction, with additional lanes provided at key locations. The following key traffic controls exist on Wallum Place and Bayshore Drive:

- 60 km/h speed limit on Ewingsdale Road
- 50 km/h speed limit on Bayshore Drive
- 40 km/h speed limit on Wallum Place
- Roundabout at the Ewingsdale Road and Bayshore Drive intersection
- Roundabout on Bayshore Drive at the intersection with Grevillea Street
- Pedestrian refuge islands on Bayshore Drive
- Give way sign in Wallum Place at the intersection with Bayshore Drive
- No kerb and gutter treatment on the north-western and south-western corners of the Wallum Place and Bayshore Drive intersection.

The Rytenkild traffic study indicated the morning network peak occurred between 08:30 and 09:30 and the afternoon network peak occurred between 15:45 and 16:45. Table 11.1 summarises the traffic flows during peak times.

Table 11.1. Traffic counts for two-way traffic flow (vehicles per hour) during peak traffic times on roads used to access the BBSTP.

Location	Two Way Traffic Flow (vehicles per hour)	
	Morning	Afternoon
Ewingsdale Road west of Bayshore Drive	1470	680
Ewingsdale Road east of Bayshore Drive	870	1120
Bayshore Drive in the vicinity of Wallum Place	100-200	100-200
Wallum Place	95	120

11.2.2. On-site Conditions

The main site access is located at the far western end of Wallum Place leading to a sealed, internal haul road. A gravel access road is located between the STP and the treatment wetlands to the east. This road provides access to the

wetlands and is located outside the perimeter fencing for the STP. Off-street parking is provided for 12 cars in the vicinity of the office, with additional informal parking across various locations throughout the site. The STP is serviced by commercial vehicles ranging from medium and large rigid trucks up to 19 m articulated vehicles (AV) (semi-trailers).

Operational impacts of the STP on the road network are typically very minor and include the following.

- 4 x STP operators based on-site at the Byron STP;
- 4 x electricians employed the Byron STP, travelling to/from jobs around the Shire;
- 5 x mechanical maintenance personnel employed at Byron STP.

The maximum traffic generation/worst-case scenario is estimated to include 9 employee/service vehicle trips per day; 1-2 sludge deliveries per week; and 1 chemical delivery per week. In addition, biosolids are removed every six weeks resulting in 45 dump-truck movements in/out over a 2-3 day period.

11.2.3. Local Transport

Two bus services, operated by Blanch's Bus Company, operate within 800 m of the site. The closest bi-directional bus stop is located on Julian Rocks Drive, south-east of the site.

11.3. Impact Assessment

11.3.1. Proposed Traffic Volumes

Loading/servicing for the proposed development is expected to be undertaken by a variety of commercial vehicles including small, medium and large rigid trucks up to and including 19m long articulated semi-trailers. The proposed development is expected to include 3 to 5 staff accessing the site per day and 10 deliveries per day, with a maximum of 2 trucks onsite at any one time. These vehicle movements are in addition to those currently required for STP operation. With the assumption that 7 vehicle movements (5 staff and 2 truck movements) will occur during the road network peak periods, the assessment determined that the proposal will not have any unacceptable impacts on the road network.

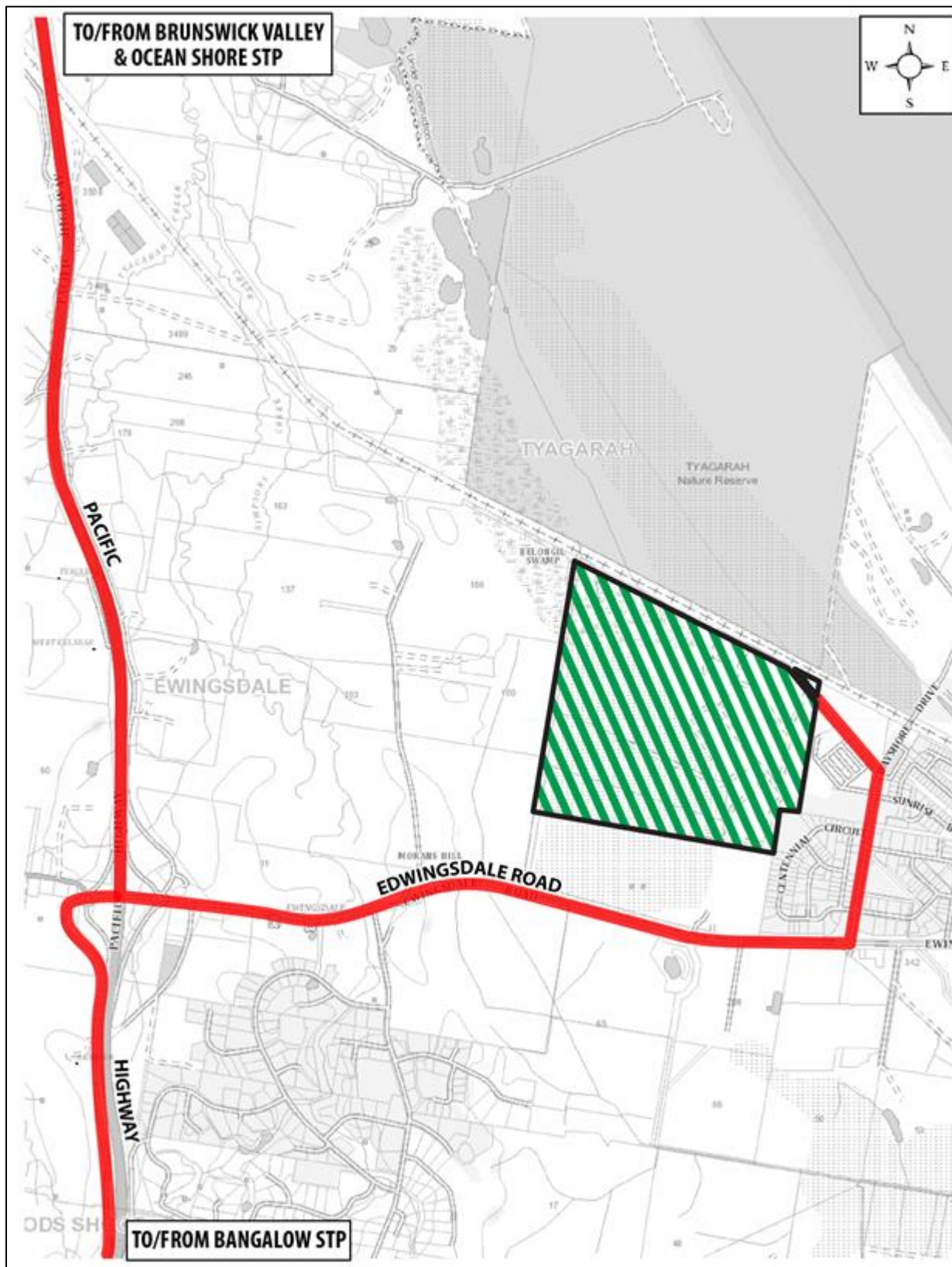
The proposal will significantly reduce the truck movements associated with the removal of biosolids (currently requiring approximately 45 truck movements over a 2-3 day period, occurring at six-week intervals). The biosolids will be processed onsite through the composting facility, being used for energy production.

11.3.2. Haulage Routes

All incoming materials for processing at the proposed BEF will come from other Byron Shire Sewage Treatment Plants and through the Byron Shire Council kerbside and commercial organics collection programs. As such, vehicle haulage routes to the Byron BEF will remain unchanged from those presently in use.

The access to the site will be provided via Wallum Place directly off Bayshore Drive, Ewingsdale Road and the Pacific Highway (northbound and southbound), as illustrated on Figure 2.1. No other routes are available as they are either blocked by private land or consist of land mapped High Biodiversity Value.

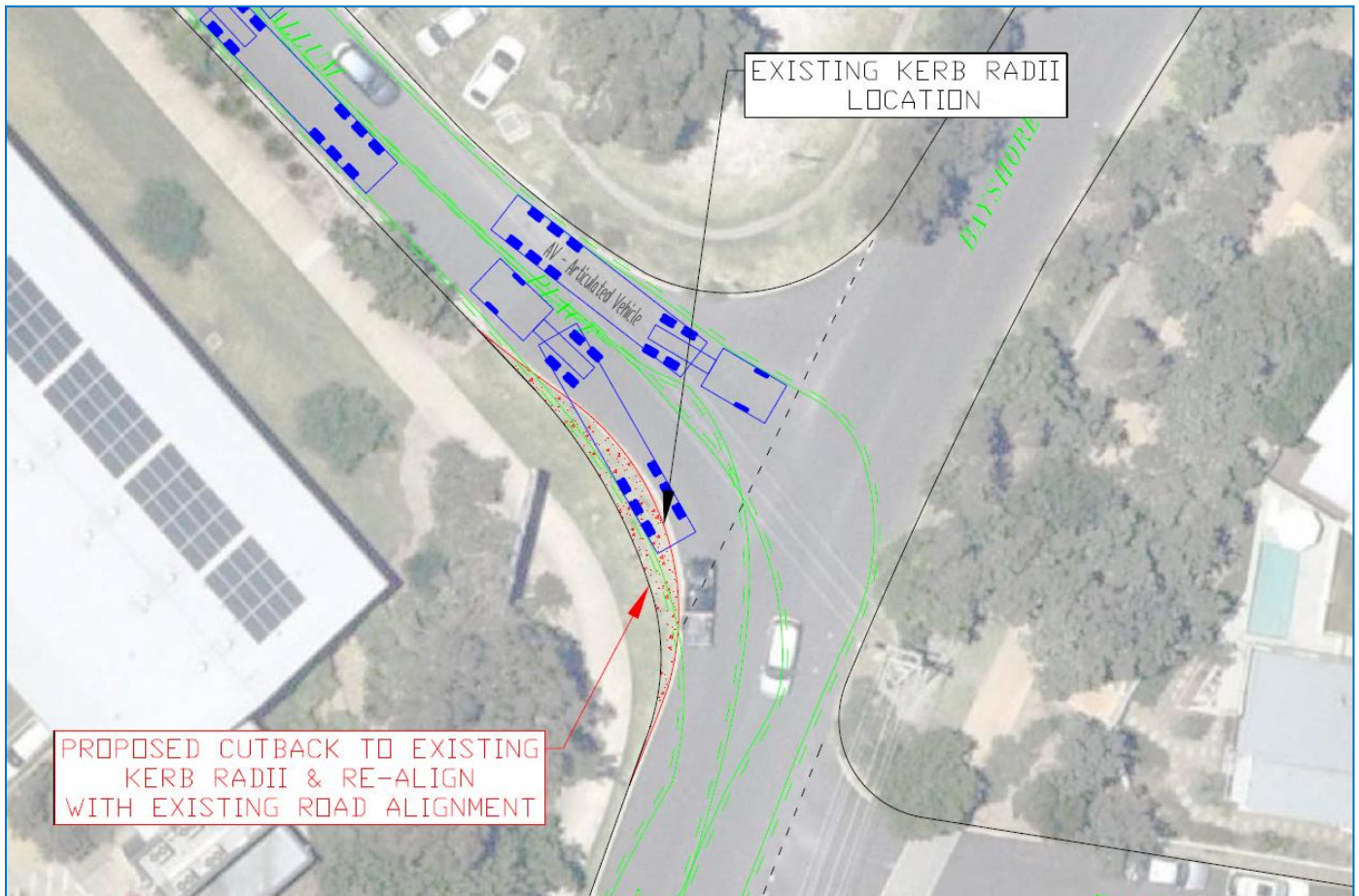
Figure 11.1. Proposed haulage routes to and from the BEF.



Swept path analysis has identified the need for minor pavement widening and upgrade works at the intersection of Wallum Place and Bayshore Drive to accommodate the larger 19 m articulated vehicles that will access the BEF (Figure 11.2). Minor widening of the existing paved road on the south-western corner of the intersection is required.

This widening will not affect the existing public footpath. There are no existing kerb/gutter or stormwater inlet pits in the vicinity of the works, therefore no underground infrastructure works will be required. Minor disruptions to traffic flow during pavement widening works are expected.

Figure 11.2. Swept turning paths of 19 m semi-trailers indicate that pavement widening is required on the south-west corner of the Bayshore Drive and Wallum Place intersection.



11.3.3. Road Network Capacity

The SIDRA analysis of the Ewingsdale Road/Bayshore Drive intersection indicated that the roundabout currently operates at Level of Service “A” during the morning peak and Level of Service “B” during the afternoon peak. The additional traffic flows from the BEF development will not change the current Levels of Service and will result in an increase in total average vehicle delays of 0.1 to 0.4 seconds per vehicle.

The SIDRA analysis of the Bayshore Drive/Wallum Place intersection indicated that it currently operates at Level of Service “A” during the morning and afternoon peak times. The additional traffic flows from the BEF development will not change the current Level of Service and will not result in any increase in total average vehicle delays.

The 10-year design horizons for the Ewingsdale Road and Bayshore Drive intersection indicated that the intersection would operate at Level of Service E during the afternoon peak. This result is in keeping with the results of a traffic review undertaken by Cardno in 2017²⁴. The review found that road network upgrades will be required along

²⁴ Cardno (QLD) Pty Ltd (2017). *Review of MR545 Traffic Studies: Desktop Review*. Prepared for Byron Shire Council.

Ewingsdale Road to accommodate future growth of the region. The 10-year design horizon for the Wallum Place and Bayshore Drive intersection indicated the intersection would continue to operate at current Levels of Service.

The analysis indicates that the projected increase in traffic activity as a consequence of the development proposal will not have any unacceptable traffic implications in terms of road network capacity. However, the study notes that the upgrades proposed for Ewingsdale Road in the Cardno report should be implemented prior to the 2028 design horizon to ensure the road network continues to operate at an acceptable Level of Service.

11.3.4. Parking Assessment

As per the Byron Shire Council's Development Control Plan 2014, the proposed development is required to accommodate five (5) off-street parking spaces. The development has allowed for seven (7) off-street parking spaces, including one disabled space. All parking spaces have been designed in accordance with the relevant Australian Standard (AS2890.1).

Truck parking on site is available through the circulation aisles which have been specifically designed to enable passing of 19 m articulated vehicles. The volume of parking within the circulation aisles is in excess of the parking requirements of the available trucks servicing the site. In addition, the Receiving Hall of the facility has sufficient space in the central area of the warehouse to accommodate two 19 m articulated vehicles – the maximum number on site at any one time.

11.3.5. Pedestrian/Cycling Infrastructure

Bayshore Drive is a local, unclassified road which is primarily used to provide vehicular and pedestrian access to frontage properties. Kerbside parking is generally permitted along both sides of the road, subject to signposted restrictions.

A new Bike Plan has been developed by BSC in 2019 that provides a contemporary approach to bicycle network planning, design and promotion that reflects the current situation and also aligns with the future direction of Byron Shire.

The proposed Bioenergy facility (BEF) will result in a net increase of approximately 10 trucks per day, with a maximum of 2 trucks on-site at any given time. When compared to the traffic surveys undertaken at the Bayshore Drive/Wallum Place intersection and at the Ewingsdale Road/Bayshore Drive intersection, this additional movements represents a net increase of less than 1% of the traffic movements along Bayshore Drive and Ewingsdale Road.

As such, that level of traffic is statistically insignificant to warrant for any additional upgrades to the planned pedestrian/cycle infrastructure outlined within the Byron Shire Bike Plan.

11.3.6. Construction Impacts

Construction is expected to be undertaken over a period of 10 months. An average of 6-8 truck movements per day (including all deliveries of equipment and materials) are expected during construction of the proposed facility, with a peak period of up to 20 trucks per day during concrete pour of pavements. These movements will primarily be related to delivery of materials and movements on-site for a short-term period. Some light vehicles for construction workers travelling to and from the Site are also expected. Overall, the traffic volumes associated with construction of the BEF are expected to be lower than the operational traffic volumes. Therefore, construction traffic is unlikely to impact the surrounding road network.

11.4. Mitigation Measures

11.4.1. Construction Traffic Management Plan

A Construction Traffic Management Plan is to be developed prior to any site preparation or construction works. The management plan will include, as a minimum:

- Construction noise is only permitted:
 - Monday to Friday 07:00 to 18:00
 - Saturday 08:00 to 13:00
 - No construction work on Sundays or public holidays
- All demolition and excavated spoil material are to be loaded wholly within the site.
- All vehicles to enter and exit the site in the forward direction
- All heavy vehicles involved in construction to approach and depart the site via Pacific Highway, Ewingsdale Road, Bayshore Drive and Wallum Place.
- Light traffic roads and roads subject to load or height limits to be avoided.
- Heavy vehicle movements to be minimised during school peak periods.
- Access to all neighbouring properties is to be maintained at all times. The management plan is to include a communication plan to update nearby residents and businesses on construction vehicle movements and other potential traffic impacts. All nearby residents and businesses are to be provided with a phone number to contact the site manager.
- All practicable measures must be taken, including the use of “truck scrubbers”, to ensure that vehicles leaving the site do not deposit mud or debris on the road. Any mud or debris deposited on the road must be cleaned up immediately in a manner that does not pollute waters (i.e. by sweeping or vacuuming).
- A Traffic Control Plan may be required during construction. The plan is to be developed in accordance with the RMS publication *Traffic Control at Works Sites* (2018), version 5.0 and the Standards Australia publication AS1742.3: *Traffic Control Devices for Work Sites on Road*.
- Onsite parking for employee, tradesperson and construction vehicles to be clearly defined.

With the implementation of the traffic mitigation and management measures provided above, the proposed BEF is expected to comply with all applicable legislation and guidelines with respect to potential traffic impacts and is therefore suitable for construction and operation.

12. Biodiversity

Land Eco Consulting (Land Eco) prepared the Biodiversity Development Assessment Report (BDAR) pursuant to section 7.7 of the *NSW Biodiversity Conservation Act 2016* for the Byron Bay Bioenergy Facility. The BDAR assesses the potential ecological impacts of the proposed development and provides recommendations to avoid, minimise, mitigate and offset impacts. The proposed development will require the clearing of approximately 0.52 ha of historically cleared vegetation. No remnant vegetation will be impacted for the proposed development to proceed.

Targeted surveys conducted between January and March 2021 confirmed the presence of three threatened fauna species within the subject land. *Crinia tinnula* (Wallum Froglet) (BC Act: Vulnerable) and *Litoria longiburensis* (Wallum Sedge-frog/Olongburra frog) (BC Act: Vulnerable; EPBC Act: Vulnerable) were found in the remnant wetland east and west of the subject land. Whilst *Thersites mitchellae* (Mitchell's Rainforest Snail) (BC Act: Endangered; EPBC Act: Critically Endangered) was found in the south-western corner of the proposed development footprint. No threatened flora species were identified in or adjacent to the subject land.

This chapter summarises the findings of the BDAR. The full BDAR is contained in Appendix N. This chapter should be read in conjunction with Appendix N.

12.1. Methodology

The BDAR was prepared in accordance with the Biodiversity Assessment Method (DPIE 2020) 'Appendix C: Streamlined assessment module – Small area' as the proposal does not exceed the native vegetation clearing area threshold under the *Biodiversity Conservation Act 2016* and therefore does not trigger the Biodiversity Offset Scheme (BOS). The proposed development requires no clearing of native vegetation from within an area mapped on the BV Map. The proposed clearing of native vegetation from the BV Map has not triggered the BOS and is not the reason why this BDAR was produced. The decision to prepare a BDAR was self-elected by the applicant, however the presence of the Mitchell's Rainforest Snail within areas of vegetation to be cleared also triggers the BOS.

The Biodiversity Assessment Method (DPIE 2020) 'Appendix C: Streamlined assessment module – Small area' aims to:

- Describe the biodiversity values present within the Subject Land and surrounding area, including the extent of native vegetation, vegetation integrity and the presence of threatened ecological communities (TECs);
- Determine the habitat suitability within the Subject Land for candidate threatened species;
- Prepare an impact assessment regarding potential impacts of the proposed development on biodiversity values, including potential prescribed impacts and serious and irreversible impacts (SAIIs) within the Subject Land;
- Identify and discuss efforts to avoid and minimise impacts on biodiversity values; and
- Calculate the biodiversity credits (i.e., ecosystem credits and species credits) that measure potential impacts of the development on biodiversity values. This calculation will inform the decision maker of the number and class of offset credits required to be purchased and retired as a result of the proposed development.

Under the Biodiversity Assessment Method (BAM) Appendix C assessment of species credit species is only required for species credit species that are SAI entities, or species credit species that were incidentally recorded within the Subject Land.

12.1.1. Characterisation of Landscape and Floral Communities

The characterisation of the landscape and floral communities within and surrounding the Subject Land was conducted in accordance with the requirements of the BAM Appendix C. The methods facilitate the identification of vegetation types and communities, as well as other landscape features (e.g., soil classifications and hydrology) recorded within the Subject Land in order to assess the suitability of habitat for threatened species.

Targeted field surveys using the BAM Vegetation Integrity Survey (VIS) method were undertaken to confirm the species composition of floral communities on the site. The VIS method also includes an assessment of the condition of the vegetation communities which is used to determine the offset requirements for impacts to the vegetation. During the targeted vegetation surveys habitat features, including the presence of hollow-bearing trees, were identified.

Flora surveys were targeted at potentially occurring threatened 'species credit' flora species that are listed 'Serious and Irreversible Impact' (SII). Surveys were conducted in January, February and March during the appropriate survey period for each species.

12.1.2. Fauna Survey Methods

Ecologist targeted surveys were carried out on 27 January 2021, 16 - 18 February 2021, and 23 - 27 March 2021 in accordance with the following guidelines:

- a) *Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species* (OEH 2004)
- b) *Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians* (DECC 2009)
- c) *NSW Guide to Surveying Threatened Plants* (OEH 2016)
- d) "Species credit" threatened bats and their habitats
- e) *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft* (DEC 2004)
- f) BioNet Threatened Species

All ecosystem credit species that are predicted to occur in the Subject Land in the BAM Calculator, or are known to occur within 10km of the Subject Land (as per BioNet Wildlife Atlas (DPIE 2021c) are assumed present. However, targeted surveys for all ecosystem credit species were conducted to confirm any utilisation of the habitat present within or immediately surrounding the Subject Land. Species surveyed included those specifically identified in point 4 of the Biodiversity and Conservation Division's SEARs.

Full details of the survey methods for each species are provided in sections 4.2, 4.3 and 4.4 of the BDAR (Appendix X). As this BDAR was produced in accordance with the BAM 2020 Appendix L, targeted surveys were only undertaken for species credit species that have been identified in BioNet as 'Serious and Irreversible Impact' (SII) entities. All species credit species that had been previously recorded within the Subject Land or were recorded opportunistically during the field surveys component of this study were included in the list of species to assess and offset.

The weather conditions were considered suitable for the survey period. The nocturnal fauna surveys were undertaken during intermittently moist conditions to target frogs, snakes, owls, and the spring surveys were conducted within one to two weeks of rain to target orchids. Weather was considered suitable for detecting the target species.

12.2. Existing Environment

12.2.1. Landscape Features

Landscape features within the Subject Land and a surrounding ‘assessment circle’, which extends 1500 m around the land, were described to determine habitat types and potential species present (Table 12.1).

Table 12.1. Landscape features identified within the Subject Land and surrounding 1500m buffer.

Landscape Feature	Identification of Landscape Feature on Site
Native vegetation cover in 1500m buffer area	A 1500m ‘assessment circle’ surrounding the outside edge of the boundary of the Subject Land was prepared to determine the extent of native vegetation within the surrounding locality of the Subject Land. Native vegetation was considered to cover approximately 565 ha of the total 813 ha area within the 1500m buffer, this corresponds with the >70% vegetation cover class.
Rivers and Streams (classified according to stream order)	There are no mapped watercourses or riparian corridors in or immediately around the Subject Land (Figure 6). The nearest mapped watercourses are located over 300 metres from the Subject Land. These unnamed watercourses flow north into Simpson’s Creek which flows to the Brunswick River.
Wetlands (within, adjacent to and downstream of site)	The Subject Land is located within an area mapped ‘proximity area for coastal wetland’ (Figure 6) as defined under the State Environmental Planning Policy (Coastal Management) 2018 which is one of the reasons for the designated development status of the proposal. The BEF has been designed in a manner that avoids impacts to the adjacent coastal wetlands.
Connectivity features	The identified area of habitat connectivity between the Subject Land and native vegetation within the 1500m buffer zone has the potential to provide habitat for a number of threatened species, endangered populations and migratory species. There is the potential that ‘flyways’ used by a suite of both terrestrial and migratory avian species encompass the Subject Land as well as a land within the 1500m buffer zone.
Areas of geological significance and soil hazard features	No areas of geological significance (karsts, caves, crevices or cliffs) were identified within the Subject Land. This was determined as a result of a comprehensive site-based assessment.
Areas of Outstanding Biodiversity Value (AOBV)	The Subject Land contains no AOBV. There is no AOBV situated in the area surrounding the Subject Land

12.2.2. Native Vegetation

The site of the proposed BEF occupies a small portion of the broader Lot and is limited to the area historically cleared for the construction, operation and maintenance of the Byron Bay Sewage Treatment Plant. The majority of the site for the proposed BEF consists of non-native vegetation dominated by grasses and forbs. The severity of weed infestation varies across the site from moderate to severe. None of the native vegetation in the subject land is considered to be in good condition. The remainder of the Lot is predominantly vegetated with remnant vegetation associated with dune fields. Natural Melaleuca and Wallum Swamp wetlands occur in proximity to the proposed Site. The majority of the vegetation within the Lot comprises the ‘West Byron BioBanking Agreement Site’.

There is no remnant native vegetation in the area affected by the proposed BEF. The most significant areas of native vegetation within the Lot are small stands of mature Melaleuca Swamp which occur outside of the proposed development, to the south-western and south-eastern corners, respectively. These stands are dominated by fragmented remnant native vegetation that is floristically diverse, and structurally complex. These stands act as habitat connections to the BioBanking site and the Tyagarah Nature Reserve.

The patch size for the site was identified to be 565 hectares. The large patch size is because the native woodland vegetation in the Subject Land connects with the 'West Byron BioBank Site' and the Tyagarah Nature Reserve. The vegetation within the Subject Land must be assessed under the >100ha patch size category. Within the 1500 m assessment circle around the Subject Land, native vegetation was considered to cover approximately 565 ha of the total 813 ha area, which corresponds with the >70% vegetation cover class, the highest native vegetation cover class in the BAM.

A single Plant Community Type (PCT) was identified within the Subject Land – 1064 Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion. This PCT consisted of one distinct Condition Class – Derived Native Grassland. Within the Subject Land this PCT occurred in an extremely species poor, derived state dominated by two native grasses. Tree, shrubs, ferns and vines were absent from the Subject Land. Outside of the Subject Land the patches of PCT 1064 were structurally complex and species diverse. Due to the poor condition of the PCT within the Subject Land, the PCT does not meet the criteria to be classified as a Threatened Ecological Community.

12.2.3. Threatened Species

The field surveys identified an absence of many habitat features necessary to support threatened fauna species within the Subject Land (Table 12.2).

Table 12.2. Landscape features identified within the Subject Land and surrounding 1500m buffer.

Habitat component	Site values
Hollow-bearing trees, including dead stags	Absent. There are no hollow-bearing trees located in or near the proposed development.
Large trees with basal cavities	Absent.
Rock outcrops and bush rock	Absent.
Caves, crevices and overhangs	Absent.
Natural burrows	Absent.
Coarse woody debris (logs)	Absent.
Wetlands, soaks and streams	Artificial wetlands constructed as settling ponds for the STP surround the Subject Land. Areas of pooled water occur in the grassy areas after rainfall. Natural wetlands exist approximately 50 metres west and south of the Subject Land.
Open water bodies	Open waterbodies constructed as settling ponds for the STP surround the Subject Land.
Nests and roosts	No large stick nests suitable for threatened raptorial birds of prey were observed on or near the Subject Land during the assessment. No dense canopy of a type suitable for roosts were found.
Sap and gum sources (feed trees for gliders)	Absent.
Distinctive scats or latrine sites	Absent
She-oak fruit (Glossy Black Cockatoo feed)	Absent.
Culverts, bridges, mine shafts, or abandoned structures (microbat subterranean roosts)	Absent.

Habitat component	Site values
Decorticating bark or palm fronds suitable for microbat roosts	Absent.
Flying-fox camps	Absent
Nectar-bearing trees (e.g. winter-flowering)	Absent. There are no nectar-bearing trees or shrubs located in the Subject Land.
Lerp-bearing trees	Absent. There are no lerp-bearing trees or shrubs located in the Subject Land.
Nectar-bearing shrubs	Absent. There are no nectar-bearing trees or shrubs located in the Subject Land.
Mistletoes	Absent.
Koala browse trees	Absent. There are no native trees located in the Subject Land.
Seed-bearing trees and shrubs	Absent.
Soft-fruit-bearing trees or shrubs	The introduced Tree Tobacco is the only fruit-bearing tree that occurs in the Subject Land. This is a weed and must be removed.
Dense shrubbery and leaf litter	Absent.
Dense grassland	The <i>Setaria sphacelata</i> dominated grassland was dense and provided habitat for fauna including a diverse suite of birds, <i>Litoria fallax</i> (Dwarf Sedge Frog), <i>Wallabia bicolor</i> (Swamp Wallaby) and Mitchell's Rainforest Snail.
Estuarine, beach, mudflats, and rocky foreshores	Absent.

12.2.3.1. Ecosystem Credit Species and Species Credit Threatened Fauna

The full list of ecosystem credit species and species credit threatened fauna predicted to occur in the Subject Land is provided in section 4.2 and 4.3 of the BDAR. The following species credit species are known to exist in the Subject Property, and three of these species were observed in or immediately adjacent the Subject Land during the targeted survey component of this study, they are:

- *Crinia tinnula* (Wallum Froglet) (BC Act: Vulnerable);
- *Litoria olongburensis* (Wallum Sedge-frog) (BC Act: Vulnerable; EPBC Act: Vulnerable);
- *Thersites mitchellae* (Mitchell's Rainforest Snail) (BC Act: Endangered/SAII; EPBC Act: Critically Endangered);
- *Myotis macropus* (Southern Myotis) (BC Act: Vulnerable); and
- *Planigale maculata* (Common Planigale) (BC Act: Vulnerable).

12.3. Impact Assessment

The proposed development will require the clearing of approximately 0.52 ha of historically cleared vegetation. No remnant vegetation will be impacted for the proposed development to proceed.

12.3.1. Serious and Irreversible Impacts

No threatened ecological communities occur within the Subject Land. There will be no loss of any extent of threatened ecological community as a result of the proposed development.

Mitchells Rainforest Snail is the only SAIL species that occurs within the Subject Land. A determination of whether or not the proposed impacts are serious and irreversible has been undertaken in accordance with section 3.2 of the

‘Guidance to assist a decision-maker to determine a serious and irreversible impact’ (OEH 2017b). The final determination of whether an impact is serious and irreversible lies with the consent authority. For the SAIL Impact Assessment for the Mitchell’s Rainforest Snail refer to Table 17, section 5.1.2 of the BDAR.

12.3.2. Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the Subject Land. Impacts may also result from changes to land-use patterns.

The proposed BEF is to be constructed within an area of the existing STP that is managed through routine slashing and mowing as part of STP maintenance. The proposed development will remove an area of dense, weed-dominated grassland, and this may displace threatened snail and frogs, along with other non-threatened vertebrates however, extensive suitable habitat will continue to exist surrounding the entire development. The impacts from the loss of this marginal habitat are not expected to significantly exceed those impacts that take place on a regular basis through routine slashing and mowing of the Subject Land which is a requirement of STP maintenance.

It is possible that the increased vehicular and foot traffic could cause disturbance to nesting and roosting waterbirds, including the Comb-crested Jacana, on the wetlands adjacent to the Subject Land. These perturbances will be limited to the construction phase. It is not expected that such impacts will increase significantly above current impacts associated with maintenance and operation of the existing, functional STP.

Overall, the proposed BEF is unlikely to have consequences for the bioregional persistence of the threatened species, threatened ecological communities and their habitats. Impacts (if any) will be minor, localised and unlikely to increase beyond the current base-level of impacts (such as routine mowing) in the Subject Land provided appropriate mitigation measures, as described in section 11.4, are implemented.

12.3.3. Prescribed and Uncertain Impacts

Additional impacts on biodiversity may result from activities not associated with direct vegetation clearing or development. The prescribed additional biodiversity impacts are described in full in section 5.3 of the BDAR. Table 12.3 provides a summary of the anticipated prescribed and uncertain impacts resulting from the development.

Table 12.3. Summary of Prescribed and Uncertain Impacts associated with the construction and operation of the Bioenergy Facility.

Prescribed and Uncertain Impacts	Assessment Requirements	Details
Habitat of threatened species or ecological communities associated with non-native vegetation	If human-made structures (e.g. bridges, culverts, abandoned buildings) and non-native vegetation (e.g. camphor laurel trees) provide habitat for threatened species, the assessor must: a) provide a description of the type of human-made structure or non-native vegetation habitat	The proposed development will require the removal of an area of non-native grassland, dominated by the tall tussock-forming <i>Setaria sphacelata</i>. This grassland provides shelter and prey resources for some threatened fauna species: • Pale-vented Bush-hen • Dusky Woodswallow • Australasian Bittern • Spotted Harrier • Spotted-tailed Quoll • Black-necked Stork • Brolga • Magpie Goose • White-bellied Sea-Eagle (Foraging) • Little Eagle (Foraging) • Black Bittern • Square-tailed Kite (Foraging) • Barking Owl (Foraging) • Powerful Owl (Foraging) • Eastern Grass Owl • Masked Owl (Foraging) • Sooty Owl (Foraging) • Eastern Chestnut Mouse • Wallum Froglet • Wallum Sedge Frog • Mitchells Rainforest Snail
	b) describe how each threatened species could, or does, use the human-made structure or non-native vegetation as habitat	It is considered likely that the threatened birds, mammals and amphibians listed above would all hunt for insect and vertebrate prey in these grasslands on occasion. The Mitchells Rainforest Snail is likely to shelter, forage and breed within these grasslands, and the Pale-vented Bush-hen and Eastern Chestnut Mouse may roost and nest in the grasslands. It is considered unlikely that any of the other species would breed or nest within these grasslands as the habitat is considered unsuitable for such behaviours among these nomadic fauna species. Targeted surveys revealed none of the above species within these grasslands, the only species that has been recorded utilising the grasslands is the Mitchells Rainforest Snail, Wallum Sedge Frog, Wallum Froglet and Pale-vented Bush-hen (historical records).
Habitat connectivity		The habitat connectivity associated with the Byron Bay Wetlands is significant on a local, state and international level. Local populations of fauna move across these corridors between larger Nature Reserve and National Park estate to the north and south. International populations of migratory birds (e.g. Curlew Sandpiper) utilise the wetlands as 'stepping stones' on their migration routes. The proposed development will not impact upon this habitat connectivity. The development has been specifically designed to fit within an area that

Prescribed and Uncertain Impacts	Assessment Requirements	Details
		has been historically cleared within an existing STP compound surrounded by existing STP infrastructure.
	Where corridors or other areas of connectivity link habitat for threatened entities, the assessor must: (a) prepare a list of threatened entities that are likely to use or are a part of the connectivity or corridor: (b) describe the importance of the connectivity to threatened entities, particularly for maintaining movement that is crucial to the species' life cycle	All of the ecosystem credit species identified and species credit species identified as having potential to occur in the Subject Land may utilise the habitat connectivity corridors that the Byron Bay Wetlands in the STP compound form part of.
Water bodies, water quality and hydrological processes	Where water bodies or any hydrological processes that sustain threatened entities occur on the subject land, the assessor must: (a) Prepare a list of threatened entities that may use or depend on water bodies or hydrological processes for all or part of their life cycle	Coastal freshwater wetlands (both natural and artificial) occur within the Subject Property to the south of the Subject Land. All of the ecosystem credit species and species credit species identified as having potential to occur in the Subject Land may utilise local waterbodies and hydrological processes for all or part of their life cycle. Swamp Sclerophyll Forest EEC requires natural hydrological regimes (flood events and/or inundation) in order to sustain their existence. The proposed development is not likely to alter the hydrological regimes of the adjacent Swamp Sclerophyll Forest EEC such that a significant effect/impact would ensue.

Prescribed and Uncertain Impacts	Assessment Requirements	Details
	(b) Prepare a list of threatened entities that will be, or are likely to be impacted by changes to existing water bodies or hydrological processes or the construction of a new water body	The proposed development is not likely to significantly change or alter hydrological processes such that a significant effect/impact would ensue upon a threatened species or TEC.
	(c) Describe the habitat provided for each threatened entity by the water body or hydrological process, including consideration of water quality, volume, flow paths and seasonal patterns.	The hydrological regimes of importance to the Byron Bay Wetlands and the threatened species and TEC that occur within, are artificial outflows from the STP processing, natural surface water runoff, and groundwater seepage.
Vehicle strikes on threatened species of animals or on animals that are part of a TEC	(a) Identify potential impact locations on the Site Map	Vehicle strike may occur anywhere in the Subject Land where vehicles move.
	(b) Prepare a list of threatened fauna or animals that are part of a TEC at risk of vehicle strike.	• Pale-vented Bush-hen • Dusky Wood swallow • Australasian Bittern • Spotted Harrier • Spotted-tailed Quoll • Black-necked Stork • Brolga • White-bellied Sea-Eagle (Foraging) • Little Eagle (Foraging) • Black Bittern • Square-tailed Kite (Foraging) • Barking Owl (Foraging) • Powerful Owl (Foraging) • Eastern Grass Owl • Masked Owl (Foraging) • Sooty Owl (Foraging) • Eastern Chestnut Mouse • Wallum Froglet • Wallum Sedge Frog • Mitchells Rainforest Snail

12.4. Mitigation Measures

The original development design required the clearing of small patches of native vegetation within the Subject Land. However, in order to meet the principles of 'Avoid and Minimise', the design was altered to avoid clearing this vegetation. The retention and protection of all trees surrounding the proposed BEF site has been confirmed by an experienced, qualified Consulting Arborist (Northern Tree Care, 2021, Appendix O). As a result, the development will only require the clearing of 0.52 hectares of non-native vegetation from the perimeter of the development footprint.

It is unlikely there will be any appreciable indirect impacts on biodiversity arising from the proposal that have not been addressed in Table 12.4 below, especially when considering the nature and scale of the proposed development; the character of the study area; the historic disturbance and fragmentation, and maintenance of vegetation within the Subject Property in conjunction with the proposed impact mitigation measures. Only the direct impacts associated with vegetation clearing and construction of the proposed development will require biodiversity offsets according to the BAM.

Table 12.4. Measures to be implemented before, during and after construction to avoid and minimise the impacts of the project.

Impact / Action		Outcome	Timing
Snail Management Plan		A site-specific management plan will be produced which guides the implementation of impact mitigation measures designed to protect the Mitchells Rainforest Snail.	Pre-construction During construction Operational phase
Project and Design	Location Project	The development is located entirely within an area of land that has been historically cleared of native vegetation. This area of land occurs within the compound of an existing, functional STP. The development has been designed specifically to avoid direct impacts to remnant native vegetation and habitat connectivity. An experienced Consulting Arborist has assessed all the trees around the proposed development and confirmed that all trees can be protected and retained (Northern Tree Care 2021). There will be sufficient space for ancillary structures (e.g., site compounds and laydown areas) during construction to avoid impacts to remnant native vegetation and habitat connectivity. Important fauna habitats such as remnant vegetation and wetlands have been avoided through the design process.	Pre-construction
Project Planning		The proponent will prepare a Construction Environmental Management Plan (CEMP) to manage construction activity.	Pre-construction
Preparation of a Construction Environmental Management Plan (CEMP)		A Construction Environmental Management Plan (CEMP) will be prepared for the construction phase of the project prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures will include environmental safeguards for protection of neighbouring properties and nearby waterways hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas in accordance with relevant policy documentation and Government guidelines. In order to address the potential impacts of the proposal on biodiversity, the mitigation and management	Pre-construction

Impact / Action	Outcome	Timing
	measures outlined within this table will be implemented as part of the CEMP for the site.	
Tree Protections	The proponent will engage a qualified Arborist to establish tree protections zones around retained native trees surrounding the development site as per the Australian Standards (AS 4970-2009 Protection of trees on development sites) before any construction or clearing commences to limit development activities within the tree protection zones until after all construction is completed.	Pre-construction
Hygiene Protocol	A hygiene protocol will be produced as part of the CEMP. The Hygiene protocol for the control of diseases in Australian frogs (Murra et al. 2011) will be made available on-site and adhered to. All persons accessing site will be informed of the hygiene protocols and, in particular the sensitivity of the threatened frog species in the Subject Property.	Pre-construction During construction Operational phase
Clearing of Vegetation and Fauna Habitat	In preparation for the authorised clearing of native vegetation, the following conditions will be adhered to in order to minimise all potential impacts to native biodiversity values within the Subject Land. Before any vegetation is damaged or removed, a qualified Ecologist will be assigned to undertake a pre-clearing survey to help a Surveyor delineate areas permitted to be cleared from areas that must be retained. Brightly coloured bunting or strong flagging tape will be used to delineate clearing and construction areas, from areas to be retained ('no go zones'). Prior to vegetation being damaged or removed, a qualified Ecologist with fauna identification experience will determine the presence of any suitable habitat for roosting microbats, nesting birds or other fauna in the area of the Subject Land due to be cleared. Pest species will be humanely euthanised.	Pre-construction During construction
Landscaping	It is proposed that landscaping to be undertaken within the Subject Land use only flora species representative of locally indigenous vegetation community Swamp Sclerophyll Forest EEC, as approved by an Ecologist. No non-native/exotic plants or native cultivars will be utilised in the Landscape design.	Pre-construction During construction Operational phase
Erosion and Sedimentation During Construction	Appropriate erosion and sediment control will be erected and maintained during construction to avoid the potential of incurring indirect impacts on biodiversity values. As a minimum, such measures will comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004). On-going erosion and sedimentation risks will be mitigated through implementation of the recommendations made by the Project Engineers.	Construction phase
Erection of Temporary Construction Fencing	Temporary fencing will be erected around the construction site to ensure no inadvertent clearing of native vegetation or habitat that is not approved to be cleared. This will also ensure machinery and vehicles do not enter sensitive areas outside of the development footprint.	Pre-construction During construction
Permanent roads and driveways	The following impact mitigation controls are proposed in accordance with Byron Council DCP (B1.2.2) The development will incorporate friendly road design such as speed limits, traffic calming, signage, exclusion fencing and fauna crossing structures (under passes, overpasses etc.) wherever considered necessary by Council.	Pre-construction During construction Operational phase

Impact / Action	Outcome	Timing
	Where on-going impacts to wildlife are likely, the road design is to incorporate best practice fauna sensitive design features to facilitate unimpeded wildlife movement as well as minimising any other ongoing impacts on biodiversity values, paying particular attention to the requirements of any threatened fauna or other significant fauna. Such design features will be monitored and maintained to minimise impacts on wildlife such as Mitchells Rainforest Snail. During road construction and upgrading, appropriate environmental safeguards are to be employed to minimise any biodiversity impacts. Fauna friendly road design structures shall be maintained by the proponent for a minimum period of five years after road dedication unless otherwise agreed by Council. Where a vegetation or biodiversity conservation management plan is required, any measures or related conditions of consent to mitigate road impacts on biodiversity shall be incorporated into the management plan and implemented accordingly.	
Permanent Fencing	The following impact mitigation controls are proposed in accordance with Byron Council DCP (B1.2.2). Where wildlife is likely to move between areas of suitable habitat (e.g., rural residential development), fencing will be designed to permit the free movement of native fauna (unless designed to specifically exclude movement such as along roads). Fauna exclusion fencing (or other measures) will be installed in order to reduce a significant fauna mortality risk as a result of crossing from one area of suitable habitat to another. Fauna exclusion fencing will be constructed and operational prior to the physical commencement of works (including clearing vegetation, the use of heavy equipment for the purpose of breaking ground for bulk earthworks, or infrastructure for the proposed development). Fencing design will include suitable clearances to maintain functionality and allow for access for replacement and routine maintenance. All exclusion fencing, fauna friendly fencing or other structures designed to protect fauna will be monitored and maintained to minimise impacts on wildlife.	Pre-construction During construction Operational phase
Storage, Stockpiling and Importing Soil and Materials	All storage, stockpile and laydown sites will be located away from any native vegetation to be retained. Importing soil from outside the site can introduce weeds and pathogens to the site and has the potential to incur indirect impacts on biodiversity values. Only certified clean soil, gravel, rock and building materials will be imported to the site.	Pre-construction During construction Operational phase
Stormwater and Wastewater	All stormwater and sewage disposal and transport systems will be appropriately designed by Engineers. Potential impacts relating to stormwater and runoff will be managed during construction and operation phases in accordance with engineers plans. The CEMP will guide stormwater management during the construction phase of development.	Pre-construction During construction Operational phase
Mitigating effects of Noise and Lighting	During the detailed design phase lighting (or similar high intensity outdoor lighting) will be designed to avoid light spill into natural areas.	Pre-construction During construction Operational phase

Impact / Action	Outcome	Timing
Pest animals	Development has been designed to minimise the likelihood of pest animal establishment/proliferation. Areas will be regularly monitored and managed to contain and adequately control pest animal populations.	Pre-construction During construction Operational phase
Pest plants	The construction and future usage of the development will be undertaken in a manner that minimises the establishment/proliferation of pest plant species (weeds) declared under the Biosecurity Act 2015, and where present, include measures to control them. All landscaping and landscape design will be consistent with DCP 2014 Chapter B9 Landscaping. Where a vegetation or biodiversity conservation management plan is required, any measures or related conditions of consent to manage pest plants shall be incorporated into the management plan and implemented accordingly.	Pre-construction During construction Operational phase
Mitigating effects of Construction Noise	All noise will be limited to the timeframes allowed by law.	Pre-construction During construction Operational phase

12.4.1. Biodiversity Offset Credits

12.4.1.1. Offset Requirement for Ecosystem Credits

No Ecosystem Credits are required to be retired in order to offset the biodiversity impacts of the proposed development.

12.4.1.2. Offset Requirement for Species Credits

A total of 5 Species Credits will be retired in order to offset the biodiversity impacts of the proposed development upon all species credits confirmed present/assumed present on the Subject Land (one credit retired for each species) (Table 12.5).

Table 12.5. Ecosystem credits required to offset the proposed development.

Species	Total Area (ha)	Number of Species Credits to Retire
<i>Crinia tinnula</i> (Wallum Froglet)	0.52	1
<i>Litoria olongburensis</i> (Olongburra Frog)	0.52	1
<i>Myotis macropus</i> (Southern Myotis)	0.52	1
<i>Planigale maculata</i> (Common Planigale)	0.52	1

<i>Thersites mitchellae</i> (Mitchell's Rainforest Snail)	0.52	1
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With the implementation of the biodiversity mitigation and management measures, included offsets as provided above, the proposed BEF is expected to comply with all applicable legislation and guidelines with respect to potential biodiversity impacts and is therefore suitable for construction and operation.

13. Landscape and Visual Assessment

A Landscape and Visual Impact Assessment (LVIA) and Landscape Concept Plan (Appendix L) has been prepared for the proposed BEF. The LVIA details the results of field work, documents the assessment of the existing landscape character and visual setting, and assesses potential visual impacts associated with the proposed BEF. The LVIA also discusses measures to assist in the mitigation of potential visual impacts and ensure that the character of the immediate area and surrounding visual landscape is not overly modified or diminished.

The LVIA assesses potential visual impacts due to the BEF exceeding the height limitations set forth in the Byron LEP. Under Section 4.3 of the Byron LEP, height of built structures on the site is limited to 9m from the ground level. The BEF proposes a maximum height of about 13.57m above ground level.

An overview of the guidelines, relevant frameworks and considerations of authorities utilised to form the methodology for this visual impact assessment include:

- *Byron Local Environment Plan 2014*; and
- *Byron Shire Council DCP 2014*.

13.1. Methodology

The landscape character of the proposed BEF site has been assessed at a regional, local and site scale. 'Landscape character' refers to the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects combinations of geology, landform, soils, vegetation, land use and human settlement to create a particular sense of place.

Visual impact refers to the change in appearance of the landscape as a result of a development. Visual impact is the combined effect of visual sensitivity and visual effect. Various combinations of visual sensitivity and visual effect will result in high, moderate and low overall visual impacts.

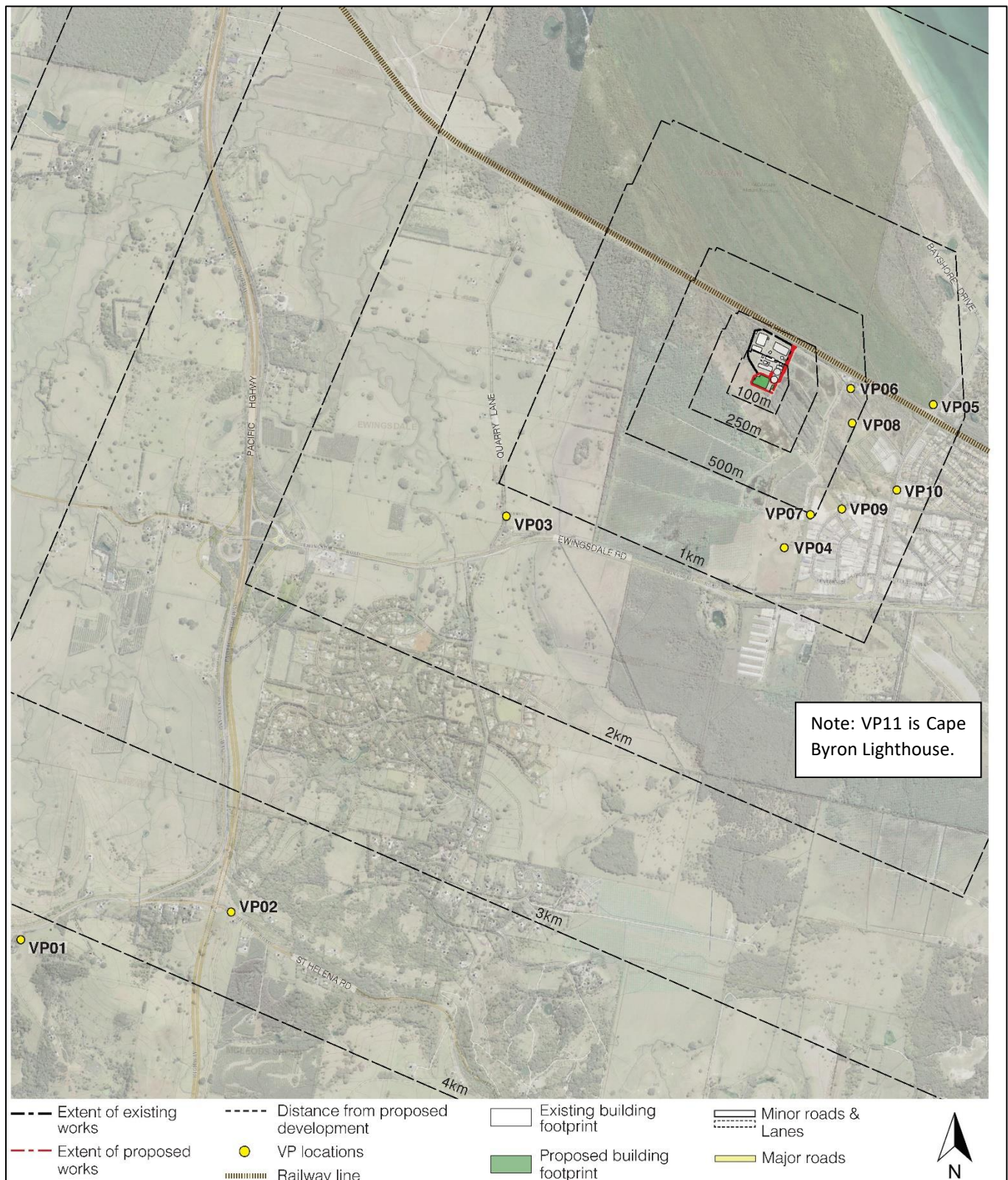
Visual sensitivity is a measure of how critically a change to the existing landscape is viewed by people from different viewpoints. Visual effect is the interaction between a proposal and the existing visual environment, sometimes expressed as the level of visual contrast of a proposal against its setting (or background).

Ten 'viewpoints' for the LVIA are identified for assessment and represent a range of views toward the proposed BEF. Viewpoints have been selected to represent a combination of the following elements:

- Areas of high landscape or scenic value;
- Visual composition (eg. focused or panoramic views, simple or complex landscape pattern);
- Range of distances;
- Varying aspects;
- Various elevations;
- Various extent of development visibility (full and partial visibility); and
- Views from major routes.

Photomontages have also been used in the LVIA to assist in the impact assessment. A photomontage is a visualisation based on the superimposition of an image (i.e. building, road, landscape addition etc.) onto a photograph for the purpose of creating a realistic representation of proposed or potential changes to a view.

Figure 13.1. Viewpoint analysis points in the VIA.



13.2. Existing Environment

Refer below to Figure 13.2 and Figure 13.3 for a selection of images (Images 01 – 06) that show the typical character of the site, surrounds, and vicinity. Table 13.1 describes the general character of each viewpoint selected for the VIA.

The proposed BEF site is located in generally low-lying topography (Image 01). To the north of the site, the Tyagarah Nature Reserve and low-lying floodplain character provide screening from the northeast. The melaleuca trees in the Integrated Water Management Reserve largely screen views from the south, southeast and east. To the west of the Site are grazing lands that have been cleared for grazing. Quarry Lane is the only road that leads to residences that are closest to the western side of the Site. The lane and houses along this road are fairly well-screened with tall Eucalypts, Melaleucas and Allocasuarinas (Image 05).

The Arts and Industrial Estate comprises of tree - lined avenues and roads that offer a unique urban – industrial interface. The Estate lies close to the same altitude as the Site.

Most receptors the are located further to the south including residences in McLeods Shoot, Skinners Shoot and residences located off McGettigans Lane. These residences are positioned on higher elevations and towards the coastline (Image 06). Residences that lie in the vicinity of Ewingsdale Road, St Helena Road and Banagalow Road, for example, are very far away from the development and would be unable to see the Project because of the densely vegetated corridors along roadsides.

Table 13.1. Description of each viewpoint selected for the VIA.

View point	Description
VP01	At the corner of Pacific Highway and Coolamon Scenic Drive. It is a famous lookout point that gives open and expansive panoramic views of the coastline
VP02	Near the high voltage substation in front of 40 St. Helena Road, McLeods Shoot which is on the ridgeline that runs between McLeods Shoot and Skinners Shoot. Views from various points on this road are generally filtered by vegetation even though it is at a higher elevation
VP03	Near the entry of House no. 25, Quarry Lane. The landscape is characterized by a gently undulating topography with rolling hills that run eastwards and have been cleared for cattle grazing
VP04	Cavanbah Sports and Recreation Centre at 249 Ewingsdale Road, Byron Bay. It is a highly modified landscape character with flat, open turf areas used by the general public for soccer and footy games
VP05	Near the North Beach Station crossing on Bayshore Drive, this viewpoint represents largely filtered views from luxury resorts and accommodation along Bayshore Drive.
VP06	Closest proximity to the proposed BEF site at the entry gate of the Integrated Water Management Reserve and car park of the Byron Bay Herb Nursery. Views are filtered and mostly contained by the wetland vegetation.
VP07	Within the extent of Lot 2 DP 706286, this viewpoint is taken from the southeast corner of the lot on which the proposed site is located. The viewpoint is a representation of views from the northern-most corner of Cavanbah Sports Centre.
VP08	The car park of Habitat residences and is a representation of views from dwellings within the Habitat mixed use precinct. The landscape character is highly modified within the extent of this area and it looks onto the constructed wetlands.
VP09	On the corner of Centennial Circuit and Wollongbar Drive. Centennial Circuit is an important road within the Arts and Industrial Estate that provides access to most warehouses.
VP10	On Bayshore Drive in front of the commercial neighbourhood centre. The landscape character is highly modified with cleared land parcels and scattered street trees along the road.
VP11	Cape Byron Lighthouse lookout, Byron Bay's most iconic tourist spot. The site includes open and expansive 360 degree views of the town, the coastline and the ocean.

Figure 13.2. Photos of the site and surrounds.



Image 01. Existing character of proposed Site



Image 02. Vegetation character of low and medium density residences east of Bayshore Drive



Image 03. Typical character of the Arts & Industrial Estate

Figure 13.3. Photos of the nearby wetlands and typical character of local roads.



Image 04. Constructed wetlands at the Integrated Water Management Reserve



Image 05. Grazing pastures and vegetation corridors along Quarry Lane located to the west of the Site

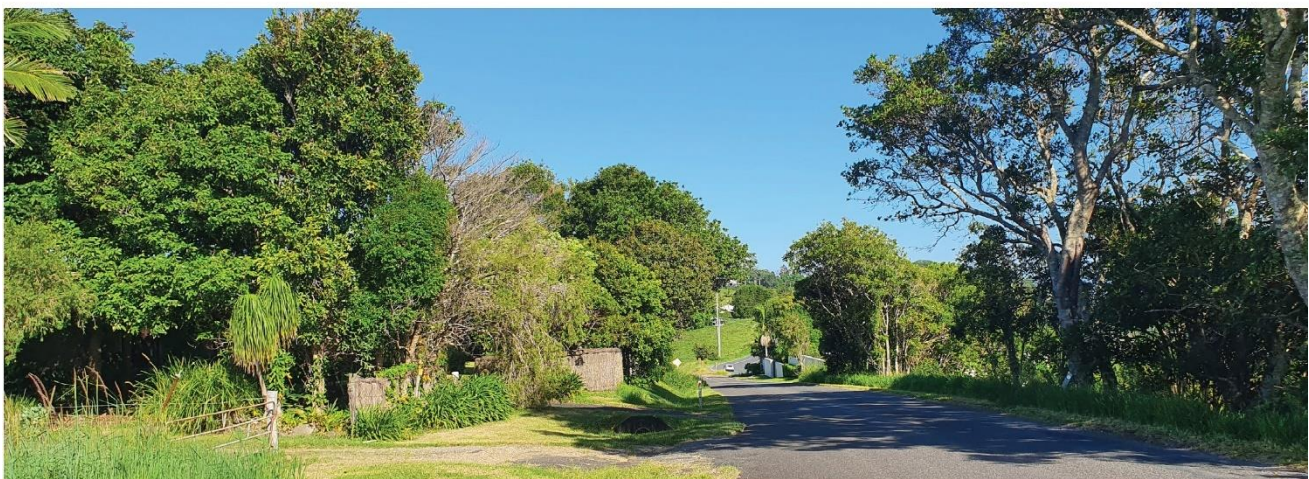


Image 06. Typical character of residences along St Helena Road, McLeods Shoot and Bangalow Road,

13.3. Impact Assessment

With all visual impact assessments, the objective is not to determine whether the proposal is visible or not, it is to determine how the proposal will impact on existing visual amenity, landscape character and scenic quality.

The visual sensitivity and visual effect of each viewpoint, when combined, result in an overall visual impact for the viewpoint. Of the ten (10) viewpoints assessed as part of the VIA, the proposed BEF would be sparsely visible from two (2) of the viewpoints. Of the two viewpoints from which the proposal would be visible, the visual impact rating was 'low' or almost negligible because of the large distance and low use.

Visual impacts are likely to be higher during construction, but ultimately achieve a low or negligible visual impact level once constructed.

Generally, there are very few opportunities to view the Project. Although the overall topography of these lots is gently undulating, with scattered woodlands that screen the Site in certain areas, there are some stretches along Quarry Lane where the facility will be visible. While the project will be visible from Quarry Lane and St. Helena Lookout, it will be congruent with the existing STP and therefore not out of place in the existing landscape.

The viewpoints that were rated as low impact contained limited views to the site, adequate screening or roadside vegetation, all of which obscure most views.

Table 13.2. Viewpoint impact assessment for operation of the proposed BEF.

Viewpoint	Location	Visual Sensitivity	Visual Effect	Potential Visual Impact
VP01	St. Helena Lookout, Pacific Highway	LOW	LOW	LOW
VP02	St. Helena Road	LOW	NIL	NIL
VP03	Quarry Lane	MODERATE	LOW	LOW
VP04	Cavanbah Centre	MODERATE	NIL	NIL
VP05	Bayshore Drive (North)	LOW	NIL	NIL
VP06	Wallum Place	LOW	NIL	NIL
VP07	Industrial Drive	LOW	NIL	NIL
VP08	Habitat Car Park	LOW TO MODERATE	NIL	NIL
VP09	Centennial Circuit	LOW	NIL	NIL
VP10	Bayshore Drive	LOW	NIL	NIL
VP11	Cape Byron	HIGH	NIL	NIL

13.4. Mitigation Measures

With the implementation of the recommended mitigation measures outlined in Table 13.3, development of the proposed BEF can be undertaken whilst maintaining the core landscape character of the area, with minimal visual impact on the surrounding visual landscape.

Table 13.3. Landscape and visual impact mitigation measures.

Element	Description
Vegetation & screening	- The design will retain existing vegetation along the western, southern and eastern boundaries of the Site to reduce the overall visual impact. This will contribute significantly towards mitigation of views for most number of visual receptors. - Existing vegetation within the environmental exclusion zones will be retained and protected to maintain the existing level of screening.
Architectural Colours	Consideration has been given to the colours of the receival hall, biofilter, digestion tunnels, admin building and other structures to ensure minimal contrast with non reflective surfaces and to help blend into the surrounding landscape to the extent practicable. Proposed materials include a dark beige-brown Colorbond metal sheeting, wall cladding and gutters and downpipes, off-form concrete and galvanised steel stairs and handrails.
Landscaping	Consideration has been given for minimising hardstand and using natural materials where possible. Additional landscape areas have been provided to visually soften the appearance of the structures associated with the Project. The planting proposed in these areas complies with the NSW Standards for Asset Protection Zones and with the Byron Shire Council DCP 2014.
Lighting	Consideration will be given to lighting design in order to minimise any visual impacts that might occur after sunset. Design of lighting will occur during the detailed design phase (prior to issue of construction certificate).

14. Aboriginal Cultural Heritage

Everick Heritage Pty Ltd conducted the Aboriginal Cultural Heritage Assessment (ACHA) for the proposal. The objective of the investigation was to identify any archaeological or cultural heritage constraints within the Project Area, and if found, establish ways in which any impacts could be avoided or mitigated.

Byron Shire lands are spread geographically across various Traditional Owners. Arakwal traditional lands extend south from the Bruns River. Minjungbal People are to the north of the Bruns River. Both are part of the Bundjalung Nation.

This chapter summarises the findings of the ACHA. The ACHA report is contained in Appendix P. This chapter should be read in conjunction with Appendix P.

14.1. Methodology

The ACHA was conducted in accordance with all relevant government assessment requirements, guidelines and policies including:

- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010) ('CoPAI');
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010) ('ACHRCP'); and
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (DECCW 2010).

The following are the broad requirements for compliance with the CoPAI;

- a) Search of all relevant cultural heritage databases;
- b) Review of development plans and related maps;
- c) Review resources documenting the geophysical and environmental factors that may have an impact upon the survival or destruction of heritage sites;
- d) Undertake a review of the disturbance history of the Project Area;
- e) Undertake a site inspection of the Project Area with representatives from the Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) ('BoBBAC');
- f) Completion of an assessment of archaeological and cultural heritage significance and impact; and
- g) Report on findings and recommended management strategies.

The method is described in full in the ACHA (Appendix P).

14.1.1. Aboriginal Consultation

The project is within land subject to the *Arakwal Indigenous Land Use Agreement*. As such, exclusive consultation with the Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) (BoBBAC) is considered to constitute substantial compliance with the ACHRCP. In this case, the determination of Registered Aboriginal Parties (RAP) was not required.

The General Manager of BoBBAC, Sharon Sloane, and Steven Kelly, BoBBAC Director and experienced Aboriginal Sites Officer were consulted on the project and attended a site inspection on 3 February 2021. The inspection also included John Hart, Project Manager from Byron Shire Council, and Everick Heritage consultants Tim Hill, Adrian Piper and Mathew Finlayson.

A draft of the ACHA, which included all background information, results and recommendations was issued to Sharon Sloane and BoBBAC on 16 February 2021 with a 28-day review period. No comments were received from BoBBAC. Following minor changes to the design of the BEF, the ACHA was issued to Sharon Sloane and BoBBAC on 27 April 2021. The minor design changes do not extend the footprint of the impact of the proposal and are therefore not expected to have any impacts on Aboriginal cultural heritage beyond those identified during the site inspection.

The Traditional Owners were formally consulted during the EIS process as per the above and raised no objections to the project.

14.2. Existing Environment

The site is adjacent to the Tyagarah Nature Reserve and Belongil Swamp. Belongil Creek lies 1.2km to the east and Simpsons Creek 1km to the west. Belongil Beach is 2km to the northeast. The site is within the boundary of the existing Byron Bay Sewage Treatment Plant (STP) on land described as 'Disturbed' as per the Heritage NSW *Due Diligence Code* 2010. Most of the disturbance on the site is the result of the construction and operation of the STP and occurs within a broader area that has been the subject of historic forest clearing and timber getting.

The Project Area is located on the Belongil sand plain which is known to contain a range of Aboriginal sites, including sites associated with Aboriginal ceremony and mythology; traditional resource use and gathering. It is located within a complex sand dune system which has the potential to contain very old Aboriginal sites. Many of the midden sites along the beachfront have been disturbed from sand mining.

14.3. Impact Assessment

14.3.1. Heritage Register Searches

A search of the Aboriginal Heritage Information Management System (AHIMS) detailed nine registered Aboriginal Sites within the project area (the site and within a 1000m buffer zone) (Table 14.1 and Figure 14.1). None of the Aboriginal Sites occurred within the area to be disturbed by the proposal. It is noted that a lack of sites in the AHIMS database does not imply the area was not occupied by Aboriginal people. It may be that the site has not been previously surveyed for cultural heritage, or any surveys were undertaken where there was poor ground surface visibility.

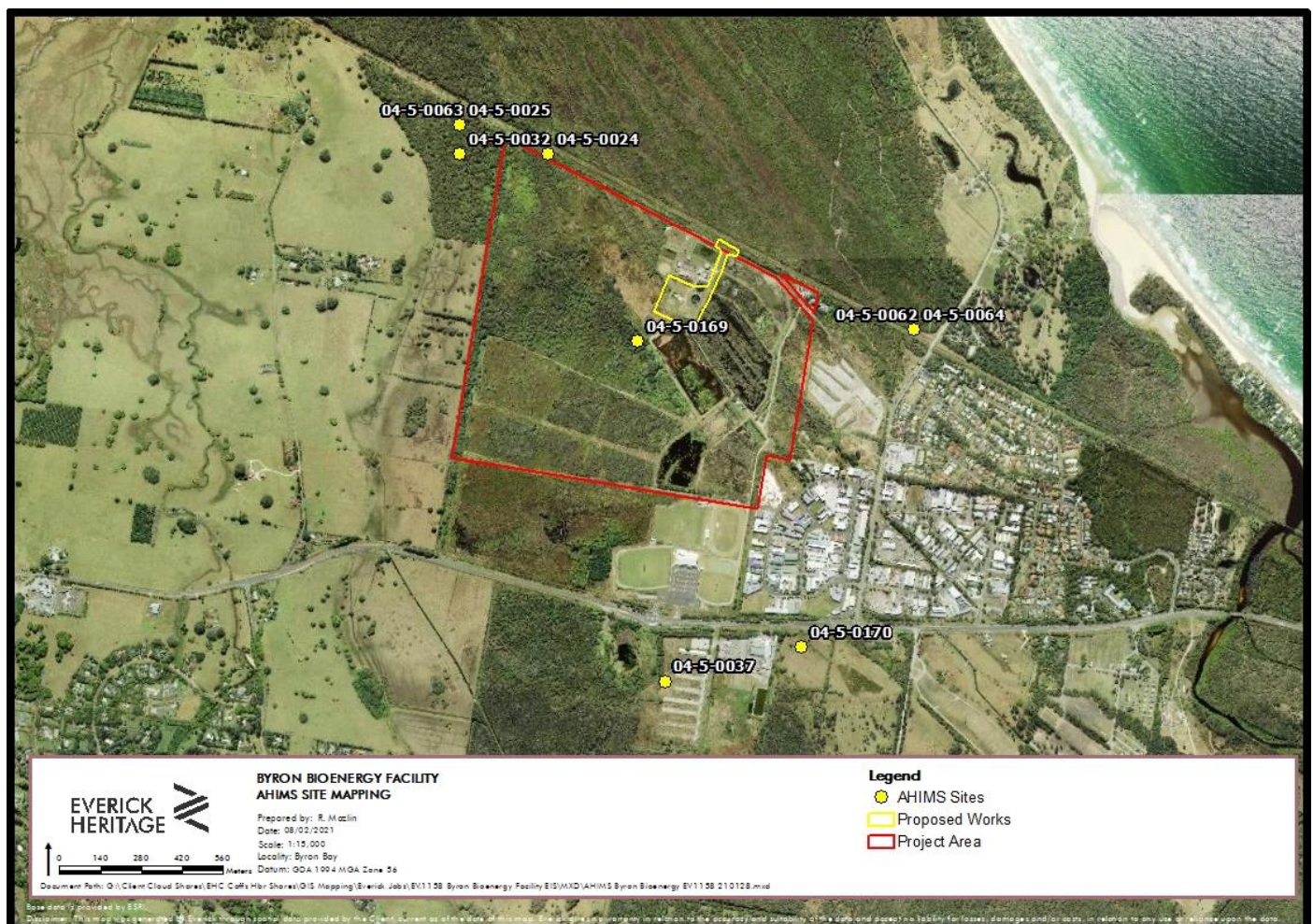
Table 14.1. AHIMS Search Results (Service ID: 563055).

Site ID	Site Name	Site Features	Site Types
04-5-0037	Cape Byron;	Artefact, Burial, Shell	Burial/s,Midden, Open Camp Site
04-5-0062	Byron Bay 1; Belongil Swamp;	Shell, Artefact	Midden
04-5-0063	None Specified	Ceremonial Ring (Stone or Earth)	Bora/Ceremonial
04-5-0064	Byron Bay 1; Byron Bay;	Shell, Artefact	Midden
04-5-0032	Tyagarah Aboriginal Stone Formations Ewingsdale	Stone Arrangement	Stone Arrangement
04-5-0169	Belongil 1	Non-Human Bone and Organic Material, Artefact	
04-5-0170	Belongil 2	Non-Human Bone and Organic Material, Artefact	
04-5-0024	Byron Bay Byron Bay 1	Shell, Artefact	Midden
04-5-0025	Byron Bay Belongil Swamp	Ceremonial Ring (Stone or Earth)	Bora/Ceremonial

In addition to Aboriginal heritage, the following registers were accessed to identify whether areas of other historical significance occurred in the project area:

- **The World Heritage List:** Contains no places within close proximity to the Project Area;
- **Commonwealth Heritage List** (Australian Heritage Council): Contains no places within close proximity to the Project Area. It is noted that the Cape Byron Headland contains the 'Cape Byron Lightstation' (item no. 1086);
- **The National Heritage List** (Australian Heritage Council): Contains no places within close proximity to the Project Area;
- **Register of the National Estate** (Australian Heritage Council): Contains no places within close proximity to the Project Area;
- **The State Heritage Register** (NSW Heritage Office): Contains no places within close proximity to the Project Area; and
- **Byron Shire LEP 2014:** Contains one (1) place within close proximity to the Project Area, being the Flick Farm and Sugar Mill – 'Carabene' – I111. This item will not be impacted by the proposed Bioenergy Facility.

Figure 14.1. Location of registered Aboriginal Sites as recorded in the AHIMS database.



14.3.2. Ethnohistorical Summary

There is considerable conjecture as to the names of dialect groups, land holding clan groups, and their associations to form tribes. However, literature indicates the Aboriginal people of the coastal Tweed-Brunswick Rivers were part of a larger linguistic group, the Bundjalung, which spoke a range of about twenty linked dialects between the Upper Clarence extending west to Tenterfield, Warwick and Beaudesert, joining the coast near Beenleigh. Dialect groups composed of interlinked clan/family groups occupied distinct areas within the wider Bundjalung association. Within these dialect associations land belonged to clan groups whose boundaries had been established in mythology.

14.3.3. Previous Archaeological Assessments

Aboriginal sites in this region have been identified on low beach barrier plains, hills and spurs that adjoin flood plains, creeks, or rivers. They are also identified on ridgelines, and within rock shelters at higher elevations. Scarred trees, which would have been in far greater numbers in the region, mainly around regularly used campsites, have almost entirely disappeared due to clearing, cropping, urbanisation and natural processes. It has been estimated that 50% of beach middens were destroyed by sand mining.

An Aboriginal heritage assessment was conducted in 2001 by ERM for the Byron Bay Sewerage Augmentation Scheme project. The assessment indicated the land within the STP had been filled to a depth of 4-5m to raise it above the flood level. There is the potential for archaeological deposits to have been disturbed by, or may remain buried under, the fill layer. The open area surrounding the fill had been previously cleared but had the potential to contain archaeological deposits being within a wetland area. However, the assessment considered the area to have low archaeological potential due to it being uninhabitable, with sites of significance more likely to be found on higher ground.

14.3.4. Values Assessment

The Project Area has no specific known Aboriginal cultural values; however it is located within a complex sand dune system which has the potential to contain old Aboriginal sites. The surrounding Belongil sand plain is known to contain a range of Aboriginal sites including sites associated with Aboriginal ceremony and mythology; traditional resource use and gathering.

There is a low potential for the Project Area to contain Aboriginal archaeological sites, however the following statements more fully consider this statement;

1. Midden sites in the surrounding area have the potential to date to the mid Holocene period (approximately 5000-3000bp). Midden material has a higher potential for scientific analysis via radiocarbon dating.
2. Midden sites have been subject to extensive removal because of sand mining. As such any remaining midden sites have an elevated conservation value because of the rarity of the site type.
3. Due to the distance of the Project Area from Belongil Creek, other site types are not expected to occur within the Project Area.

The Project Area is not considered to have any historic value.

14.3.5. Summary of Impacts

While the Project Area is located in a complex Aboriginal cultural landscape which includes a range of occupational deposits, intangible sites and plentiful resources, the scale of the proposal and history of disturbance greatly reduce the potential cultural value of the Project Area.

14.4. Mitigation Measures

Any works associated with the project that disturb the ground have the potential to harm Aboriginal objects should they occur within the development footprint. As such, the primary management and mitigation measures include the implementation of an Aboriginal Objects Unexpected Finds Procedure and a procedure for the identification and handling of Aboriginal Human Remains.

Given the history of disturbance across the Project Area, and the importance of the surrounding landscape, it is recommended that all contractors should be provided a cultural heritage induction to assist with the identification of Aboriginal objects.

15. Compilation of Mitigation Measures

A wide range of mitigation measures to prevent or minimise environmental impacts that may be generated by the proposed BEF have been detailed throughout this EIS. This section compiles those considered necessary to minimise impacts and maximise positive outcomes on the physical, social and economic environments of the local area and wider region.

The recommended mitigation measures and strategies will be implemented and managed so that the BEF complies with statutory obligations under EPA licenses and approvals. This includes environmental management and cleaner production principles in the planning, design, establishment, and operation of the BEF.

15.1. Cleaner Production Principles

Cleaner production is a practical method for protecting human and environmental health. This is achieved through the continuous application of an integrated, preventive environmental strategy towards processes, products and services. Cleaner production increases the overall efficiency of products and services and reduces damage and risks to humans and the environment. A proactive approach to reduce initial risks and consequences of impacts will assist in lowering reliance on reactive environmental mitigation measures.

The cleaner production techniques that are applicable to the ongoing operations of the project include:

- Selecting and using the most appropriate technology and materials to reduce the quantity of resources used and to minimise the amount of waste generated;
- Improved operation and maintenance practices to reduce the quantity of resources used and to minimise the amount of waste generated;
- Employing processes that are efficient in their consumption of energy, materials and natural resources and reduce greenhouse gas emissions;
- Selecting energy efficient plant and equipment for use in the facility;
- Reuse of captured stormwater as the primary source of water for the site;
- Safely disposing of any residual wastes and process residues; and
- Promoting the safe use, handling, recycling and disposal of waste products through an understanding of their life cycle.

When cleaner production principles cannot further remove environmental risk or consequence, mitigation strategies must be considered to ensure the remaining potential environmental harm is reduced to the lowest risk level possible.

15.2. Mitigation Measures and Strategies

By incorporating appropriate environmental management measures into the design of the Project and the contractual arrangements associated with the proposed works, the potential for adverse impacts on the environment will be eliminated and/or minimised.

Table 15.1 summarises the mitigation measures and strategies identified in this EIS to minimise impacts and safeguard the environment so that the desired environmental outcomes are achieved for the design, construction and operation of the BEF. Implementation of these measures will ensure the BEF minimizes or eliminates potential impacts on the physical, social and economic environments of the local area and wider region.

Table 15.1. Summary of mitigation measures and strategies.

Issue	Mitigation Strategy
Waste	Develop and implement an Operational Environmental Management Plan (OEMP) that includes processes and procedures for receiving, managing and processing organic wastes received at the BEF.
	Develop and implement a Waste Management Plan for the BEF.
Air Quality	Develop and implement an Operational Environmental Management Plan that includes procedures for monitoring and maintaining the BEF plant and equipment to minimise odour emissions. The OEMP will include management processes for the Receiving Hall to properly manage the waste receiving process, quick open/close doors and negative air pressure and ventilation system.
	Employ dust mitigation measures including covering truck loads, speed limits and sweeping access and unloading areas, as necessary.
	Implement procedures for odour complaint recording and management. Where odour issues arise, implement contingency measures.
	Establish a wheel wash at the entry / exit to the BEF.
	Ongoing odour emission monitoring will be completed with staff trained in recognising odorous conditions and understanding the required corrective measures.
Noise and Vibration	Construction is to be limited to standard construction hours (Monday to Friday 0700 to 1800 and Saturday 0800 to 1300). Any works proposed outside the standard hours will require assessment.
	Avoiding the coincidence of noisy plant working simultaneously close together would result in reduced noise emissions during construction.
	Equipment which is used intermittently is to be shut down when not in use.
	Where possible, equipment with directional noise emissions should be orientated away from sensitive receivers.
	Regular compliance checks on the noise emissions of all plant and machinery used for the proposal would indicate whether noise emissions from plant items were higher than predicted. This also identifies defective silencing equipment on the items of plant.
	Non-tonal reversing alarms should be used on all items of plant and heavy vehicles used for construction.
	If the large excavator (with a hydraulic hammer) must be used within 10 m of an STP building, then continuous vibration monitoring should be performed during construction.
Soil and Water	An acid sulfate soils management Plan (ASSMP) will be required
	An Unexpected Finds Protocol (UFP) for contamination will be prepared and included in early works/bulk earthworks environmental management plans.
	If during construction works, groundwater is extracted or surface water captured, additional testing and treatment (if required) will be provided before discharge into local waterways.

Issue	Mitigation Strategy
	A soil and water management plan will be prepared and implemented for construction pursuant to Managing Urban Stormwater: Soils and construction - Volume 1 (the Blue Book). The plan will include establishment of temporary fencing around the construction site to ensure no inadvertent clearing of native vegetation or habitat that is not approved to be cleared.
	All other hazardous materials and liquids used for plant and equipment including diesel, hydraulic oil, engine oil, gear oil, transmission oil, brake fluid, grease drum cartridges, degreasers and engine coolant are stored at in the existing bunded maintenance workshop at the STP.
	A stormwater management system will be designed and constructed for the project to capture and treat runoff generated from the development.
Hazard & Risk	Operational and emergency management procedures will be developed that take into consideration the outcomes and recommendations of the Bushfire Risk Assessment and the <i>Environmental Guidelines: Composting and Related Organics Processing Facilities</i> .
	An emergency management / response plan including emergency communications plan will be developed that includes training for site personnel, drivers and staff. The plan will be developed pursuant to the RFS document 'A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan'. A leave early strategy will be included.
	Storage and harvesting of biogas from the anaerobic digestors will include regular inspections, the use of gas detectors and gas warning devices, regular inspection of pipes for leakages, installation of ATEX components and inspection labels for readability.
Bushfire	The designated APZ will be managed and maintained in perpetuity, which will include a minimum 6m wide trafficable defensible space (perimeter, operational access road) around the BEF. Construction of buildings and structures will be in accordance with appropriate BAL.
	Doors on the hazard side of the building will be screened from the flame zone. Exits will be located in areas of lower bushfire threat where feasible.
	A secondary property access road will be identified to connect to the road system which then traverses to the main entry for emergency use.
Traffic	A Traffic Control Plan will be developed prior to any site preparation or construction works. The plan is to be developed in accordance with the RMS publication Traffic Control at Works Sites (2018), version 5.0 and the Standards Australia publication AS1742.3: Traffic Control Devices for Work Sites on Road.

Issue	Mitigation Strategy
	An operational traffic and waste haulage plan will be development such that: ○ All vehicles to enter and exit the site in the forward direction. ○ All heavy vehicles involved in construction to approach and depart the site via Pacific Highway, Ewingsdale Road, Bayshore Drive and Wallum Place ○ Light traffic roads and roads subject to load or height limits to be avoided ○ Heavy vehicle movements to be minimised during school peak periods ○ Access to all neighbouring properties is to be maintained at all times ○ A communication procedure is included to update nearby residents and businesses on construction vehicle movements and other potential traffic impacts. All nearby residents and businesses are to be provided with a phone number to contact the site manager ○ Onsite parking for employee, tradesperson and construction vehicles to be clearly defined.
Biodiversity	A site-specific Snail Management Plan will be produced which guides the implementation of impact mitigation measures designed to protect the Mitchells Rainforest Snail.
	The BDAR has described how development proposed avoids and minimises impacts on biodiversity. It has also calculated that a total of 5 species credits will be required to offset residual impacts of the development on biodiversity. Should the development obtain consent, the consent authority will set the offset obligation and include it as a condition of consent for the development. The minor residual impacts of the development will be offset through retiring of biodiversity offset credits in accordance with the NSW Biodiversity Offset Scheme. Alternatively, the necessary payment can be made to the NSW Biodiversity Conservation Fund.
	Pre-clearing surveys will be undertaken over several days and nights prior to any vegetation clearing being conducted. During these surveys, snails will be captured and safely relocated to suitable habitat in the Subject Property no less than 50 m from the development footprint.
	Construction ancillary structures (e.g., site compounds and laydown areas) will be sited to avoid impacts to remnant native vegetation and habitat connectivity.

Issue	Mitigation Strategy
	In preparation for the authorised clearing of native vegetation, the following conditions will be adhered to in order to minimise all potential impacts to native biodiversity values within the Subject Land. Before any vegetation is damaged or removed, a qualified Ecologist will be assigned to undertake a pre-clearing survey to help a Surveyor delineate areas permitted to be cleared from areas that must be retained. Brightly coloured bunting or strong flagging tape will be used to delineate clearing and construction areas, from areas to be retained ('no go zones'). Prior to vegetation being damaged or removed, a qualified Ecologist with fauna identification experience will determine the presence of any suitable habitat for roosting microbats, nesting birds or other fauna in the area of the Subject Land due to be cleared. Pest species will be humanely euthanised.
	A qualified Arborist will be engaged to establish tree protection zones around retained native trees surrounding the development site as per the Australian Standards (AS 4970-2009 Protection of trees on development sites) before any construction or clearing commences to limit development activities within the tree protection zones until after all construction is completed.
	A hygiene protocol will be produced as part of the CEMP. All vehicles, machinery and plant utilised during the construction of the BEF will be washed down prior to entering site. The Hygiene protocol for the control of diseases in Australian frogs (Murra et al. 2011) will be made available on-site and adhered to.
	It is proposed that landscaping to be undertaken within the Subject Land use only flora species representative of locally indigenous vegetation community Swamp Sclerophyll Forest EEC, as approved by an Ecologist. No non-native/exotic plants or native cultivars will be used, and the Landscape design will minimise potential for the establishment/proliferation of pest plant species (weeds) declared under the Biosecurity Act 2015.
	Construction and operation of the BEF will be in accordance with Byron Council DCP (B1.2.2) for Permanent Roads and Driveways and Permanent fencing
	All storage, stockpile and laydown sites will be located away from any native vegetation to be retained. Only certified clean soil, gravel, rock and building materials will be imported to the site.
	During the detailed design phase lighting (or similar high intensity outdoor lighting) will be designed to avoid light spill into natural areas.
	Areas will be regularly monitored and managed to contain and adequately control pest animal populations.
Heritage	An Aboriginal Objects Unexpected Finds Procedure and a procedure for the identification and handling of Aboriginal Human Remains will be developed prior to construction.
	All contractors will be provided a cultural heritage induction to assist with the identification of Aboriginal objects.

Issue	Mitigation Strategy
Visual	The design will retain existing vegetation along the western, southern and eastern boundaries of the Site to reduce the overall visual impact. This will contribute significantly towards mitigation of views for the greatest number of visual receptors.
	Consideration has been given to the colours of the receival hall, biofilter, digestion tunnels, admin building and other structures to ensure minimal contrast with non-reflective surfaces and to help blend into the surrounding landscape to the extent practicable. Proposed materials include a dark beige-brown Colorbond metal sheeting, wall cladding and gutters and downpipes, off-form concrete and galvanised steel stairs and handrails.
	Consideration has been given for minimising hardstand and using natural materials where possible. Additional landscape areas have been provided to visually soften the appearance of the structures associated with the Project. The planting proposed in these areas complies with the NSW Standards for Asset Protection Zones and with the Byron Shire Council DCP 2014.
	Consideration will be given to lighting design in order to minimise any visual impacts that might occur after sunset. Design of lighting will occur during the detailed design phase (prior to issue of construction certificate).
Biosecurity	The Biosecurity Act will be taken into consideration when planning the detailed design of the facility and quality operational process controls to ensure biosecurity measures are upheld.
General	A Construction Environmental Management Plan (CEMP) will be prepared to manage construction activity. The CEMP will include, as a minimum, industry-standard measures for the management of soil, surface water, groundwater, weeds and pollutants, and environmental safeguards for protection of neighbouring properties.

15.3. Environmental Monitoring and Reporting

Environmental monitoring will be a fundamental component of the Operational EMPs for the proposal. Monitoring programs will be developed and presented in an Environmental Management Plan (EMP) and relevant subplans in accordance with the conditions of approval and licence requirements. Proposed environmental monitoring is given in Table 15.2.

Table 15.2. Environmental monitoring proposed for the BEF.

Environmental issue	Monitoring	Purpose	Proposed limit conditions
Waste	Weighbridge records for all incoming waste materials and outgoing products and waste exported by the site under an appropriate EPA <i>Resource Recovery Order</i>	For monthly reporting to the EPA for compliance with proposed Authorised Amount and annual processing limits	Annual processing limit of 28,000 tonnes per year
Air quality	Biofilter, CHP and Flare emissions.	To confirm the effectiveness of plant and equipment to validate predictions in the air quality impact assessment	Periodic monitoring of air quality as required by the EPA
Specific Resource Recovery Orders and Exemptions	Biosolids, waste inputs and outputs	Maintain compliance with the Specific RROEs.	As required by the EPA

Monitoring and maintenance procedures will also be developed to ensure plant and equipment systems remain fit for purpose and are in good working order to ensure they will remain effective.

Operational monitoring may also result from investigative monitoring or regulatory compliance monitoring, such as conducting investigative noise or air quality monitoring in response to specific complaints. Under approval from the EPA, biosolids, biogas and composts will require monitoring to ensure compliance with the Specific RROEs.

Environmental performance reporting is a key decision support tool that provides management with the information to make meaningful and positive change. Reporting requirements will be detailed in the EMPs.

The identification of actual and potential non-conformities contributes to continual improvement of the environmental management system through corrective action and preventive action, respectively. If the reports identify any shortcomings in the way that the construction activities or the operations are being conducted, or in the performance of environmental control structures, the necessary changes will be made to the EMP to reflect these changes. The NSW EPA will receive all relevant reports and prompt notification of any incidents or deviations in performance as well as updated EMP as required.

15.1. Continual Improvement

Environmental monitoring and inspections will be conducted in accordance with a schedule nominated in the EMP. Quantified and unquantified information contained in the EIS will be assessed to ensure that the construction and operational phases of the Project meet acceptable environmental standards. Inspections and monitoring will be in line with the EMP, development approval conditions and applicable licenses. Monitoring and inspection results will be followed up with corrective actions where required. Where needed appropriate action will be taken to avoid recurrence of non-conformances

Any corrective and preventive action will require a change environmental management documentation in a continual process for document control. This process has the ultimate goal of driving continual improvement.

15.2. Ecological Sustainable Development

The EIS has considered a range of social, environment and economic factors of the project, with a focus on Ecologically Sustainable Development (ESD) principles. The EIS found that there were no significant environmental impacts that could not be mitigated by appropriate mitigation measures and management strategies.

This EIS assesses potential environmental impacts associated with constructing and operating the proposed BEF. Specialist assessments for key issues including traffic, air quality, biodiversity and bushfire have provided opportunities for eliminating and reducing risk of serious and permanent impacts on the environment. Several alternatives were assessed during the development of the proposal as detailed in Section 1.5.

Consideration of selected environmental, social and economic factors determined that constructing the BEF adjacent to the Byron STP was the preferred option.

The proposed BEF is consistent with the principles of intergenerational equity. The BEF will improve resource recovery of organics in the Byron Shire LGA into the future. Putrescible organic material will be converted into high quality compost. The project will divert material from landfill, increase the life of existing landfill cells, reduce greenhouse gas emissions and produce biogas energy for use at the Byron STP and the BEF itself.

FOGO kerbside collection for the local community will be processed locally, reducing transport costs and associated emissions. Recycled organics provides resources to agricultural industries whilst reducing air emissions into the environment.

A comprehensive biodiversity impact assessment has been prepared to identify and mitigate any potential impacts to local biodiversity from construction and operation of the proposed BEF. The site consists of mostly cleared land. The site footprint has been updated to avoid high value biodiversity and designed to minimise potential impacts on the surrounding environment. No trees will be removed to construct and operate the project.

The proposed BEF is not expected to significantly impact threatened species, populations, or ecological communities listed under the BC Act or EPBC Act.

16. Cumulative Impacts

A cumulative impact on the environment results from the incremental impact of human activities with consideration to the historic, current and foreseeable planned activities for a particular area. Cumulative impacts from a cluster of premises will vary between locations but typically cumulative impacts are a product of the location, the number and type of facilities present in the vicinity, the way they are managed, and the capacity of the local environment to accommodate these facilities.

Upcoming future projects in the area include:

- Road infrastructure upgrades as detailed in the Traffic Impact Assessment; and
- Housing and commercial development in Byron Bay and surrounds as detailed in the Social Impact Assessment. This includes Habitat Stage 5, which will comprise commercial, retail and tourist accommodation.

The proposed BEF is not considered to make a significant contribution to cumulative impacts due to the mitigation measures that will be put in place to manage environmental impacts. There are numerous long-term cumulative benefits of the proposed development, including a contribution to the attainment of waste management and climate

change objectives for Byron Shire, and progress toward the aims and objectives of relevant NSW legislation concerning management of problem wastes, illegal dumping and waste to landfill targets.

16.1. Assessment of stress level of existing environment and long-term impacts of the BEF

This section provides a summary of the existing environmental stress levels and any key potential long-term environmental impacts of the proposal.

16.1.1. Social and community

The assessment of broader potential social impacts suggests that the proposed development is unlikely to have negative impacts, such as those related to odour or traffic, on the surrounding community. The development will be integrated within the existing Byron Bay Sewage Treatment Plant facility, and is surrounded by lands conserved as wetlands, which will act as a long-term buffer between the development and neighbouring land uses. Byron Shire Council understand that areas of the south of the project site are important and growing industrial, arts and residential areas. Therefore the proposed development has integrated design changes and proposed a set of mitigation measures detailed in this EIS to ensure the project has minimal impact on the local environment and the surrounding community in the long term.

16.1.2. Waste and sustainability

The project will provide a putrescible organics resource recovery option for Byron Council and local businesses who currently must access facilities in neighbouring shires. It will also provide a secure supply of zero emission electrical energy for the Byron STP and the community it services.

16.1.3. Air Quality

Overall, the results of the air quality modelling indicate that odour emissions from the proposed BEF can be minimised to within an acceptable level using an appropriately sized biofilter. While the cumulative scenario including the Byron STP predict minor exceedance of the 2.5 OU limit, modelling is conservative, and contingency mitigation measures are available should odour issues arise. It is highly unlikely any cumulative odour would be noticed, and that there are abundant potential future measures to address the unlikely event of odours detected off site

These include maintenance and monitoring measures to ensure operations are optimised and plant and equipment are operating at maximum efficiency. In the unlikely event of complaints from the community, review of weather conditions and operations at both the Byron STP and BEF will be undertaken. Procedures for addressing complaints promptly will ensure timely community engagement.

16.1.4. Noise and Vibration

Noise in the surrounding area of the proposed BEF site is dominated by local flora and fauna, road traffic and distant commercial/industrial hum. Nearby sensitive receptors include commercial and residential properties, a public recreation area, hotel accommodation and a place of worship.

The traffic noise along Wallum Place and Bayshore Drive already exceeds the Road Noise Policy (RNP) criteria. Predicted noise increases associated with operational vehicle movements is expected to be less than 0.1 dB, well below the Road Noise Policy criteria of 2 dB cumulative increase in areas already exceeding the RNP.

16.1.5. Soil and Water

Acid sulfate soils is an acute environmental problem in many coastal areas of NSW. Byron Bay has a history of acid sulfate soils issue causing acid runoff, high metals and fish kills. With low lying areas such as where the proposed BEF is located, disturbance of acid sulfate soils (ASS) through construction and excavation is a risk. A soil and water management plan will include procedures to address potential ASS during construction and ensure that any disturbance of soils does not lead to longer term leaching affects.

The existing constructed wetlands are an amenity providing multiple social and water quality benefits to the local catchment. The proposed BEF operations largely occur interior to the waste receival hall and organics processing tunnel, which are controlled environments. Parking areas and access ways will drain to a stormwater detention and treatment facility. Maintenance of this infrastructure will ensure no long-term impacts to surface runoff or groundwater.

16.1.6. Visual and Landscape Character

The proposed BEF is being developed alongside the existing Byron STP in previously cleared land. The surrounding landscape is wetland and forest, which screens the facility from most viewpoints and publicly accessible areas. The constructed wetlands will continue to be managed well into the future. No significant visual impacts are expected once the facility is in operation.

16.1.7. Traffic

Access to the proposed BEF site will be via Wallum Place directly off Bayshore Drive, Ewingsdale Road and the Pacific Highway (northbound and southbound). Recent upgrades to the Ewingsdale Road and Bayshore Drive intersection have increased traffic safety. Future upgrades are planned between the M1 and Byron Bay for staged improvements to the road network.

One minor change to from traffic generated by the BEF is pavement widening along the south-western corner of the Bayshore Drive/Wallum Place intersection. This is to accommodate a swept turning paths of the 19m long semi-trailers.

Wallum place is the only environmentally viable access point to the BBSTP per previous studies. Projected increase in traffic activity from the BEF would not have any unacceptable traffic implications in terms of road network capacity. Under a +10-year future scenario, the projected additional traffic flows expected to be generated by the development proposal, intersections used for transport of inputs and outputs from the BEF would continue to operate at current Levels of Service.

16.1.8. Bushfire, Hazards and Risk

Hazards and risks have been assessed in the preliminary hazard assessment and bushfire risk assessment. The project collects and uses the biogas generated through anaerobic digestion to power the adjacent Byron STP and the BEF.

Whilst bushfire will continue to be a risk to all development into the future, the BEF provides for mitigation measures to reduce risks. These measures include using appropriate building materials, setting in place procedures for monitoring and maintenance of the facility, and establishing emergency plan measures. The facility will include gas monitoring and leak detection, and fire safety equipment and hydrants. Full access around the facility will be provided for fire trucks, and APZs will be established per the bushfire risk assessment.

The stockpiling of flammable material will be minimal (typically less than 1,000m³ and occur inside the receival hall). Product storage outside the receival hall will also be minimal (up to 1,000m³).

Overall, the development includes construction and emergency measures to manage fire risk to the surrounding environment.

16.1.9. Biodiversity

The proposed development will clear a weed-infested, managed native grassland (lawn) which provides low habitat heterogeneity. No other habitat will be impacted by the development.

The proposed development is situated in a position surrounded by existing industrial infrastructure. No important native vegetation or habitat will be removed. No remnant vegetation will be impacted for the proposed development to take place, however, there is an offset for loss of foraging habitat (albeit degraded weed-infested) for species credit species that were recorded on the BEF site during the assessment.

The development will not contribute to cumulative impacts. The proposed development has been designed and will be facilitated in a manner that minimises and manages all potential indirect impacts to fauna or flora.

16.1.10. Heritage

The heritage study found no significant heritage within the proposed BEF site and surrounds that would be impacted by the project. The development will have no long-term impacts on heritage values in the area.

16.2. Infrastructure requirements flowing from the proposal

Aside from a minor adjustment for pavement widening along the south-western corner of the Bayshore Drive/Wallum Place intersection, no additional community infrastructure is required to support the development.

16.3. Conclusion

The cumulative impact of the proposed development is expected to be minimal. The potential for adverse impacts will be mitigated by a range of measures, as listed in Section 15.

17. Justification of the Proposal

The proposed Byron Bioenergy Facility (BEF) is designed to deliver a safe, economic, durable, and functional solution for the recovery and beneficial use of Byron Shire Council's biosolids and other municipal organic wastes whilst offsetting electrical costs of operating the Byron Bay STP. It will provide organics recycling capacity for the organic wastes already being source separated by the community, while making additional capacity available for the diversion of more waste from landfill as the population and economic activity in the area grows. It will also provide a secure supply of zero emission electrical energy that will meet the entire electrical energy demands of the BBSTP and export additional electricity to the grid.

By installing a long term, reliable, locally based organics recycling solution, the Byron Community will reduce their waste management costs and their impact on the environment. In recent years Byron Shire has recycled their FOGO at a facility located north west of the Gold Coast. While source separation and diversion of waste from landfill delivers economic, social and environmental benefits, transporting it long distances for processing reduces those benefits. Facilities located in other local government areas justifiably prioritise managing local waste, which can lead to temporary landfilling and higher costs for transport and processing Byron Shire's source separated wastes. The BEF addresses these risks.

The proposed BEF will produce composted soil amendments locally. This compost will be suitable for use in landscaping and agricultural applications replacing bulk recycled and virgin soil amendments, including those imported into the shire from other areas. The nutrient value and quality of these soil amendments will exceed those produced at BSC's existing garden waste composting facility. Up to an additional 10,000 tonnes will be produced by the BEF for beneficial use each year. There are proven environmental and economic benefits of using composted mulch on tree crops such as Macadamia, which are a significant commercial crop in and around the Byron Shire²⁵.

The proposed BEF will represent a significant piece of public infrastructure that will create jobs within the Byron Shire. The project will create approximately 25 jobs in construction over a 10-month period and 5 new full-time jobs during the operational phase. The project is expected to inject approximately \$76.5 million into the local economy over the twenty-year life of the project comprising \$16.5 million capital investment and \$60 million in expenditure related to BEF operations.

The proposed BEF will also deliver educational and demonstration opportunities for the promotion of sustainable waste management practices. The organic wastes processed by this facility are commonly composted, applied directly to land or landfilled. The BEF will maximise the beneficial reuse of these organic wastes as both soil amendment and fuel.

If granted consent, the proposed BEF would be the first dry Anaerobic Digestion Facility producing energy from source separated municipal organic wastes in NSW. The lessons learnt from the development of this 'beyond best practice' facility will be available to local governments throughout NSW and Australia.

²⁵ DPI Primefact, Using Compost in Macadamia Orchards, accessed 19 May 2021
https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0019/140284/using-compost-in-macadamia-orchards.pdf

Appendices

Appendix A – Secretary’s Environmental Assessment Requirements (SEAR 1471)

Appendix B – Site and Civil Plans

Appendix C – Capital Investment Valuation

Appendix D – Social Impact Assessment and Consultation Report

Appendix E – Site Waste Minimisation and Management Plan (SWMMP)

Appendix F – Traffic Impact Assessment

Appendix G – Air Quality Impact Assessment

Appendix H – Noise and Vibration Impact Assessment

Appendix I – Preliminary Site Investigation and Groundwater Assessment

Appendix J – Geotechnical Report

Appendix K – Bushfire Assessment

Appendix L – Visual Impact Assessment

Appendix M –Request for an exception to the building height limit

Appendix N – Biodiversity Report

Appendix O – Arborist Report

Appendix P – Aboriginal Cultural Heritage Assessment

Appendix Q – Concept Erosion and Sediment Control Plans

Appendix R – Acid Sulphate Soil Management Plan