
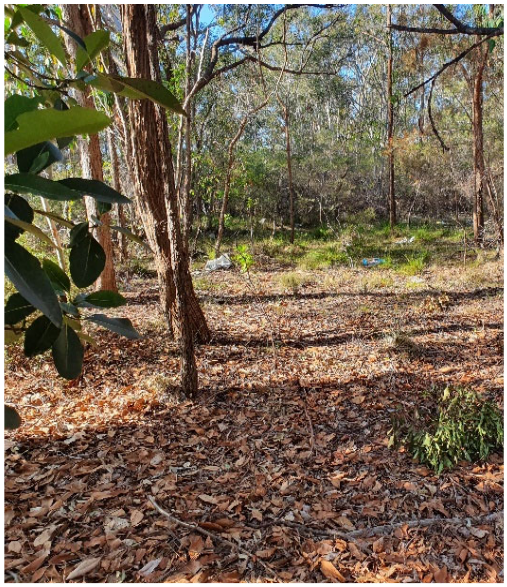
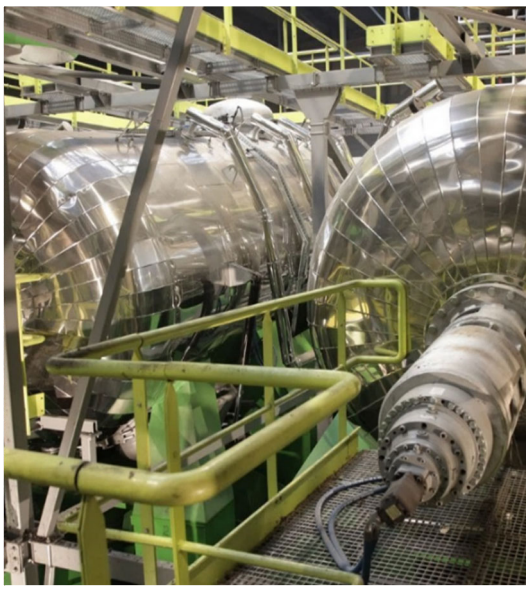

Bioelektra Australia Pty Ltd

West Nowra Resource Recovery Park Stage 2

Environmental Impact Statement

VOLUME 1

June 2021

Executive summary

INTRODUCTION

Bioelektra Australia Pty Ltd (Bioelektra) proposes to construct and operate an integrated resource recovery facility at West Nowra (referred to in this report as 'the project'). Bioelektra has engaged GHD Pty Ltd (GHD) to prepare documentation to support an application for the project in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW) (the EP&A Act).

The project is State significant development by operation of Part 4, Division 4.7 of the EP&A Act and State Environmental Planning Policy (State and Regional Development) 2011. It is subject to approval by the Minister for Planning and Public Spaces or the Independent Planning Commission. This Environmental Impact Statement (EIS) has been prepared to support the application for approval of the project.

The EIS addresses the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment (the SEARs) dated February 2021. The EIS also addresses the EIS form and content requirements of schedule 2 of the Environmental Planning and Assessment Regulation 2000 (the Regulation).

BACKGROUND

In 2016 Shoalhaven City Council (Council) sought approval for a Concept Proposal for a resource recovery park with a combined capacity of 130,000 tonnes per year (the West Nowra Resource Recovery Park). The Concept Proposal included:

- Stage 1 – clearing of land and provision of basic infrastructure on the nominated site, which would be undertaken by Council or contractors appointed by Council as part of early construction works.
- Stage 2 – construction and operation of a resource recovery park which would be undertaken by an alternative waste technology provider/facility operator, selected through a tendering process to provide the specialised resource recovery facilities.

Council sought Project Approval for Stage 1 as part of the same application.

A staged approach was adopted to enable Stage 1 to commence (subject to planning approval) while a contractor was appointed and the details of Stage 2 were determined via the tendering and design process.

Council received Concept Approval and Stage 1 Project Approval for the West Nowra Resource Recovery Park on 25 August 2016 (application number SSD 7015). The approved Stage 1 works include:

- Demolition of the existing animal shelter
- Site preparation and clearing of the site
- Perimeter, entry/exit and service roads and line marking
- Installation of perimeter/boundary fencing
- Weighbridge and weighbridge office
- Staff and visitor car parking, including line marking
- Detention and sedimentation dams/basins
- Identification of asset protection zones

Council subsequently awarded Bioelektra Australia Pty Ltd (Bioelektra) with the contract for delivery of Stage 2 of the works (this project).

PROJECT OVERVIEW

The project involves constructing and operating a resource recovery facility with pre-treatment for mixed municipal waste of up to 130,000 tonnes per year, comprising:

- A waste reception hall
- A processing building for shredding and sterilisation operations using 16 autoclaves to pre-treat and sterilise the waste
- A materials recovery facility for sorting all processed waste minus organic matter separated from autoclave pre-treatment
- A boiler room, transformer hall and liquid petroleum gas (LPG) station supplying utilities and electricity for site operations

The project also includes ancillary infrastructure, including offices, amenities, staff and visitor parking, internal roadways, weighbridges and weighbridge offices, fencing, and a pumping station and firefighting tanks.

The Concept Approval (SSD 7015) included construction and demolition waste processing and an alternative waste treatment/materials recovery facility. However, construction and demolition waste processing is no longer proposed as part of the project. In addition, the waste processing technology proposed by Bioelektra includes sterilisation of waste through autoclaving and materials recovery through various sorting operations.

Other ancillary infrastructure not included as part of the Concept Approval (SSD 7015) but proposed as part of this project includes the boiler room, transformer hall, LPG station and pumping station and firefighting tank.

PROJECT LOCATION

The site on which the project is proposed (the site) is lot 342, deposited plan (DP) 257515 within the Shoalhaven local government area (LGA). The site, which is located in West Nowra approximately five kilometres to the west of the Nowra central business district, is accessed from Flatrock Road, off Yalwal Road.

THE PROPONENT

The proponent for the project is Bioelektra Australia Pty Ltd, part of the Bioelektra Group. Bioelektra Group offers waste treatment and recovery solutions. The company separates waste and delivers biodegradable fractions, refuse derived fuel (RDF) fractions, metals, plastics, and glass items for recycling and recovery purposes. It sells biodegradable fractions, metals, plastics, glass items, and alternative fuel.

PROJECT OBJECTIVES AND BENEFITS

The objectives of the project are to:

- Reduce the amount of waste requiring landfill disposal, and thereby extend the life of the landfill at the West Nowra Recycling and Waste Facility, to allow it to continue to serve the local community's waste disposal needs further into the future.
- Improve resource recovery rates in line with the objectives of the NSW *Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a) and the NSW *20-Year Waste Strategy* (draft), which include targets for diverting more waste from landfill and increasing recycling.

The project would deliver outcomes consistent with national and state legislation and strategies for sustainable waste management. It aligns with the philosophy of viewing waste and a resource – and recovering resources in their highest net resource value state.

Overall the project would:

- Divert valuable resources from landfill and increase recovery and recycling of resources from the waste stream
- Extend the landfill at the West Nowra Recycling and Waste Facility to allow it to continue to serve the local community's waste disposal needs further into the future
- Contribute to the achievement of the targets for increased recycling and landfill diversion in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a) and Draft *NSW 20-Year Waste Strategy*
- Provide benefits through development of a new industry and new employment opportunities in the Shoalhaven

The project would also have other flow on benefits such as (Wright 2008):

- The recovery of more resources may in turn reduce greenhouse gas emissions both at the landfill and in the manufacture of replacement products
- The promotion and leadership in non-metropolitan waste management initiatives
- Reduction of the impact on the environment through the extraction of material that could otherwise be recovered

COMMUNITY AND STAKEHOLDER ENGAGEMENT

A Community and Stakeholder Engagement Strategy was developed and implemented during preparation of the EIS. The engagement activities were undertaken to provide details of the project, the project need and benefits and to seek input from relevant stakeholders.

A variety of engagement activities were undertaken including:

- Letters/newsletters to directly affected residents and the community with proximity of the site
- Letters to relevant government agencies
- Bioelektra website
- Community information sessions at the Nowra Showground
- 1800 community information line and email address

All issues raised during the engagement are addressed in the EIS.

ENVIRONMENTAL ASSESSMENT

Waste management

Construction

The management of wastes generated during construction would be in accordance with relevant NSW legislation and the principles of the waste management hierarchy set out in the NSW *Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a).

During construction 25 metre crane lift bins would be located next to the weighbridge to store construction and demolition waste. During peak construction the bins would be removed on a daily basis. In the façade and finishes zones, 240 litre mobile garbage bins and two metre

hooklift bins would be used and emptied into larger receptacles by telehandlers. Any excess spoil from earthworks for the project would be stockpiled on site for use as construction fill if suitable.

Non-recyclable or non reusable material would be collected on a regular basis by authorised and appropriately licensed waste collection contractors for offsite disposal at landfill.

General waste generated by construction staff and wastewater and sewage from site facilities would be collected on a regular basis by an authorised and appropriately licensed contractor for offsite disposal or recycling.

Operation

Table E.1 shows the waste streams expected to be received at the site and the maximum throughputs on a yearly basis. The maximum daily throughput would be approximately 356 tonnes and maximum weekly throughput 2,500 tonnes.

Table E.1 Incoming waste streams – maximum throughputs

Waste stream	Quantity (tonnes per year)	Waste morphology (%)
Food waste	78,000	60%
Paper and cardboard	11,700	9%
PET	1,300	1%
PP	1,300	1%
Other plastics	6,500	5%
Glass	4,550	3.5%
Ferrous metal	3,380	2.6%
Non-ferrous metals	390	0.3%
Textile	3,900	3%
Wood	2,600	2%
Rubber, leather	2,600	2%
Inert	13,780	10.6%
Total	**130,000**	**100%**

In addition to the incoming waste streams identified above, small quantities of waste would be generated during operations from staff administration and amenities functions and general maintenance activities. Key operational waste streams would include:

- General waste generated by operational site personnel (such as food scraps, aluminium cans, glass bottles, plastic and paper containers, paper, cardboard and other office wastes)
- Wastewater and sewage from staff facilities

The expected facility outputs are shown in Table E.2.

Table E.2 Expected facility outputs

Material	Predicted output (%)	Quantity (tonnes)
Biomass	37.2%	48,360
RDF light	9.0%	11,700
RDF heavy	7.3%	9,490
PP	0.8%	1,040
PET	0.8%	1,040
Glass	3.2%	4,160
Ferrous metals	2.6%	3,380
Non-ferrous metals	0.3%	390
Aggregates	9.5%	12,350

Material	Predicted output (%)	Quantity (tonnes)
Evaporation	24.3%	31,590
Residual waste	5.0%	6,500
Total	**100%**	**130,000**

Waste processing and quality control

Incoming waste loads would be inspected and tracked throughout the site with entry and exit through the weighbridge. Any non-conforming materials such as hazardous wastes would be rejected from the site and details recorded.

Waste would be directly unloaded within the waste reception area would undergo initial mechanical processing of the waste to remove any large waste components and shred the waste to create a more homogeneous mass. The material would be transferred through the processing building via a network of automated conveyors from sterilisation, to stabilisation and then mechanical sorting. The processing system would allow for approximately 95% of the incoming material to be diverted from landfill.

The product material would be stored temporarily in bins or bags (for glass) in partially enclosed bays. The materials would be reloaded onto trucks and transported off site via the weighbridge for reuse and further processing. The RDF and part of the biomass product streams would be used for off site energy recovery in accordance with the EPA (2015) *NSW Energy from Waste Policy Statement.*

Wastes generated on site during operation would also be managed in accordance with relevant NSW legislation and the principles of the waste management hierarchy set out in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a). The remainder of the biomass output stream would be used in other non-thermal applications.

Air quality and odour

An air quality assessment was undertaken to assess potential air quality and odour impacts for the construction and operation of the project.

Construction of the project was assessed via a qualitative approach. Construction mitigation measures were identified to minimise any potential dust emissions during construction efforts. No dust impacts are anticipated during the construction of the project.

Operation of the project was assessed via a quantitative approach that utilised air quality dispersion modelling. An emissions inventory was prepared for odour, particulates and combustion products. Odour emissions were based on sampling data obtained from a similar reference facility. Particulate emissions were based on manufacturer specified emissions limits. Boiler combustion emissions were based on stack concentrations provided by Bioelektra.

Background air quality was reviewed and incorporated into the assessment where possible based on the previous assessments at the site undertaken and ambient concentrations recorded from the Albion Park South monitoring station. Cumulative odour impacts as a result of the operation of the project and the West Nowra Landfill were accounted for by using the dispersion model prepared by SLR Consulting in their assessment of landfill operations associated to the West Nowra Landfill Extensions (SLR (2019) and SLR (2020)).

No exceedances of the assessment criteria for any pollutant were predicted and no impacts are expected during the operation of the project.

Dust and odour mitigation measures have been identified to assist with management onsite during operation of the project.

Greenhouse gas

A quantitative greenhouse gas (GHG) assessment was undertaken to estimate the emissions from construction and operation of the project.

Scope 1 and 2 emissions from construction of the project are estimated as 586 tCO_2-e, which is approximately 0.0004% of NSW's annual emissions and 0.0001% of Australia's annual emissions. Construction emissions is considered negligible compared to annual emissions in NSW and Australia.

Annual scope 1 and 2 emissions from the project during operations are estimated as 18,081 tCO_2-e, which is equivalent to approximately 0.01% and 0.003% of NSW's and Australia's annual emissions respectively. The estimated operational emissions are also considered negligible compared to annual emissions in NSW and Australia. Operational emissions are predicted to be lower than the facility reporting threshold of 25,000 tCO_2-e per year, under the National Greenhouse and Energy Reporting scheme.

Soils and water

Construction

No significant impacts associated to soil and water are expected due to construction of the project, risks would be managed by standard erosion and sediment control procedures and the soil and water management system. This includes:

- Existing soil and water management infrastructure including sediment basin and clean water drain along the western boundary of the site would be utilised
- Diversion of clean runoff around disturbed areas and minimisation of disturbed areas
- Runoff from the site would be collected and either used to manage dust, or subsequently treated and discharged in accordance with per *Managing Urban Stormwater: Soils and Construction* (DECC 2008)
- Any overflows would be discharged off site towards Cabbage Tree Creek

Operation

During operation, the primary potential risk to downstream surface water quality is runoff from sealed areas. Operational soil and water management measures would include:

- Upstream clean runoff and runoff from the perimeter roads and roofed areas would be diverted and discharged off site
- Runoff from the carpark and entrance area would be managed in a stormwater treatment system involving a gross pollutant trap, buffer swale and constructed wetland
- Swale drains from the construction phase would be retained along the northern, eastern, and southern boundaries and regraded as required to the remaining permanent sediment basin in the north-west and constructed wetland. The existing drain along the western boundary to be retained to convey clean runoff from perimeter road and roofed areas
- Overflows would be discharged off-site towards Cabbage Tree Creek

Water quality

During the operational phase, waste materials would be confined to indoors or outdoors within enclosed containers such as hooklift bins and bags. Since waste materials would not be stored outside unless covered or in enclosed containers, and process water would be treated on-site before tankering for off-site disposal, runoff from site is expected to be as per typical industrial

urbanised sites. This significantly reduces the risk to downstream surface waters with respect to water quality.

Runoff from perimeter roads is not expected to have a significant impact on downstream waters since its road surface areas are minimal and spread throughout the site and vehicles carrying waste are not expected to travel in this area of the site.

It is considered that there is a greater risk arising from construction of the car park and hardstand areas. MUSIC modelling results show that for all indicator pollutants, the predicted loading from the car park and hardstand areas post-development (including a gross pollutant trap, buffer strip and constructed wetland), is less than the predicted pollutant loading from the equivalent area in its current condition.

Water sourcing

A water balance assessment for the project indicates that on average the site has an excess of water with a total of 9.6 megalitres expected to overflow annually from the two basins.

The soil and water management system on-site would be separate to the municipal waste pre-treatment process which would primarily utilise re-used water recovered from the sterilisation process.

Flooding

Detailed and recent flood study reports do not exist for the upper Shoalhaven River as this part of the river is considered to a have a generally low flood risk. Therefore, a high-level flood model was developed to determine the approximate flood level levels in the vicinity of the site during the 1 in 100 annual exceedance probability (AEP) storm. Flood levels are likely to be approximately 300 to 350 metres from the site boundary and therefore no significant impacts from local flooding are predicted.

No significant infrastructure has been identified downstream of the site between the site and the Shoalhaven River. Therefore, no detailed detention assessment has been carried out as no significant impacts, in terms of the site changes affecting future flood conditions, is expected.

However, approximately 500 millimetres of detention storage would be provided in the site stormwater dams to minimise peak flows to minimise risk to erosion downstream.

Contamination

A preliminary site investigation (PSI) was prepared by GHD for the project to assess the nature and extent of contamination on the site and propose measures to ensure the site is suitable for its intended use.

The primary exposure risk would be during construction of the project associated to excavation activities which have the potential to mobilise potential contaminants in soils and groundwater. The primary potential receptor is identified as construction workers involved with the associated earthworks for construction of the project. In addition, ecological receptors including burrowing animals and aquatic flora and fauna in existing dams are identified as potential receptors. However, it is noted that the site would be cleared for construction activities, and any contaminated material would be excavated and removed. A number of control measures would be implemented during construction to manage potential contamination risks.

Operational activities carried out by site workers and visitors would not involve direct contact with below ground structures, soil or groundwater. The proposed pavement and hardstand would reduce the opportunity for potential exposure to contamination. Therefore, source pathway receptor (SPR) linkages are considered incomplete for this scenario.

Groundwater does not appear to be beneficially used within 500 metres of the site and therefore, groundwater users have not been identified as a receptor. The SPR linkages are incomplete.

Landfill gas, if present, may affect site personnel during operation. Gases may also pose an explosion risk in any of these settings. If gases are migrating to site, the SPR linkages could be complete. Control measures relating to landfill gas would address potential operational landfill gas risks. With the implementation of these measures, the site would be suitable for its intended operational use as a resource recovery park.

Traffic and transport

Traffic generation

The construction of the project would generate an additional 45 vehicles (90 vehicle movements) per day on the surrounding road network over the 12 to 18 months construction period. A maximum of 29 peak hour vehicle movements would be associated with staff arrival/departure times, with the remaining traffic spread throughout the day. These expected construction traffic movements are the same as construction traffic movements that were predicted for the Concept Proposal.

During operation 127 vehicles per day are expected to be generated in 2020 and 226 vehicles per day are expected to be generated in 2030. This compares to 121 vehicles per day in 2017 and 115 vehicles per day in 2027 that were predicted to be generated for the Concept Proposal operation.

Intersection performance

Proposed traffic flows at the existing intersections were analysed using SIDRA to obtain propose operation of key intersection in 2020 and 2030 under a ten year horizon.

Construction of the project would have a negligible impact to the operation of key intersections. Mitigation measures would need to be implemented to manage construction trucks through West Nowra and minimise grouping of truck arrivals.

It is expected that the intersection performance in 2020 and 2030 would be similar to the intersection performance analysed as part of Concept Proposal EIS (GHD 2016) for the years 2017 and 2027 respectively. The traffic assessment confirmed that:

- The percentage increase of traffic on the surrounding road network as a result of the project would be minimal and indicates that the project would have negligible operational impact.
- Albatross Road/Kalandar Street roundabout would require upgrade to accommodate future background traffic growth. This intersection arrangement would need to be investigated further as part of other studies.

A warrant assessment was also undertaken at the intersection of Flatrock Road/Yalwal Road based on Austroads (2020) *Guide to Traffic Management – Part 6: Interchanges, Intersections and Crossings Management*. It was determined that a rural basic intersection treatment is suitable for the intersection.

This intersection layout is currently a basic intersection layout, therefore no upgrade is required. However, it is noted that the existing intersection does not provide the required widened shoulder on Yalwal Road. This is considered an existing condition that should be improved regardless of whether the project were to proceed.

Swept path assessment

The swept path assessment confirmed that the proposed site plan is able to facilitate 19 metre heavy rigid reverse movements into the waste reception hall / despatch / covered holding bays and manoeuvring through the site. This includes vehicle use of the entry and exit area where standard prefabricated weighbridges would be located.

There would be no conflicts in site entry and exit of weighbridge, though the vehicle body would come close to the kerb at the weighbridge (north and south).

The swept path assessment also confirms that the proposed site plan can facilitate the movements of a 26 metre B-double to access the site, travel along Perimeter Road (with parallel alignment to the LPG Station), and use the western exit to turn onto Flatrock Road.

Parking and access

Access and parking arrangements have been accommodated in the schematic plan and are designed in general accordance with *AS2890.1 Parking Facilities: Off-street car parking* and *AS 2890.2 Parking Facilities: Off street commercial vehicle facilities*, with the provision of 40 spaces to accommodate the number of staff and visitors.

Noise and vibration

Construction

Acoustic modelling was undertaken using CadnaA 2020 noise modelling software to predict the effects of construction noise generated during construction of the project.

Construction noise management levels are not predicted to be exceeded at any sensitive receiver during standard hours. Construction of the main building structure is predicted to result in the highest noise levels. The highest noise levels at the nearest residential receivers are predicted to be more than 5 dBA below the noise management level at all sensitive receivers.

The vibration assessment identified that no adverse vibration impacts or cosmetic damage vibration impacts are anticipated as a result of the project.

To evaluate the impacts on receivers near the proposed access road to the site, calculations were undertaken using the NSW Roads and Maritime Services construction noise estimator utilising the United Kingdom Department of Transport (1988), *Calculation of Road Traffic Noise* (CoRTN) prediction method. It was concluded that noise requirements of the *NSW Road Noise Policy* (RNP) (DECCW 2011) would be met during construction and no further mitigation is required.

Operation

Acoustic modelling was undertaken using CadnaA 2020 noise modelling software to predict the effects of noise generated during the operation of the facility.

The model indicates that compliance is predicted at all sensitive receivers during worst-case operations during the early morning shoulder period. Compliance during this period ensures compliance with the less-stringent day period. It should be noted that the noise levels during the early morning shoulder period are likely to be lower than those presented as there would be less truck movements during this period and the roller door would be open for a shorter period of time. Several noise mitigation measures were identified for the design of the project.

The assessment also indicated that the received noise level at the nearest residences is predicted to comply with the sleep disturbance criterion.

As the predicted noise emissions from the project are below the project amenity noise levels during all relevant assessment periods, no further consideration of cumulative noise impacts is required. Nevertheless, a cumulative noise impact assessment considering noise emissions from the project and the existing and future operations of the adjacent landfill was undertaken. This predicted that the cumulative industrial noise level at each receiver would also be below the NPfI recommended amenity noise level.

To reduce potential traffic noise impacts during operation, heavy vehicle movements along Flatrock Road are proposed to be limited to 50 kilometres per hour. Based on this, noise levels are predicted to meet the requirements of the RNP.

Fire and incident management

Bush fire

A bush fire report was prepared as part of the Concept Proposal EIS (GHD 2016). The assessment has been reviewed for consistency with the more recent NSW RFS (2019) *Planning for Bush Fire Protection*) and all identified bush fire protection measures have been carried forward into design of the project and the management measures proposed for the project.

The project is subject to an elevated bush fire risk given its proximity to large tracts of native forest. Development of land classified as bush fire prone land is subject to a number of bush fire related planning controls under the EP&A Act and the *NSW Rural Fires Act 1997*. A number of bush fire protection measures would be incorporated into the project construction and operation in accordance with the Aims and Objectives, and the Acceptable Solutions of the performance criteria, identified in *Planning for Bush Fire Protection* (NSW RFS 2019). The proposed measures go beyond the requirements for a non-residential building due to the establishment of an asset protection zone to the east, south and north of the proposed building.

Fire safety

A fire incident management review was undertaken for the project and fire protection equipment including a fire hydrant, detection and alarm system proposed for the site. The proposed fire protection system and stockpile layouts would be compliant with the requirements of FRNSW (2020a) *Fire Safety in Waste Facilities Guidelines* except where varied through consultation with FRNSW.

Hazards and risk

The preliminary hazard analysis (PHA) assessed risks associated to the onsite LPG station. LPG is classified as a Dangerous Good by the National Transport Commission (2020) *Australian Code for the Transport of Dangerous Goods by Road & Rail* (the Australian Dangerous Goods Code). No other dangerous goods are proposed to be stored or transported to the site that trigger SEPP 33 trigger values. The Level 2 PHA evaluation findings indicate that the computed risk level is below the suggested risk criteria for the adjacent land use as outlined in *Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning* prepared by the NSW Department of Planning (2011b). Therefore, the LPG tank would be acceptable subject to the proposed minimum clearance distances, detailed design and management measures.

Based on the findings of the air quality, noise, vibration and visual impact assessments, the project would not release a quantity of pollutant emissions to be considered ‘potentially offensive’.

Visual assessment

A visual assessment was undertaken which considered impacts on four groups of receptors including residential receptors, travellers on Flatrock Road and the user of the Shoalhaven Campus of the University of Wollongong. The impact of the visual receptors were determined to have a sensitivity of moderate or less due to the existing vegetation screening and limited interest in views towards the site or distance to the site reducing prominence of the views.

The magnitude of the impacts for the identified receptors was determined to be low or negligible due to limited visual accessibility and distance to the project. Consequently, the overall impact significance of the project at all identified receptors was considered to be low to negligible.

The building design and colour schemes would blend in the natural environment to reduce any significant visual impact on the community.

Socio-economic

A socio-economic assessment showed that the construction of the project would not impact on community use of the land in the surrounding area. There are no community facilities near the site such as schools, churches, child care centres, open space or recreational facilities. The project would complement existing waste related land uses at the adjacent site, and improve opportunities for resource recovery.

The project would also have a positive employment impact during construction and operation. The construction workforce is likely to include a maximum of 200 staff working across the entire span of the project delivery. Approximately 34 fulltime permanent positions are expected to be generated during operation.

The proposed new facilities are well located with few residential dwellings in close proximity to the site. The potential for negative amenity impacts would also be significantly reduced by the implementation of appropriate environmental management controls and design features.

Council is proposing to develop a future community education centre (as part of a separate proposal) to allow the local community to visit the site and learn about the resource recovery and waste management activities of the project and the adjacent landfill.

The increased diversion of waste from landfill would assist Council in reducing future financial liabilities associated with the waste and environment levy. This is because the project would reduce the volume of waste being disposed of to landfill and therefore reduce future waste levy payments made by users of the facility. In addition, the project would extend the life of the landfill at the West Nowra Recycling and Waste Facility and delay the need for a new landfill disposal site and/or the need to transport waste outside of the Shoalhaven.

Biodiversity

The construction and operation of the project would be undertaken subject to meeting the requirements of the Stage 1 Project Approval relating to site clearance and number and type of biodiversity credits. It is assumed that no biodiversity value would remain on site following Stage 1 site clearance and preparation works.

Vegetation management actions during Stage 1 would prevent additional clearing in adjacent lots, minimise additional indirect impacts on vegetation in adjacent lots and remove any movement corridors that may have existed on the site. No threatened species would occur on site following the clearing of vegetation in accordance with the Stage 1 Project Approval.

As such, a BDAR waiver request for the Stage 2 EIS was prepared and submitted to the Biodiversity and Conservation Division of DPIE. The Biodiversity and Conservation Division

determined that the project is not likely to have any significant impact on biodiversity values and therefore a BDAR is not required.

PROJECT JUSTIFICATION AND CONCLUSIONS

The justification for the project is based on a number of factors:

- The project is consistent with the objects of the EP&A Act
- The project is consistent with the strategic direction for waste management in NSW and at a national level
- The site is suitable
- The project is in the public interest
- The project is generally consistent with the requirements, development standards and environmental impact envelope of the Concept Proposal (SSD 7015)

The EIS concludes that many of the potential issues identified would be effectively managed through project design features. To manage residual issues, and in some cases eliminate them completely, a number of mitigation and management measures (commitments) would be undertaken. The construction and operation of the project would be undertaken in accordance with all relevant legislative guidelines.

This EIS has considered the objects of the EP&A Act, including the encouragement of ESD. The assessment integrates all significant economic and environmental considerations and seeks to avoid any potential serious or irreversible damage to the environment. Bioelektra and Council as part of Stage 1 has also considered a number of alternatives to the project (including the alternative of not proceeding) and is satisfied that the project is consistent with the objects of the EP&A Act.

This EIS has addressed the issues identified in the SEARs issued under Part 4 of the EP&A Act and the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

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Certification

Submission of environmental impact statement
Prepared under Part 4 of the *Environmental Planning and Assessment Act 1979*.

Environmental impact statement prepared by:

Name:	Anna Montgomery
Qualifications:	Bachelor of Engineering (Civil and Environmental)
Address:	Level 15, 133 Castlereagh Street Sydney NSW 2000

Responsible person:

Name:	Fred Itaoui Managing Director Bioelektra Australia
Address:	31/287 Victoria Road Rydalmere NSW 2116

Proposed development: West Nowra Resource Recovery Park Stage 2.

Address of the land on which the infrastructure to which the statement relates: Lot 342, deposited plan (DP) 257515.

Description of the infrastructure to which the statement relates:
The EIS relates to the construction and operation of Stage 2 of the West Nowra Resource Recovery Park on Lot 342 DP 27515 including waste reception hall and processing building and supporting infrastructure.

Environmental impact statement:
An environmental impact statement is attached addressing all matters in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979 (NSW)*.

Declaration: I certify that I have prepared the contents of this environmental impact statement in response to the Secretary's environmental assessment requirements dated February 2021 and the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. To the best of my knowledge the information contained in the environmental impact statement is not false or misleading.

Signature: 

Name: Anna Montgomery
Date: 03 June 2021

1. Introduction

1.1 Background

In 2016 Shoalhaven City Council (Council) sought approval for a Concept Proposal for a resource recovery park with a combined capacity of 130,000 tonnes per year (the West Nowra Resource Recovery Park). The Concept Proposal included:

- Stage 1 – clearing of land and provision of basic infrastructure on the nominated site, which would be undertaken by Council or contractors appointed by Council as part of early construction works.
- Stage 2 – construction and operation of a resource recovery park which would be undertaken by an alternative waste technology provider/facility operator, selected through a tendering process to provide the specialised resource recovery facilities.

Council sought Project Approval for Stage 1 as part of the same application.

A staged approach was adopted to enable Stage 1 to commence (subject to planning approval) while a contractor was appointed and the details of Stage 2 were determined via the tendering and design process.

Council received Concept Approval and Stage 1 Project Approval for the West Nowra Resource Recovery Park on 25 August 2016 (application number SSD 7015) (refer Appendix A). The approved Stage 1 works include:

- Demolition of the existing animal shelter
- Site preparation and clearing of the site
- Perimeter, entry/exit and service roads and line marking
- Installation of perimeter/boundary fencing
- Weighbridge and weighbridge office
- Staff and visitor car parking, including line marking
- Detention and sedimentation dams/basins
- Identification of asset protection zones

Council subsequently awarded Bioelektra Australia Pty Ltd (Bioelektra) with the contract for delivery of Stage 2 of the works.

Bioelektra now proposes to construct and operate an integrated resource recovery facility at the site as part of Stage 2 of the West Nowra Resource Recovery Park (the project) and has engaged GHD Pty Ltd (GHD) to prepare documentation to support an application for the project in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW) (the EP&A Act).

1.2 Project overview

The project involves constructing and operating a resource recovery facility with pre-treatment for mixed municipal waste of up to 130,000 tonnes per year, comprising:

- A waste reception hall
- A processing building for shredding and sterilisation operations using 16 autoclaves to pre-treat and sterilise the waste

- A materials recovery facility for sorting all processed waste minus organic matter separated from autoclave pre-treatment
- A boiler room, transformer hall and liquid petroleum gas (LPG) station supplying utilities and electricity for site operations

The project also includes ancillary infrastructure, including offices, amenities, staff and visitor parking, internal roadways, weighbridges and weighbridge offices, fencing, and a pumping station and firefighting tanks.

The Concept Approval (SSD 7015) included construction and demolition waste processing and an alternative waste treatment/materials recovery facility. However, construction and demolition waste processing is no longer proposed as part of the project. In addition, the waste processing technology proposed by Bioelektra includes sterilisation of waste through autoclaving and materials recovery through various sorting operations.

Other ancillary infrastructure not included as part of the Concept Approval (SSD 7015) but proposed as part of this project includes the boiler room, transformer hall, LPG station and pumping station and firefighting tank.

1.3 The proponent

Bioelektra Australia Pty Ltd, part of the Bioelektra Group, offers waste treatment and recovery solutions. The company separates waste and delivers biodegradable fractions, refuse derived fuel (RDF) fractions, metals, plastics, and glass items for recycling and recovery purposes. It sells biodegradable fractions, metals, plastics, glass items, and alternative fuel. The company was founded in 2007 in Warsaw, Poland with Bioelektra Australia founded in 2017.

1.4 Project location

The site on which the project is proposed (the site) is located on lot 342, deposited plan (DP) 257515 within the Shoalhaven local government area (LGA). The site, which is located in West Nowra approximately five kilometres to the west of the Nowra central business district, is accessed from Flatrock Road, off Yalwal Road (refer to Figure 4.1).

The site is adjacent to the existing West Nowra Recycling and Waste Facility and occupies an area of about 3.6 hectares, of which approximately 2.4 hectares would be developed as part of the project.

1.5 EIS purpose and structure

The project is State significant development by operation of Part 4, Division 4.7 of the EP&A Act and State Environmental Planning Policy (State and Regional Development) 2011. It is subject to approval by the Minister for Planning and Public Spaces or the Independent Planning Commission. This Environmental Impact Statement (EIS) has been prepared to support the application for approval of the project.

The EIS addresses the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment (the SEARs) dated February 2021 (refer to Appendix B). The EIS also addresses the EIS form and content requirements of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (the Regulation).

The EIS contains two volumes incorporating the main text within Volume 1 and appendices and specialist technical studies in Volume 2. Volume 1 includes:

- An introduction to the EIS (Chapter 1)
- An overview of the statutory framework and assessment requirements (Chapter 2)

- A description of stakeholder engagement undertaken during preparation of the EIS (Chapter 3)
- A description of the site and existing facilities (Chapter 4)
- An overview of the project need and alternatives considered (Chapter 5)
- A description of the project including plans of proposed works, the resource recovery processes, likely waste streams, classifications and quantities, construction activities and likely staging (Chapter 6)
- Identification and prioritisation of issues (Chapter 7)
- The results of assessment of key environmental issues identified by the SEARs (Chapters 8 to 17)
- A summary of proposed management and mitigation measures (Chapter 18)
- The conclusions and justification for the project including an evaluation of the project with regard to social, economic and environmental considerations and the results of the EIS (Chapter 19)
- References (Chapter 20)

Volume 2 contains the specialist technical/background reports prepared as part of the EIS process, supporting correspondence and consultation information.

2. Statutory framework

2.1 Approval requirements under the *Environmental Planning and Assessment Act 1979*

The EP&A Act and Regulation provide the framework for development assessment in NSW. The EP&A Act and the Regulation include provisions to ensure that the potential environmental impacts of a development or activity are rigorously assessed and considered in the decision-making process.

2.1.1 Permissibility

The project is permissible with development consent in accordance with the Shoalhaven Local Environmental Plan 2014 (the Shoalhaven LEP) (see section 2.2). As a result, it is subject to the approval and assessment requirements of Part 4 of the EP&A Act.

2.1.2 State significant development

Section 4.36(2) of the EP&A Act provides that a State environmental planning policy may declare any development, or any class or description of development, to be State significant development. The project is declared State significant development in accordance with State Environmental Planning Policy (State and Regional Development) 2011 (the State and Regional Development SEPP) (see section 2.2.3).

2.1.3 Approval authority

In accordance with section 4.5(a) of the EP&A Act the consent authority for State significant development is the Minister for Planning and Public Spaces or the Independent Planning Commission if the development is of a kind for which the Commission is declared to be the consent authority by an environmental planning instrument.

The Minister for Planning and Public Spaces would be the consent authority unless the conditions in clause 8A of the State and Regional Development SEPP are met (see section 2.2.3).

2.2 Application of relevant environmental planning instruments

2.2.1 Shoalhaven Local Environmental Plan 2014

The site is located in the Shoalhaven LGA and the relevant local environmental plan is the Shoalhaven Local Environmental Pan 2014 (the Shoalhaven LEP). The site is zoned SP2 – Infrastructure (Waste/Resource Management Facility) (see Figure 4.3).

The zone provisions provide that the purpose shown on the land zoning map, including any development that is ordinarily incidental or ancillary to development for that purpose, is permitted with consent.

Waste and resource management facilities are defined by the LEP in accordance with the Standard Instrument – Principal Local Environmental Plan (2006 EPI 155a) (the Standard Instrument) as follows:

waste or resource management facility means any of the following—
(a) a resource recovery facility,
(b) a waste disposal facility,
(c) a waste or resource transfer station,

(d) a building or place that is a combination of any of the things referred to in paragraphs (a)–(c).

A resource recovery facility is defined as:

… 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.

As the project involves separating, sorting and treating waste and temporary storage and transfer of recovered resources, it meets the definition of a resource recovery facility for the purposes of the LEP/Standard Instrument and is permissible with consent under the Shoalhaven LEP.

The objectives of the SP2 zone, and the consistency of the project with these objectives, are provided in Table 2.1.

Table 2.1 Consistency with zone objectives for SP2

Objective	Consistency/ discussion
To provide for infrastructure and related uses	The project involves constructing and operating a resource recovery facility, which is permitted use in this zone. Waste and resource recovery are essential infrastructure and are the nominated infrastructure use (i.e. Waste/Resource Management Facility) for this parcel of land.
To prevent development that is not compatible with or that may detract from the provision of infrastructure	The project is compatible with surrounding land uses, is consistent with the nominated use for this parcel of land, and would not detract from the provision of infrastructure in surrounding SP2 zoned areas.

2.2.2 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (the Infrastructure SEPP) clarifies the consent arrangements for infrastructure projects. According to clause 8(1) 'if there is an inconsistency between this Policy and any other environmental planning instrument, whether made before or after the commencement of this policy, this policy prevails to the extent of the inconsistency'.

Clause 121(2)(a) of the Infrastructure SEPP provides that development for the purposes of a waste or resource transfer station may be carried out by any person with consent on land in a prescribed zone. Prescribed zones are defined by clause 120 and include SP2 Infrastructure.

Clause 120 provides that '…waste disposal facility, waste or resource management facility and waste or resource transfer station have the same meanings as in the Standard Instrument'. As noted in section 2.2.1, the project meets the definition of waste and resource management facilities in the Standard Instrument.

There is no inconsistency between the LEP and Infrastructure SEPP in relation to the consent requirements for waste and resource management facilities. The consent requirements of the LEP prevail.

2.2.3 State Environmental Planning Policy (State and Regional Development) 2011

The aims of the State and Regional Development SEPP are to identify development that is State significant infrastructure and State and regionally significant development. The project does not meet the definitions of State significant infrastructure or regionally significant development.

Clause 8 of the State and Regional Development SEPP provides that development is State significant development, pursuant to section 4.36 of the EP&A Act, if:

- by the operation of an environmental planning instrument, it is not permissible without development consent under Part 4 of the Act, and
- it meets the definitions provided in Schedule 1 or 2 of the SEPP.

Clause 23 in Schedule 1 includes the following in the definition of waste and resource management facilities:

> *(3) Development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per year of waste.*

As the project is permissible with consent (see section 2.2.1) and meets the above definition (it for the purpose of a resource recovery facility and would handle more than 100,000 tonnes per year of waste) it is declared State significant development.

Clause 8A provides that the Independent Planning Commission is declared, under section 4.5(a) of the Act, to be the consent authority for State significant development applications:

- that are not supported by relevant council(s), or
- where the Department has received more than 50 unique public objections, or
- that has been made by a person who has disclosed a reportable political donation in connection with the development application.

2.3 Approval requirements under other legislation

2.3.1 Approvals that do not apply or have to be applied consistently to State significant development

In accordance with section 4.41(1) of the EP&A Act, the following approvals, which may have otherwise been required to undertake the project as State significant development, would not be required:

- *Fisheries Management Act 1994* (NSW) – permit for work or structures within a waterway under sections 201, 205 or 219
- *Heritage Act 1977* (NSW) – approval to disturb an item (under Part 4) or an excavation permit under section 139
- *National Parks and Wildlife Act 1974* (NSW) – an Aboriginal heritage impact permit under section 90
- *Rural Fires Act 1997* (NSW) – a bush fire safety authority under section 100B
- *Water Management Act 2000* (NSW) – a water use approval under section 89, a water management work approval under section 90, or an activity approval (other than an aquifer interference approval) under section 91.

Section 4.42(1) provides that the following potentially relevant approvals cannot be refused if necessary for the carrying out of an approved project and are to be substantially consistent with an approval to carry out the project:

- An environmental protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)
- A consent under Section 138 of the *Roads Act 1993* (NSW) (Roads Act).

The approval requirements of the POEO Act and Roads Act as they relate to the project are summarised in the following section.

2.3.2 Requirements under other NSW Acts and environmental planning instruments

Protection of the Environment Operations Act 1997

The POEO establishes, amongst other things, the procedures for issuing licences for environmental protection on aspects such as waste, air, water and noise pollution control. Environment protection licences are generally required for scheduled activities or scheduled development work.

The project meets the definitions of scheduled activities provided in Schedule 1 of the POEO Act, in particular clause 34 (resource recovery), as it would treat more than 30,000 tonnes of general waste per year. As a result, an environment protection licence would be required. Environment Protection Licence 20899 is held by Council and permits Scheduled Development Work for Stage 1 of the Resource Recovery Park. An application would be required to transfer this existing licence to Bioelektra (as permitted by the licence). Licence variation applications would also be required to permit Scheduled Development Work for Stage 2 and operation of Stage 2.

Roads Act 1993

Section 138 of the Roads Act provides that a person must not impact on, or carry out work on or over, a public road other than with the consent of the appropriate roads authority.

The project would not involve any works to public roads and approval under the Roads Act would not be required.

Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) aims to conserve biodiversity at a bioregional and state scale and lists a number of threatened species, populations and ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats.

An ecological assessment was undertaken in accordance with the requirements of relevant guidelines as part of the Stage 1 assessment, which assumed that all vegetation on the site would be cleared as part of Stage. The project would be undertaken subject to meeting the requirements of the Stage 1 Project Approval relating to site clearance and the number and type of biodiversity credits that would be provided. It is assumed that no biodiversity values would remain on site following Stage 1 site clearance and preparation works.

As such, a biodiversity development assessment report (BDAR) waiver request for Stage 2 was prepared and submitted to the Biodiversity and Conservation Division of the Department of Planning, Industry and Environment (DPIE). The Biodiversity and Conservation Division determined that the project is not likely to have any significant impact on biodiversity values and

therefore a BDAR is not required. A copy of the determination and approval of the BDAR waiver is provided in Appendix H.

Further detail is provided in section 17.3.

Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) specifies the duties of public and private landholders as to the control of priority weeds. Under this Act, priority weeds have been identified for local government areas and assigned duties for control. Part 3 provides that any person who deals with biosecurity matter (i.e. weeds) and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter has a duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.

The Stage 1 Project Approval authorises site preparation and clearing of the site. Construction and operation of the project (i.e. Stage 2 works) would be undertaken subject to meeting the requirements of the Stage 1 Project Approval relating to site clearance.

If present, priority weeds on the site would be assessed and controlled in accordance with the requirements of the Biosecurity Act.

Contaminated Land Management Act 1997

The general object of the *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and, where appropriate, remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment.

Under the CLM Act, OEH can issue investigation and remediation orders for sites that are considered to be contaminated. No such orders have been issued in relation to the site.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) requires developers and consent authorities to assess the hazards and risks associated with a proposed development before approval is given for construction and operation.

Under SEPP 33, a potentially hazardous industry means a development for the purposes 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. SEPP 33 requires developments that are potentially hazardous to have a preliminary hazard analysis (PHA) prepared to determine the risk to people, property and the biophysical environment at the proposed location and in the presence of controls.

A preliminary risk screening and a PHA have been prepared in accordance with SEPP 33. Results are provided in Chapter 16.

A potentially offensive development means a development for the purposes of an industry which, if the development were to operate without employing any measures to reduce or minimise its impact, would emit a polluting discharge in a manner which would have a significant adverse impact. Development that requires an environment protection licence is considered to be potentially offensive. However, by definition, if the level of offence is generally not considered to be significant if the relevant licences can be obtained.

An environment protection licence would be required to operate the project in accordance with the requirements of the POEO Act (refer to section 2.3.2). As a result it is considered to be a 'potentially offensive industry'. If the NSW Environment Protection Authority (EPA) considers that the project can be issued with the required licence, under the guidelines that apply to SEPP 33, the project is not likely to be considered to be an 'offensive industry'.

State Environmental Planning Policy No. 55 – Remediation of Land

The aims and objectives of *State Environmental Planning Policy No. 55* (SEPP 55) are to provide a state-wide planning approach to contaminated land remediation and to promote the remediation of contaminated land to reduce risk of harm.

SEPP 55 restricts consent authorities from issuing development consent on land that may be contaminated, unless the consent authority is satisfied that the land in question is suitable for development or would be suitable if the appropriate remediation was undertaken.

The aims and objectives of SEPP 55 are considered in Chapter 12, including the potential for the site to be contaminated and whether this presents any unacceptable risks to human health.

Draft Remediation of Land State Environmental Planning Policy

The preliminary site investigation (PSI) for contamination prepared for the site is consistent with the current SEPP 55.

An explanation of Intended Effect for the proposed new SEPP and draft Contaminated Land Planning Guidelines was put on exhibition from 31 January to 13 April 2018 with the intention to eventually repeal and replace the current SEPP 55. The draft SEPP has yet to be finalised and is subject to change.

The draft policy has made changes to the definitions of Category 1 and Category 2 remediation works, introduced a defined role for a Certified Environmental Practitioner for Site Contamination (CEnvP (SC)), and aligned the site investigation process with the *National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013, National Environment Protection Council* (ASC NEPM) (a NSW EPA approved guideline, which the draft SEPP states is "the core technical reference document for undertaking an assessment of site contamination in Australia").

The framework for the PSI for contamination for the site was developed in accordance with guidelines "made or approved" by the NSW EPA under the CLM Act, in particular, the ASC NEPM (NEPC 2013). The PSI report was also reviewed and approved by a CEnvP (SC), which aligns with proposed new roles and responsibilities outlined in the draft SEPP. On this basis, GHD considers that the investigations that have been undertaken are consistent with the requirements of the draft SEPP. Any future assessments, remediation and validation of contaminated land (as may be required) would be consistent with the draft policy or with similar policy that has been approved at the time.

The draft SEPP lists 16 new Classes that trigger Category 1 remediation works. The following is an example where two of the new Classes could apply to the site should the draft SEPP be introduced as it currently stands:

Based on the results of the PSI, the likelihood for the migration of landfill gas onto the site was assessed as moderate to high due to the proximity of the neighbouring landfill. Therefore, it was recommended that a landfill gas risk assessment is undertaken as part of the early design phase for the project. If remediation or management is required to address landfill gas issues, then development consent will also be required based on

- Class (e) remediation of a site affected by hazardous ground gas, and
- Class (m) remediation where a long- term environmental management plan is or will be required.

2.3.3 Requirements under Commonwealth legislation

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), 'actions' that are likely to have a significant impact on matters of national environmental significance, or a

significant impact on Commonwealth land, must be referred to the Australian Minister for the Environment for assessment. If the Minister determines that a referred proposal is a 'controlled action' under the EPBC Act, the approval of the Minister would be required.

A search of the EPBC Act protected matters online search tool was undertaken on 11 December 2020 for an area within a five kilometre radius of the site. The report indicated that:

- There are no world heritage properties in the vicinity of the study area
- There are no national heritage places in the vicinity of the study area
- The study area is not within the catchment of any wetlands of international significance (Ramsar listed wetlands)
- There are no Commonwealth marine areas in the vicinity of the study area
- There is the potential for four threatened ecological community to occur within or in the vicinity of the study area
- There is the potential for 74 threatened species to occur within or in the vicinity of the study area
- There is the potential for 52 migratory species to occur in within or the vicinity of the study area

The report also indicated that there are five Commonwealth lands and one Commonwealth Heritage Place in the vicinity of the site. None of these properties are located within the site or in close proximity and therefore no impacts are anticipated.

The project is not a nuclear action, nor does it involve a coal seam gas development or a large coal mining development. The project is not located within the Great Barrier Reef Marine Park.

The Stage 1 Project Approval authorises site preparation and clearing of the site. The construction and operation of the project (i.e. the Stage 2 works) would be undertaken subject to meeting the requirements of the Stage 1 Project Approval relating to site clearance and the number and type of biodiversity credits. It is assumed that no biodiversity values would remain on site following completion of the Stage 1 site clearance and preparation works.

Vegetation management actions during Stage 1 would prevent additional clearing in adjacent lots, minimise additional indirect impacts on vegetation in adjacent lots and remove any movement corridors that may have existed on the site.

The project is not expected to have any significant impacts on matters of national environmental significance within or in the vicinity of the study area. Therefore, a referral would not be required.

2.4 Assessment process and requirements

The key steps in the assessment process are described below.

2.4.1 Application and assessment requirements

As described in Chapter 1, Council received Concept Approval and Stage 1 Project Approval for the West Nowra Resource Recovery Park. Section 4.22(4) of the EP&A Act provides that the consent granted does not authorise the carrying out development on any part of the site concerned unless:

(a) consent is subsequently granted to carry out development on that part of the site following a further development application in respect of that part of the site, or

(b) the concept development application also provided the requisite details of the development on that part of the site and consent is granted for that first stage of development without the need for further consent.

In accordance with the requirements of section 4.22(4), this EIS has been prepared to support the development application for the Stage 2 works (described in Chapter 6).

Section 4.12(8) of the EP&A Act provides that a development application for State significant development must be accompanied by an EIS prepared in the form prescribed by the regulations. Clause 3(8) of Schedule 2 of the Regulation provides that an EIS needs to comply with any environmental assessment requirements that have been provided in respect of the development. The environmental assessment requirements detailed in the SEARs, together with where they are addressed by this EIS, are provided in Appendix B.

The form and content requirements for the EIS are defined by clauses 6 and 7 of Schedule 2 of the Regulation. These requirements, and how they are addressed by the EIS, are provided in Appendix C.

2.4.2 Public exhibition and submissions

If the EIS is considered to meet the SEARs, DPIE will place it on public exhibition for a minimum of 28 days and invite submissions. DPIE will provide the proponent with a copy or summary of the submissions received and may ask the proponent to respond to the issues raised.

2.4.3 Assessment and approval

Following the exhibition period, DPIE will, on behalf of the Minister/Independent Planning Commission, review the EIS and the submissions report. The matters that are taken into consideration when determining the application are defined in section 4.15(1) of the EP&A Act. An assessment of the project against these matters is provided in Chapter 19.

The Minister/Independent Planning Commission may refuse the project or approve it with such conditions and modifications as they may determine. The decision and the assessment report will be published on DPIE's Major Projects' website following determination.

3. Stakeholder engagement

3.1 Community and stakeholder participation plan

GHD developed a Community and Stakeholder Engagement Plan at the commencement of the project, which:

- Identified key stakeholders (as part of the SEARs)
- Identified directly impacted landholders
- Captured a project communication risk assessment
- Recommended an Engagement Action Plan

Having undertaken communications and engagement activities on behalf of Council in 2016, the engagement approach for this project was to build upon the knowledge and response to the Stage 1 work in 2016 and to develop an engagement program that was appropriate to the level of interest and impact within the community.

To successfully deliver appropriate community and stakeholder engagement, the following engagement objectives were adopted:

- Understanding the context of engagement activities (what was done previously, with who, the outcomes and gaps)
- Undertaking a robust stakeholder analysis to identify appropriate community members and agencies with an interest in the project and cross checking with those identified in the SEARs
- Carrying out engagement using a variety of both traditional and digital tools to ensure project information was available and accessible to all stakeholders, particularly during COVID-19 and any associated community restrictions
- Opening up communication channels between stakeholders and the project team through the implementation of a 1800 phone line and email address

A copy of the Community and Stakeholder Engagement Plan is provided in Appendix D.

3.2 Consultation with government agencies

Letters were sent to relevant government agencies requesting comment on any issues that should be addressed in the EIS. Agencies consulted included:

- Transport for NSW – Roads
- DPIE
- NSW EPA
- NSW Rural Fire Service (NSW RFS)
- Council

Responses/issues identified in government agency consultation and where each is addressed in the EIS is shown in Table 3.1. Correspondence between agencies is provided in Appendix D.

Table 3.1 Issues raised from government agency consultation

Agency/ stakeholder	Response/issue	Response/where addressed in the EIS
Transport for NSW – Roads	No response received	Not applicable
DPIE	Biodiversity and Conservation Division (BCD) of DPIE noted that BDAR Waiver has been issued, and therefore had no additional comments. The BCD noted that engagement with the EPA is still necessary.	Not applicable, refer below re: NSW EPA
NSW EPA	The NSW EPA requested a briefing. A briefing was provided on 2 November 2020. The NSW EPA noted the following key points for consideration:	
	• The EIS should provide a comprehensive air quality assessment. This should – identify odour sources, assess impacts and identify treatments and mitigation measures – include data from similar products e.g. Polish facility	Chapter 9
	• The EIS should describe how leachate and water will be managed – including a water balance that identified water demand, water reuse and disposal quantities	Chapter 11
	• The EIS should include details on contingency measures to be put in place to prevent contamination or receipt of wastes not permitted to be received	Section 8.3.8
	• The EIS should document the contamination requirements for any SRF/RDF products would be met – for example PVC	Section 8.3.8 and 8.5
	• The EIS should describe end-markets for each of the output/product streams	Section 8.3.7
	• The EIS should describe the waste process and technology in sufficient detail so that the NSW EPA can understand impacts from an environmental perspective	Section 8.3
Shoalhaven City Council	• The noise and vibration impacts to close sensitive receivers are expected to be minimal, however should be considered	Section 14
	• The EIS should outline the proposed wastewater management system	Section 11
	• The EIS should consider dust, sediment and erosion, leachate and pollution prevention and include the storage or any chemicals on site and hazard management	Section 9, 11, and 16.2.1
	• The EIS should include a bulk earthworks concept plan	Bulk earthworks part of site establishment work approved under Stage 1
	• The EIS should address traffic impacts and on site parking and manoeuvring requirements	Section 13
	• The stormwater management system and water quality targets should comply with the targets outlined in the Council's DCP Chapter G2. A	Section 11.3

Agency/ stakeholder	Response/issue	Response/where addressed in the EIS
	MUSIC model should be included to demonstrate pollutant removal effectiveness.	
NSW RFS	No response received	Not applicable

In addition, as part of the fire safety assessment, a meeting application was submitted to Fire and Rescue NSW (FRNSW) on 29 January 2021 to seek comment on the project including the proposed fire safety measures (see Chapter 15). A copy of the fire and incident management review (Appendix O) was provided to FRNSW as part of the application. A meeting with FRNSW was subsequently held on 18 May 2021. FRNSW indicated that it was generally happy with the proposed approach to fire safety and provided some recommendations for consideration during the next design stage.

3.2.1 Additional engagement activities

Additional engagement was undertaken following review of DPIE's review of the draft EIS, as summarised in Table 3.2.

Table 3.2 Statutory engagement activities and outcomes

Agency	Date	Response received	Comments
DPIE	7/04/2021	N/A	Teleconference with DPIE to discuss adequacy review and additional engagement requirements
Major Hazards Unit - DPIE	14/04/2021	N/A	Teleconference to confirm preliminary hazard assessment approach
Jemena Gas Networks	28/04/2021	Jemena acknowledged the project is more than 130 m from the Eastern Gas Pipeline but confirmed that the project falls within the measurement length. Jemena therefore advised that: • Bioelektra must engage with Jemena throughout design and construction, ensuring no additional protection or control measures are required by Jemena • Any change to the site footprint or scope must be submitted for review by Jemena • All work to be in accordance with Jemena's Design and Construction Guidelines (GAS-960-GL-PL-001) • Any HDD or blasting within the development site is advised to Jemena and risk assessed (as required). Jemena also clarified that at this stage, a formal Safety Management Study (SMS) risk assessment workshop will not be required and that a desktop risk assessment will be undertaken by its engineers. Once detailed design has been provided, Jemena will	These comments have been incorporated into the proposed mitigation measures for the project (see Section 16.3)

Agency	Date	Response received	Comments
		provide confirmation on this and may determine that an SMS is required.	

3.3 Consultation with the community, landholders and local residents

3.3.1 Information mail outs to directly impacted landholders

In order to capture feedback from landholders located in the vicinity of the facility, GHD hand-delivered project update letters to the property owners located within the area identified in Figure 3.1.

The letter provided property owners and residents with an update on the proposed plans for the project in the vicinity of their property and offered property owners a briefing with the project team. Recipients were provided the project team's 1800 phone line and email address to schedule a meeting.

These letters were hand-delivered to properties on 21 October 2020. GHD received no incoming phone calls or emails from these property owners.

Paper Size ISO A4
1:8,249

0 200 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park Stage 2

Directly impacted properties – letter distribution area

Project No. **12536311**
Revision No. **A**
Date **28 Jan 2021**

FIGURE 3.1

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Data source: Aerial imagery - Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Inset map - Geoscience Australia.
Created by: afoddy

3.3.2 Community update newsletter (wider community)

To seek feedback from the broader community surrounding the site in West Nowra, GHD prepared a project update newsletter, which was distributed to approximately 1,800 West Nowra residents located within a four kilometre radius of the facility location (Figure 3.2). The newsletter was issued to residents on 12 November 2020.

The newsletter included:

- A project update
- Information about Bioelektra and its technology
- An invitation to a community information session, with a link to register attendance

Contact information for the project team for the community to ask any questions

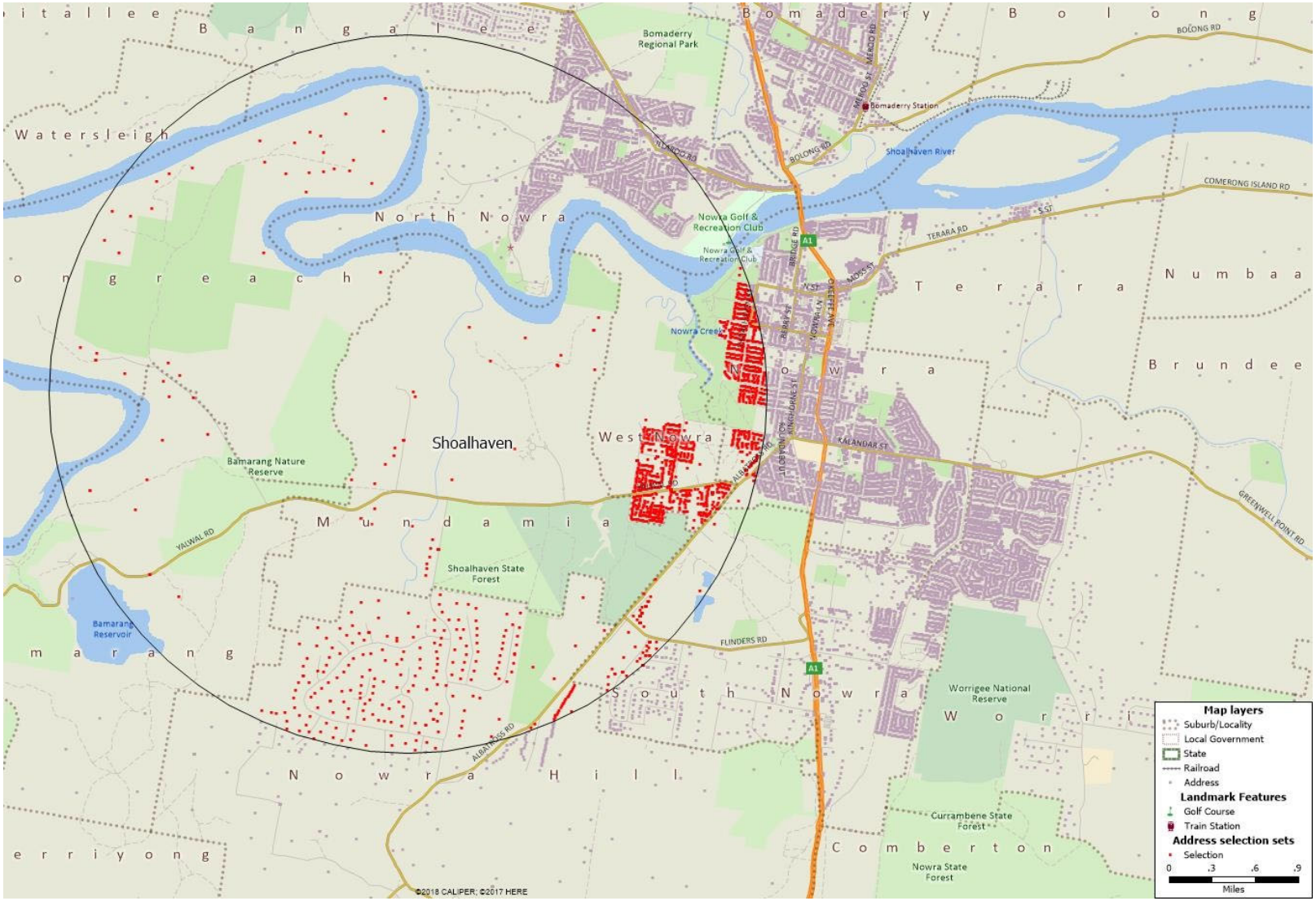


Figure 3.2 Newsletter distribution area

Source: Adpost Group (2020)

3.3.3 Information session

An in-person community information session was held on 25 November 2020, between 3 pm and 6 pm at the Committee Room in the Nowra Showground. The session was advertised via the community newsletter, distributed to over 1800 residents in the West Nowra area.

The purpose of this session was to:

- Provide a platform for the community to ask questions about the project
- Inform the local community about Bioelektra's technologies
- Seek feedback on the project for consideration in the EIS

To ensure staff and community attendees were kept safe, GHD took steps to ensure COVID-19 safe measures were in place. This included, physically distanced room set up, pre-registration for the session to manage incoming attendees and provision of hand sanitiser, face masks and disinfectant.

Prior to the session, three groups of attendees registered for a 30-minute timeslot at the information session. On the day of the session, two groups, three people in total, were in attendance.

During the session, the comments relating to the project were overwhelmingly positive. A range of questions were asked by participants, these are summarised in Table 3.3 along with responses or where further detail is provided in the EIS.

3.3.4 Submission issues and concerns raised

Key issues raised during the consultation activities with the community, landholders and local residents are shown in the following table and also provided in the community and stakeholder engagement outcomes report in Appendix E.

Table 3.3 Issues raised by community, landholders and local residents

	Enquiry/issue	Response/where addressed in the EIS
Community information session		
Raised at the community information session	Size and layout of the plant	A detailed description of the project is provided in Chapter 6, including the proposed size and layout.
	How materials are recycled and who were the on-sellers for the recyclable products	Bioelektra has agreements in place with a variety of manufacturers to receive the recovered materials from the project. Further details of the proposed destinations for the recovered materials are provided in Section 8.3.7.
	Project timing	The project is expected to commence operation in 2022.
	Service area for the project	The project would initially receive mixed municipal waste from the Shoalhaven local government area, but would also have capacity to receive waste from the wider region.
	Other similar facilities and their success	Bioelektra operates a similar facility in Poland and it has been operating successfully for several years now. This project would be the first of this kind in Australia.
	Alternative recycling technologies in Australia	A wide variety of recycling technologies are available in Australia. Bioelektra's technology

	Enquiry/issue	Response/where addressed in the EIS
		differs from conventional recycling in that it includes pre-treatment through autoclaving, which produces a relatively low moisture output stream. This output stream is clean and the low moisture content allows efficient and effective separation into component parts through leading edge recycling technologies. More detail on the technologies is provided in Chapter 6 and Section 8.
	How the site will be powered	The project would require electricity for operation. This would be sourced from the grid but a number of solar panels are proposed as part of the design which would assist with offsetting some of this power requirement. The autoclaves would use LPG to heat the boiler to produce steam. Further detail is provided in Section 6.4.
	Funding avenues for the project	The project is being funded through a variety of private investors. The project may also be eligible for a Federal or NSW Government grant and this would be investigating in due course.
	Impact of the project on Council rates	The project is not expected to have any direct impact on Council rates. The project would help divert waste away from landfill and reduce Council waste and environment levy liabilities into the future.
	Opportunities for collaboration with other south coast industries such as the University of Wollongong	Bioelektra has agreements in place with a number of manufacturers to receive the recovered materials from the project. However, it is always interested in further opportunities for collaboration, particularly local south coast industries and would explore any opportunities that arise.
	How does the recycling product the plant creates get recycled?	Bioelektra has agreements in place with a variety of manufacturers to receive the recovered materials from the project. These external manufacturers would turn the recovered materials into various products. Further details of the proposed destinations for the recovered materials is provided in Section 8.3.7.
Directly affected residents and landholders		
Incoming phone calls or emails	None	Not applicable.
Wider community (responses to newsletter)		
Incoming phone call (1800 line)	Would like to know more about how waste is turned into energy.	Confirmed the facility generates products that can be recycled. Directed caller to Bioelektra's webpage via email.
	Is there an opportunity for Bioelektra to partner with local hospitals to aid in recycling of medical waste?	Enquiry forwarded to Bioelektra to manage directly.
Information session registration	x3 registrations using Microsoft Forms	Confirmation phone call or email issued.

3.4 Approach to future community and stakeholder engagement

Bioelektra proposes develop an ongoing community and stakeholder engagement program. The program would include:

- Regular project update letters to directly affected residents/landowners (Figure 3.1)
- Regular project update newsletters to the project catchment area (Figure 3.2)
- Regular briefings/meetings with the NSW EPA and Council
- Use of Council's Have Your Say page
- Regular updates on the Bioelektra website
- Engagement with the community, schools and the University of Wollongong as a way to support education around waste reduction, sustainability, waste management, resource recovery and use of recycled materials by industry – including offering educational workshops and tours of the operational facility

Updates would occur at key project milestones such as exhibition of the EIS, prior to construction commencing, key construction milestones and at commencing of operation. Engagement with the community, schools and the University of Wollongong would be ongoing during operation.

4. Description of the site

4.1 Site location and ownership

The site is approximately five kilometres to the west of the Nowra Central Business District and is accessed from Flatrock Road, off Yalwal Road in Mundamia (refer to Figure 4.1).

The site is adjacent to the existing landfill and is located on an approximate 3.6 hectare parcel of land (Lot 342 DP 257515), which is owned by Council.

4.2 Site description

The location of key features on the site are shown on Figure 4.2. The land is currently occupied by an animal shelter and associated buildings (Photo 4.1) which have been decommissioned (are non-operational). The majority of it is cleared with some small paddocks around the kennels (Photo 4.2). The current entrance to the site is currently off Flatrock Road. There is a small carpark in front of the animal shelter building.

Other buildings and features near to the former animal shelter include:

- Stockyards and carports - located north west of animal shelter
- A single storey Colorbond® cladded building with corrugated iron roof, located on the northern side of the main animal shelter complex. The cladded building was in a better structural condition to the other buildings onsite and likely newer. This building was locked at the time of a site walkover conducted by GHD on 19 August 2020, however at the time it appeared to have wooden bird boxes stored inside.
- Two concrete slabs, thought to be the location of the former residence and another unknown structure, located approximately 50 to 60 metres west of the animal shelter complex (Photo 4.4)
- Shipping containers stored on a concrete slab where a former residence was located and north-west of the main animal shelter complex
- Several small fenced grassed paddocks, raised absorption beds and absorption trenches

Photo 4.1 Main animal shelter building and car park

Photo 4.2 Rear of animal shelter with holding yards

Photo 4.3 Colorbond cladded building

Photo 4.4 Concrete slab and locked containers

There is approximately 0.5 ha of relatively intact (though degraded) vegetation in the south of the lot where the site fronts Flatrock Road (Photo 4.5). The north western portion of the site comprises open grassy paddocks, framed by denser vegetation (Photo 4.6).

Photo 4.5 Vegetation in the south of the site

Photo 4.6 Open grassed areas in the north west of the site

Around the boundaries and scattered over the northern half of the land are numerous remnant and regrowth Scribby Gums (*Eucalpytus sclerophylla*) and Red Bloodwood (*Corymbia gummifera*) with small areas of native shrubs and occasionally mown or slashed vegetation (Photo 4.7).

Much of the northern section of the site is covered in young thick vegetation, possibly regrowth from former clearing. The central part of the site is mostly densely grassed with some earthen mounds (Photo 4.8).

Photo 4.7 Typical vegetation around the edges of the northern part of the site

Photo 4.8 Grassed area in the central part of the site

There are three livestock dams located throughout the middle and northern portions of the site.

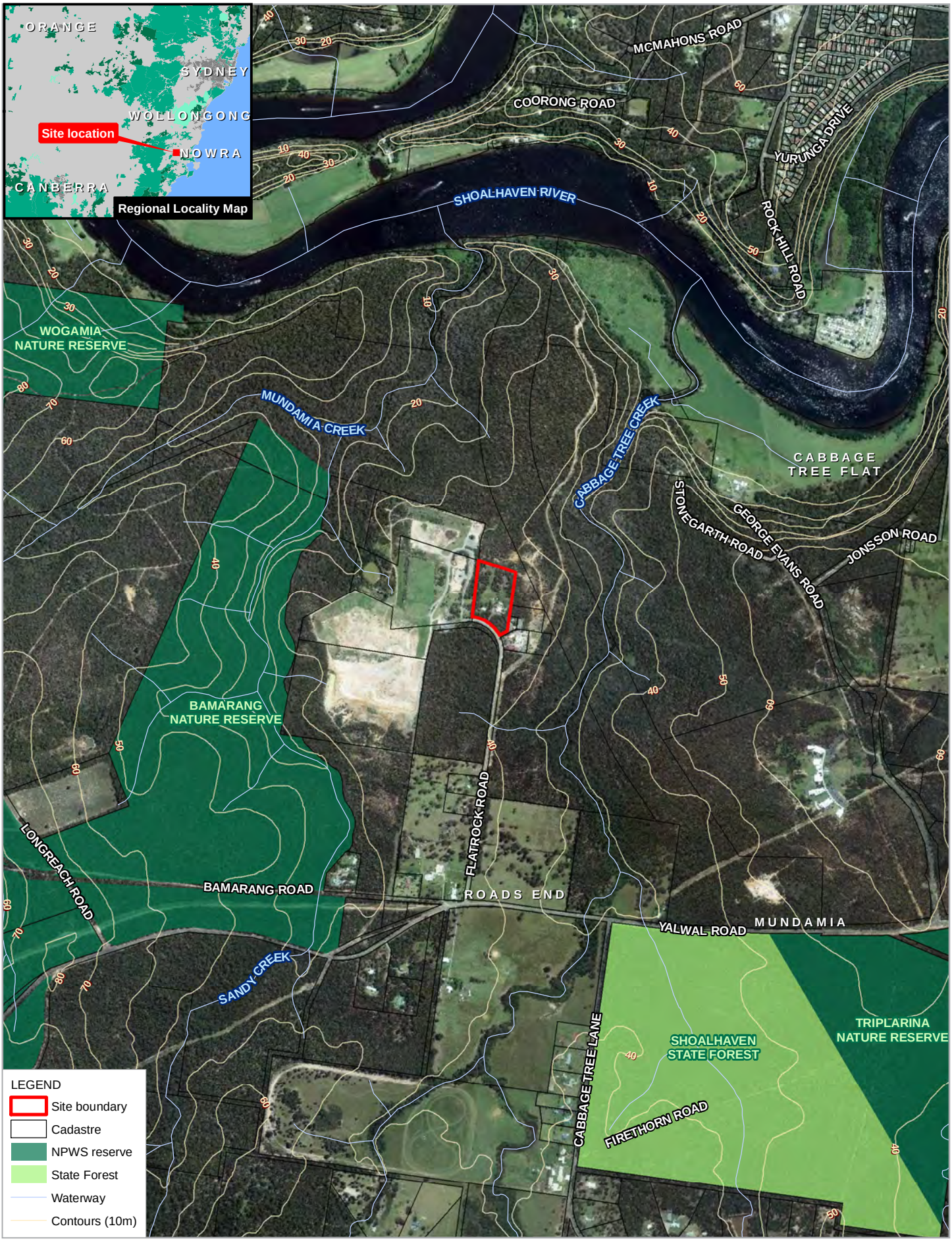
4.3 Surrounding land uses

The surrounding land uses are shown on Figure 4.3. A small number (approximately six) of rural residential properties are located approximately 700 metres south of the site and a rural residential property located approximately 900 metres to the north east. The Shoalhaven Campus of the University of Wollongong is located approximately 1.3 kilometres to the south-east.

The existing West Nowra Recycling and Waste Facility is immediately to the west of the site.

The DPIE West Nowra Office is located immediately to the southeast.

The remaining land to the north and east of the site is undeveloped bushland – primarily the Bamarang Nature Reserve and/or land owned by the Nowra Local Aboriginal Land Council and the Council.



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Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park Stage 2

Site **Location**

Project No. 12536311
Revision No. -
Date 28 Sep 2020

FIGURE **4.1**

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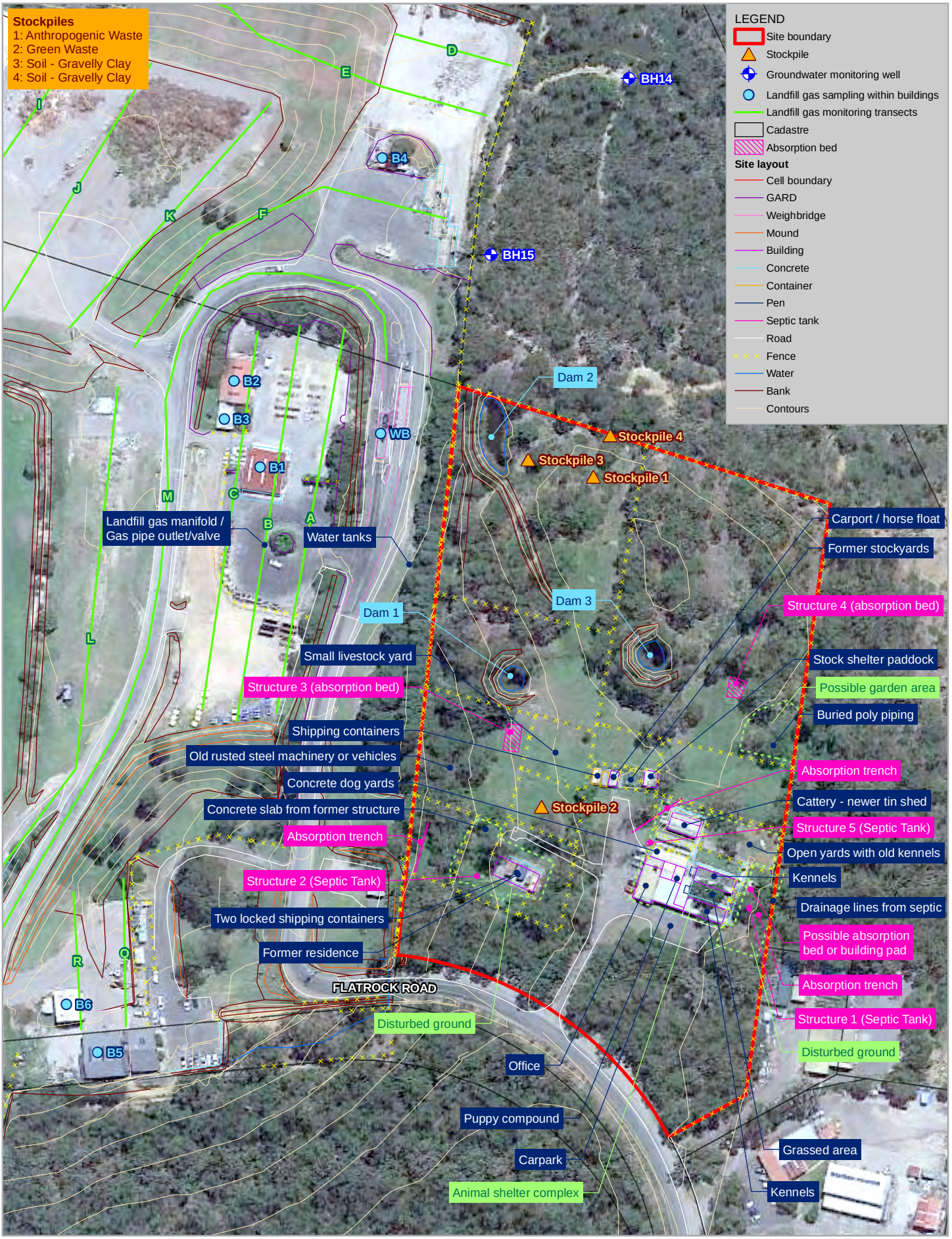
Data source: Aerial imagery - Sixmaps 2020 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Inset map - Geoscience Australia. Created by: jrprice



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Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park Stage 2

Site Features

Project No. 12536311
Revision No. -
Date 28 Sep 2020

FIGURE 4.2

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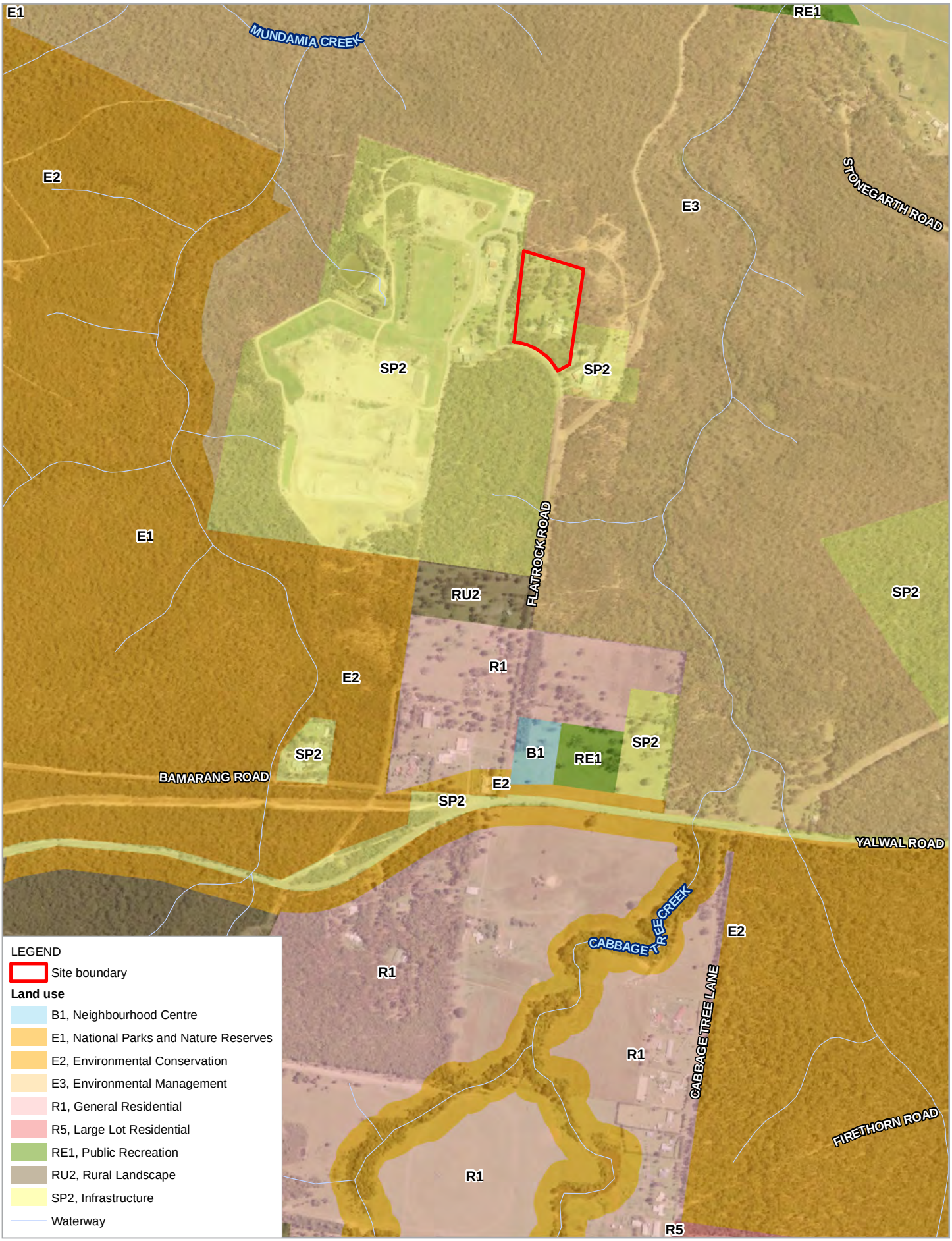

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GHD

Bioelektra Australia Pty Ltd
West Nowra Resource Recovery
Park Stage 2

Project No. 12536311
Revision No. A
Date 28 Jan 2021

Zoning and surrounding land uses

FIGURE 4.3

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Data source: Aerial imagery - Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Inset map - Geoscience Australia.
Created by: afoddy

5. Project need and alternatives

5.1 Strategic context

5.1.1 Objectives

Council is striving to become a leader in the recovery of recyclable materials from the waste stream, and to minimise the quantities of waste disposed to landfill by re-using and processing waste types that would normally end up in landfill. To help assist it to achieve this goal, it appointed Bioelektra to deliver the project.

The objectives of the project are to:

- Reduce the amount of waste requiring landfill disposal, and thereby extend the life of the landfill at the West Nowra Recycling and Waste Facility, to allow it to continue to serve the local community's waste disposal needs further into the future.
- Improve resource recovery rates in line with the objectives of the NSW *Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a) and the NSW *20-Year Waste Strategy* (draft), which include targets for diverting more waste from landfill and increasing recycling.

5.1.2 National Waste Policy

In 2018, the Australian Government updated the previous 2009 National Waste Policy: *Less Waste, More Resource*. The *2018 National Waste Policy* (DEE 2018) provides a national framework for waste and resource recovery in Australia and outlines the responsibilities for collection action by businesses, governments, communities and individuals until 2030. The policy embodies a circular economy and identifies five overarching principles for waste management in a circular economy, which include:

- Avoid waste:
  - Prioritise waste avoidance, encourage efficient use, reuse and repair
  - Design products so waste is minimised, they are made to last and we can more easily recover materials
- Improve resource recovery:
  - Improve material collection systems and processes for recycling
  - Improve the quality of recycled material we produce
- Increase use of recycled material and build demand and markets for recycled products
- Better manage material flows to benefit human health, the environment and the economy
- Improve information to support innovation, guide investment and enable informed consumer decisions

Overall, the policy aims to apply circular economy principles improved waste management in Australia and align with Australia's obligations to the *United Nations Sustainable Development Goals*.

The project would:

- Manage waste as a resource
- Deliver economic, environmental and social benefits
- Contribute to sustainability, innovation and employment opportunities

The project is therefore consistent with the aims and objectives of the 2018 National Waste Policy (DEE 2018).

5.1.3 NSW strategic planning drivers

The NSW strategic policy framework for waste management incorporates policy to drive waste reduction and resource recovery. The framework has been strengthened with legislation to streamline development of waste management infrastructure, and a strategy to provide for increasing resource recovery and reducing toxicity in products.

Draft NSW 20-Year Waste Strategy

Between 8 March 2020 to 8 May 2020, the NSW Government sought public consultation on the *Cleaning Up Our Act: The Future for Waste and Resource Recovery in NSW* (NSW EPA 2020a) issues paper. The purpose of this public consultation was to seek feedback from community and industry to develop the draft *20-Year Waste Strategy* that will present a proposed package of actions for implementation. The issues paper sets out the case for action and outlines a range of options to support the shift towards a circular economy.

The issues paper (NSW EPA 2020a) outlines options for the four key alignment directions of the *20-Year Waste Strategy* which are to:

- Generate less waste
- Improve collection and sorting
- Plan for future infrastructure
- Create end markets

NSW Waste Avoidance and Resource Recovery Strategy 2014-21

A state-wide waste avoidance and resource recovery strategy is prepared every five years to address this priority. The latest strategy is the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a), which provides the framework for maximising conservation of natural resources and minimising environmental harm from waste management and disposal of solid waste. The strategy proposes long-term directions for waste in NSW and includes targets for:

- Avoiding and reducing waste generation
- Increasing recycling
- Diverting more waste from landfill
- Managing problem wastes better
- Reducing litter
- Combating illegal dumping

Relevant to the project are the following targets:

- By 2021-22, increase recycling rates for:
  - Municipal solid 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%
- By 2021-22, increase waste diverted from landfill from 63% (in 2010-11) to 75%

The project would assist in achieving the increased recycling rates and landfill diversion targets listed above. The project is consistent with the *NSW Waste Avoidance and Resource Recovery*

Strategy 2014-21 (NSW EPA 2014a) as it is built around the diversion of mixed municipal waste.

Waste Less Recycle More

The NSW Government *Waste Less, Recycle More* initiative was extended to guarantee funding from 1 July 2017 to 2021 to continue work already underway to modernise the waste section in NSW. The four-year extension provides a further $337 million worth of funding for business recycling, organics collections, market development, managing problem wastes, new infrastructure, research and development, local councils and programs to tackle illegal dumping and litter.

The 2017-2021 *Waste Less, Recycle More* funding priorities and allocations are as follows:

- Local government waste and resource recovery – $70 million
- Illegal dumping prevention and waste enforcement – $65 million
- Household problem wastes – $57 million
- Waste and recycling infrastructure – $48 million
- Organics infrastructure – $35.5 million
- Litter prevention and enforcement – $30 million
- Business recycling – $22.5 million
- Recycling innovation – $5 million
- Heads of Asbestos Co-ordinating Authorities - $4 million

The project has waste and recycling infrastructure and therefore aligns with the priorities of the *Waste Less, Recycle More* initiative. The project may be eligible for a grant under one of the funds in this program.

5.1.4 Regional drivers

Illawarra Shoalhaven Regional Plan 2036

The *Illawarra Shoalhaven Regional Plan 2036* (DPE 2015) was developed in 2015 and applies to the Local Government Areas of Kiama, Shellharbour, Shoalhaven and Wollongong.

The regional plan sets a vision for the Illawarra Shoalhaven region to build a sustainable future and a resilient community, capable of adapting to changing economic, social and environmental circumstances.

To achieve this vision, four goals have been set out:

- To provide a variety of housing choices, with homes that meet needs and lifestyles
- Consist of communities that are strong, healthy and well-connected
- Make appropriate use of agricultural and resource lands
- Protects and enhance the natural environment

One of the actions stated in the regional plan is to develop sufficient long-term waste management capacity as the population and development of the region increases. The project is consistent with this strategic action as it would provide large scale capacity for processing mixed municipal waste from the Illawarra-Shoalhaven region.

Draft Illawarra Shoalhaven Regional Plan 2041

The draft updated *Illawarra Shoalhaven Regional Plan 2041* (DPIE 2020) has been prepared to guide strategic planning and land use decisions in the region for the next 20 years. It is the first regional plan to undergo a five-year review to reset priorities and ensure continued progress for the Illawarra Shoalhaven region. The draft was exhibited between 2 November 2020 to 17 December 2020.

Objective 16 identifies that resource optimisation is priority for the Illawarra Shoalhaven's councils. Specifically, Strategy 16.1 is as follows:

> *"Support the development of a circular economy including understanding opportunities for industrial symbiosis in local strategic planning and waste management strategies."*

The project would recovery a variety of valuable resources from the waste stream that would otherwise have been landfilled. These resources would be transported offsite and then used to manufacture new products. This is consistent with Strategy 16.1 and the overall objectives of the draft updated *Illawarra Shoalhaven Regional Plan 2041* (DPIE 2020).

Southern Region Waste Program - Regional Waste Avoidance and Resource Recovery Strategy 2017-21

The *Regional Waste Avoidance and Resource Recovery Strategy 2017-21* (Jacobs 2017) is a regionally coordinated strategy for its participating councils of Wollongong, Shellharbour, Kiama, Shoalhaven and Wingecarribee. The strategy was developed under the funding of the *Waste Less, Recycle More* initiative. The main strategic themes of the regional strategy are aligned with the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a). It contains a number of strategic themes:

- Theme 1 – Waste avoidance and reduction
- Theme 2 & 3 – Increase recycling and divert waste from landfill
- Theme 4 – Manage problem wastes better
- Theme 5 – Reduce litter
- Theme 6 – Reduce Illegal dumping
- Theme 7 – Improve regional governance

The project is consistent with Themes 2, 3 and 4 as it would appropriately manage mixed municipal waste and increase recovery of materials that would otherwise have been landfilled.

Shoalhaven City Council Waste Reduction Management Strategy 2017/18 to 2021/22

The Shoalhaven City Council (2017) *Waste Reduction Management Strategy* has four main drivers:

- The NSW WARR Strategy 2014-21 to "enable the whole NSW community to improve environment and community well-being by reducing the environmental impact of waste, and using resources more efficiently"
- The requirement under the local government act to have a long term focus on the *Community Strategic Plan 2020* and "address key issues relating to social, environmental, economic and civil leadership objectives"
- Limited lifespan of the West Nowra Landfill Facility
- Population growth dynamics forecasted for the Shoalhaven region

The project aligns well the strategy as it would help address the issue of the limited lifespan of the West Nowra landfill, as well as reduce the environmental impact of waste through increased resource recovery.

Current services

Council currently provides a combination of collection and disposal services to residents including a weekly kerbside collection service for waste and a fortnightly service for recycling. There are two landfills with transfer stations and eight recycling and waste transfer depots throughout the local government area which provide convenient access for drop-off waste and recycling. Some separated recyclable materials can be delivered to these depots free of charge and there are reduced fees for other separated materials.

While there is no regular kerbside collection service for organics, there is an on-call kerbside service for green waste and/or bulky waste for a nominal charge, provided by Council. In addition, two no-charge tipping vouchers are provided to ratepayers each year.

The project would not change the kerbside collection service types or frequency provided by Council.

West Nowra landfill life

There are currently two landfills in the local government area: the Huskisson landfill and West Nowra landfill (located at the West Nowra Recycling and Waste Facility). Huskisson landfill only accepts general solid waste (non-putrescible).

The West Nowra landfill is the only general solid waste (putrescible) landfill in the Shoalhaven Region. Based on carrying on operations at the current rate of disposal and current landfill design, the landfill is projected to reach full capacity in 2026. In May 2020, Council received approval for the extension of the West Nowra landfill into adjacent land. Based on current landfilling rates, the extension is expected to provide additional landfill capacity to service the Shoalhaven local government area up to 2034, and would commence operation from approximately 2026 (Arcadis 2019).

Section 88 waste and environment levy

The NSW Government, under section 88 of the POEO Act, applies the waste and environment levy to every tonne of waste delivered to certain licenced waste facilities in NSW. This levy increases every year. The 2020-21 landfill levy rate for metropolitan areas, which includes the Shoalhaven local government area, is $146.00/tonne. It is scheduled to rise by CPI each year. The cost of the levy now exceeds the underlying cost of landfill disposal.

The levy is designed to encourage resource recovery and recycling of waste. It is generally added to the disposal charges set by facility operators. It provides businesses, councils and individuals an incentive to reduce the amount of waste generated, and encourages them to seek alternatives to landfill disposal. A deduction from the waste levy may be claimed for waste subsequently transported from the site to another facility for processing, recovery or recycling or offsite for other lawful activity after being processed, recovered or recycled on site.

Increased diversion of waste from landfill would assist Council to reduce future financial liabilities associated with the levy. The project would reduce the volume of waste being disposed of to landfill and therefore reduce the future levy payments of Council.

5.2 Benefits

Overall the project would:

- Divert valuable resources from landfill and increase recovery and recycling of resources from the waste stream
- Extend the life of the West Nowra landfill to allow it to continue to serve the local community's waste disposal needs further into the future
- Contribute to the achievement of the targets for increased recycling and landfill diversion in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a) and Draft *NSW 20-Year Waste Strategy*
- Provide benefits through development of a new industry and new employment opportunities in the Shoalhaven

The project would also have other flow on benefits such as (Wright 2008):

- The recovery of more resources may in turn reduce greenhouse gas emissions both at the landfill and in the manufacture of replacement products
- The promotion and leadership in non-metropolitan waste management initiatives
- Reduction of the impact on the environment through the extraction of material that could otherwise be recovered

5.3 Site selection

The West Nowra landfill at the West Nowra Recycling and Waste Facility is the only licensed general solid waste (putrescible) landfill within the Shoalhaven local government area and is centrally located in relation to the main population and growth centre of Nowra as well as close to the Princes Highway.

One alternative considered by Council in the early planning stages was to locate the resource recovery park at the Huskisson landfill site. This is some 25 kilometres from the existing waste facilities at West Nowra and would create major inefficiencies for Council and any resource recovery park staff due to travelling distances required to access the landfill.

It was therefore considered essential that the resource recovery park be located immediately adjoining or close to the existing West Nowra Recycling and Waste Facility. This would enable users and staff to access the landfill and stockpile sites and take advantage of its central location and proximity to major transport routes (Princes Highway).

Other nearby Council owned land located adjacent (across the road) to the site (Lot 1 DP1104402) was previously identified and considered for the development of the West Nowra Resource Recovery Park. This other land was identified for potential future landfilling. It was also further away from existing recycling and public waste receival areas.

The site was therefore identified as the preferred location.

5.4 Alternatives considered

The *West Nowra Landfill Extension – Environmental Impact Statement* (Arcadis 2019) included modelling to assess the life expectancy of the West Nowra landfill under four scenarios.

Two of the scenarios modelled by Arcardis (2019) included:

- Scenario 4: Existing West Nowra landfill and landfill extension, without the West Nowra Resource Recovery Park

- Scenario 3: Existing West Nowra landfill and landfill extension, with addition of the West Nowra Resource Recovery Park commencing operation in 2021

The West Nowra Landfill Extension was approved on 11 May 2020. Therefore, for this project, Scenario 4 represents the 'Do-nothing' (or base case) option and Scenario 3 represents how the project could further extend the life expectancy of the West Nowra Recycling and Waste facility.

Under the 'Do-nothing' scenario, the modelling by Arcadis (2019) predicts that the capacity of the landfill at the West Nowra Recycling and Waste Facility will be reached by approximately 2034 (as shown in Figure 5.1).

Figure 5.1 Landfill life expectancy – 'Do-nothing' option

Source: Arcadis (2019)

The modelling also showed that, with addition of the West Nowra Resource Recovery Park, the life of the landfill at the West Nowra Recycling and Waste Facility could be extended by an additional ten years (to 2044) compared to the 'Do-nothing scenario' (as shown in Figure 5.2).

This was based on a number of assumptions including that operation of the West Nowra Resource Recovery Park would commence in 2021 with a diversion rate of 40% in the first year, 50% in the second year and 60% for the following years.

The diversion rate of the project is expected to be higher that these adopted assumptions (as discussed in Chapter 8) and therefore, the life of the landfill at the West Nowra Recycling and Waste Facility is more likely to be extended even further as a result of the project.

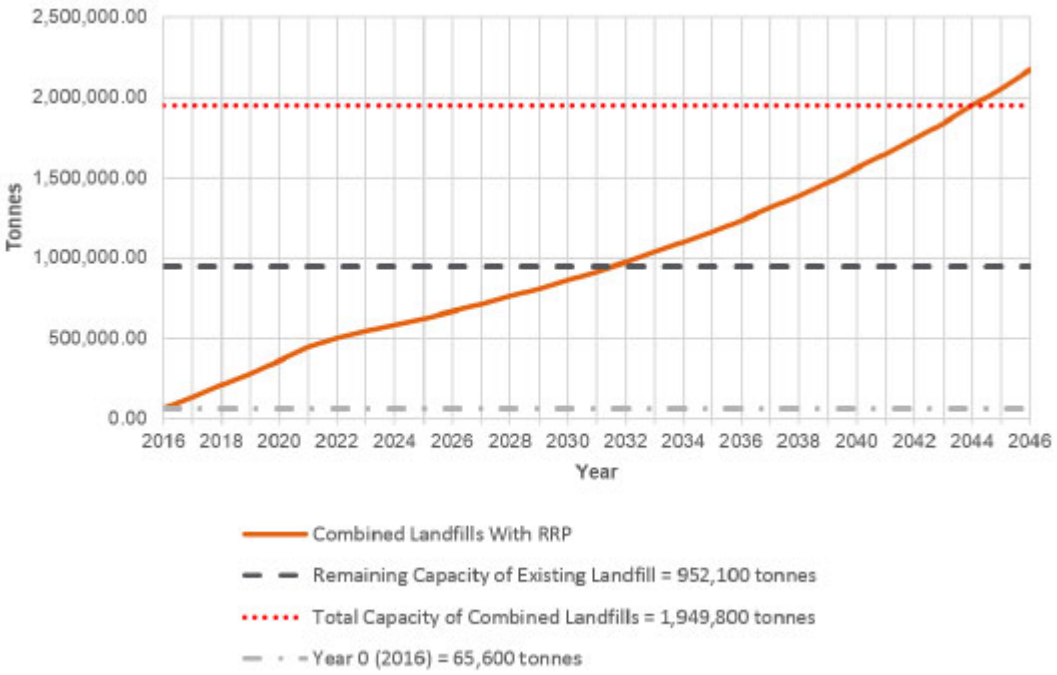


Figure 5.2 Landfill life expectancy – with the project

Source: Arcadis (2019)

The alternative, if the project did not go ahead (i.e. the 'Do nothing' scenario), would mean that the benefits identified in Section 5.2 would not be realised.

6. Project description

6.1 Overview

The project is defined as the construction and operation of a resource recovery facility with pre-treatment for mixed municipal waste of up to 130,000 tonnes per year, comprising:

- A waste reception hall
- A processing building for shredding and sterilisation operations using 16 autoclaves to pre-treat and sterilise the waste
- A materials recovery facility for sorting all processed waste minus organic matter separated from autoclave pre-treatment
- A boiler room, transformer hall and LPG station supplying utilities and electricity for site operations

The project also includes ancillary infrastructure including offices, amenities, staff and visitor parking, internal roadways, weighbridges and weighbridge offices, fencing, and a pumping station and firefighting tanks.

An assessment of consistency of the project with the Concept Proposal is provided in Section 19.1.6.

6.2 Proposed facilities and infrastructure

6.2.1 Site layout

The proposed site layout is presented in Figure 6.1. Further concept design drawings are provided in Appendix F.

The buildings and infrastructure and ancillary components are detailed in the following sections.

BASED ON PROPOSED SITE PLAN PREPARED BY BECA, DATED MARCH 2019 (REF: 2440823-ar-0501-a) AND AMENDED BY GHD TO RELOCATE LPG STATION, ADJUST COVERED HOLDING BAYS AND INTERNAL ROAD ALIGNMENTS AND REMOVE TRANSFER STATION.

Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park Stage 2

Site Layout

Job Number 12536311
Revision A
Date December 2020

Figure 6.1

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Plot Date: 11 December 2020 - 2:31 PM Plotted by: Daniela Taylor Cad File No: Drawing1.dwg

6.2.2 Waste reception hall and processing building

The waste reception hall and processing building would comprise an enclosed structure placed on a slab-on-ground. The building would have a floor space of approximately 10,775 square metres, sufficient for the proposed 130,000 tonnes per year throughput. The building roof elevation would be approximately 12.3 metres to 16.6 metres high. Architectural building elevation plans are provided in Appendix F.

An indicative layout of the waste reception hall and processing building is shown in Figure 6.2. The material movement and plant and equipment configuration is shown in Figure 6.3. The layout would be finalised during detailed design.

Vehicles would enter and exit the reception hall via roller doors on the eastern side of the building. Further details on vehicle movements is provided in Chapter 13. There would be two unloading areas for the incoming waste material with concrete push walls. The floor would be graded to facilitate cleanout and drainage of the waste reception hall. The incoming material would be fed by front end loader into a preliminary shredder and dosing bunker located on the western side of the hall prior to transfer via conveyor to the sterilisation hall.

The autoclave loading system in the sterilisation hall would consist of mobile reversible conveyors and designed movable decks to allow movement of the entire conveyor to the loading hatches of the tanks. The autoclave system would comprise a series of 16 closed tanks. Once the sterilisation cycle is complete, the material would be automatically loaded onto the discharge feeder. A control room of approximately nine square metres would be located within the sterilisation hall to allow observation and monitoring of the processing activities.

The sterilised material would be transferred to the stabilisation hall by conveyor along the western side of the building above the boiler room. The stabilisation hall would include a series of feed hoppers.

The segregation and sorting area would be located adjacent to the stabilisation hall with entrances on the eastern and northern side of the building. This area would house mechanical sorting equipment. The stabilised material would be loaded onto a conveyor belt to be fed into the automated sorting system.

A series of twelve covered external material output bays would be located along the eastern and northern side of the building. Recovered material including polyethylene terephthalate (PET), polypropylene (PP), low-density polyethylene (LDPE), high-density polyethylene (HDPE), plastic mix, polyvinyl chloride (PVC), biomass, refuse derived fuel (RDF), glass, metals (ferrous and non-ferrous) and aggregate would be stored in containers and dispatched from the external storage bays. Conveyor belts would transfer the material directly from the sorting area to the storage containers.

An elevated enclosed viewing deck would be located along the western side of the building with glass windows that would allow for observation of operational activities within the processing building. The viewing deck would be accessed internally from the second floor of the building.

A ventilation system would be installed in the processing building comprising two lots of four off roof ventilation fans mounted on the roof. These would place the segregation and sorting area and sterilisation hall under negative pressure. The stack on the fan discharge would reach a height of approximately three metres above the peak of the roof.

A process air extraction system would also be in place where the screens and dosing bunker conveyor are located, to collect dust emissions. The dust collector located between the sorting area and sterilisation hall above the boiler room would exhaust air outside the building.

Further detail on the proposed technology, plant, equipment and waste treatment process is provided in Chapter 8.

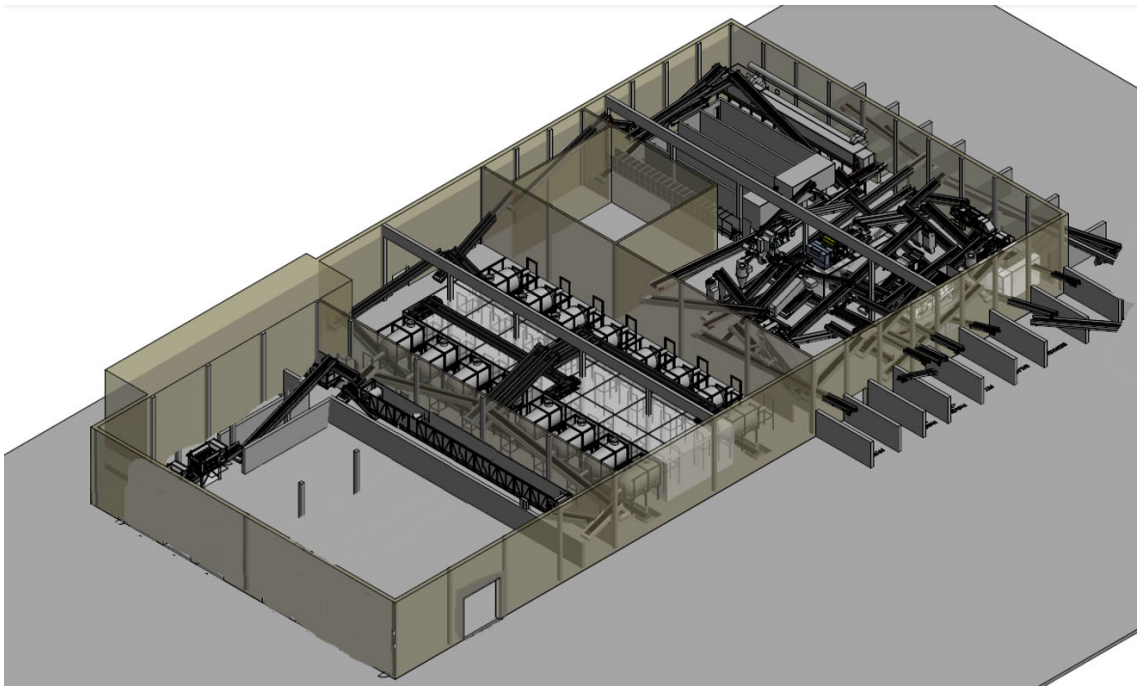
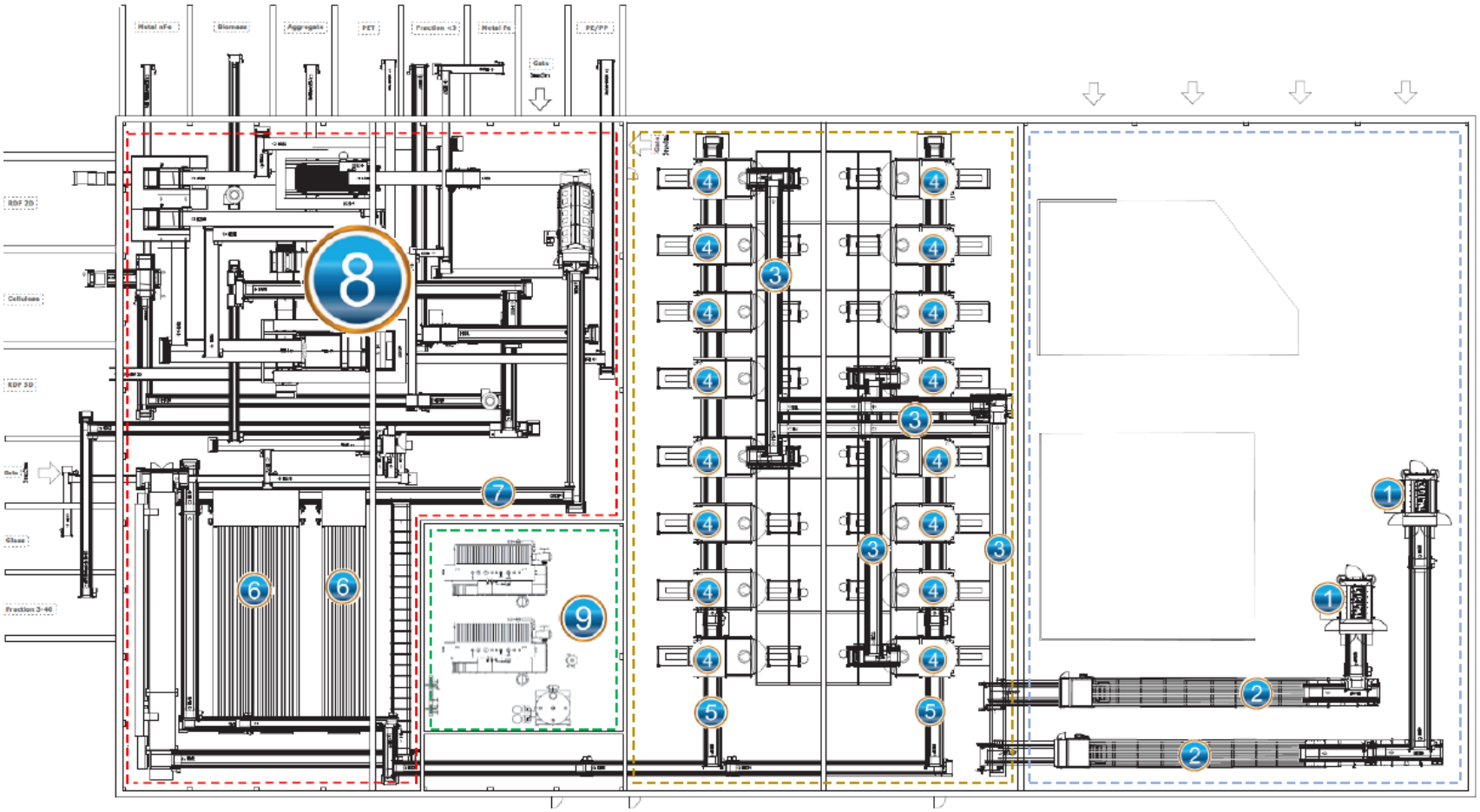


Figure 6.2 Indicative layout of main reception and processing building

Source: Eggersmann (2019) amended by GHD



1. Shredders (x2)
2. Moving floor bunkers (x2)
3. Conveyor belts –Autoclave material loading
4. Autoclaves (x16)
5. Conveyor belt – Autoclaved material discharge
6. Buffer zone – Material stabilization
7. Conveyor belt – Material loading to sorting lines
8. Sorting lines – Vibratory screens, Ballistic screen, Flip Flop screen, separation screen, Optical sorters, Eddy current, OB magnet, Air knife and Zig Zag Air density separator
9. Boiler Room - 2 x 6.5 TPH LPG fired water tube steam boilers

- Reception Hall
- Sterilization Hall
- Sorting Hall
- Boiler Room

Figure 6.3 Plant and equipment layout plan

Supporting infrastructure

Supporting infrastructure to be located within the processing building would include the boiler room (to be located between the sterilisation hall and stabilisation hall), transformer area and wastewater treatment plant which would be located on the eastern side of the building.

The boiler room would have two access points on the western side of the building. The water tube boiler unit would be located on the western side of the room. The boiler would be fuelled by LPG and have a throughput rating of 5,000 kilograms per hour. The layout would comprise one feed water tank and pump and packaged burner with steam boiler and flue gas stack.

The wastewater treatment plant would be located adjacent to the sterilisation hall. A piped connection would drain waste water from the waste reception hall and processing area to the plant. The system would comprise a rotary drum filter, balance tank, activated sludge reactor, sequencing batch reactor, sludge and treated effluent tanks, and screw press. The plant would be a fully automated system with remote monitoring. As shown in Figure 6.4, the wastewater treatment plant would be partially enclosed, a roof structure would be constructed over the plant area.

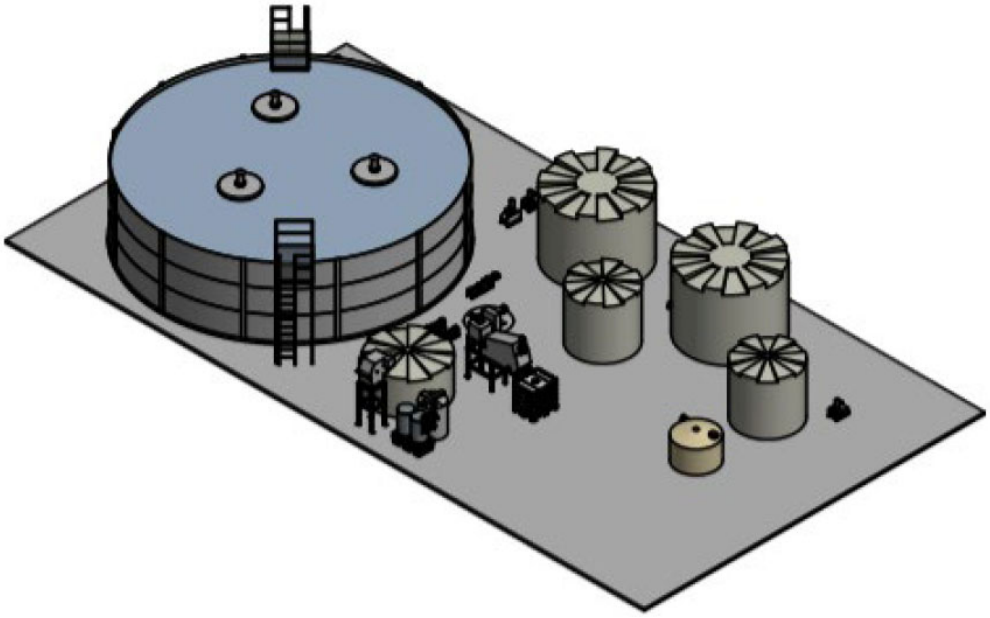


Figure 6.4 Indicative wastewater treatment plant layout

Source: Aerofloat Wastewater Treatment Specialists (2019)

6.2.3 LPG station

An LPG station would be located at the rear of the site. The LPG station would include one above ground tank with a total capacity of 50 tonnes. The LPG tank would be supported by reinforced concrete upstands as shown in Figure 6.5. Access to the LPG station to allow filling would be provided on the northern side with tankers oriented so they are able to leave the site without reversing (meeting the standard requirement that they should face the site exit). B-double tankers would deliver LPG to the site once per week.

The LPG station would be appropriately bunded with roofing to prevent stormwater accumulation in the bunded area.

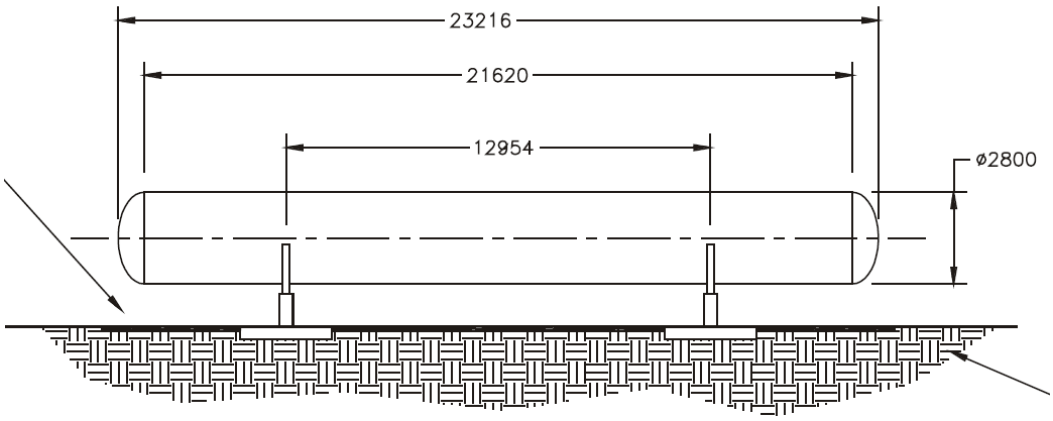


Figure 6.5 Example of 50 tonne LPG tank

Source: ELGAS Limited (2005)

6.2.4 Covered holding bays

Covered holding bays would be located along the eastern side of the site to provide additional storage for recovered material. Excess quantities of biomass and RDF would be expected to be stored in this area. The bays would be have a roof structure to provide protection from wet weather and the bins would have lids to prevent dust emissions.

6.2.5 Site office and amenities

The site office and amenities would be located south of and adjacent to the waste reception hall and processing building on the lot frontage. The office space would be constructed across two levels with access from the parking area. The levels would be connected by a central stairway and elevator.

The office would include amenity facilities including toilets, shower facilities, lunchroom, offices and kitchenettes. All facilities would meet regulatory and building requirements related to the number of people as well as disabled access requirements.

The office would also have direct pedestrian access to the viewing gallery from the north west corner of the upper level and an access corridor on the ground level.

6.2.6 Parking

Employee parking for up to 40 vehicles would be provided within the site. 34 spaces would be allocated for staff parking and the remaining six for disabled, emergency and visitor parking.

6.2.7 Weighbridge

An 18 metre inbound and outbound weighbridge and weighbridge office would be located at the heavy vehicle entrance to the site.

6.2.8 Site security and fencing

The site would be fenced with two metre high cyclone security fencing, with two barbed wire strands at the top of the fence. The project would utilise the existing fencing along the western side of the site.

6.3 Access

Two main entrances would provide access to the site via Flatrock Road. The existing site access would be used for light vehicles and provide access to the parking area for staff and

visitors. A new entry to the site would be constructed for heavy vehicles to the east of the existing site entrance and would provide access to the waste reception hall and processing building via a weighbridge.

Vehicles that need to be weighed would pass through an exit weighbridge in this area before leaving the site. There would also be a bypass road to the east of the weighbridges for vehicles that do not need to be weighed when leaving the site.

A service road around the perimeter of the site would be provided to permit sealed vehicle access around the site boundary for fire trucks, but also to enable B doubles delivering LPG to exit the site in a forward direction, without needing to reverse. The service road would provide a minimum six metres clearance for access by fire services and B doubles.

6.4 Utilities and services

Electricity

Electricity is already supplied to the existing buildings on the site and is also being generated on the adjacent site from the landfill gas power plant. This Endeavour Energy (electricity provider) infrastructure would be used to supply electricity for the sorting equipment.

In addition, the project would include installation of a one megawatt (1 MW) solar power system that comprises approximately 3,000 solar panels (each 330 kilowatts). The system is expected to generate an average 4,000 kilowatt hours per day or 1.46 million kilowatt hours per year. A storage battery would be located within in close proximity to the main switchboard, outside the building. The electricity generated would be used for project operations.

Steam for the autoclave operations would be generated in the boiler using LPG from the LPG station, which is to be located at the rear of the site.

A substation and transformer hall would be allocated to provide suitable voltages for the plant equipment. The peak power supply requirements are likely to be 80 kilowatt hours per tonne of waste processed. In addition, the heating requirements for autoclave sterilisation are expected to be 0.8 gigajoules per tonne of waste.

An application/enquiry to Endeavour Energy (in conjunction with Council which is building a new MRF on the adjacent landfill site) would be undertaken as part of the detailed design.

Communications

The site would be provided with telephone, computer and data cable access. Standard telephone cabling and two-way radio / mobile telephones would provide the required telecommunication services. Internet access would be provided via ADSL or Wi-Fi. These services are already available at the site.

Water supply

Rainwater would be collected from roofs for general use around the site, but for water quality reasons, water needed to generate the pressurised steam required during autoclave sterilisation produce steam would need to be drawn from the local reticulated water supply. A water main already supplies the site.

Wastewater management

Process wastewater would be treated on site to a standard that enables it to be tankered from site, to the Council wastewater treatment plant.

Sewage and other water arising from the amenities facilities would be managed separately to wastewater arising from the resource recovery park activities. Since Council's reticulated

sewerage system does not currently service the site, an onsite wastewater package treatment plant would be provided. The treated effluent from this would be combined with the treated effluent from the process wastewater before removal from site.

6.5 Water management

The project would include an upgrade to the existing surface water management system at the site. The proposed arrangement would comprise:

- Infrastructure approved as part of the Concept Proposal:
  - a sediment basin located in the north east corner to be decommissioned following construction
  - a constructed wetland on the eastern boundary (eastern basin) that is converted from a sediment basin following construction
  - use of the existing sedimentation basin located in the north west corner of the site (north-western basin)
  - gross pollutant trap and buffer swale from carpark and entrance area connecting to the eastern basin
- use of the existing stormwater diversion drain along the western boundary of the site
- swale drains and culverts located across internal roads and site access roads to divert clean water off site or drain runoff water to basins

The arrangement is shown in Figure 11.1. Runoff from undisturbed areas within the property boundary would be diverted to ensure that it does not intercept the flows from the road and roof areas to avoid cross contamination.

Rain falling on perimeter roads and roofed areas from the western side would flow across the roads, and away from the building. In this way, the discharge of this water would be spread out and not concentrated. This water, which is expected to be clean, given the infrequent use of the perimeter roads, would be discharged directly from site, minimising the impact of the project on the surrounding areas.

Run off from the car park and outdoor site entrance area, where there are a greater number of vehicles present, would be directed to a stormwater management system including a gross pollutant trap, buffer swale and wetland.

Wastewater produced as part of operation of the project would be treated on site in the wastewater treatment plant and then tankered off-site for disposal at an appropriate facility. Processing water for operations would be sourced from potable mains water.

Further details of the proposed soil and water management arrangements for the project are provided in Chapter 11 and Appendix K.

6.6 Fire management

An emergency fire water supply and pumping station would be installed to manage fire hazards on site. A fire suppression system would be installed in the waste reception hall and processing building. Further detail is provided in Chapter 15.

6.7 Landscaping

Existing vegetation within the vegetation buffer zone on the northern and eastern boundary of the site would be maintained.

6.8 Construction of the project

6.8.1 Overview

The construction period is estimated to be 12 months with an additional three months for commissioning. This includes the construction of erosion and sediment control infrastructure, earthworks, the resource recovery facility and the installation of new equipment.

Construction activities would include:

- Bulk earthworks for site shaping and surface water drainage and detention ponds
- Detailed excavation for lift and stair raft pads
- Pouring concrete foundation slab, footings, hardstand and suspended slabs for the main buildings
- Construction of pavement areas for car park and access roads and new site entrance
- Installation of steel truss framework for structures
- Erection of pre-cast concrete panels for external and internal partition walls and metal roof for site buildings
- Installation of solar panel system
- Installation of processing equipment
- Installation of firewater tanks
- Construction of weighbridges and weighbridge office
- Installation of fencing and signage

Temporary ancillary infrastructure to facilitate construction works would include:

- Installation of a temporary main switchboard and electrical riser to provide power during construction.
- Establishment of site offices and amenities

Works associated with the Stage 1 Project Approval would commence prior to the Stage 2 works. The Stage 1 works are anticipated to take approximately 4-6 weeks. Stage 1 construction activities will have substantially commenced by August 2021. It is noted that construction activities already approved as part of Stage 1 Project Approval included:

- Site preparation including clearing of the site, grading and demolition of the existing structures
- Construction of entry/exit and service roads and line marking
- Installation of perimeter/boundary security fencing and gates
- Creation of detention and sedimentation dams/basins

6.8.2 Construction workforce

The construction workforce is likely to include a maximum of 200 staff working across the entire span of the project delivery. The peak workforce is expected during major concrete pours up to 25 people.

Heavy vehicles would enter and exit the site through the main site entrance located along the eastern boundary. Staff light vehicles would enter and exit via the carpark entrance.

6.8.3 Construction hours

Construction working hours would be undertaken during the periods specified in the *Interim Construction Noise Guidelines* (DECC 2009). Those are:

- 7 am to 6 pm Monday to Friday
- 8 am to 1 pm Saturdays
- No work on Sundays or Public Holidays

6.8.4 Plant and equipment

Plant and equipment required for construction of the project would include, excavators, dozers, telehandlers, graders, compaction equipment, trucks, mobile concrete pump, concrete vibrators, concrete saw, welders and a mobile crane.

6.8.5 Construction environmental management

The construction of the project would be undertaken in accordance with the construction environmental management plan to be developed for the project. The plan would detail mitigation measures to manage risks associated with generation of dust, noise, and other environmental impacts during construction as identified in the EIS and conditions of approval.

6.9 Operation of the project

6.9.1 Overview

The project would function as an integrated resource recovery facility with additional pre-treatment controls to sterilise the incoming waste prior to sorting. This key pre-treatment control would enable the facility to accept mixed unsorted waste for recycling.

The facility would receive waste at the waste reception hall where it would be shredded before being conveyed for batch autoclave sterilisation under pressure and heat. This process would create a nutrient rich biomass which would then be sieved to separate it from the rest of the sterilised material and then transferred offsite to be processed further.

The remainder of the material would then be sorted and separated in a similar manner to traditional resource recovery/materials recovery facilities. The material would then be stockpiled in large containers to be transferred offsite for further recovery and reuse.

Figure 6.6 provides an overview of the proposed materials flows.

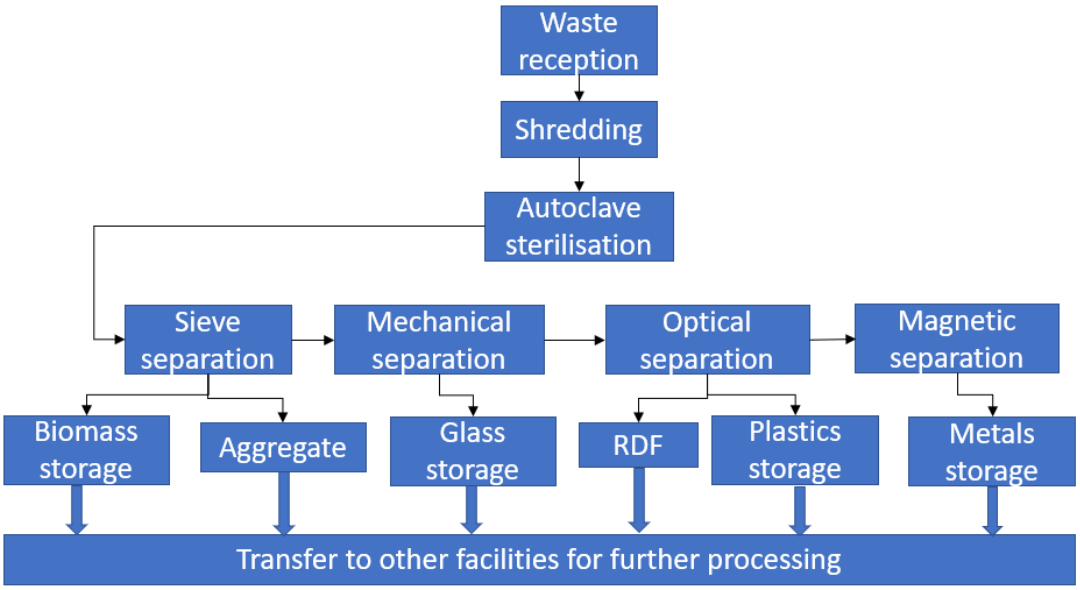


Figure 6.6 Materials flow diagram

Further details of the proposed technology, plant, equipment and waste process are provided in Chapter 8.

6.9.2 Operational workforce

The project would require approximately 34 fulltime equivalent staff during operation with up to 16 staff per shift.

6.9.3 Hours of operation

The project would operate year round, 24 hours per day, seven days per week. However waste acceptance would only occur Monday to Friday between 6 am and 6 pm.

6.9.4 Plant and equipment

The following plant and equipment is expected (but not limited) to be used during operation of the project.

Processing:

- Preliminary shredder
- Autoclaves
- Dosing bunker
- Loading feeder
- Conveyors
- 2D/3D ballistic separator
- Cascade separator
- Pneumatic separator
- Eddy current separator
- Electromagnetic separator
- Near-infrared (NIR) opto-electric separator
- Air compressor

- Fans to provide air for ventilation of the building
- Fans to extract odorous air from composting operations
- Floor cleaning machine
- Two front end loaders

Supporting infrastructure:

- Boiler
- Wastewater package treatment plant
- Transformer

7. Identification and prioritisation of issues

7.1 Identification

The key project-related issues warranting detailed assessment in the EIS was identified through:

- Review of the existing environmental context and surrounding locality
- The legislative framework applicable to the project
- The preliminary environmental risk screening
- The outcomes of consultation to undertaken with government agencies and other relevant stakeholders

The outcomes of the preliminary environmental risk screening, including the issues identified for further detailed assessment in the EIS, are discussed in Section 7.2.

7.2 Environmental risk screening

A preliminary environmental risk screening was undertaken to identify potential environmental impacts that may arise as a result of the project.

The preliminary environmental risk screening was undertaken in the form of a preliminary, desktop-level risk assessment, to broadly assess the potential environmental risks that may arise as a result of the construction and operation of the project to identify key areas for the assessment.

The environmental risk analysis for the project involved:

- Identifying environmental aspects
- Identifying the source of potential risks associated with each of these aspects
- Identifying the potential impact associated with each risk
- Identifying priority issues for the EIS

Table 7.1 provides the environmental risk analysis for the project. It includes:

- A summary of the potential key impacts/risks
- Consideration of the priority for the assessment
- A discussion regarding the findings of the preliminary risk screening

Table 7.1 Preliminary environmental risk screening results

Environmental aspect	Source of risk	Potential impact	Priority of assessment	Discussion
Traffic	Additional vehicles on the local road network during construction activities and during operation	Potential disruption to local road users	Medium	The project would generate traffic as a result of waste deliveries to the site and offsite transport of product and waste. However, the majority of waste deliveries would have been accessing the West Nowra Recycling and Waste Facility (adjacent to the site) to dispose of waste anyway. Small vehicles for staff would also access the site. Chapter 13 includes a traffic impact assessment which considers the potential impacts of the project on the local road network.
Noise and vibration	Noise and vibration generated during construction activities and operation of the facility	Impacts on sensitive receivers in proximity to the project from noise	Medium	The project has potential to create short-term, temporary noise and vibration during construction activities. During operation, the majority of operations would occur within the buildings. Waste receival and all waste processing would be within the buildings (no processing of waste would occur outdoors). The acoustic properties of building cladding materials have been considered in the design. The closest residents are approximately six rural residential properties located 700 metres to the south with one located 900 metres to the north east. Given the distance to the residential receivers, the project is not expected to result in any significant noise or vibration impacts. Chapter 14 includes an assessment of the potential noise and vibration impacts of the project.
Hydrology and soils, flooding	Erosion and sediment and surface water quality impacts during construction leading to contamination of surface water	Impacts to stormwater quality runoff from erosion and sedimentation	Low	Two sediment basins were proposed as part of Stage 1 to be installed during the construction phase and continued to be used during operation. These were approved under SSD 7015. As a result of design refinement during Stage 2, some changes are proposed for water management. Appropriate stormwater management controls are proposed to manage surface water run-off.

Environmental aspect	Source of risk	Potential impact	Priority of assessment	Discussion
	Erosion and sediment and or other surface water quality impacts during operation Flooding impacts			Chapter 11 includes an assessment of potential soil and water impacts.
Hazards and fire risks	Site location in native forest Storage and stockpiling of combustible waste materials Storage and transport of dangerous goods	Damage to property and human suffering from bushfire or on onsite fire or incident involving dangerous goods	Medium	The Concept Proposal EIS (GHD 2016) included an assessment of bushfire risk which identified that the site would be subject to an elevated bushfire risk given its proximity to large tracts of native forest. The requirement for a buffer zone and appropriate asset protection zones identified in this assessment have been incorporated into the project design. A dedicated pumping station and firewater tank is proposed as part of the project. The storage and temporary stockpiling of potentially combustible waste and finished products (e.g. containing plastics, etc) can also be a fire risk. The project also includes the storage of LPG on the site (50 tonne). Chapter 15 includes an assessment of fire risks including an assessment of compliance against the relevant NSW Fire and Rescue guidelines. Chapter 16 includes an assessment of the project in accordance with SEPP 33. It provides the results of a preliminary risk screening and the PHA.
Air quality	Dust and other air emissions generated during construction and operation of the facility	Impacts on sensitive receptors in proximity to the project and staff from dust and odour exposure	Medium	The scale of dust emissions is expected to be relatively small during the construction phase and would be managed through a construction environmental management plan. All waste receival and waste processing activities would occur within the buildings. No waste processing would occur outside. Autoclaving pre-treatment of waste is also expected to significantly reduce the potential for odour.

Environmental aspect	Source of risk	Potential impact	Priority of assessment	Discussion
				Operational dust emissions would be minimal as waste processing and receival activities would occur within the building. Chapter 9 includes an assessment of air quality and odour impacts.
Aboriginal heritage	Contact with aboriginal heritage listed lands from construction works	Damage to aboriginal heritage items or artefacts or historical sites	Low	The Concept Proposal EIS (GHD 2016) included an Aboriginal heritage assessment which indicated that the site has low archaeological potential and low archaeological significance. The project is not expected to disturb any land not already assessed and approved as part of Stage 1.
Non-aboriginal heritage	Contact with non-aboriginal heritage listed lands from construction works	Damage to non-aboriginal heritage items or artefacts or historical sites	Low	The Concept Proposal EIS (GHD 2016) indicated there are no heritage listed items, no unlisted heritage items or areas of archaeological potential located within or adjacent to the site and therefore items of state or local heritage significance are minimal. The project is not expected to disturb land not already assessed and approved as part of Stage 1.
Biodiversity	Contact with threatened plant and animal species	Disruption to habitat during construction or operation	Low	The Concept Proposal EIS (GHD 2016) included assessment of flora and fauna and was based on a conservative assumption that the entire site would be cleared. The project is not expected to have any impact on flora and fauna beyond that already assessed and approved as part of Stage 1. Section 17.3 includes an overview of previous assessment findings. A BDAR waiver has also been approved and is attached in Appendix H.
Greenhouse gas	High energy use of the facility relative to traditional resource recovery facilities	Increased indirect emissions into the atmosphere	Low	The project would require power and fuel for operating the facility, which would generate greenhouse gases. Chapter 9.6 provides an assessment of greenhouse gas impacts.
Visual amenity	Visibility of the proposed facilities reducing the amenity of nearby sensitive receptors.	Reduced visual amenity of nearby receptors	Low	Part of the project is likely to be visible from users of Flatrock Road in the immediate vicinity of the site. However the overall potential for the project to impact on visual amenity is considered to be low.

Environmental aspect	Source of risk	Potential impact	Priority of assessment	Discussion
				The project would be located immediately adjacent to the existing West Nowra Recycling and Waste Facility. There is also extensive vegetation surrounding the site, which would assist in screening the facility from more distant potential visual receptors. Section 17.1 includes an assessment of visual amenity impacts.
Weed and feral animal control and biosecurity risks	Operation of project leading to a spread of noxious weeds or pathogens in the local area or in products. Operation of the project attracting pests and vermin, resulting in a nuisance to nearby sensitive receptors.	Pests and vermin Spread of noxious weeds	Low	Autoclaving would ensure the resulting product would be free of pathogenic organisms. The waste operation and receival would take place within buildings and hence the likelihood of pests and vermin being attracted to the operations is minimal.

7.3 Priority assessments for the EIS

Based upon the results of the preliminary environmental analysis, the following broad qualitative risk ratings were assigned for each environmental attribute.

- Moderate – Traffic, noise and vibration, air quality, hazards and fire risk
- Low – Hydrology, soils and flooding, Aboriginal heritage, non-Aboriginal heritage, flora and fauna, greenhouse gas, visual amenity, weeds and feral animal control and biosecurity

The EIS includes supporting technical assessments for traffic, noise and vibration, air quality and greenhouse gas, soils and water, visual amenity and hazard and fire risks based upon contemporary government guidelines and in accordance with the SEARs issued for the project.

8. Waste management

8.1 Construction

8.1.1 Waste streams

The following waste streams are expected to be generated during construction:

- Construction material including spoil/fill from earthworks, offcuts and packaging
- Small quantities of general waste generated by site personnel (such as food scraps, aluminium cans, glass bottles, plastic and paper containers, paper, cardboard and other office wastes)
- Building and demolition materials from the decommissioning and demolition of the existing site buildings
- Wastewater and sewage from construction staff amenities

8.1.2 Waste management during construction

The management of wastes generated during construction would be in accordance with relevant NSW legislation and the principles of the waste management hierarchy set out in the NSW *Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a).

The approved Stage 1 works included demolition of the existing animal shelter and site preparation and clearing of the site. Therefore, waste materials from the decommissioning and demolition of the existing site buildings would be transferred to the West Nowra Recycling and Waste Facility for recycling and reuse where appropriate under the Stage 1 Project Approval.

Any excess spoil from earthworks for the project would be stockpiled on site for use as construction fill if suitable.

During construction 25 metre crane lift bins would be located next to the weighbridge to store waste. During peak construction the bins would be removed on a daily basis. In the façade and finishes zones, 240 litre mobile garbage bins and two metre hooklift bins would be used and emptied into larger receptacles by telehandlers.

Labelled and colour coded receptacles would be provided at the construction site office for general waste from construction personnel to ensure source separation of recyclable materials and residual landfill waste. These wastes would be collected on a regular basis by authorised and appropriately licensed waste collection contractors for offsite recycling or disposal.

Portable amenities/ablutions would be provided for construction staff. Wastewater and sewage from these facilities would be collected on a regular basis by an authorised and appropriately licensed contractor for offsite disposal.

8.2 Operation

8.2.1 Incoming waste streams

Table 8.1 shows the waste streams expected to be received at the site and the maximum throughputs on a yearly basis. The maximum daily throughput would be approximately 356 tonnes and maximum weekly throughput 2,500 tonnes. Mixed municipal waste would be sourced predominantly from the Council waste (red lid bin) collections. Mixed municipal waste may also be received from council areas in the wider region. The incoming mixed municipal waste would be classified as general solid waste (putrescible).

Table 8.1 Incoming waste streams – maximum throughputs

Waste stream	Quantity (tonnes per year)	Waste morphology (%)
Organic waste	78,000	60%
Paper and cardboard	11,700	9%
PET	1,300	1%
PP	1,300	1%
Other plastics	6,500	5%
Glass	4,550	3.5%
Ferrous metal	3,380	2.6%
Non-ferrous metals	390	0.3%
Textile	3,900	3%
Wood	2,600	2%
Rubber, leather	2,600	2%
Inert	13,780	10.6%
Total	**130,000**	**100%**

In addition to the incoming waste stream identified above, small quantities of waste would be generated during operations from staff administration and amenities functions and general maintenance activities. Key operational waste streams would include:

- General waste generated by operational site personnel (such as food scraps, aluminium cans, glass bottles, plastic and paper containers, paper, cardboard and other office wastes) – classified as general solid waste (putrescible) and general solid waste (non-putrescible)
- Wastewater and sewage from staff facilities – classified as liquid waste

8.2.2 Outputs

The waste processing operation (Section 8.2) has been designed to ensure that the project is consistent with the aims, objectives and guidance in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-2021* (NSW EPA 2014a). In particular, the technologies have been selected to maximise the diversion of waste from landfill and increase beneficial reuse of the recovered materials. Details of proposed destinations for the facility outputs are discussed in Section 8.3.7.

The expected facility outputs are shown in Table 8.2.

Table 8.2 Expected facility outputs

Material	Predicted output (%)	Quantity (tonnes)
Biomass	37.2%	48,360
Light RDF	9.0%	11,700
Heavy RDF	7.3%	9,490
PP	0.8%	1,040
PET	0.8%	1,040
Glass	3.2%	4,160
Ferrous metals	2.6%	3,380
Non-ferrous metals	0.3%	390
Aggregates	9.5%	12,350
Evaporation	24.3%	31,590
Residual waste	5.0%	6,500
Total	**100%**	**130,000**

Heavy RDF would comprise 2 dimensional materials of particle size greater than 60 mm including textiles. Light RDF would comprise 3 dimensional materials of particle size between 12

mm and 40 mm including paper, plastic films and foils. Heavy RDF would be separated by a cascade and the light RDF would be sorted using pneumatic separators. Examples of typical heavy and light RDF output streams are shown in Photo 8.1.

Photo 8.1 Examples of typical heavy and light RDF

8.3 Waste processing

8.3.1 Waste transport

Incoming waste material would be transported to site via heavy vehicles using the access routes discussed in Chapter 13. Loads would be covered on public roads and uncovered for inspection at the weighbridge located at the main entrance to the site. Any non-conforming materials such as hazardous wastes would be rejected from the site and details recorded. Signage at the entrance to the site would clearly identify permitted and prohibited waste types. Waste vehicles would exit through the outbound weighbridge.

8.3.2 Waste reception

Incoming trucks would enter the main processing building from the east and unload directly to the waste reception hall. The layout of the waste reception hall is shown in Figure 8.1. The central unloading area would be graded to allow a free draining surface to facilitate clean out. Any washdown water would be collected from wastewater grates located in front of the entry gate system and discharged into a buffer tank and then transported by pipeline to the wastewater treatment plant.

The material would be inspected during unloading and any non conforming materials detected (such as building wastes or hazardous items such as car batteries or gas cylinders) would be segregated as shown in Figure 8.1 for removal and disposal off site to an appropriately licenced facility.

Non hazardous items, plus specific items such as car batteries and gas cylinders could potentially be taken to the adjacent West Nowra Recycling and Waste Facility for disposal or

recycling. The unloading area would have a maximum storage capacity of 1,400 tonnes which is equivalent to approximately four days throughput.

The first phase would be initial mechanical processing of the waste to remove any large waste components and shred the waste to create a more homogeneous mass. A front end loader would transfer the material to the preliminary shredder and dosing bunker. The dosing bunker controls the speed and volume of the feed material for processing. The material would then be conveyed to the autoclaves for sterilisation. Refer Photo 8.2.

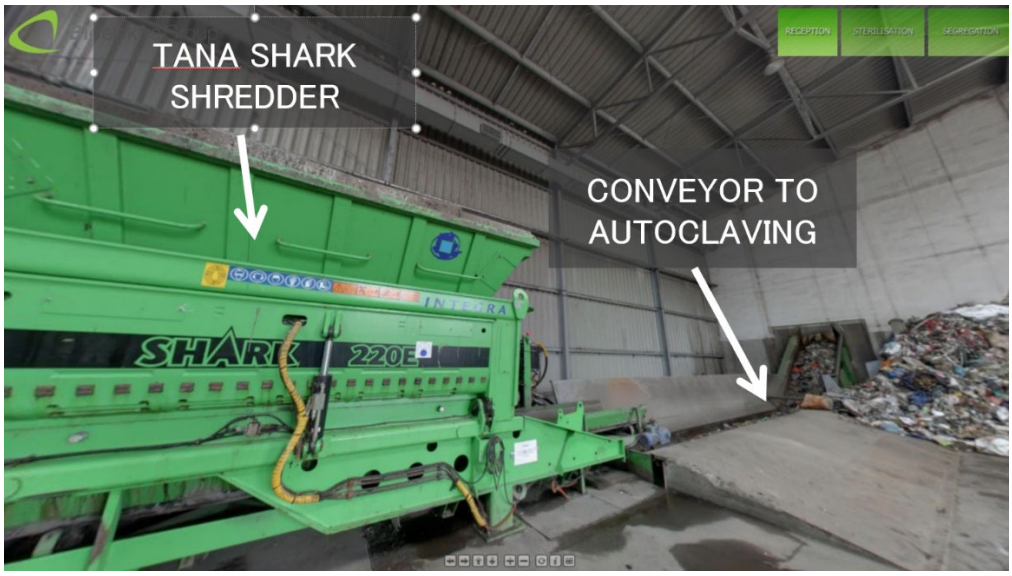
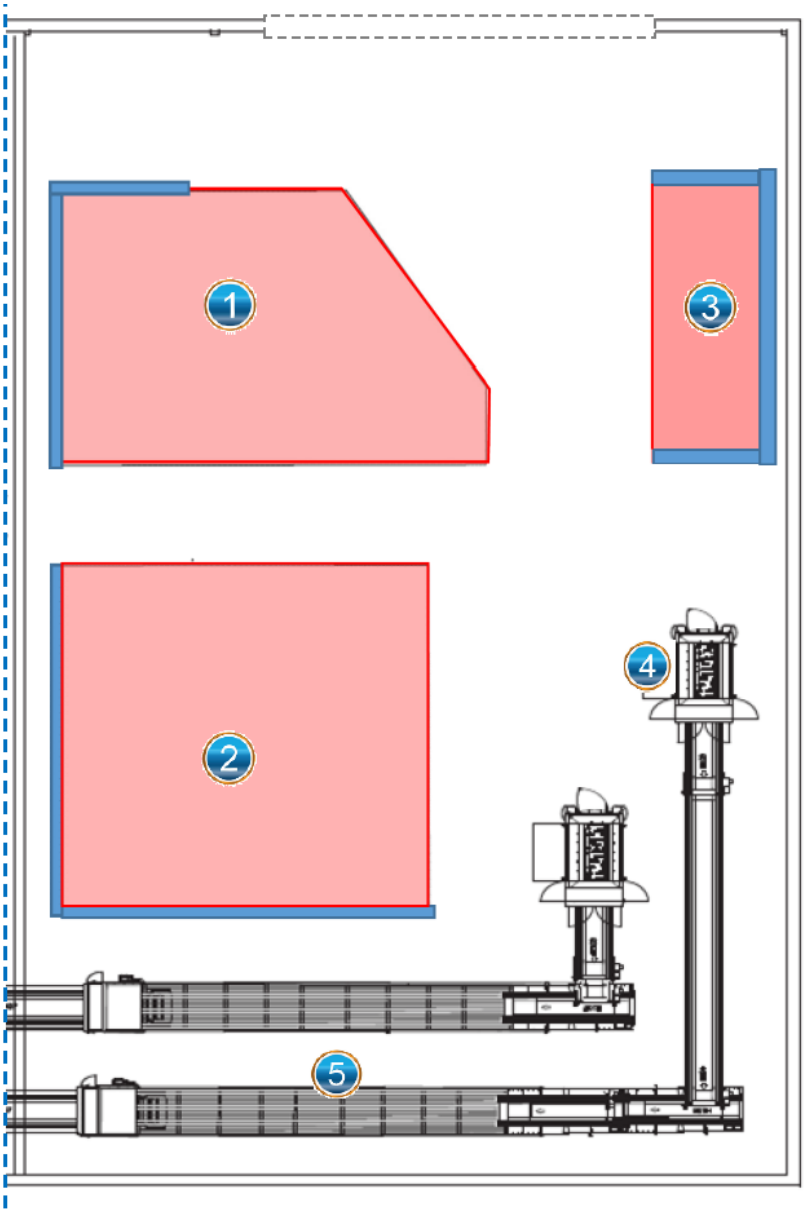


Photo 8.2 Waste reception area – initial shredding and transfer to the feeder (example)



1. Mixed waste (610 tonne) 2.6 m high ~ 750 m3 (Mixed weight density of 0.8 t/ m3)
2. Mixed waste (790 tonne) 2.6 m high ~ 1,000 m3 (Mixed weight density of 0.8 t/ m3)
3. Storage of non-conforming wastes (200 tonne) 2.6 m high ~250 m3
4. Shredders (x2)
5. Moving floor bunkers (x2)

Figure 8.1 Waste reception hall layout plan

8.3.3 Sterilisation

The waste would then be loaded into an autoclave chamber to be sterilised (refer Photo 8.4 and Photo 8.5). The autoclaving process would be performed in a number of cyclic autoclave processes, i.e. the empty autoclave chamber would be filled up with waste, the heat processing would be initiated and once the process is completed, the sterilised mass would be removed from the autoclave. This cycle would be repeated a number of times.

The process would take place under high pressure (2-5 bar) and high temperature. The walls of the autoclave would be heated by the injection of steam. The autoclave jacket separates the waste from where the steam is injected to prevent contact with the waste. The construction of the reactor chamber would allow the mixing of the mass during the heat processing. These

conditions would be maintained for approximately three hours after which the pressure would decrease and the material would be removed from the chamber.

Photo 8.3 Autoclave jacket and waste loading hatch (example)

The autoclaving process would be carried out in the temperature range of 120-150 degrees Celsius. Thus, it is possible to effectively eliminate (sterilise) microorganisms from the waste. This would also greatly reduce the pungent unpleasant smell typically associated with waste and replace it with a distinct sweeter smell. The heat processing is expected to reduce the volume of waste by approximately 60% and mass by 15%. This would facilitate the storing, transporting and further mechanical processing of the sterilised waste.

The steam generated by the heating process would be recirculated through the system. Steam from the internal part of the autoclave would be discharged during decompression to the external post process steam condensation system. A modular biological-mechanical filter would be installed downstream of the condensing system at the exhaust air outlet. Wastewater from processing would be transferred by pipeline directly to the wastewater treatment plant.

As a result of heat processing, the recyclable materials (cans, plastic bottles, metals, glass) would be relatively clean as any labels or organic contaminants would have been removed. At this stage, the processed mass would contain fiberized paper, cardboard, kitchen waste, and a mineral fraction - mainly sand, stones and ceramics.

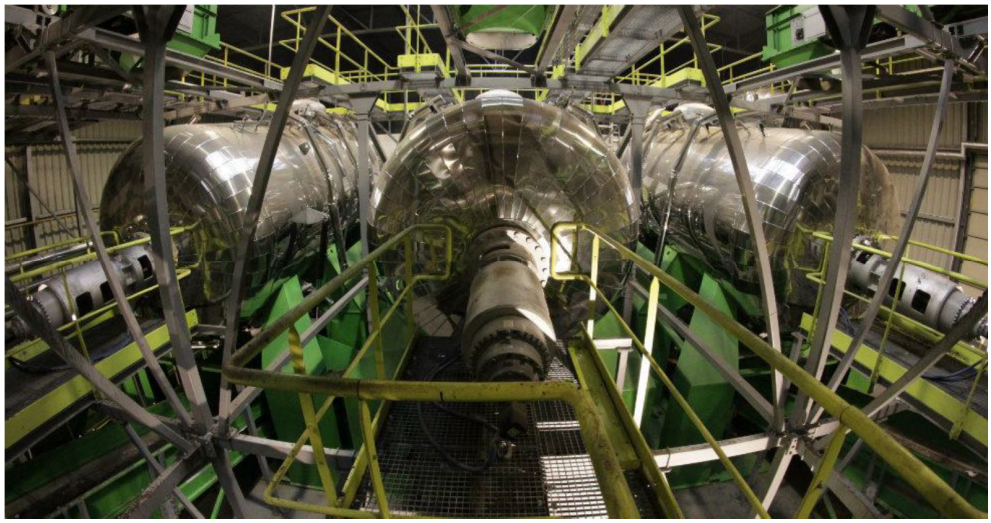


Photo 8.4 Autoclaves (example)

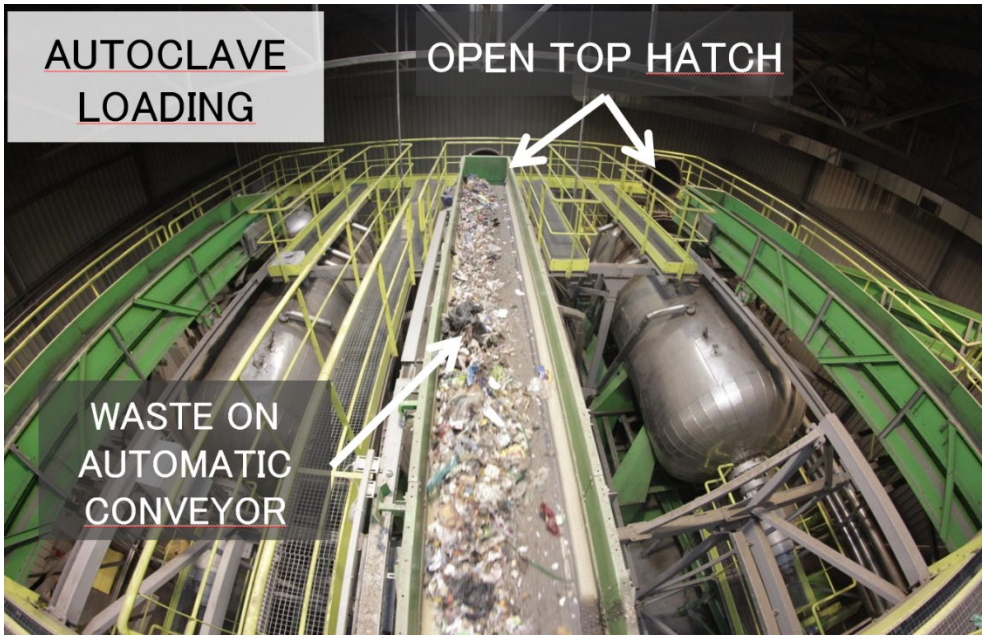


Photo 8.5 Autoclave loading (example)

8.3.4 Stabilisation

After completing the sterilisation process in autoclaves, waste would be unloaded to the stabilisation hall, where it would stabilise naturally (refer Photo 8.6). While the temperature of processed waste decreases, sterile water would evaporate from the waste. Stabilised material has a great potential for further mechanical processing, recycling and recovery, as it is dry and can be easily separated.

Photo 8.6 Stabilisation (example)

8.3.5 Segregation

After stabilisation, the waste would be transferred for mechanical segregation on the separation line, typical of a conventional dry recycling facility. There would be a set of feeders, separators and screens which would separate particular fractions to the individual containers (refer Photo 8.7). The feeders would initially pass the material through a series of screens to mechanically sort by particle size.

Ferrous metals would be separated by electromagnetic separators. The magnet separator would be mounted above the conveyor to remove ferrous metals following initial screening and from the biomass material.

Alternative fuel (RDF fractions) would be isolated via a set of mechanical-pneumatic screens equipped with an eddy-current separator. Lightweight and heavier particles would be separated by air streams that separate the material based on density. Denser particles such as aggregates and glass would be removed. The eddy-current separator would separate non-ferrous metals such as aluminium from the sterilised material using a strong pulsed magnetic field.

The most demanding unit in technological line would be the optical sorters, which would separate plastics (with PET and PP fractions isolated), as well as glass, which takes the form of clean cullet, free of contaminants. The optical sorters would be programmed to scan and separate the material using a valve system mounted at the end of the conveyor.

Photo 8.7 Separated recycling streams for transfer (example)

8.3.6 Materials storage

As shown in Photo 8.7, the product material would be stored temporarily in bins or bags (for glass) in partially enclosed bays with roof and walls on three sides. Similarly, the excess biomass and RDF product material would be stockpiled in the covered holding bays which would comprise a roofed structure with walls on three sides. Individual product types would be kept separate and segregated by output/product type. The output/product storage/stockpile areas would also be labelling or signposting in a way which is clearly visible.

The proposed maximum storage volumes are summarised in Table 8.3.

Waste and product stockpiling and storage is assessed further in Section 15.2 from a fire safety perspective.

The product materials would be reloaded onto trucks and transported off site via the weighbridge for reuse and further processing elsewhere. Waste storage would be temporary and subject to the availability of transport and markets for end product.

Table 8.3 Proposed maximum storage volumes

Output material	Storage method	Storage volume (tonnes)
Biomass	Hooklift compactor bin	397
RDF light	Hooklift bin	96
RDF heavy	Hooklift bin	78
PP	Hooklift bin	9
PET	Hooklift bin	9
Glass	Bag	34
Ferrous metal	Hooklift bin	28
Non-ferrous metals	Hooklift bin	3
Aggregates	Hooklift bin	102
Landfill	Stockpile in covered holding bay	100
Total		**856**

8.3.7 Materials dispatch

The output materials/products would be dispatched offsite to a variety of other facilities for recycling or manufacture into other products. Bioelektra has secured agreements with a number of entities, which would ensure the product outputs are beneficially reused wherever possible.

The proposed destinations for the output materials/products are as follows:

- RDF light and RDF heavy – Cement Australia
- Biomass – Boral / Cement Australia
- Plastics (PP and PET) – Polymer Processors / Advanced Circular Polymer
- Glass (coloured and mixed) – Casafico
- Ferrous and non-ferrous metals – metal recyclers
- Aggregates – SCE Australia
- Landfill – West Nowra Landfill (adjacent site)

RDF would be received by Cement Australia for cement kiln feedstock. This would replace feedstock that may otherwise have been fossil fuel derived.

Biomass would be received by several entities as a feedstock in the production of brick, masonry type products, cement kiln feedstock and feedstock for hydrogen fuel. This would replace feedstock that may otherwise have been fossil fuel derived. Opportunities for potential use of the biomass at the Innovating Energy biomass power generation plant proposed in Nowra are also being explored.

Separated PP and PET plastics would be received by plastic manufacturers as feedstock in the production of a variety of plastic products.

Glass would be received by Casafico to be used in the production of a variety of innovative and sustainable building products.

Aggregates would be received by SCE to be used in the production of recycled construction materials for mining and civil construction applications.

8.3.8 Management of waste generated on site during operation

Wastes generated on site during operation would also be managed in accordance with relevant NSW legislation and the principles of the waste management hierarchy set out in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a).

Labelled and colour coded receptacles would be provided at the site office for general waste from staff administration and amenities functions to ensure source separation of recyclable materials and residual landfill waste.

Waste generated from general maintenance activities would also be placed in small waste labelled and colour coded receptacles in accordance with legislative and regulatory requirements.

Operational wastes would either:

- be collected on a regular basis by authorised and appropriately licensed waste collection contractors for offsite recycling or disposal or
- be processed through the facility (if appropriate e.g. general office waste)

Records would be kept of any waste generated onsite that is processed through the facility and any waste collected for offsite disposal or treatment.

Permanent amenities/ablutions would be provided for operational staff within the office. Wastewater and sewage from these facilities would be collected on a regular basis by an authorised and appropriately licensed contractor for offsite disposal.

8.4 Quality control, record keeping and waste tracking

A number of other quality control steps are proposed during operation to track incoming waste and outgoing products, manage non-conforming wastes and ensure the quality of outgoing products, as listed in Table 8.4.

Table 8.4 Quality control, record keeping and waste tracking measures

Aspect	Measures
Signage at entrance	• Signage at the entrance clearly identifying the permitted waste types and prohibited waste types
Weighbridge inspection	• Primary visual inspection of all incoming loads at the weighbridge to recognise and identify if the load contains any unpermitted wastes • Where a load is identified as containing unpermitted wastes, rejection of the load
Reception hall inspection	• Secondary inspection at the reception hall – including visual inspection during unloading by trained staff • Removal of any unpermitted waste identified or load rejection as required
Training	• Training of all staff in roles which require inspection of loads, including: – permitted waste types and prohibited waste types – all relevant regulatory and legislative/licencing, standards and guidelines – asbestos awareness – asbestos handling and removal (for staff that may be required to remove asbestos) • Maintenance of training records
Rejected loads register	• Maintenance of a rejected loads register – including records of date, time of load rejected, registration of vehicle(s), type of waste(s) rejected and reason for rejection
Output/product storage	• Labelling or signposting of output/product storage/stockpile areas in a way which is clearly visible • Separation/segregation of individual separated listed output/product types in stockpiles, bins or bags under cover
Inspections	• Daily inspections by trained staff of output/product storage areas to ensure storage is being undertaken in accordance with the storage area requirements and implementation of any required corrections immediately • Maintenance of inspection records
Specifications, sampling and testing	• Where applicable, development of specifications, sampling and testing procedures in conjunction with product/recovery stream customers or as required by relevant resource recovery orders
Incoming and outgoing waste/product records	• Accurate recording of all incoming and outgoing (waste and product outputs) in accordance with the record keeping requirements of the Environment Protection Licence (EPL) for the facility, the EPA (2015) *NSW Energy from Waste Policy Statement* and any relevant resource recovery orders

8.5 NSW Energy from Waste Policy Statement

The EPA (2015) *NSW Energy from Waste Policy Statement* outlines the policy framework and technical criteria that apply to facilities proposing to recover energy from waste in NSW. The

EPA considers energy recovery to be a complementary waste management option for residual waste produced from material recovery processes. The policy states that energy recovery facilities may only receive feedstock from waste processing facilities or collection systems that meet specific resource recovery criteria.

The project would not recover energy from waste but it would produce two RDF streams and the biomass stream suitable for off-site energy recovery. The project would receive mixed municipal waste from council collection systems. The EPA (2015) *NSW Energy from Waste Policy Statement* resource recovery criteria for facilities processing these types of mixed municipal waste streams are shown in Table 8.5.

It is noted that the RDF product streams would comprise 16.3% by weight of the waste stream received at the site (see Table 8.2). Only a portion of the biomass output stream would be used for off-site energy recovery (in accordance with the resource recovery criteria). The remainder of the biomass output stream would be used in other non-thermal applications.

Table 8.5 Resource recovery criteria for energy recovery facilities

Waste stream	Processing facility	% residual waste allowed for energy recovery
Mixed municipal waste (MSW)	Facility processing mixed MSW waste where a council has separate collection systems for dry recyclables and food and garden waste	No limit by weight of the waste stream received at a processing facility
	Facility processing mixed MSW waste where a council has separate collection systems for dry recyclables and garden waste	Up to 40% by weight of the waste stream received at a processing facility
	Facility processing mixed MSW waste where a council has a separate collection system for dry recyclables	Up to 25% by weight of the waste stream received at a processing facility

In addition to the above, waste streams proposed for energy recovery should not contain contaminants such as batteries, light bulbs or other electrical or hazardous wastes.

The following measures would be adopted to ensure compliance with the EPA (2015) *NSW Energy from Waste Policy Statement*:

- implementation of the quality control measures described in Section 8.4 to ensure the RDF and biomass streams would not contain contaminants
- record keeping and waste tracking measures described in Section 8.4 including accurate recording of all incoming, outgoing (waste and product) including quantities of mixed municipal waste from Council (and other councils in the wider region that may deliver mixed municipal waste to the site) and maintenance of a rejected loads register as described in Table 8.4
- mechanical segregation on the separation line with a variety of magnets, screens and optical sorters to ensure materials such as PVC plastics, aggregates, metals etc do not end up in the RDF or biomass streams (see Section 8.3.5)
- development of RDF/biomass specifications, sampling and testing procedures in conjunction with RDF/biomass customer(s)
- implementation of the agreed RDF/biomass sampling and testing regime, which would be performed by a third party, National Association of Testing Authorities (NATA) accredited laboratory
- preparation of an Energy from Waste Management Plan to address and manage compliance with the EPA (2015) *NSW Energy from Waste Policy Statement*.

8.6 Environmental management measures

Table 8.6 provides a summary of the proposed waste management measures.

Table 8.6 Waste management measures

Issue	Management measure	Timing
Construction waste	Waste would be managed during construction in accordance with a Construction Waste Management Plan to be developed for the project. The Construction Waste Management Plan would: • adopt the waste hierarchy principles contained in the *Waste Avoidance and Resource Recovery Act 2001* • define the processes, responsibilities and management measures that would be implemented during construction to manage waste • include procedures for the assessment, classification, management and disposal of waste in accordance with the *Waste Classification Guidelines* (NSW EPA 2014b)	Construction
Operational waste	Operational waste from site personnel and maintenance activities, would be managed in accordance with operational environmental management plan for the project. The operational environmental management plan would adopt the waste hierarchy principles contained in the *Waste Avoidance and Resource Recovery Act 2001*.	Operation
	All waste received at the site during operation would be managed in accordance with the operational environmental management plan, the site EPL and EPA (2015) *NSW Energy from Waste Policy Statement*. The Operational Environmental Management Plan would include: • An Operational Waste Management Plan – including the quality control, record keeping and waste tracking steps listed in Table 8.4 • An Energy from Waste Management Plan to address and manage compliance with the EPA (2015) *NSW Energy from Waste Policy Statement*	Operation

9. Air quality and odour

An air quality and odour assessment was prepared by GHD for the project (Appendix I). A summary of the assessment and proposed mitigation measures is provided in this chapter.

9.1 Assessment method

The air quality assessment was undertaken in accordance the NSW EPA *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2016b) (the Approved Methods) to assess potential worst-case air quality impacts from the project. The assessment considered the following air pollutants:

- Odour
- Particulate matter (Total Suspended Particulates (TSP) and particulate matter with diameter smaller than 10 microns (PM_{10}). As the primarily source of particulate matter is from manual handling and transfer of waste, it is anticipated the majority of particulate matter would have a relatively large diameter. Consequently, TSP and PM_{10} were the fractions of particulate matter examined.)
- Products of combustion including Nitrogen Dioxide (NO_2) and Carbon Monoxide (CO)

Based on a review of the project description and identification of the likely air emissions from the project, a qualitative approach was adopted to assess the construction of the project.

A quantitative approach utilising air quality dispersion modelling was adopted to assess the operation of the project. A review of the surrounding terrain, air quality emission sources and distance to nearby receptors was undertaken to inform the dispersion modelling. Predicted air quality impacts were modelled in accordance with the Approved Methods using an approved computer software model CALPUFF.

Cumulative odour impacts (impacts as a result of the operation of the project and the existing West Nowra landfill) were accounted for by using the dispersion model prepared by SLR Consulting in their assessment of landfill operations associated with the West Nowra Landfill Extension in *Additional Air Quality Modelling and Assessment (SLR Consulting, 2020)* and *West Nowra Recycling & Waste Facility Proposed Stage 4 Landfill Extension Air Quality Impact Assessment (SLR Consulting, 2019).*

9.2 Existing environment

9.2.1 Sensitive receptors

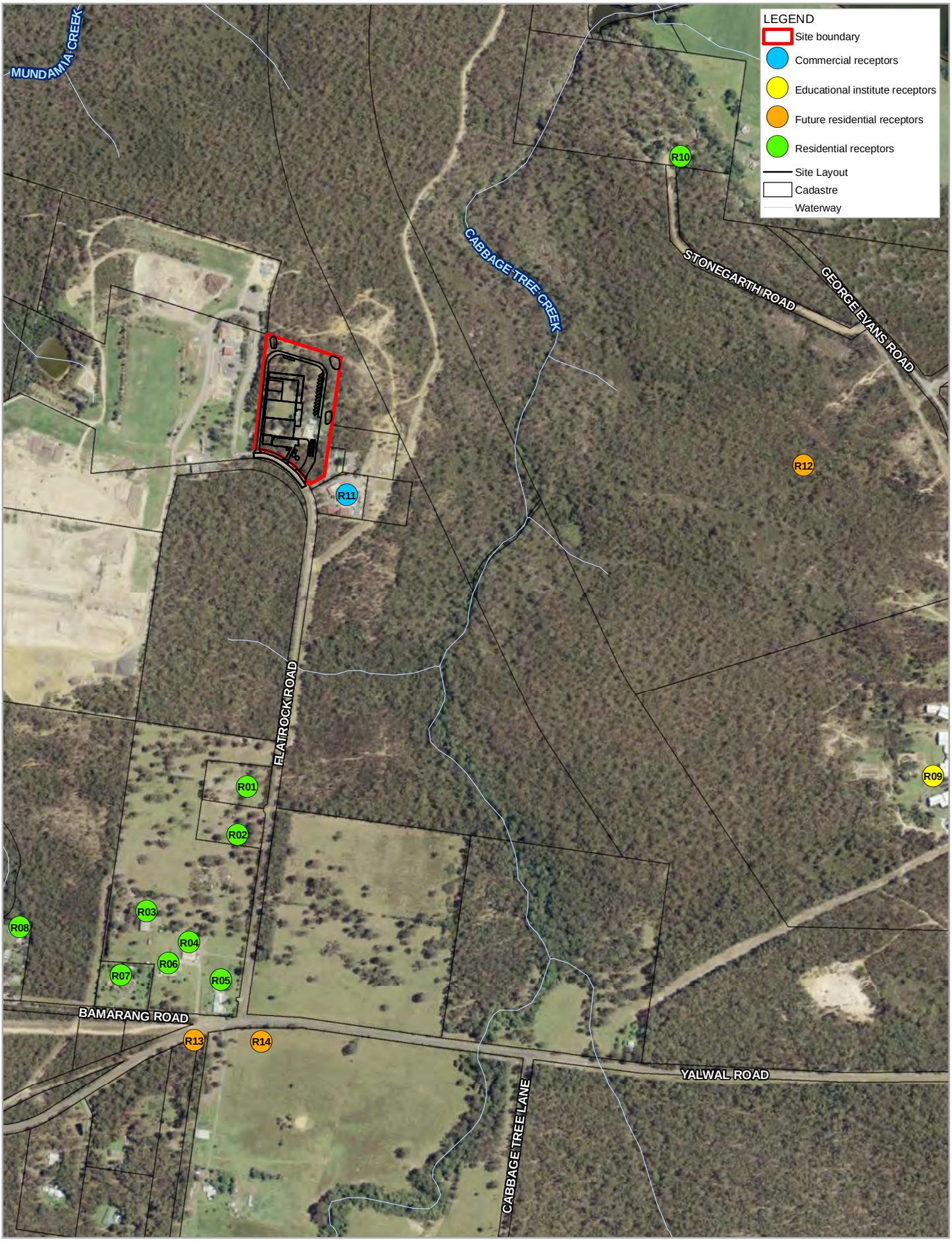
The Approved Methods defines sensitive receptors as locations where people are likely to work or reside and may include a dwelling, school, hospital, office or recreation areas.

The locations of the representative sensitive receptors relative to the site are presented in Table 9.1 with a description, address and approximate distance from site. The locations of representative sensitive receptors in the study area are shown in Figure 9.1.

Table 9.1 Representative sensitive receptor locations

Receptor	Description	Address	Approximate distance from the site
R01	Residential dwelling	43 Flatrock Road, Mundamia	620 m south
R02	Residential dwelling	41 Flatrock Road, Mundamia	720 m south
R03	Residential dwelling	3 Flatrock Road, Mundamia	910 m south
R04	Residential dwelling	3 Flatrock Road, Mundamia	950 m south
R05	Residential dwelling	3 Flatrock Road, Mundamia	1000 m south
R06	Residential dwelling	3 Flatrock Road, Mundamia	1000 m south
R07	Residential dwelling	18 Bamarang Road, Mundamia	1050 m south
R08	Residential dwelling	Jim Da Silva Farm, 38A Old Bamarang Road, Mundamia	1060 m southwest
R09	University of Wollongong Shoalhaven Campus	George Evans Rd, West Nowra	1350 m east
R10	Residential dwelling	56 Stonegarth Road, Mundamia	800 m northeast
R11	DPIE buildings	104 Flatrock Road, Mundamia	55 m southeast
R12[1]	Future residential	Mundamia Urban Release Area	930 m east
R13	Future residential	Cabbage Tree Lane Urban Release Area (west of Cabbage Tree Lane)	1170 m south
R14	Future residential	Cabbage Tree Lane Urban Release Area (east of Cabbage Tree Lane)	1170 m south

[1] R12 receptor was located at the worst-case location based on the planning zone. This is considered conservative as the proposed Mundamia development is located to the east of the R12.



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Project and sensitive receptor locations

Project No. 12536311
Revision No. 0
Date 11/05/2021

FIGURE 9.1

\\ghdnet\ghd\AU\Sydney\Projects\21\12536311\GIS\Maps\Deliverables\12536311_Z013_AirLocation.mxd Data source: Aerial imagery - Google Earth 2021 (image date - 24/02/2016, image extracted - 25/08/2020) & Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Borehole locations - ENRS. Created by: kpsroba

9.2.2 Ambient air quality

The existing landfill at the West Nowra Recycling and Waste Facility is a source of odour and particulate matter in the immediate area. To get an understanding of ambient air quality in the local area, GHD reviewed available long term monitoring data.

No significant sources of emissions to air were identified in the area surrounding the site. The prominent source of background dust would be areas subject to wind erosion and from urban activities. Pollen and vegetation derived dust would also be expected. Ambient pollutant concentrations for the 2019 calendar year are presented in Table 9.2.

Table 9.2 Ambient air quality data (01/01/2019 – 01/01/2020, µg/m^3)

Pollutant	Averaging period	NSW DPIE monitoring station	
		Albion Park South	Wollongong
PM_{10}	Maximum 24 hour	104.3	
	Maximum 24 hour (below assessment criteria)	47.0	
	70th percentile	21.3	
	Annual average	19.5	
NO_2	Maximum 1 hour	77.1	
	Annual average	7.2	
CO	Maximum 1 hour		5405.0
	Maximum 8 hour		2645.0

Elevated 24 hour averaged PM_{10} concentrations that exceed the assessment criteria were identified.

9.3 Assessment criteria

9.3.1 Air quality assessment criteria

The assessment criteria from the Approved Methods were adopted for the project. The criteria should be met at existing or future off-site sensitive receptors. The assessment criteria are provided as cumulative impacts, where the predicted impact of the project (incremental) is added to the existing levels (background) in order to assess the pollutants impacts.

To determine the level of air quality impact, emissions from the project must be assessed against the assessment criteria, as shown in Table 9.3, which are presented in micrograms per cubic metre (µg/m^3).

Table 9.3 Air quality impact assessment criteria

Pollutant	Averaging period	Percentile	Assessment criteria (µg/m^3) [2]
TSP (total suspended particulates)	Annual average	100th	90
PM_{10}	24 hour maximum	100th	50
	Annual average	100th	25
$PM_{2.5}$	24 hour maximum	100th	25
	Annual average	100th	8
CO	1 hour maximum	100th	30,000
	8 hour maximum	100th	10,000
NO_2	1 hour maximum	100th	246

[2] CO assessment criteria was converted from milligrams per cubic metre (mg/m^3) to micrograms per cubic metre (µg/m^3) for consistency

Pollutant	Averaging period	Percentile	Assessment criteria (µg/m^3) [2]
	Annual average	100th	62
SO_2	1 hour maximum	100th	570
	24 hour maximum	100th	228
	Annual average	100th	60

9.3.2 Odour assessment criteria

The assessment criteria for odour are applied at the nearest existing or likely future off-site sensitive receptor. The Approved Methods defines odour assessment criteria (measured in odour units (OU))[3] and specifies how they should be applied in dispersion modelling to assess the likelihood of nuisance impact arising from the emission of odour.

The odour assessment is summarised in Table 9.4.

Table 9.4 Odour assessment criteria in the Approved Methods

Population of the affected community	Odour performance criteria (nose response odour certainty units at 99th percentile[4])
Single residence (≤ ~2)	7
~ 10	6
~ 30	5
~ 125	4
~ 500	3
Urban (≥~2,000)	2

The criteria assume that 7 OU at the 99th percentile would be acceptable to the average person, but as the number of exposed people increases, there is a chance that more sensitive individuals would be encountered. The criterion of 2 OU at the 99th percentile is considered to be acceptable for large populations (more than 2,000 people).

The criteria have also been specified at an averaging time of nominally one second. The choice of the short averaging time recognises that the human nose has a response time of less than one second, so that modelling of odour impact should allow for the short-term concentration fluctuations in an odour plume due to turbulence.

The site is surrounded primarily by vegetated land including the Bamarang Nature Reserve to the west. There are less than 10 houses within a one kilometre radius of the site with an expected population of less than 30 people. Therefore an odour assessment criteria of 5 OU was adopted for all current receptors (R01 to R11).

It is understood that potential future residences are proposed in Mundamia and Bamarang areas (assessed as R12, R13 and R14). The proposed Mundamia development (R12 to the east of the project) consists of approximately 300 allotments. Therefore an odour assessment criteria of 3 OU was adopted for this future residential receptor (R12).

The proposed Bamarang development (R13 and R14 to the south of the project) does not have development consent and consequently lot plans and the number of future residents are not available at the time of this assessment, however it is understood that the lands are zoned general residential. Therefore an odour assessment criteria of 5 OU was adopted for these future residential receptors (R13 to R14). It is recommended that the odour assessment criteria

[3] The number of odour units is the concentration of a sample divided by the odour threshold or the number of dilutions required for the sample to reach the threshold. This threshold is the numerical value equivalent to when 50 per cent of a testing panel correctly detect an odour.

[4] This is a prediction of the odour level that may occur 99 per cent of the time, or that is below these criteria for 99 hours in every 100. Odour performance criteria are designed to be precautionary, so that impacts on sensitive receivers can be minimised.

is confirmed for R13 and R14 once more detail regarding the number of proposed allotments within the development becomes available.

9.4 Air handling systems

The reception hall would be maintained under negative pressure to minimise fugitive emissions to air. Inlet louvres on the side of the building would allow air in, while ventilation fans would direct air to an odour and dust control stack. The reception hall control stack would be fitted with an activated carbon filter (to treat odour) and a fabric filter (to reduce dust).

The sorting hall would be fitted with a dust collector extraction system. Inlet louvres or doorways open on the eastern and western walls of the building would allow air into the stabilisation and sorting hall. Odorous air inside the stabilisation and sorting hall would then be ventilated via the sorting hall stack.

Further detail is provided in Appendix I.

9.5 Assessment of potential impacts

9.5.1 Construction

The most significant construction activities likely to generate emissions to air (primarily dust) are the early construction works (clearing of land and provision of basic infrastructure on the site) which were assessed in the Stage 1 air quality assessment in *West Nowra Recovery Park EIS Air Quality Assessment* (GHD 2015). The remaining construction activities to be assessed as part of Stage 2 are considered relatively minor and unlikely to result in air quality impacts.

Consequently, further quantitative assessment was not considered necessary for the project. It is expected that the implementation of appropriate mitigation measures would effectively control dust generation for the construction of the project. Mitigation measures to minimise air quality impacts during the construction of the project are provided in Section 9.6.

9.5.2 Operation

Odour

Odour emissions from the project are anticipated to occur from waste stored in the material reception hall (released primarily via the ventilation stack and minor fugitive emissions from the operable roller doors while open) and from the wastewater treatment plant activated sludge reactor. The basis for the project odour emissions from the waste reception hall, wastewater treatment plant, stabilisation and sorting hall and product storage area including sampling results are provided in Appendix I.

The odour emissions inventory for the project is shown in Table 9.5.

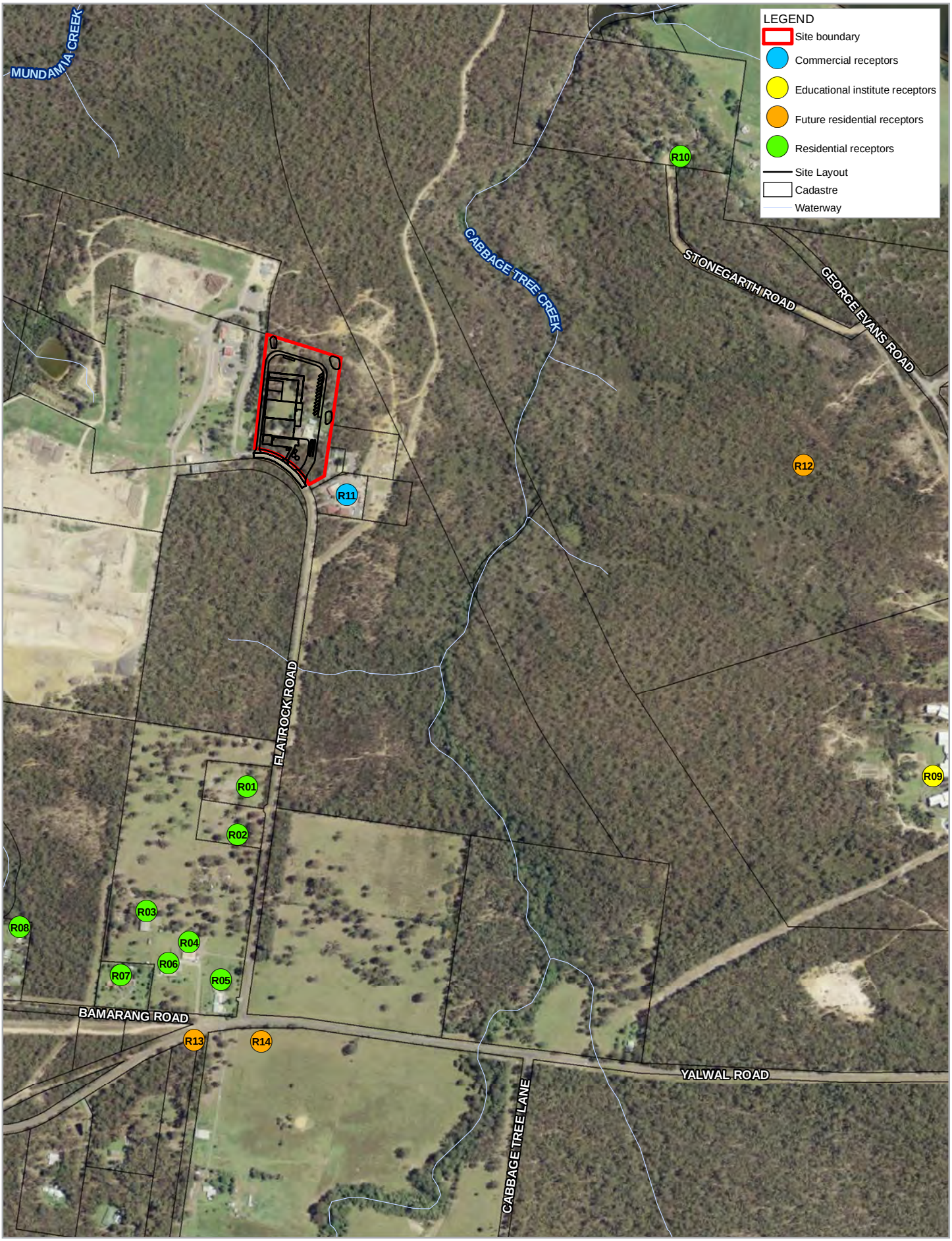
Table 9.5 Odour emissions inventory

Odour source	Source type	Odour emission rate ($OU.m^3/s$)	Peak to mean factor	Modelled odour emission rate ($OU.m^3/s$)
Material reception hall (ventilation stack)	Stack (point source)	21,735	2.3 (Wake-affected point)	49,991
Sorting hall	Stack (point source)	1,274	2.3 (Wake-affected point)	2,930
Material reception hall (roller doors)	Volume	860	2.3 (Near field volume)	1,978
Wastewater treatment plant	Area	204	2.5 (Near field area)	509
Finished product storage area	Area	306	2.5 (Near field area)	764

The predicted odour concentrations from the project and cumulative scenarios at each sensitive receptor is shown in Table 9.6 and an incremental odour contour plot is shown on Figure 9.2 and cumulative odour contour plots for the project with current landfill operations and the project with proposed stage 4 Landfill Extension are shown on Figure 9.5 and Figure 9.6 respectively. No exceedances of the odour assessment criteria were predicted.

Table 9.6 Predicted odour concentrations (OU)

Receptor	Odour assessment criteria (OU)	Predicted 99th percentile odour concentrations (1 second average, OU)		
		Incremental	Cumulative (The project + current landfill operations)	Cumulative (The project + proposed stage 4 Landfill Extension)
R01	5	0.4	0.9	1.3
R02	5	0.3	0.6	0.9
R03	5	0.2	0.4	0.5
R04	5	0.2	0.3	0.5
R05	5	0.2	0.3	0.4
R06	5	0.2	0.3	0.4
R07	5	0.2	0.3	0.4
R08	5	0.2	0.3	0.4
R09	5	1.1	1.1	1.2
R10	5	0.8	1.2	1.3
R11	5	2.9	3.1	3.3
R12	3	2.7	2.7	2.8
R13	5	0.2	0.3	0.3
R14	5	0.2	0.2	0.3



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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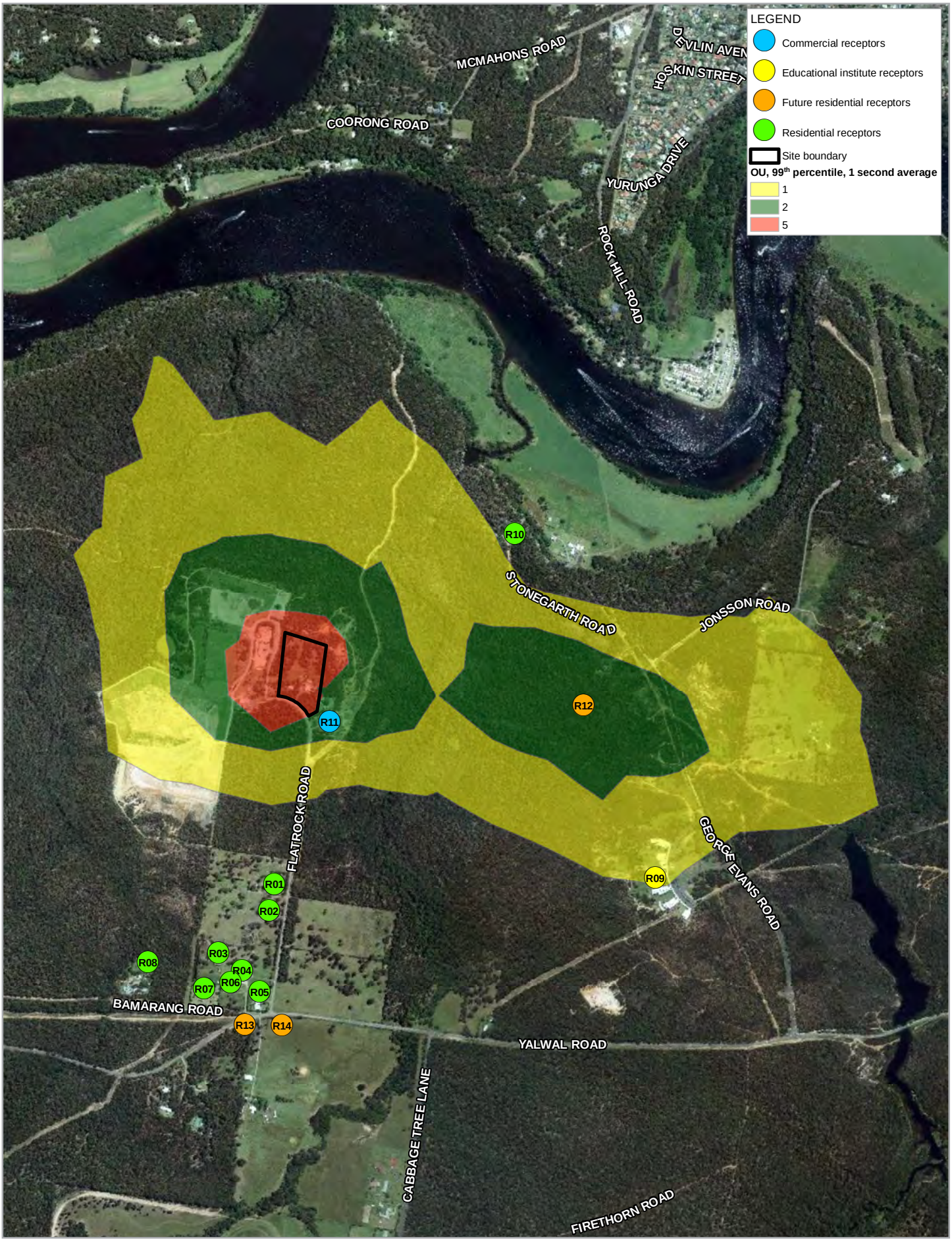
West Nowra Resource Recovery Park - Stage 2

Project and sensitive receptor locations

Project No. 12536311
Revision No. 0
Date 11/05/2021

FIGURE 9.1

\\ghdnet\ghd\AU\Sydney\Projects\21\12536311\GIS\Maps\Deliverables\12536311_Z013_AirLocation.mxd Data source: Aerial imagery - Google Earth 2021 (image date - 24/02/2016, image extracted - 25/08/2020) & Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Borehole locations - ENRS. Created by: kpsroba



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

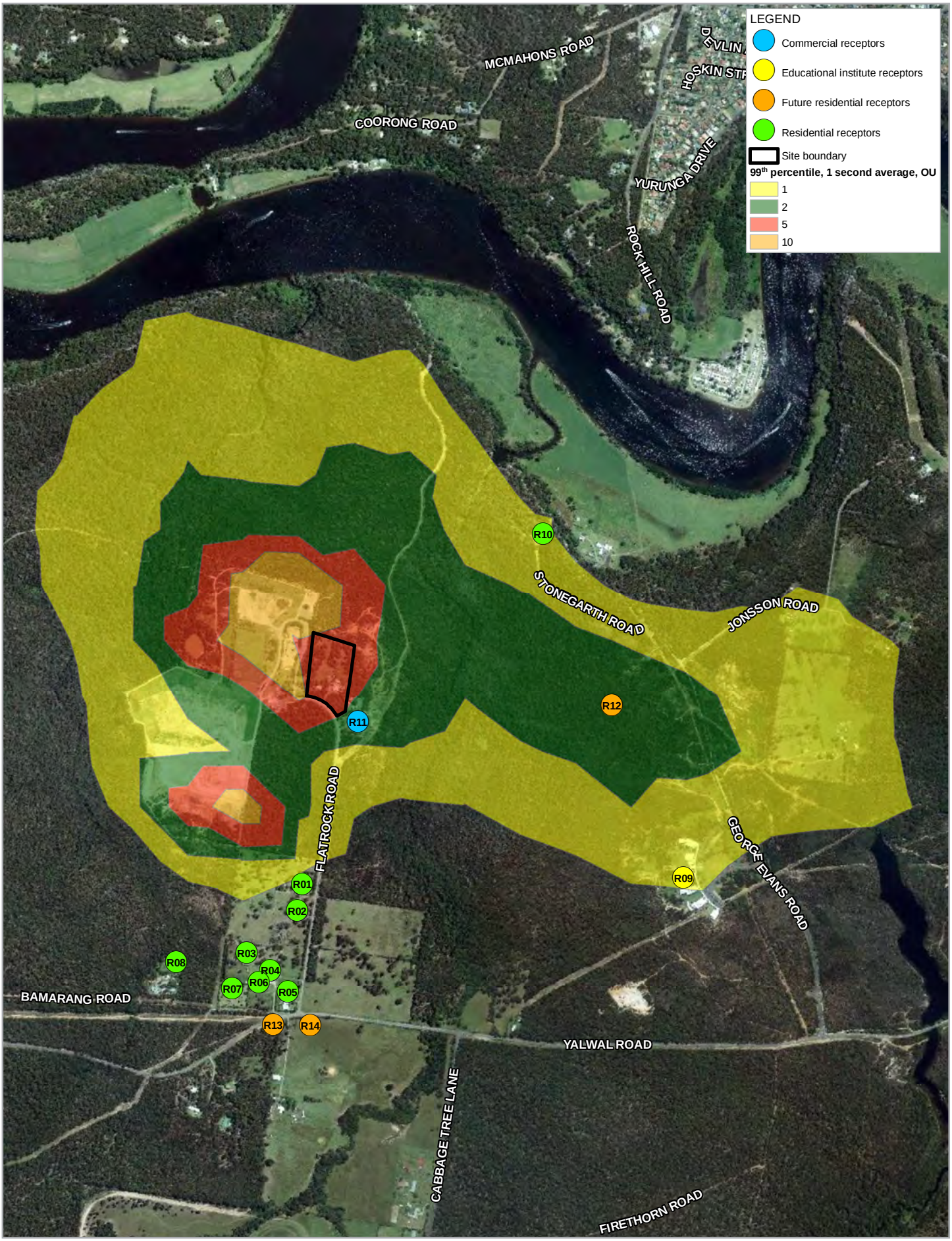
Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Predicted incremental peak odour concentrations (99th percentile, 1 second average, OU)

Project No. 12536311
Revision No. 0
Date 11/05/2021

FIGURE 9.2

\\ghdnet\ghd\AU\Sydney\Projects\21\12536311\GIS\Maps\Deliverables\12536311_Z014_AirPeak.mxd Data source: Aerial imagery - Google Earth 2021 (image date - 24/02/2016, image extracted - 25/08/2020) & Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Borehole locations - ENRS. Created by: kpsroba



Paper Size ISO A4
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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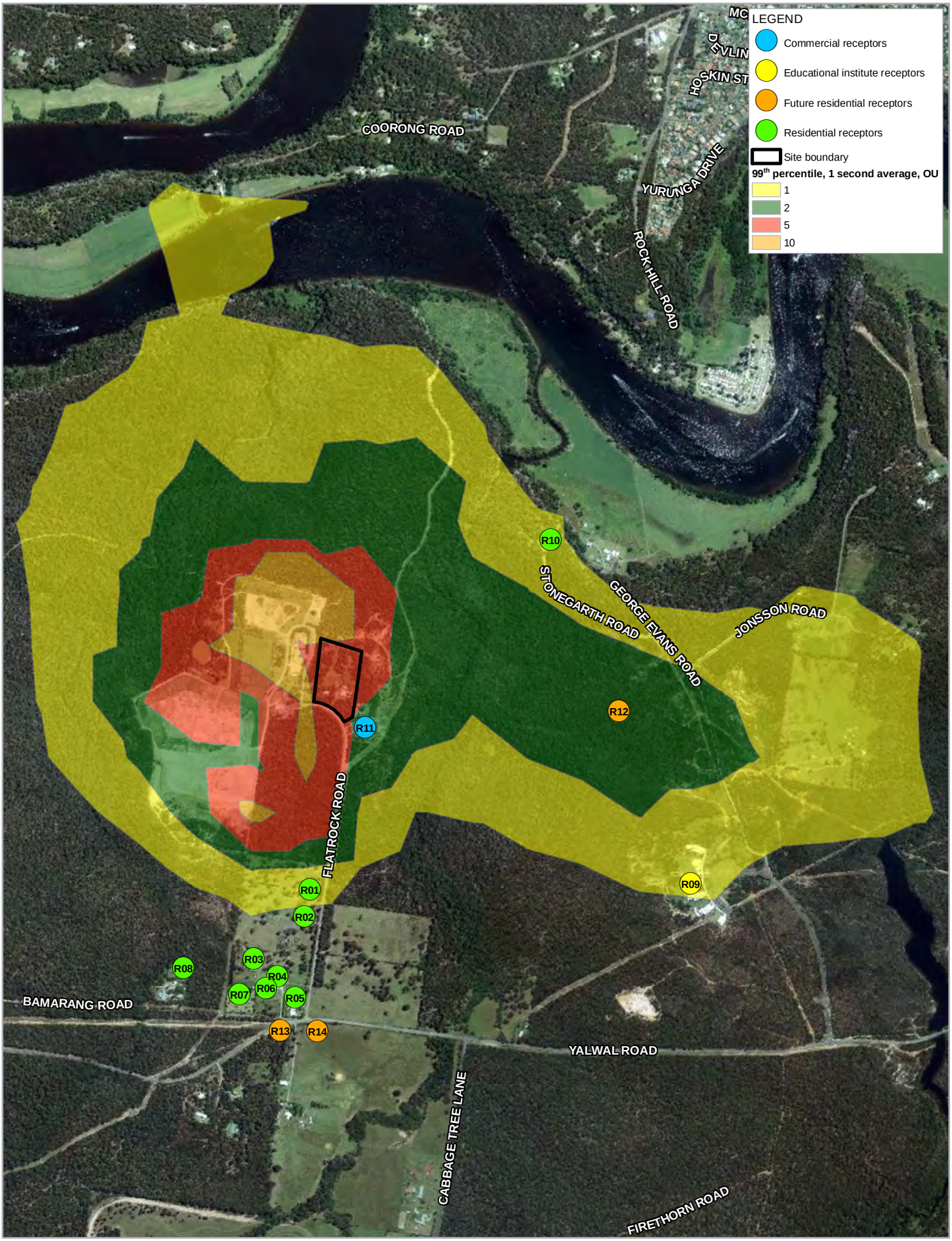
Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Predicted cumulative peak odour concentrations with current landfill operations (99th percentile, 1 second average, OU)

Project No. 12536311
Revision No. 0
Date 11/05/2021

FIGURE 9.3

\\ghdnet\ghd\AU\Sydney\Projects\21\12536311\GIS\Maps\Deliverables\12536311_Z017_PCumulativePeakOdour.mxd Data source: Aerial imagery - Google Earth 2021 (image date - 24/02/2016, image extracted - 25/08/2020) & Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Borehole locations - ENRS. Created by: kpsroba



Paper Size ISO A4
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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Predicted peak odour concentrations, cumulative with proposed stage 4 extension (99th percentile, 1 second average, OU)

Project No. 12536311
Revision No. 0
Date 11/05/2021

FIGURE 9.4

\\ghdnet\ghd\AU\Sydney\Projects\21\12536311\GIS\Maps\Deliverables\12536311_Z018_PCumulativeProposed.mxd

Data source: Aerial imagery - Google Earth 2021 (image date - 24/02/2016, image extracted - 25/08/2020) & Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Borehole locations - ENRS. Created by: kpsroba

Dust

Particulate emissions would occur from the building ventilation systems in the receivals and sorting hall. Particulate emissions were estimated based on the proposed building ventilation air flowrate and fabric filter dust concentration performance factors provided by Bioelektra. Stack properties are provided in Appendix I.

The dust emissions inventory for the project is shown in Table 9.7.

Table 9.7 Dust emissions inventory

Dust source	Source type	TSP emission rate (g/s)	PM_{10} emission rate (g/s)	Notes[5]
Reception hall	Stack (point)	0.011	0.0056	Design flow rate 40,000 m^3/h Dust load estimate 1 mg/Am^3
Sorting hall (process air extraction)	Stack (point)	0.068	0.034	Total max flow 24,600 Am^3/h or 21,500 Nm^3/h Maximum residual dust 10 mg/Nm^3

The predicted incremental particulate concentrations from the project at each sensitive receptor is provided in Table 9.8. Contour plot of incremental 24 hour averaged and annual averaged PM_{10} are shown on Figure 9.5 and Figure 9.7 respectively.

Predicted particulate concentrations from the project are low with the maximum 24 hour PM_{10} concentration in the year being 0.6 $\mu g/m^3$ at R11, and 0.3 $\mu g/m^3$ at a residential dwelling (approximately 1% of the assessment criteria). These incremental concentrations are minor in comparison to expected reductions in particulates from reduced landfill operations due to the project.

Cumulative particulate concentrations were calculated by adding predicted incremental concentrations to the maximum recorded background concentrations provided in Table 9.8 and are as follows:

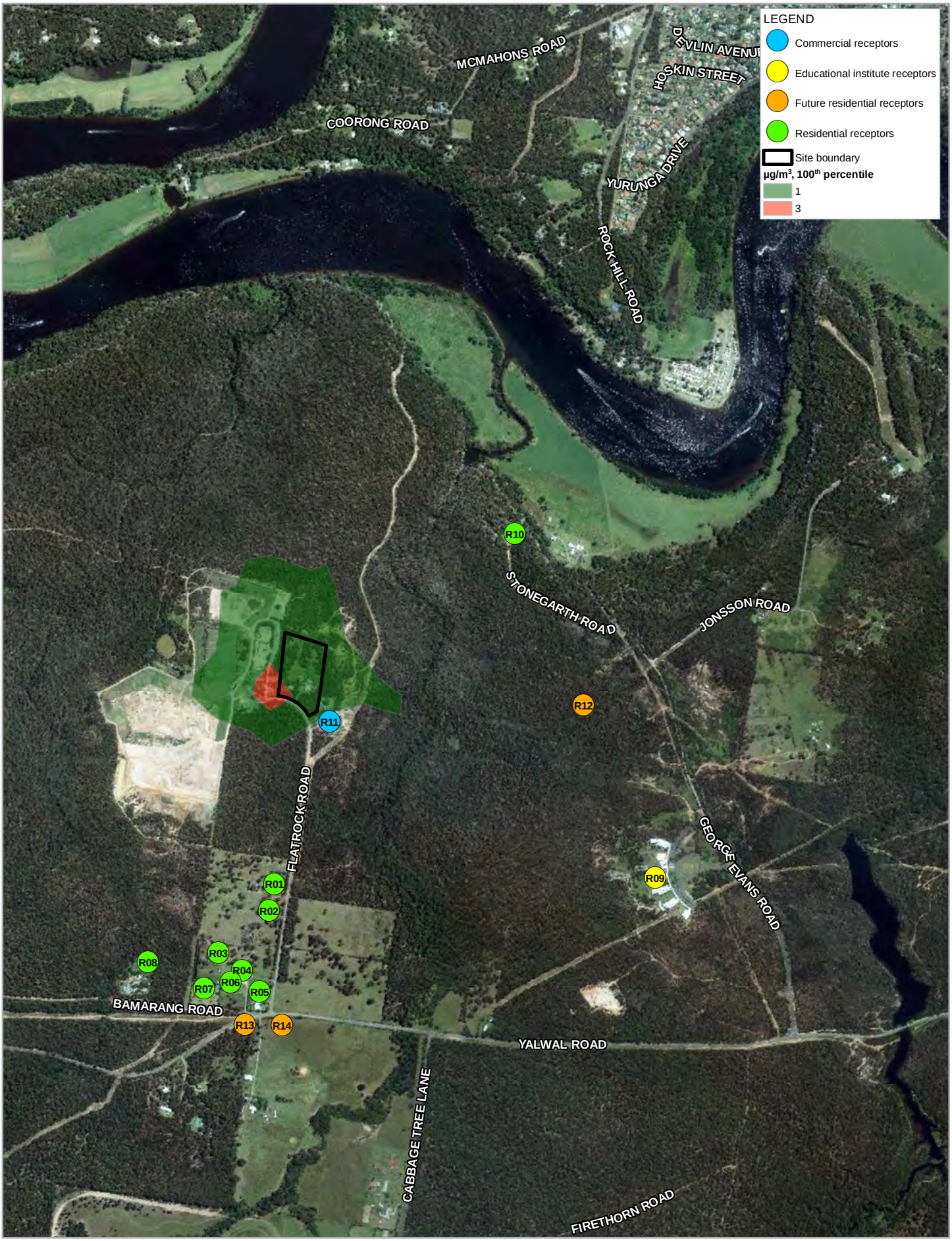
- A 24 hour PM_{10} concentration of 47.0 $\mu g/m^3$
- An annual PM_{10} concentration of 19.5 $\mu g/m^3$
- An annual TSP concentration of 39.0 $\mu g/m^3$ (assumed double the background annual PM_{10})

Cumulative 24 hour PM_{10} concentration presented in Figure 9.6 were calculated by adding predicted incremental concentrations to the 70th percentile background concentration (21.3 $\mu g/m^3$) as an indicative background concentration for the purpose of showing a cumulative 24 hour PM_{10} contour.

[5] Ventilation system flowrates and dust emission factors sourced from equipment supplier quotations provided by Bioelektra.

Table 9.8 Predicted dust concentrations (µg/m^3)

Receptor	Predicted incremental dust concentration (µg/m^3)			Predicted cumulative dust concentration (µg/m^3)		
Pollutant	TSP	PM_{10}		TSP	PM_{10}	
Averaging period	Annual	24 hour	Annual	Annual	24 hour	Annual
Assessment criteria	90	50	25	90	50	25
R01	0.01	0.3	0.01	39.1	47.3	19.6
R02	0.01	0.2	0.01	39.1	47.2	19.6
R03	0.01	0.1	0.01	39.1	47.1	19.5
R04	0.01	0.1	0.01	39.1	47.1	19.5
R05	0.01	0.2	0.01	39.1	47.2	19.5
R06	0.01	0.1	0.01	39.1	47.1	19.5
R07	0.01	0.1	0.01	39.1	47.1	19.5
R08	0.01	0.1	0.01	39.1	47.1	19.5
R09	0.04	0.3	0.02	39.1	47.3	19.6
R10	0.03	0.2	0.02	39.1	47.2	19.6
R11	0.08	0.6	0.05	39.2	47.6	19.6
R12	0.14	0.5	0.09	39.2	47.5	19.6
R13	0.01	0.1	0.00	39.1	47.1	19.5
R14	0.01	0.1	0.00	39.1	47.1	19.5



Paper Size ISO A4
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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Predicted incremental 24 hour averaged PM_{10} concentrations (100^{th} percentile, µg/m³)

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FIGURE 9.5

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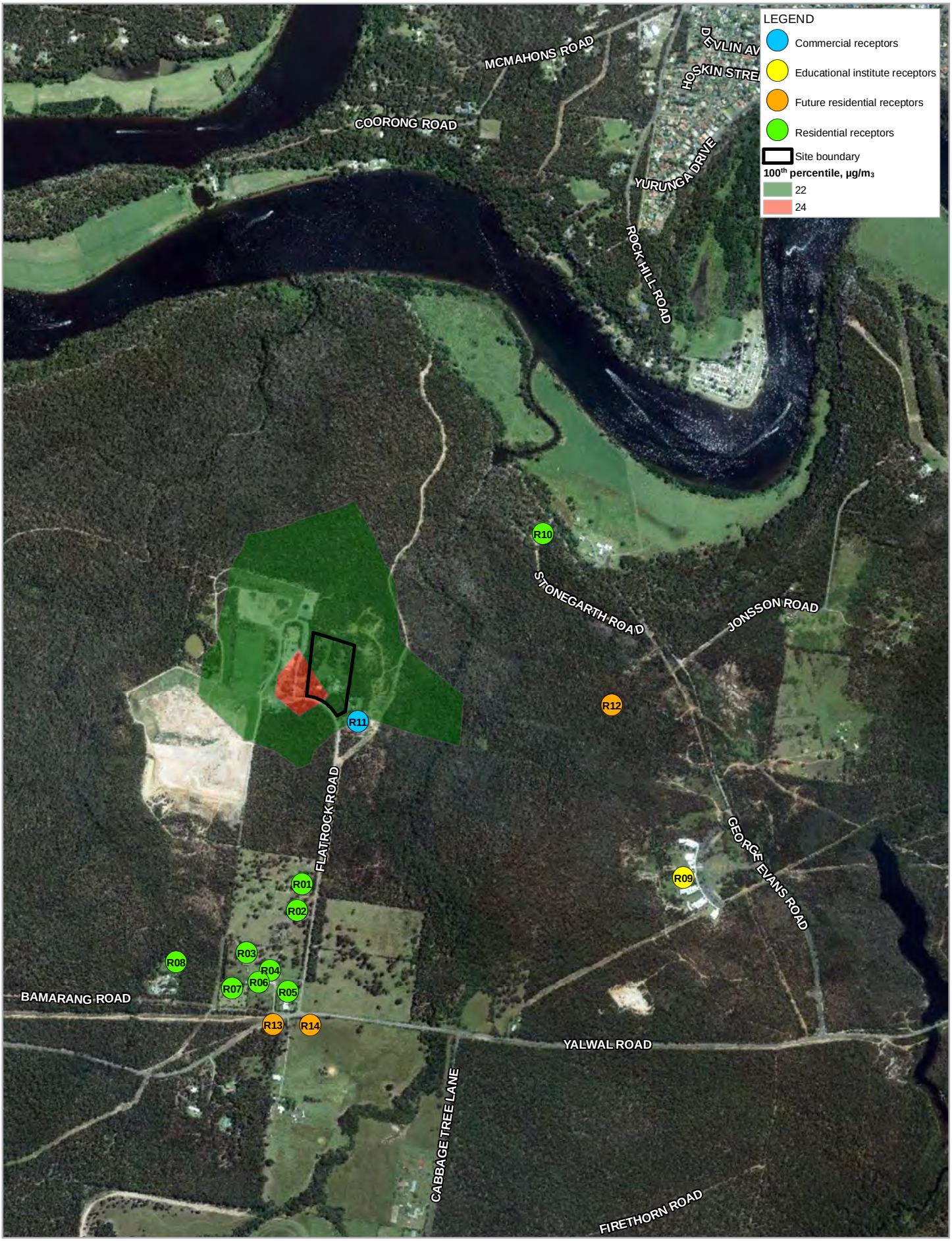
Data source: Aerial imagery - Google Earth 2021 (image date - 24/02/2016, image extracted - 25/08/2020) & Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Borehole locations - ENRS. Created by: kpsroba



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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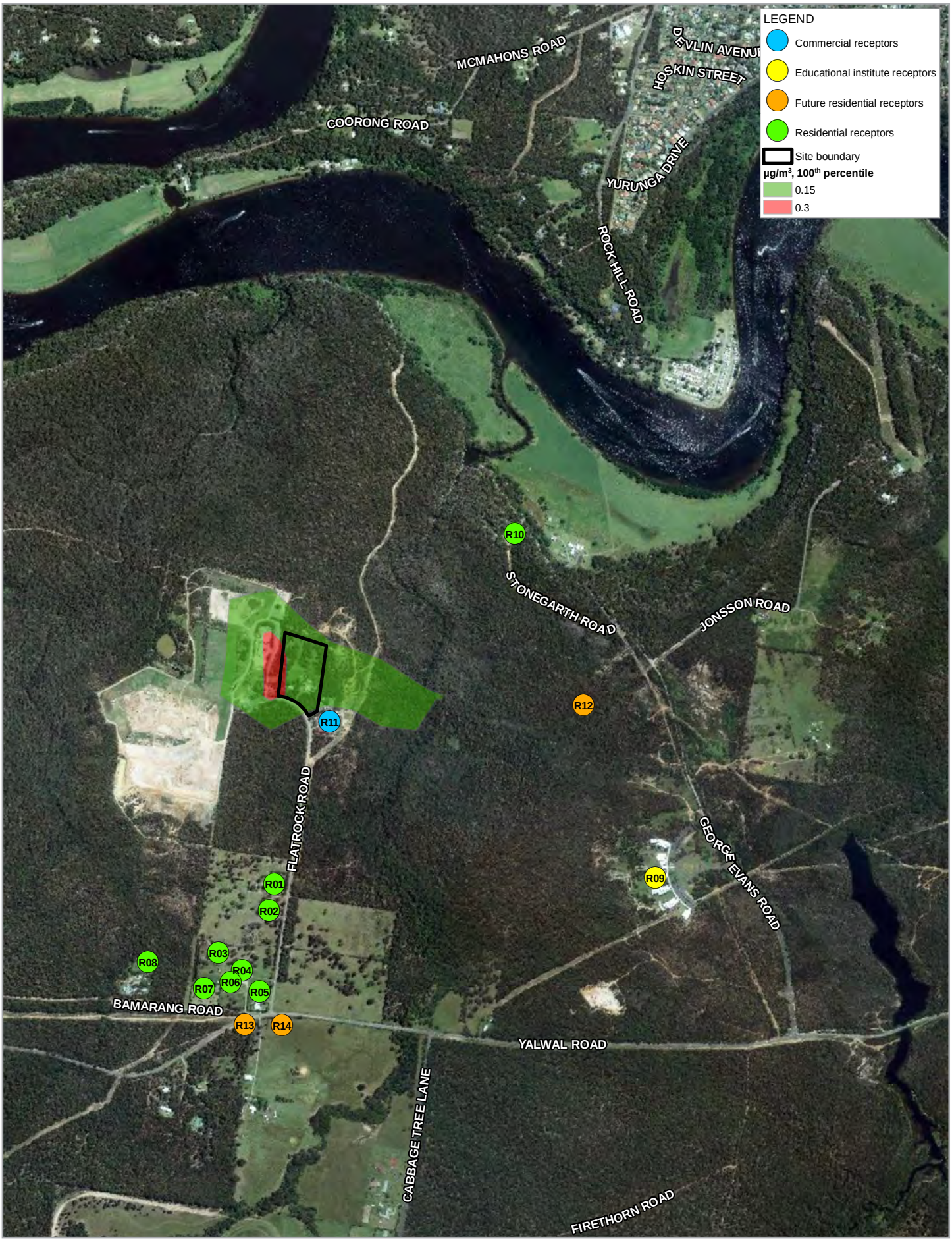
Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Predicted cumulative
24 hour averaged PM_{10} concentrations
(100th percentile, µg/m³)

Project No. 12536311
Revision No. 0
Date 11/05/2021

FIGURE 9.6

\\ghdnet\ghd\AU\Sydney\Projects\21\12536311\GIS\Maps\Deliverables\12536311_Z019_PCumulative24h.mxd Data source: Aerial imagery - Google Earth 2021 (image date - 24/02/2016, image extracted - 25/08/2020) & Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Borehole locations - ENRS. Created by: kpsroba



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Predicted incremental annual average PM_{10} concentrations (100^{th} percentile, µg/m³)

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Date 11/05/2021

FIGURE 9.7

Boiler emissions

Combustion emissions would occur from combustion in the boiler and would be released via the flue gas stack. The boiler is used to provide heat for use in the autoclaves to pre-treat and sterilise the waste. Combustion pollutant exhaust concentrations (in parts per million (ppm)), flue gas flowrate (in kilograms per hour (kg/hr)) and temperature were provided by Bioelektra and are presented in Table 9.9.

Table 9.9 Boiler emissions

Parameter	Value	Units
NO_x exhaust concentration	100	ppm
CO exhaust concentration	50	ppm
SO_2 exhaust concentration	Considered negligible and not further assessed	N/A
Flue gas flow rate	12,000	kg/hr
Flue gas temperature	250	°C

The calculated combustion emissions rates from the boiler are provided in Table 9.10.

Table 9.10 Combustion pollutant emission rate

Pollutant	Value	Units
NO_2	0.898	g/s
CO	0.275	g/s

Predicted incremental concentrations of boiler emissions are shown in Table 9.11. The predicted cumulative concentrations taking into account the background concentration (from Table 9.2) are shown in Table 9.12.

No incremental or cumulative exceedances of the assessment criteria are predicted.

Table 9.11 Predicted incremental pollutant concentrations (µg/m^3)

Receptor	Predicted incremental combustion pollutant concentrations (µg/m^3)			
Pollutant	NO_2		CO	
Averaging period	1 hour	Annual	1 hour	8 hour
Assessment criteria	246	62	30,000	10,000
R01	30.5	0.1	9.4	3.7
R02	28.3	0.1	8.7	3.4
R03	15.2	0.1	4.7	1.3
R04	15.7	0.1	4.8	1.8
R05	21.1	0.1	6.5	2.7
R06	13.5	0.1	4.2	1.2
R07	11.4	0.1	3.5	1.0
R08	24.2	0.1	7.5	1.1
R09	34.0	0.4	10.4	3.0
R10	48.1	0.3	14.9	3.6
R11	49.9	0.4	15.4	5.6
R12	81.3	1.5	25.0	0.5
R13	10.7	0.1	3.3	0.0
R14	16.5	0.1	5.1	0.0

Table 9.12 Predicted cumulative pollutant concentrations (µg/m^3)

Receptor	Predicted cumulative combustion pollutant concentrations (µg/m^3)			
Pollutant	NO_2		CO	
Averaging period	1 hour	Annual	1 hour	8 hour
Assessment criteria	246	62	30,000	10,000
R01	107.6	7.3	5,414.4	2,648.7
R02	105.4	7.3	5,413.7	2,648.4
R03	92.3	7.3	5,409.7	2,646.3
R04	92.8	7.3	5,409.8	2,646.8
R05	98.2	7.3	5,411.5	2,647.7
R06	90.6	7.3	5,409.2	2,646.2
R07	88.5	7.3	5,408.5	2,646.0
R08	101.3	7.3	5,412.5	2,646.1
R09	111.1	7.6	5,415.4	2,648.0
R10	125.2	7.5	5,419.9	2,648.6
R11	127.0	7.6	5,420.4	2,650.6
R12	158.4	8.7	5,430.0	2,645.5
R13	87.8	7.3	5,408.3	2,645.0
R14	93.6	7.3	5,410.1	2,645.0

9.6 Environmental management measures

Table 9.13 provides a summary of the proposed air quality and odour management measures.

Table 9.13 Air quality and odour management measures

Issue	Management measure	Timing
Dust management during construction	• The proposed selection of construction plant would be reviewed and equipment and dust reduction measures utilised where possible • All spoil stockpiles would be covered where possible • Particulate matter generated from construction activities is typically more prominent during dry and windy conditions. Water suppression would be used during these worst case conditions and when visible plumes of dust are observed to be dispersed from the construction of the project • The frequency of water dust suppression would be increased during worst case dust dispersion meteorological conditions (dry and windy) • The construction site would be maintained and kept clean • Controlled site access would be maintained with use of cattle/shaker grids and wheel wash in order to reduce the tracking of mud off site • All vehicles transporting spoil or other dispersible material would be appropriately covered to prevent the escape of dust or other material while in transit • A log of all dust complaints received would be compiled and any potential causes of the complaint noted. If a trend in complaints is identified, work methods would be adjusted accordingly to minimise the likelihood of any future complaints	Construction

Issue	Management measure	Timing
	• Visual monitoring would be undertaken by site management to ensure that construction works do not generate unacceptably high quantities of dust • Appropriate air quality mitigation measures (as provided above) would be included in the Construction Environment Management Plan	
Air quality during construction	• Construction plant and equipment would be properly operated and maintained to minimise excessive exhaust emissions • Appropriate air quality mitigation measures (as provided above) would be included in the Construction Environment Management Plan	Construction
Dust management during operation	• All building ventilation dust filters would be regularly checked and maintained and replaced in accordance with manufacturer specifications • Controlled site access would be maintained with vehicle wash down/clean down facilities (wheel wash if necessary) to be established to maintain access roads	Operation
Odour management during operation	• The activated carbon filter would be regularly checked, maintained and replaced in accordance with manufacturer specifications • The quantity of putrescible waste stored in the reception hall would be minimised • The reception hall would be kept as clean as possible via regular sweeping and wash down to minimise unnecessary odour emissions • The quantity of waste inside the reception hall would be minimised as much as practicable to prevent unnecessary build-up of waste • Unnecessary opening of the reception hall door would be minimised where possible • An odour complaint register to record all occurrence of odour complaints would be created • Staff would be informed of the potential odour impacts from the operation of the project and educated on appropriate mitigation measures (as outlined above)	Operation

10. Greenhouse gas

A greenhouse gas assessment was prepared by GHD for the project (Appendix J). A summary of the assessment and proposed mitigation measures is provided in this chapter.

10.1 Assessment method

A quantitative greenhouse gas (GHG) assessment was undertaken to estimate the emissions from construction and operation of the project.

The assessment considered the following scopes of emissions:

- Scope 1: Emissions from direct energy use
- Scope 2: Indirect energy use from imports and exports of electricity, heat or steam

The assessment was undertaken in accordance with the principles of *ISO 14064-2: Greenhouse gases – Part 2* and the general principles for estimating emissions in the National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008. Relevant sections of the following documents were used for the purposes of defining appropriate methods for quantification of emissions from individual sources:

- NGER (Measurement) Determination 2008 (as amended) and *National Greenhouse and Energy Reporting Act 2007* (NGER Act), Commonwealth Department of Industry, Science, Energy and Resources
- Commonwealth Department of Industry, Science, Energy and Resources (2020) *National Greenhouse Accounts (NGA) Factors*

These guidelines are considered representative of good practice GHG accounting in Australia and are applicable to the project.

10.2 Existing environment

Australia's national, state and territory GHG emissions inventories are reported by the Department of Industry, Science, Energy and Resources. Australia's national GHG emissions, by sector, for the year to March 2020 and year 2018 are presented in Table 10.1 below. Total emissions for the year to March 2020 are 528.7 $MtCO_2$-e, and 537.4 $MtCO_2$-e for year 2018.

Table 10.1 National and NSW emissions

Emissions source	Australia emissions year to March 2020 ($MtCO_2$-e) [1]	2018 Australia emissions ($MtCO_2$-e) [2]	2018 NSW emissions ($MtCO_2$-e) [2]
Energy – Electricity	172.9	183.2	52.1
Energy – Stationary Energy (excluding electricity)	102.7	97.1	15.3
Energy – Transport	99.7	100.8	28.7
Energy – Fugitive Emissions	55.8	54.4	13
Industrial Processes and Product Use	34.6	34.2	13.7
Agriculture	68	75.6	18
Waste	13.1	12.7	4.3
Land Use, Land Use Change and Forestry	-18.5	-20.6	-13.3
Overall Total	**528.7**	**537.4**	**131.7**

Source:

1. Table 3, Department of the Environment and Energy (2020a)
2. Table 4, Department of the Environment and Energy (2020b)

The major emission source for NSW was stationary energy, primarily for electricity generation, which contributed to 51.2% of greenhouse gas emissions. The second largest source was the transport sector which contributed to approximately 21.8% of the state's emissions.

10.3 Assessment of potential impacts

10.3.1 Construction

A summary of estimated scope 1 and 2 GHG emissions that would occur as a result of construction activities for the project is presented in Table 10.2

Table 10.2 Summary of emissions – construction phase

Activity	Activity data	Units	Total emissions (t CO_2-e)	
			Scope 1	Scope 2
Phase 2 diesel consumption	57	kL	156	0
Phase 3 diesel consumption	104	kL	282	0
Phase 4 diesel consumption	33	kL	89	0
Diesel consumption (generator & telehandler)	22	kL	60	0
Total emissions (t CO_2-e/ year)			**586**	**0**

Scope 1 and 2 emissions from construction of the project are estimated as 586 tCO_2-e, which is approximately 0.0004% of NSW's annual emissions and 0.0001% of Australia's annual emissions. Construction emissions is considered negligible compared to annual emissions in NSW and Australia.

10.3.2 Operation

A summary of estimated scope 1 and 2 GHG emissions that would occur as a result of operation of the project is presented in Table 10.3.

Table 10.3 Summary of annual emissions – operations phase

Activity	Activity data	Units	Annual emissions (t CO_2-e)	
			Scope 1	Scope 2
LPG consumption	4,364	kL/year	11,825	0
Total diesel consumption	18	kL	49	0
Solar production	1,429	MWh	0	0
Electricity consumption (NSW)	7,662	MWh	0	6,206
Total			**11,875**	**6,206**

Annual scope 1 and 2 emissions from the project during operations are estimated as 18,081 tCO_2-e, which is equivalent to approximately 0.01% and 0.003% of NSW's and Australia's annual emissions respectively. The estimated operational emissions are also considered negligible compared to annual emissions in NSW and Australia. Operational emissions are predicted to be lower than the facility reporting threshold of 25,000 tCO_2-e per year, under the National Greenhouse and Energy Reporting scheme.

10.4 Environmental management measures

Table 10.4 provides a summary of the proposed greenhouse gas management measures.

Table 10.4 Greenhouse gas management measures

Issue	Management measure	Timing
Energy consumption	• The project would utilise solar power	Operation
	• Plant, equipment and vehicles selected for use would be efficient and operational activities would be optimised as far as practicable to minimise energy consumption	Operation

11. Soils and water

A soils and water assessment was prepared by GHD for the project (Appendix K). A summary of the assessment and proposed mitigation measures is provided in this chapter.

11.1 Assessment method

The assessment method was developed based on an analysis of the likely risks of the project concerning soils and water. The risk assessment found:

- During operation, waste would be confined indoors or outdoors within enclosed containers such as hooklift bins and bags. The site therefore is not anticipated to contain any waste areas that would be subjected to rainfall. Only roof and general traffic areas are expected to be exposed on-site. Therefore, the potential pollutants of concern in stormwater runoff were understood to be those typically associated with industrial urbanisation. As such, a MUSIC model was developed to quantify potential impacts of the project in relation to the pollutants of concern.
- No drawing of groundwater is proposed, therefore a detailed groundwater yield assessment was not undertaken. Further, as no riparian or groundwater dependent ecosystems were identified in the vicinity of the site, these have not been assessed. Also, since there would not be any significant infrastructure on the waterways immediately downstream of the site, no detailed stormwater detention assessment was required.
- Most of the site would be covered by buildings, and roof water runoff is considered to constitute a very low water quality risk to downstream waterways. The area of perimeter roads is minimal and flows from these areas would therefore not be concentrated. Runoff for larger trafficked areas such as the car park and entrance area would be collected and sent to a stormwater management system including a gross pollutant trap, vegetated buffer strip and a constructed wetland.

The above preliminary risk assessment informed the assessment methodology, with items of low risk assessed qualitatively. Soil and water management measures were developed based on the outcomes of the assessment.

Water balance

A water balance assessment was developed to determine runoff quantities and processing requirements. Rainfall and evaporation data were used to determine the annual direct rainfall, runoff, and evaporation volumes for each dam. The water balance took into consideration both water runoff, demand for potable water and recycling of processing water.

The water balance considered runoff from the whole of the site, including Basin 1 and Basin 2 (refer Figure 11.1). Basin geometries were estimated based on the space available and the size indicated on the general layout plan. Processing requirements and reuse volumes were estimated based on data available on similar projects. A spreadsheet was used to generate the water balance.

MUSIC modelling

A MUSIC model was developed to assess the potential impact of runoff from the carpark and site entrance areas on downstream water quality. It is anticipated that pollutants of concern for these areas are consistent with those typically associated with industrial urbanisation, and that this area poses the primary significant risk with relation to water quality.

Therefore, a MUSIC model was deemed necessary to estimate any changes to water quality due to these aspects of the site and to assess the effectiveness of proposed mitigation.

The MUSIC model simulated the pollutant loads for the proposed carpark and entrance area as well as the effectiveness of the proposed stormwater treatment system to estimate resultant pollutant loads in discharge for the system. It also estimated the existing generation of pollutants from the equivalent existing site area. Total Suspended Solids, Total Phosphorus, Total Nitrogen and Gross Pollutants were simulated which are common indicator pollutants for impervious catchments.

Preliminary salinity assessment

A preliminary assessment of the salinity potential at the site was undertaken by GHD as part of the preliminary site investigation (Appendix L). The following tasks were undertaken to assess salinity impacts:

- A site walkover was conducted to visually assess any salinity indicators.
- Three surface soil samples from the upper 0.1 metres of the soil profile were collected for electrical conductivity (EC) testing.

Acid sulfate soils

With reference to the NSW Government Sharing and Enabling Environmental Data (SEED) website, there is no known occurrence of acid sulfate soils at or near the site.

11.2 Existing environment

Topography and hydrology

The site is located between two creeks that flow northwards into the Shoalhaven River. Namely Sandy Creek which is 680 metres west of the site and Cabbage Tree Creek which is 450 metres east of the site. The site elevation varies from 46.5 metres on the Australian Height Datum (m AHD) in the south western corner to a high point in the north of the site at 49 m AHD. It includes grassed areas modified by development activity and natural bushland remnants in the southern end of the property. The topography of the site is generally even and sloping westwards towards the adjacent waste management facility.

Groundwater dependent ecosystems and riparian zones

There are no identified watercourses draining through the site. No groundwater dependent ecosystems have been identified in the vicinity of the site. The site is more than 450 metres from the nearest waterway (Cabbage Tree Creek).

Salinity

With reference to the NSW Government Sharing and Enabling Environmental Data (SEED) website, there is no known salinity hazard at or near the site. This is also consistent with a Lotsearch (LS014012 EP) report obtained as part of the Preliminary Site Investigation (Appendix L) that indicates that there are no dryland salinity occurrences at or near the site.

The NSW Soil and Land Information System database was reviewed and identified three soil technical reports prepared for properties located between 2.3 kilometres and 3 kilometres from the site. The reports indicated that no salting was evident. However, no electrical conductivity measurements were recorded.

The digital soil map provided by SEED and accessible via eSPADE v2.1 indicates that the site is situated in an area where electrical conductivity ($EC_{1:5}$)[6] is between >0.1 and 0.3 deciSiemens per metre (dS/m).

The salinity class assessed for each soil layer is provided in Table 11.1 below. It is noted that the closest soil survey to the site is 2.3 kilometres south-west of the site (profile number 31), therefore actual soil conditions at the site may differ.

Table 11.1 Potential salinity class

Soil layer	$EC_{1:5}$ (dS/m)	Soil texture[1]	Conversion factor	ECe (dS/m)[2]	Salinity class	Comments
Topsoil (0-0.3 m)	>0.1 to 0.3	loams, sandy loams, sand	10 to 17	1 to 5.1	Non-saline to moderately saline	The effects of salinity range from mostly negligible to yields of many crops affected
Subsoil (0.3-1.0 m)	>0.1 to 0.3	Medium-heavy clays	6	0.6 to 1.8	Non-saline	Salinity effects mostly negligible

Notes:
[1] Soil texture descriptions:
- Medium-heavy clays = medium clays, heavy clays
- Loams = loam, silty loam, sandy clay loam
- Sandy loams = sandy loam and fine sandy loam
- Sands = sand, loamy sand, clayey sand

[2] EC_e values of soil salinity classes based on Table 6.2 in DLWC (2002).

The EC results from the soil sampling indicated the samples ranged between 2.5 dS/m and 3.2 dS/m. The soil description and results are provided in Appendix L. The site soils were classified as slightly saline which may adversely affect very sensitive crops.

11.3 Assessment of potential impacts

11.3.1 Construction

The following soil and water management system is proposed during construction:

- Existing soil and water management on-site:
  - The works under the Stage 1 Project Approval involve the clearing of land and provision of basic infrastructure on the site as part of early construction works. As part of these early works, a sediment basin would be constructed on the north-western end of the site to manage erosion and sediment for disturbed areas during the Stage 1 construction phase. For the purpose of the project (Stage 2), this basin is considered existing and would be utilised during construction of the project and the operational phase of the facility. Although Stage 1 works are ongoing, they would be completed prior to the proposed construction phase of the project and are therefore considered the baseline conditions.
  - An existing clean water drain exists along the western boundary of the site. It currently conveys runoff from the site south where it is understood to drain under the nearby landfill before flowing into downstream creeks. This drain would be retained during both the construction and operational phases of the project as a clean water drain.
- During the construction phase:

[6] EC value determined using one part soil and five parts distilled water

- Standard erosion and sediment control procedures involving minimisation of disturbed areas, minimisation of mobilised sediment and capturing of site runoff in sediment basins would be implemented in compliance with the *Managing Urban Stormwater: Soils and Construction* (DECC 2008) for managing erosion and sediment.
- Sediment basins would include the existing permanent basin from Stage 1 and one proposed permanent basin that would then be converted during the operational phase to a constructed wetland. Temporary sediment basins, used for low lying areas that would not draining to the permanent basins, would be constructed as required to manage sediment per *Managing Urban Stormwater: Soils and Construction* (DECC 2008).
- Swale drains would be constructed along the site boundaries to intercept and direct sediment laden runoff to the sediment basins.
- Runoff from the site would be collected and either used to manage dust, or subsequently treated and discharged in accordance with per *Managing Urban Stormwater: Soils and Construction* (DECC 2008).
- Overflows are to be discharged off-site towards Cabbage Tree Creek.

No significant impacts associated to soil and water are expected due to construction of the project, risks would be managed by standard erosion and sediment control procedures and the soil and water management system.

11.3.2 Operation

The proposed soil and water management system during operation of the project is shown in Figure 11.1 and would include:

- Upstream runoff would be diverted around the site where practical
- Runoff from the perimeter roads and roofed areas would be discharged off site, avoiding concentration of flows. Runoff from these areas would be considered clean due to limited catchment area and infrequent use of the perimeter road.
- Runoff from the carpark and entrance area would be managed in a stormwater treatment system involving a gross pollutant trap, buffer swale and constructed wetland
- Swale drains from the construction phase would be retained along the northern, eastern, and southern boundaries and regraded as required to the remaining permanent sediment basin in the north-west and constructed wetland. The existing drain along the western boundary to be retained to convey clean runoff from perimeter road and roofed areas.
- Overflows would be discharged off-site towards Cabbage Tree Creek
- The floor of the reception hall would be graded to facilitate cleanout, drainage and collection of washdown water. Any washdown water would be collected from wastewater grates installed in front of the entry gate system and discharged to a buffer tank and then transferred by pipeline to the WWTP for treatment. The wastewater would be treated to a standard that enables tankering off site to the Council wastewater treatment plant.

0 10 20 30 40 50m

SCALE 1:1000 AT ORIGINAL SIZE

N

GHD

Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Proposed Water Management System
Operational Phase

Job Number 12536311
Revision -
Date 13 Jan 2021

Figure 11.1

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 13 January 2021 - 5:42 PM Plotted by: Nathan Griffiths
Cad File No: \\ghdnet\ghd\AU\Sydney\Projects\21\12536311\CADD\Drawings\12536311-XC_DrainageSitePlan.dwg

Water quality

During the operational phase, waste materials would be confined to indoors or outdoors within enclosed containers such as hooklift bins and bags. Since waste materials would not be stored outside unless covered or in enclosed containers, and process water would be treated on-site before tankering for off-site disposal, runoff from site is expected to be as per typical industrial urbanised sites. This significantly reduces the risk to downstream surface waters with respect to water quality.

Runoff from perimeter roads is not expected to have a significant impact on downstream waters since its road surface areas are minimal and spread throughout the site and vehicles carrying waste are not expected to travel in this area of the site.

It is considered that there is a greater risk arising from construction of the car park and hardstand areas. MUSIC modelling results show that for all indicator pollutants, the predicted loading from the car park and hardstand areas post-development (including a gross pollutant trap, buffer strip and constructed wetland), is less than the predicted pollutant loading from the equivalent area in its current condition.

The constructed wetland would collect runoff from the eastern side of the site including, the carpark, hardstand areas and eastern roofed areas. Following the *Design, construction and establishment of construction wetlands: design manual* (Melbourne Water 2017) and *Managing Urban Stormwater Using Constructed Wetlands* report (Wong, Breen, Somes & Lloyd 1998), the wetland would consist of soil, water, and biota to mimic the processes and functions of surrounding natural systems to retain water and remove various pollutants while minimising its disturbance.

The constructed wetland would be designed to support plant growth and improve water quality by trapping fine particles and soluble pollutants, and limit negative impacts on surrounding biodiversity.

Water sourcing

Figure 11.2 represents the mean predicted annual demand volumes during the operational phases as predicted by the water balance. This indicates that on average the site has an excess of water with a total of 9.6 megalitres is expected to overflow annually from the two basins.

The soil and water management system on-site would be separate to the municipal waste pre-treatment process which would primarily utilise re-used water recovered from the sterilisation process.

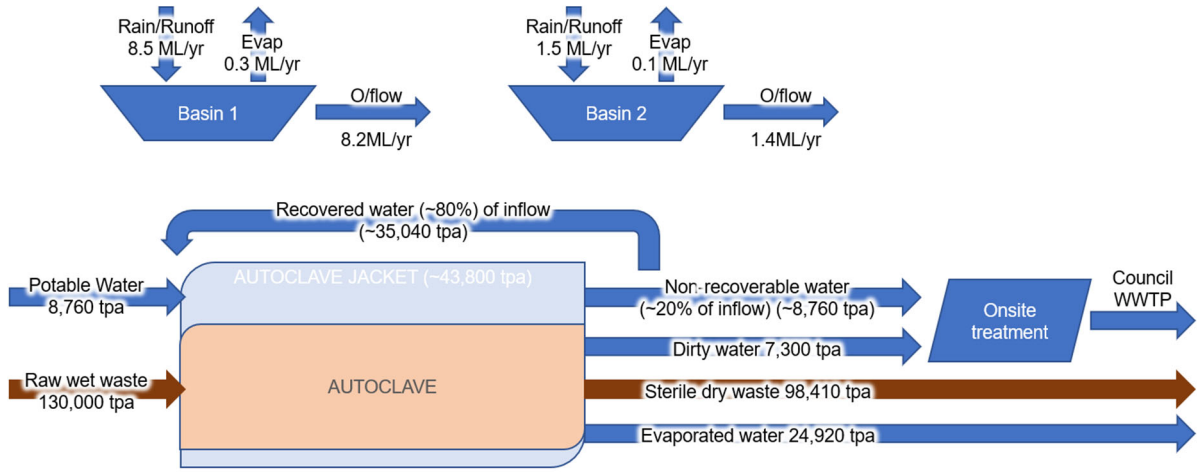


Figure 11.2 Expected site water balance volumes

Flooding

Detailed and recent flood study reports do not exist for the upper Shoalhaven River as this part of the river is considered to a have a generally low flood risk. There are several reports available exploring flooding regimes downstream of Nowra Bridge. A flood study of the Nowra Riverview Road area completed as part of the *Nowra Floodplain Management Plan* (WMAwater 2002) described expected flood levels at Nowra Bridge, 5 kilometres downstream of the study site.

Therefore, a high-level flood model was developed to determine the approximate flood level levels in the vicinity of the site during the 1 in 100 annual exceedance probability (AEP) storm. Flood levels are likely to be approximately 300 to 350 metres from the site boundary and therefore no significant impacts from local flooding are predicted. Indicative flood extents are shown in Figure 11.3.

Figure 11.3 Approximate flood extents during the 1 in 100 AEP storm

No significant infrastructure has been identified downstream of the site between the site and the Shoalhaven River. Therefore, no detailed detention assessment has been carried out as no significant impacts, in terms of the site changes affecting future flood conditions, is expected.

However, approximately 500 millimetres of detention storage would be provided in the site stormwater dams to minimise peak flows to minimise risk to erosion downstream.

11.4 Environmental management measures

Table 11.2 provides a summary of the proposed soils and water management measures.

Table 11.2 Soils and water management measures

Issue	Management measure	Timing
Soil salinity	• The effects of salinity on foundations would be assessed as part of future geotechnical investigations in accordance with *AS 2159 – 2009 Piling – Design and Installation*	Detailed design
Surface water management	• All earthworks, filling, building, driveways or other works, would be designed and constructed (including stormwater drainage if necessary) so that at no time, would any ponding of stormwater occur on adjoining land as a result of the project	Detailed design
	• Before beginning major works, soil sampling would be undertaken per Landcom (2005) to determine if flocculent will be required to achieve sedimentation	Construction
Contaminated run off	• Erosion and sediment control measures would be based on the design principles outlined in *Managing Urban Stormwater: Soils and Construction* (Landcom 2005) including: – Disturbed areas and the period of disturbance would be minimised – Clean run off would be diverted around disturbed areas	Construction

Issue	Management measure	Timing
	– Disturbed runoff would be collected and managed in sediment ponds	
	• The contractor would prepare a detailed erosion and sediment control plan which would be updated throughout the construction period	Construction
	• Stockpiles of material would be located well away (minimum of five metres from concentrated flow paths) from areas of frequent inundation, any permanent stockpiles would be aligned to water flow and temporarily stabilised with vegetation	Construction
Off site migration of sediment	• Access roads and disturbance activities would be managed with consideration to minimising off-site transport of sediment	Construction
Contaminated runoff	• A stormwater treatment system involving a gross pollutant trap (also capable of capturing hydrocarbons) buffer strip and constructed wetland would be adopted to manage water quality in the carpark area	Operation
Water quality	• A water quality monitoring program would be implemented on-site to assess the runoff discharging from the sediment basins with respect to key waste and urbanisation pollutant parameters, to confirm the basis of the water quality risk assessment. Surface water quality will be assessed with consideration of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000). Monitoring would take place quarterly during the first year of the operational phase with samples to be taken during a discharge event from the constructed wetland occurring within the facility's operating hours. After the first year of operation, samples would be taken annually.	Operation

12. Contamination

A preliminary site investigation (PSI) was prepared by GHD for the project (Appendix L) to assess the nature and extent of contamination on the site and proposes measures to ensure the site is suitable for its intended use. A summary of the assessment and proposed mitigation measures is provided in this chapter.

12.1 Assessment method

The framework for the PSI for contamination was developed in accordance with guidelines "made or approved", by the NSW EPA under CLM Act. These guidelines include, but are not limited, to the following:

- NSW EPA (2020b) *Consultants reporting on contaminated land – Contaminated Land Guidelines*
- National Environment Protection Council (NEPC) (2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999*

The PSI was also carried out in accordance with SEPP 55 and makes comment on the site's suitability with respect to the proposed land use.

It is noted that activities associated with site preparation, clearing and demolitions works are covered under the Stage 1 Project Approval. The Stage 2 activities assessed relate to construction and operation of the project.

The PSI included the following:

- Review of published information (e.g. topographic, geological, soil landscape, acid sulfate soil and salinity maps).
- Review of Sharing and Enabling Environmental Data and eSpade v2.1 database, climate information and urban capability maps and/or reports (if available).
- Specific information reviewed for assessing the potential for contamination to exist at the site included historical title records, aerial photographs and Council planning records, interviews with persons familiar with the history of the site, search of WaterNSW groundwater bore database and EPA databases.
- A site walkover on 19 August 2020 to visually assess potential sources of contamination, observe surrounding land uses, topography, drainage, nearby sensitive environments, and consider details of the site history and desktop study to further assess potential areas of environmental concern, contaminants of potential concern, and salinity indicators.
- Collection of three fragments of potential asbestos containing material and laboratory analysis for asbestos.
- Preparation of a preliminary conceptual site model.

12.2 Existing environment

12.2.1 Site history

The site is situated within a rural area immediately to the east of the West Nowra Landfill. Council has owned the site since 1979 and prior to this time Crown Lands was the registered proprietor. Prior to 1980, the site was largely undeveloped, except for a few access tracks, and densely vegetated. The site operated as an animal shelter between 1980 and 2018. Since

2018, the animal shelter activities ceased at the site and were relocated to Nowra Hill (South Nowra Animal Shelter).

The animal shelter was constructed in the 1970s. In the 1984 aerial photograph, the site was partly cleared of trees/shrubs, and contained three buildings that occupied the southern portion of the site, whilst two relatively small dams were within the central portion of the site. In the southern portion of the site, the buildings comprise an animal shelter to the east, and a caretaker's cottage and shed to the west. By 1993, a third dam had been constructed in the north-western corner of the site. This dam was the largest of the three dams occupying the site. The dam walls are likely to have been constructed with materials from the dam itself. No other dams are known to have existed on-site.

The caretaker's cottage was demolished circa 2011, as it had been affected by termites. Building materials used in this structure contained bonded asbestos sheeting. The asbestos was removed prior to demolition by a licenced asbestos removalist and a clearance certificate was provided following removal. The building was also likely to have been painted with lead based paints given the age of the structure.

The building concrete slab was retained and has been used for placement of shipping containers (for storage of materials). The exact contents stored in shipping containers is unknown but could have included cleaning products or chemicals.

Various forms of disinfectants, industrial peroxides, bactericidals, virucidals, fungicidals, sporicidals and tuberculocidals were used throughout the operation of the animal shelter to clean kennels. These products contained bleach, peroxide, quaternary ammonium compound, phosphoric acid, sodium hyperchlorite, ampholytic surfactants and sequesterants. The chemicals were applied to the kennels then hosed out with water.

The water, chemicals and excrement were washed into traps located at the end of the kennels. These traps discharged into a septic tank located east of the shelter. The contents of the septic tank were released into absorption trenches and/or beds located north (and possibly east) of the animal shelter complex. Other chemicals were likely to have been used to control animal parasites (e.g. ticks, fleas). These chemicals were directly applied to the animal by hand. No animal tick dips were used.

Council indicated that weed control activities were carried out periodically throughout the site to ensure animals were not consuming potentially harmful vegetation. The type / brand of pesticide / herbicide used is unknown but likely to be modern less persistent chemicals, as application occurred between 1980 and 2018.

A second septic tank was located west of the animal shelter complex and was used for human waste. The septic tank contents were pumped out. However absorption trenches located west of the tanks suggest septic tank contents were also released onto the ground.

Site history information indicated that deceased animals were removed from site and there were no on-site burials. In addition, no fuel storage tanks, no diesel generators and no incineration occurred on-site.

The area to the west of the site was initially a quarry c1970 then became a landfill at some point after this time. Former landfill cells are located immediately west of the site. Council indicated that environmental investigations undertaken within this area show no evidence of contamination affecting the site via groundwater or landfill gas migration. Landfill gas used to be recovered from a gas manifold that existed approximately 75 metres west of the site. The manifold was decommissioned in 2015 as it was no longer producing gas in viable quantities for re-use.

Limited information is available on filling activities at the site. It is expected that some imported fill may exist below pavements and buildings. No information is available on dam water and sediment quality.

Groundwater, surface water, leachate and landfill gas quality at the West Nowra Landfill has been routinely monitored since 1999, as part of Council's EPL conditions. Results indicate that it is unlikely that impacts have migrated off the landfill boundaries. Between 2015 and 2018, two above ground tanks were installed immediately to the west of the site. Based on site observations, these tanks are fire fighting water storage tanks. The area to the south-east of the site was developed before 1993 and remained relatively unchanged since that time. It comprised several buildings and a large amount of stored material.

There are no Contaminated Land Record of Notices and Notified Sites under the CLM Act associated with the site or nearby areas.

EPL 20899 is held by Council and permits Scheduled Development Work for Stage 1 of the Resource Recovery Park.

12.2.2 Contaminants of potential concern

A broad suite of contaminants of potential concern are possibly associated with the identified sources, including:

- Area of Environmental Concern 1 – Potential weathering of hazardous building materials and demolition of site structures:
  - Asbestos, zinc and lead
- Area of Environmental Concern 2 – Storage and use of chemicals including septic tanks and absorption beds:
  - Organochlorine pesticides (OCP), organophosphorus pesticides (OPP), herbicides, heavy metals, nutrients (ammonia, total nitrogen, nitrate, nitrite, total phosphorus), heavy metals and pathogens (e.g. *e. coli*, faecal coliforms)
- Area of Environmental Concern 3 – Fill of unknown quality and origin, and anthropogenic waste:
  - Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), OCP, OPP heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury, zinc) and asbestos. The site was developed in the late 1970s and therefore a potential source for polychlorinated biphenyls (PCB) is relatively unlikely. However, small quantities of PCBs may have existed in oils used in old transformers or capacitors in fluorescent tubes. No transformers were identified on-site however fluorescent tubes had been used. PCBs, if previously used, may exist in the vicinity of the buildings in the southern portion of the site.
- Area of Environmental Concern 4 – Sediment and surface water quality in the three dams:
  - Sediment: TRH, BTEX, PAH, OCP, OPP, heavy metals and asbestos
  - Surface water: TRH, BTEX, PAH, OCP, OPP and heavy metals
- Area of Environmental Concern 5 – West Nowra Landfill (off site source):
  - Landfill gases include methane carbon, dioxide carbon, monoxide and hydrogen sulphide

12.2.3 Conceptual site model

Pathways

The primary pathways by which potential receptors could be exposed to the contaminants of potential concern outlined above are considered to be:

- Hazardous building materials and impacted soils
  - Dermal contact with hazardous material such as lead-based paint and zinc
  - Inhalation of dust generated from friable asbestos, and zinc and/or lead in soils
- Soil/fill and anthropogenic material
  - Ingestion of contaminated soils
  - Dermal contact with contaminated soils
  - Inhalation of dust from contaminated soils
  - Inhalation of vapours/gases generated by contaminated soil
- Surface water and sediment (on-site dams)
  - Ingestion of contaminated surface water
  - Dermal contact with contaminated surface water or sediment
  - Inhalation of vapours/gases generated by contaminated sediment
- Groundwater:
  - Dermal contact with contaminated groundwater
  - Inhalation/accumulation of landfill gas or vapours released from contaminated groundwater
  - Discharge of contaminated groundwater to groundwater dependent ecosystems.
- Gas/vapour intrusion
  - Gas migration from adjoining landfill via the subsurface and preferential pathways such as subsurface infrastructure and service trenches

In addition to potential exposure pathways, there may also be preferential pathways in the form of subsurface infrastructure and services which may facilitate preferential migration of contaminants in groundwater or stormwater.

Receptors

The assessment focused on the proposed land use associated with the project and ongoing operation. Accordingly, the key receptors of interest include:

- Current and future site users: individuals working at the site (noting that the site is now non-operational)
- Future construction workers: individuals involved in the future construction and maintenance of the proposed resource recovery park
- Future intrusive maintenance workers: carrying out repairs or installation on subsurface utilities
- Groundwater users: based on the groundwater bore search, groundwater is not being beneficially used within 500 m of the site. Given that a landfill is located immediately west of the site, this would further preclude the beneficial use of groundwater. The site and surrounding areas are serviced by reticulated water and therefore it is unlikely groundwater would be considered as a primary resource to supply water to the site and surrounding areas.

- Ecological receptors: The site and surrounding areas are occupied by native flora. There was also evidence of burrowing within parts of the site. The presence of native vegetation and available water is likely to encourage fauna to use and/or reside at the site. Aquatic species may exist in the dams.

12.3 Assessment of potential impacts

12.3.1 Construction

Construction of the project would involve excavation for site shaping, footings and installation of services. If inadequately managed, disturbance of contaminated soil has the potential to:

- Mobilise potential contaminants impacting soils, waterways and groundwater
- Increase risk of migration of contaminants off site via leaching, dust, subsurface flow or overland flow
- Increase the risk of exposure to potential contaminants by direct contact or inhalation by site workers

For the project, the primary receptor is considered to be workers involved with the associated earthworks, such as those working directly working with soil. Earthworks are likely to involve shallow excavations associated with pavements and installation of underground services whilst deeper excavations would be required for foundations. This exposure scenario provides an increased likelihood that workers would be in direct contact with soil and exposed to dust and vapours via inhalation generated during excavation. Therefore, the source-pathway-receptor (SPR) linkages could be complete if contamination exists.

The depth of excavations associated with the project would be confirmed during detailed design. Foundations that extend below six metres of the ground surface may intercept groundwater which may be brought to the surface with excavation spoil. This exposure scenario provides an increased likelihood that workers could be in direct contact with groundwater. Therefore, the SPR linkages could be complete if contamination exists in groundwater.

Landfill gas, if present, may affect site workers during construction. The possible exposure scenarios include gas accumulation within trenches, service pits and buildings. Gases may also pose an explosion risk in any of these settings. If gases are migrating to site, the SPR linkages could be complete.

Potential impact to ecological receptors is considered likely. The majority of the site is unpaved. There is evidence of burrowing animals particularly in areas which are used for septic tank releases (Structure 4). Additionally, aquatic flora and fauna may exist within dams. If contamination exists in soil, surface water or sediment, the SPR linkages could be complete for ecological receptors. However, it is noted that the site would be cleared for construction activities, and any contaminated material would be excavated and removed.

Other construction activities that have the potential to results in contamination of soil due to accidental spills, leaks or fuel, oil and other potential contaminating substances from plant and equipment.

In order to ensure the site is suitable for its intended future use and to manage potential contamination impacts during construction, the control measures identified in Section 11.4 would be implemented.

12.3.2 Operation

Operational activities carried out by site workers and visitors would not involve direct contact with below ground structures, soil or groundwater. The proposed pavement and hardstand

would reduce the opportunity for potential exposure to contamination. Therefore, SPR linkages are considered incomplete for this scenario.

Groundwater does not appear to be beneficially used within 500 metres of the site and therefore, groundwater users have not been identified as a receptor. The SPR linkages are incomplete.

Landfill gas, if present, may affect site personnel during operation. The possible exposure scenarios include gas accumulation within trenches, service pits and buildings. Gases may also pose an explosion risk in any of these settings. If gases are migrating to site, the SPR linkages could be complete. The control measures relating to landfill gas would address potential operational landfill gas risks. With the implementation of these measures, the site would be suitable for its intended operational use as a resource recovery park.

12.4 Environmental management measures

Table 12.1 provides a summary of the proposed contamination management measures. It is also noted that Landfill Gas Industries (LGI) is currently extending the gas wellfield at the landfill, which should reduce the potential for landfill gas migration. The gas will be used to generate electricity, or flared.

Table 12.1 Contamination management measures

Issue	Management measure	Timing
Landfill gas	• A landfill gas risk assessment would be undertaken as part of the next design phase and the results would be considered for building design elements, such as passive or active gas mitigation measures, should gas migration be identified and pose an unacceptable risk	Detailed design
	• Landfill gas would be assessed through the installation of landfill gas monitoring wells installed along the western boundary of the site and also within the facility footprint. Gas accumulation monitoring would also be carried out within the existing structure and service pits. The landfill gas monitoring would be carried out over approximately six months to capture high and low pressure conditions.	Detailed design
Contamination	• Further targeted contamination assessment would be undertaken prior to construction commencing	Pre-construction
	• An Unexpected Finds Protocol would be prepared prior to construction commencing to manage previously unidentified occurrences of contamination that may be encountered during construction	Pre-construction
	• Any imported construction fill materials would be certified virgin excavated natural material or excavated natural material	Construction
Spills/leaks/ incidents	• Procedures would be developed to manage the risk of accidental spills and leaks and these would be incorporated in the construction environmental management plan for the project	Construction
	• Appropriate bunding and sediment and erosion control measures would be provided for the processing and maintenance areas and LPG station	Operation
	• Refuelling procedures and LPG tank filling procedures would be developed to manage the risk of accidental spills and leaks	Operation

Issue	Management measure	Timing
	• A pollution incident response management plan would be developed and implemented which outlines management procedures for potential contaminants during operation	Operation
Non-conforming waste	• Any non-conforming wastes would be managed and disposed of in accordance with the procedure identified in Section 8.4	Operation

13. Traffic and transport

A traffic impact assessment was prepared by GHD for the project (Appendix M). A summary of the assessment and proposed mitigation measures is provided in this chapter.

13.1 Assessment method

The traffic impact assessment included:

- A review of existing road features, adjacent developments, traffic volumes, sight distances and crash data
- A review of additional traffic generated as a result of the project
- An assessment of the performance of the existing intersections (queues, delays, level of service, safety) during construction and operation
- An assessment of vehicle swept turn path and queueing analysis at the proposed site access

13.2 Existing environment

The existing traffic volumes on the surrounding road network are within the expected functional classifications outlined by Transport for New South Wales.

As part of the Concept Proposal EIS (GHD 2016), the 2014 traffic flows were analysed using SIDRA to assess the existing operation of key intersections. The results of the 2014 SIDRA assessment indicated that the intersections of Flatrock Road/Yalwal Road, Yalwal Road/Albatross Road and Albatross Road/Kalandar Street operated satisfactorily in both the AM and PM peaks under existing traffic conditions. The intersection of Kalandar Street and Princes Highway was found to operate over capacity at level of service (LoS) F under existing operating conditions in both the AM and PM peaks in 2014.

In the Concept Proposal EIS (GHD 2016) assessment, intersection performance was analysed using SIDRA to understand the intersection capacities for the horizon year 2027 without the resource recovery park, but including a two percent background growth rate. The analysis indicated that only the Flatrock Road/Yalwal Road intersection was expected to operate satisfactorily in 2027 under current intersection control arrangements.

The other intersections were expected to operate at level of service (LoS) F over capacity under the 2027 ‘base’ traffic conditions. The assessment recommended that upgrading these intersections would be required as part of any future planned urban release areas within the surrounding road network in order to maintain satisfactory operating conditions.

It is anticipated that the intersection performance in 2020 under existing condition would be similar to the intersection performance in 2027 assessed in the Concept Proposal EIS (GHD 2016), with any variation in operational performance associated with the increase background traffic growth within the road network.

A review of the crash history for the surrounding roads indicated that crashes were generally spread along the roads and not concentrated in one particular area, with the exception of the intersection of Kalandar Street/Princes Highway. Concentrated recorded crashes at this intersection could be a result of high traffic volumes and an intersection operating at and over capacity.

13.3 Assessment of potential impacts

13.3.1 Construction

The construction of the project would generate an additional 45 vehicles (90 vehicle movements) per day on the surrounding road network over the 12 to 18 months construction period. A maximum of 29 peak hour vehicle movements would be associated with staff arrival/departure times, with the remaining traffic spread throughout the day. These expected construction traffic movements are the same as construction traffic movements that were predicted for the Concept Proposal.

Since the traffic generated during the construction phase of the project is expected to be the same as traffic predicted for the Concept Proposal, it is expected that intersection performance levels would be similar to the Concept Proposal construction traffic assessment (for the year 2016), with any potential variation being associated with background traffic growth and not the proposed construction activity.

Intersection SIDRA model results for the Concept Proposal construction traffic assessment indicated that all intersections would continue to operate satisfactorily in terms of capacity under the current intersection control arrangements, except for:

- The Albatross Road/Kalandar Street intersection, which was expected to operate at capacity, with a predicated LoS E during the AM peak hour. However, this intersection was predicted to also operate at LoS E in 2016 without construction traffic. Based on this, construction of the project would have a negligible impact to the operation of this intersection.
- The intersection of Kalandar Street / Princes Highway, which was expected to operate at LoS F during both the weekday AM and PM peak. However, this intersection was also expected to operate at LoS F in 2016 during these peak periods, without the construction traffic. Based on this, construction of the project would have a negligible impact to the operation of this intersection.

Mitigation measures would need to be implemented to manage construction trucks through West Nowra and minimise grouping of truck arrivals.

13.3.2 Operation

Swept path assessment

The swept path assessment confirmed that the proposed site plan (Figure 6.1) is able to facilitate 19 metre heavy rigid reverse movements into the waste hall / despatch / covered holding bays and manoeuvring through the site. This includes vehicle use of the entry and exit area where standard prefabricated weighbridges would be located.

There would be no conflicts in site entry and exit of weighbridge, though the vehicle body would come close to the kerb at the weighbridge (north and south).

The swept path assessment also confirms that the proposed site plan can facilitate the movements of a 26 metre B-double to access the site, travel along Perimeter Road (with parallel alignment to the LPG Station), and use the western exit to turn onto Flatrock Road.

Operational traffic generation

During operation 127 vehicles per day are expected to be generated in 2020 and 226 vehicles per day are expected to be generated in 2030. This compares to 121 vehicles per day in 2017 and 115 vehicles per day in 2027 that were predicted to be generated for the Concept Proposal operation.

Intersection performance

The project is expected to generate just seven percent more (an additional six vehicles per day) total operational vehicles in 2020 compared to the number of vehicles predicted in Concept Proposal EIS (GHD 2016) for the year 2017. Similarly, the project is expected to generate only 11 more vehicles per day during operation of the project in 2030 compared to the Concept Proposal operational phase in the year 2027.

Therefore, it is expected that the intersection performance in 2020 and 2030 would be similar to the intersection performance analysed as part of Concept Proposal EIS (GHD 2016) for the years 2017 and 2027 respectively – as summarised below:

The SIDRA results for the year 2017 indicated the following (similar performance is expected for the project in 2020):

- Including traffic associated with the resource recovery park, the intersections of Flatrock Road/Yalwal Road and Yalwal Road/Albatross Road would continue to operate satisfactorily.
- The intersection of Albatross Road/Kalandar Street is operating at LoS F in the AM peak. However, this intersection is also expected to capacity at LoS F under the 2017 AM peak 'base' traffic conditions. As such, any additional traffic has placed it at capacity.
- The intersection of Kalandar Street and Princes Highway would continue to operate with an unacceptable LoS F during both the AM and PM peak hours, as it is expected to do under 2017 'base' traffic conditions.

The results of SIDRA intersection modelling for year 2027 were as follows (similar performance is expected for the project in 2030):

- With predicted background traffic growth and traffic associated with the resource recovery park, the intersection of Flatrock Road / Yalwal Road would continue to operate satisfactorily in 2027 under the current intersection control arrangements.
- The remaining intersections are expected to operate over capacity, at LoS F in 2027.

However, it is noted that the intersection performance under conditions in 2014 indicated that these intersections would also operate over capacity, at LoS F, under the 2027 'base' traffic conditions and not as a result of the project.

The traffic assessment confirmed that:

- The percentage increase of traffic on the surrounding road network as a result of the project would be minimal and indicates that the project would have negligible operational impact.
- Albatross Road/Kalandar Street roundabout would require upgrade to accommodate future background traffic growth. This intersection arrangement would need to be investigated further as part of other studies.

A warrant assessment was also undertaken at the intersection of Flatrock Road/Yalwal Road based on Austroads (2020) *Guide to Traffic Management – Part 6: Interchanges, Intersections and Crossings Management*. It was determined that a rural basic intersection treatment is suitable for the intersection of Flatrock Road and Yalwal Road.

This intersection layout is currently a basic intersection layout, therefore no upgrade is required. However, it is noted that the existing intersection does not provide the required widened shoulder on Yalwal Road. This is considered an existing condition that should be improved regardless of whether the project were to proceed.

Access and parking

Access and parking arrangements have been accommodated in the schematic plan and are designed in general accordance with *AS2890.1 Parking Facilities: Off-street car parking* and *AS 2890.2 Parking Facilities: Off street commercial vehicle facilities*, with the provision of 40 spaces to accommodate the proposed number of staff and visitors.

Within the car park at the intersection of the parking aisle and the access road, it is recommended to implement traffic management measures (i.e. give way signage and line marking) at the terminus of the access road to reinforce vehicle priority movements.

13.4 Environmental management measures

Table 13.1 provides a summary of the proposed traffic management measures.

Table 13.1 Traffic management measures

Issue	Management measure	Timing
Construction traffic	• A Construction Traffic Management Plan would be prepared for the project and include: – management and timing of heavy vehicles through West Nowra – management and timing of trucks accessing the site to ensure there is sufficient room within the site to accommodate the vehicles	Construction
Parking and access	• Access and parking arrangements would be designed in accordance with *AS2890.1 Parking Facilities: Off-street car parking and AS 2890.2 Parking Facilities: Off street commercial vehicle facilities*.	Detailed design
	• During detailed design, the following amendments would be considered: – The addition of a central median at site entry (south of the weighbridge office) to minimise conflicts and vehicles 'cutting the corner'	Detailed design
Operation traffic	• All parties would be required to coordinate visits with the office, particularly those that will access the covered holding bays and despatch (east)	Operation

14. Noise and vibration

A noise and vibration impact assessment was prepared by GHD for the project (Appendix N). A summary of the assessment and proposed mitigation measures is provided in this chapter.

14.1 Assessment method

The following key tasks were undertaken in the assessment:

- Identification of the key sensitive receivers in the study area and the type of land use
- Baseline noise monitoring at two residential receivers for a period of a week to establish construction noise management levels in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC 2009) and the intrusiveness noise levels in accordance with the *Noise Policy for Industry* (NPfI) (NSW EPA 2017)
- An assessment of potential construction noise impacts based on indicative construction scenarios against the requirements of the ICNG
- An assessment of potential construction vibration impacts (human comfort and cosmetic damage to structures) against the adopted guideline vibration guideline values
- Preparation of a 3D computer noise model representing maximum noise emission operations during the day and night period and predict noise levels at the sensitive receivers in the study area
- Assessment of operational noise impacts at sensitive receivers against the requirements of the NPfI, including an assessment of potential sleep disturbance impacts
- Assessment of potential construction and operational traffic noise impacts due to additional traffic generation on public roads against the requirements of the *NSW Road Noise Policy* (RNP) (DECCW 2011)
- Development of mitigation measures to reduce the potential for noise and vibration impacts where required during the construction and operational phases of the project

14.2 Existing environment

14.2.1 Sensitive receivers

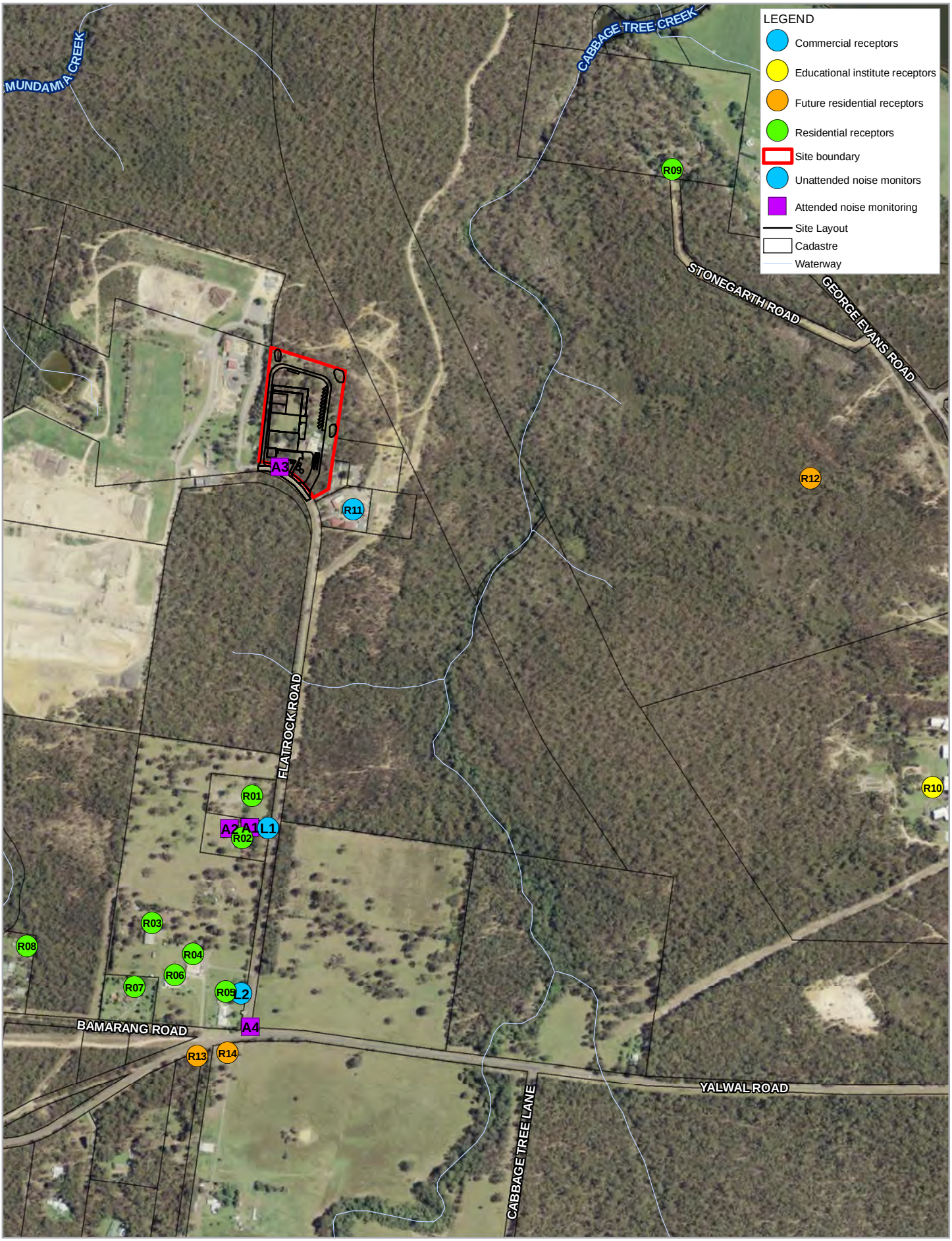
The study area for the noise and vibration assessment was defined as approximately 1.2 kilometres from the project as noise impacts are not anticipated beyond this distance. The sensitive receivers, land uses and planning zones are listed in Table 14.1 and shown in Figure 14.1.

The residential receivers have been categorised into two discrete noise catchment areas (NCAs) based on their proximity to the dominant noise source in the area being road traffic along Yalwal Road. NCA1 has been defined as residences within 200 metres of Yalwal Road and NCA2 has been defined as all other residences within the study area.

Future residential receivers at the Mundamia Urban Release Area (R12 to the east) and at the Cabbage Tree Lane Urban Release Area (R13 and R14 to the south) have also been included in the assessment as potential sensitive receivers as these subdivisions do not yet have development consent.

Table 14.1 Sensitive receivers and land uses

Land use	Receiver ID	Address	NCA	Planning zone	Direction to site
Residential	R01	43 Flatrock Road, Mundamia	NCA1	RU2 – Rural Landscape	South
	R02	41 Flatrock Road, Mundamia	NCA1	R1 – General Residential	South
	R03	3 Flatrock Road, Mundamia	NCA1	R1 – General Residential	South
	R04	3 Flatrock Road, Mundamia	NCA2	R1 – General Residential	South
	R05	3 Flatrock Road, Mundamia	NCA2	R1 – General Residential	South
	R06	3 Flatrock Road, Mundamia	NCA2	R1 – General Residential	South
	R07	18 Bamarang Road, Mundamia	NCA2	R1 – General Residential	South
	R08	38A Old Bamarang Road, Mundamia	NCA2	SP2 – Infrastructure	South
	R09	56 Stonegarth Road, Mundamia	NCA2	E3 – National Parks and Nature Reserves	North East
Educational	R10	University of Wollongong, Shoalhaven campus	-	SP2 – Infrastructure	South East
Commercial	R11	National Parks and Wildlife Service office	-	SP2 – Infrastructure	South East
Future residential	R12	Mundamia Urban Release Area	NCA2	R1 – General Residential	East
	R13	Cabbage Tree Lane Urban Release Area (west of Cabbage Tree Lane)	NCA2	R1 – General Residential	South
	R14	Cabbage Tree Lane Urban Release Area (east of Cabbage Tree Lane)	NCA2	E2 – Environmental Conservation	South



Paper Size ISO A4
1:10,000

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Bioelektra Australia Pty Ltd
West Nowra Resource Recovery Park - Stage 2

Sensitive receivers and noise monitoring locations

Project No. 12536311
Revision No. 0
Date 11/05/2021

FIGURE 14.1

\\ghdnet\ghd\AU\Sydney\Projects\21\12536311\GIS\Maps\Deliverables\12536311_Z007_NoiseLocation.mxd Data source: Aerial imagery - Google Earth 2021 (image date - 24/02/2016, image extracted - 25/08/2020) & Sixmaps 2021 (© Department of Customer Service 2020); General Topo: NSW LPI DTDB 2020 & 2015; Cadastre: NSW LPI DCDB 2020; Borehole locations - ENRS. Created by: kpsroba

14.2.2 Noise monitoring

Background noise monitoring was undertaken to establish the construction noise management levels in accordance with the ICNG and the intrusiveness noise levels in accordance with the NPfI. Noise monitoring was conducted between Thursday 3 September and Monday 14 September 2020.

Meteorology data was obtained from the Bureau of Meteorology's Nowra RAN Air Station AWS (SN: 068076) for this assessment, located approximately seven kilometres to the south of the site.

Unattended noise monitoring results

The noise logger data results are summarised in Table 14.2 and Table 14.3. The noise logging results are typical of a rural noise environments with the dominant noise sources being the nearby road network and natural sounds. The background noise levels are generally consistent with the noise logging undertaken as part of the Concept Proposal EIS (GHD 2016) during the day period. The measured background noise levels in 2020 during the evening and night are lower than what was measured as part of the Concept Proposal EIS (GHD 2016).

It should be noted that the existing noise levels may include noise from the existing landfill that is located adjacent to the site. As the landfill has been operating for a period in excess of 10 years, noise from the landfill site is considered a normal part of the acoustic environment (see A1 of *Fact Sheet A – Noise Policy for Industry* (EPA 2017)).

Table 14.2 Summary of ambient and background noise monitoring results

Location	NCA	Background noise descriptors $L_{A90(Period)}$, dBA				Ambient noise descriptors $L_{Aeq(period)}$, dBA			
		EMS	Day	Eve	Night	EMS	Day	Eve	Night
L1: 41 Flarock Rd, Mundamia, NSW	NCA1	38	36	25	23	54	58	42	47
L2: 3 Flarock Rd, Mundamia, NSW	NCA2	39	37	28	24	53	55	44	50

Note: EMS refers to the early morning shoulder period – 6 am to 7 am

Table 14.3 Summary of road traffic noise monitoring results

Location	NCA	$L_{Aeq(15\ hr)}$ day	$L_{Aeq(9\ hr)}$ night	Peak $L_{Aeq(1hr)}$ day	Peak $L_{Aeq(1hr)}$ Early morning shoulder
L1: 41 Flarock Rd, Mundamia, NSW[1]	NCA1	58	46	60 (11 am to 12 am)	50 (6 am to 7 am)
L2: 3 Flarock Rd, Mundamia, NSW[2]	NCA2	55	49	57 (11 am to 12 am)	53 (6 am to 7 am)

Notes:

1. Dominant traffic noise source is Flatrock Road and Yalwal Road
2. Dominant traffic noise source is Flatrock Road only

Attended noise monitoring results

Attended noise measurements (15 minute) were undertaken at several locations in the surrounding area to characterise the existing noise environment in the area. The results of the noise measurements are presented in Table 14.4.

Table 14.4 Summary of ambient and background noise monitoring results

ID	Location	Time	$L_{A90(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Amax(15\ min)}$	Notes
A1	41 Flatrock Road (near road)	14:15	40	58	79	Trucks on Flatrock Road, birds, dog barking, helicopters nearby
A2	41 Flatrock Road (backyard)	14:30	39	49	63	Site (landfill) noise Birds and road noise
A3	Site entrance	15:00	39	63	89	Cars and trucks entering and the exiting landfill site
A4	3 Flatrock Road (near road)	15:30	46	63	83	Trucks and cars on Yalwal Road. Dogs, sheep and cows audible

14.2.3 Noise and vibration criteria

Construction noise management levels

The ICNG is used to assess noise impacts associated with construction works. The guideline recommends standard hours for construction activities as Monday to Friday: 7 am to 6 pm, Saturday: 8 am to 1 pm and no work on Sundays or public holidays.

Construction noise management levels for residential premises are provided in Table 14.5.

Table 14.5 Noise management levels for residential receivers

Time of day	Noise management level, $L_{Aeq(15\ min)}$	Application notes
Recommended standard hours	Noise affected: RBL[1] + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected: 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level.

Time of day	Noise management level, $L_{Aeq(15\ min)}$	Application notes
		If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and discuss respite periods for noisy works.
Outside recommended standard hours	Noise affected: RBL + 5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable measures have been applied and noise is more than 5 dBA above the noise affected level, the proponent should consult with the community. For guidance on negotiating agreements see Section 7.2.2 of the *Interim Construction Noise Guideline*.

Note 1: RBL – Rating Background Level, as defined by the NSW EPA (2017) *Noise Policy for Industry* (NPfI)

Noise management levels for other sensitive land uses are provided in Table 14.6.

Table 14.6 Noise management levels for other sensitive land uses

Land use	Noise management level, $L_{Aeq(15m)}$ (External)
Commercial	70 dBA
Classrooms	55 dBA (based on 45 dBA internal)
Industrial premises	75 dBA

A summary of the project construction noise management levels for each identified sensitive receiver type is provided in Table 14.7.

Table 14.7 Project construction noise management levels

Receiver Type	Time of day	Noise Management Level (NML)
Residential – NCA1	Standard construction hours	46 dBA
Residential – NCA2	Standard construction hours	47 dBA
Commercial	When in use	70 dBA
Industrial	When in use	75 dBA (external)

Human comfort vibration levels

Typically, construction activities generate ground vibration of an intermittent nature. Intermittent vibration is assessed using the vibration dose value. Acceptable values of vibration dose are presented in Table 14.8 for sensitive receivers.

Table 14.8 Human comfort intermittent vibration limits

Receiver type	Period	Intermittent vibration dose value ($m/s^{1.75}$)	
		Preferred value	Maximum value
Residential	Day (7 am and 10 pm)	0.2	0.4
	Night (10 pm and 7 am)	0.13	0.26
Offices, schools, educational institutes and places of worship	When in use	0.4	0.8

Cosmetic damage vibration levels

The effects of transient vibration on structures is considered in *BS 7385 Part 2 – 1993 Evaluation and measurement for vibration in buildings*.

The criteria provided in *BS 7385* are presented in Table 14.9. The guide values in for transient vibration assumes there are no resonant responses in structures and low-rise buildings. Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at lower frequencies, then the guide values are reduced by up to 50 per cent.

Table 14.9 Vibration guide values – minimal risk of cosmetic damage

Line	Type of structure	Peak component particle velocity in frequency range of predominant pulse – transient vibration		Peak component particle velocity in frequency range of predominant pulse – continuous vibration[1]	
		4 Hz to 15 Hz	15 Hz and above	4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above		25 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above	7.5 mm/s at 4 Hz increasing to 10 mm/s at 15 Hz	10 mm/s at 15 Hz increasing to 25 mm/s at 40 Hz and above

Note: These values are based on section 7.4.3 *Guide values for continuous vibration relating to cosmetic damage* from *BS 7385-2* (BSI 1993)

The predominant vibration for most construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers and excavators occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). However, a conservative vibration damage screening level per receiver type is given below:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s

Operational noise criteria

The NpfI provides guidance on the assessment of operational noise impacts. The guideline includes both intrusiveness and project amenity noise levels that are designed to protect receivers from noise significantly louder than the background level, and to limit the total noise level from industry near a receiver.

For residential receivers, the project noise trigger levels are provided in Table 14.10. The project noise trigger levels reflect the most stringent noise level requirements derived from the intrusiveness and project amenity noise levels. Project noise trigger levels should be achieved during all periods of the day, as the facility will operate 24 hours a day (loudest operations between 7 am and 6 pm).

Table 14.10 Project noise trigger levels – residential receivers, dBA

Criteria $L_{Aeq(15min)}$	NCA	Residential receivers			
		EMS[1]	Day[1]	Evening[1]	Night[1]
Intrusiveness noise level	NCA1	43	41	35[2]	35[2]
	NCA2	44	42	35[2]	35[2]
Project amenity noise level (rural)	All	38	48	43	38
Project noise trigger levels	NCA1	38	41	35	35
	NCA2	38	42	35	35

Notes:

1. The NPfI defines Day as 7 am to 6 pm Monday to Friday and 8 am to 6 pm Saturday, Sunday and Public Holidays, Evening 6 pm to 10 pm, Early Morning Shoulder Period 6 am to 7 am and Night as the remaining periods.

2. The minimum rating background level used for the intrusiveness criteria for the evening/night period is 30 dBA in accordance with the NPfI

For educational institutes and commercial receivers, the project noise trigger levels are provided in Table 14.11.

Table 14.11 Project noise trigger levels – non-residential receivers, dBA

Receiver	Time of day	$L_{Aeq(15m)}$, dBA
Classrooms	When in use	45 (external)
Commercial premises	When in use	65 (external)

Note: Based on an internal noise level of 35 dBA + 10 dBA to account for noise through and open window

The NPfI provides guidelines for assessing sleep disturbance from short-term noise events. A detailed maximum noise level event assessment should be undertaken where noise levels from the project site during night time hours (10 pm to 7 am) at residential receivers exceeds:

- $L_{Aeq,15min}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{AFmax} 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater.

No significant maximum noise events are anticipated between the hours of 10 am and 6 am as there are no truck movements between these hours and there will be no sorting into the external despatch bins. As such, assessment of the potential sleep disturbance impacts between 6 am and 7 am is considered the worst-case. Table 14.12 summarises the background noise level at the nearby residential receivers and sleep disturbance criterion.

Table 14.12 Sleep disturbance screening criteria

Receiver type	Early morning shoulder L_{A90} background noise level, dBAA	Screening criteria, dBA
Nearby residential receivers (NCA1)	38	40 $L_{Aeq,15min}$ 53 L_{AFmax}

14.3 Assessment of potential impacts

14.3.1 Construction

Construction noise

Acoustic modelling was undertaken using CadnaA 2020 noise modelling software to predict the effects of construction noise generated during construction of the project.

The construction noise scenarios including anticipated equipment and activity noise levels are shown in Table 14.13.

Table 14.13 Construction noise scenarios – standard hours

Scenario ID	Scenario name/activity	Equipment	Activity noise level (dBA)
CS1	Site establishment	• Trucks • Hand tools	111
CS2	Ground works and excavation	• Bulldozer (CAT D10) • 20 tonne excavator • 6 tonne excavator • Backhoe loader	113
CS3	Structure	• 25 tonne crane • Welder • Trucks • Concrete truck	116
CS4	Landscaping	• 25 tonne crane • Backhoe loader	108
CS5	Testing and commissioning	• Truck • welder	111

The predicted maximum noise level along with the noise management levels (NML) for each receiver are presented in Table 14.14. The noise modelling assumes that all equipment are operating at maximum capacity simultaneously at the closest distance between the construction works and the receiver. As such, the predicted noise levels are highly conservative and actual noise levels are likely to be lower.

Table 14.14 Predicted construction noise levels, dBA

ID	Name / location	NML	CS1	CS2	CS3	CS4	CS5
R01	43 Flatrock road	46	35	37	40	32	35
R02	41 Flatrock Road	46	34	36	39	31	34
R03	3 Flatrock Rd	47	30	32	35	27	30
R04	3 Flatrock Rd	47	30	32	35	27	30
R05	3 Flatrock Rd	47	29	31	34	26	29
R06	3 Flatrock Rd	47	29	31	34	26	29
R07	18 Bamarang Road	47	29	31	34	26	29
R08	38A Old Bamarang Road	47	28	30	33	25	28
R09	Stonegarth Road	46	32	34	37	29	32
R10	University of Wollongong - Shoalhaven Campus	55	25	27	30	22	25
R11	NPWS Office	70	57	59	62	54	57

Table 14.14 shows that the construction NMLs are not predicted to be exceeded at any sensitive receiver during standard hours. Construction of the main building structure is predicted to result in the highest noise levels. The highest noise levels at the nearest residential receivers are predicted to be more than 5 dBA below the noise management level at all sensitive receivers.

Construction vibration

The vibration assessment identified that the most vibration intensive activity is anticipated to be excavation works with a 26 tonne excavator. Excavation activities have the potential to exceed the human comfort vibration criteria should these works occur within 73 metres of residences. No residences have been identified within 73 metres of excavation works and as such, no adverse vibration impacts are anticipated as a result of the project.

The assessment also identified that excavation works have the potential to exceed the cosmetic damage criteria should these works occur within 22 metres of a sensitive receiver building. No buildings have been identified within 22 metres of excavation works and as such, no adverse cosmetic damage vibration impacts are anticipated as a result of the project.

Construction traffic

To evaluate the impacts on receivers near the proposed access road to the site, calculations were undertaken using the NSW Roads and Maritime Services construction noise estimator utilising the United Kingdom Department of Transport (1988), *Calculation of Road Traffic Noise* (CoRTN) prediction method.

This found that during standard construction hours an increase in road traffic noise levels of +1.3 dBA is predicted for residences along Flatrock Road. As such, the noise requirements of the RNP would be met during construction and no further mitigation is required.

14.3.2 Operation

Operational noise

Acoustic modelling was undertaken using CadnaA 2020 noise modelling software to predict the effects of noise generated during the operation of the facility.

The results of the modelling are shown in Table 14.15.

Table 14.15 Predicted operational noise levels

Receiver ID	Residential NCA	Type	$L_{Aeq(15min)}$ Project noise trigger level (NPfI), dBA		Predicted $L_{Aeq(15min)}$ Level - EMS	Predicted $L_{Aeq(15min)}$ Level - Night	Compliance
			Day (EMS)	Evening / Night			
R01	NCA1	Residential	41 (38)	35	38	35	Yes
R02	NCA1	Residential	41 (38)	35	36	34	Yes
R03	NCA1	Residential	41 (38)	35	33	32	Yes
R04	NCA2	Residential	41 (38)	35	32	31	Yes
R05	NCA2	Residential	41 (38)	35	32	30	Yes
R06	NCA2	Residential	41 (38)	35	32	31	Yes
R07	NCA2	Residential	41 (38)	35	31	30	Yes
R08	NCA2	Residential	41 (38)	35	31	30	Yes
R09	NCA2	Residential	41 (38)	35	33	30	Yes
R10	-	Classrooms	45		31	26	Yes
R11	-	Commercial	65		50	48	Yes
R12	NCA2	Future residential	42 (38)	35	34	31	Yes
R13	NCA2	Future residential	42 (38)	35	31	30	Yes
R14	NCA2	Future residential	42 (38)	35	33	29	Yes

This indicates that compliance is predicted at all existing and future sensitive receivers during worst-case operations during the early morning shoulder period. Compliance during this period ensures compliance with the less-stringent day period. It should be noted that the noise levels during the early morning shoulder period are likely to be lower than those presented as there would be less truck movements during this period and the roller door would be open for a shorter period of time.

Compliance with the evening and night period is also predicted based on the assumption that there are no truck movements or sorting into the external despatch areas between 6 pm and 6 am.

The calculated cumulative noise levels at each receiver for all three scenarios indicate that the total industrial noise level is below the recommended amenity noise level.

The individual predicted noise levels and the calculated cumulative noise levels at each receiver is presented in Table 14.16 along with the relevant NPfI recommended amenity noise level.

Table 14.16 Calculated $L_{Aeq(15min)}$ cumulative noise levels, landfill (existing and future) and Bioelektra site

Receiver ID	Receiver Type	Predicted $L_{Aeq(15min)}$ noise levels, dBA				Calculated cumulative $L_{Aeq(15min)}$ noise levels, dBA			Recommended amenity $L_{Aeq(15min)}$ noise level, dBA	Total industrial noise level below recommended amenity noise level?
		The project	Existing landfill	Scenario 1	Scenario 2	Existing landfill + the project	Scenario 1 + the project	Scenario 2+ the project		
R01	Residential	38	43	44	42	44	45	43	53	Yes
R02	Residential	36	42	42	39	43	43	41	53	Yes
R03	Residential	33	41	39	35	41	40	37	53	Yes
R04	Residential	32	39	38	33	40	39	36	53	Yes
R05	Residential	32	38	35	31	39	37	34	53	Yes
R06	Residential	32	39	37	36	40	38	37	53	Yes
R07	Residential	31	39	37	32	40	38	35	53	Yes
R08	Residential	31	40	38	33	41	39	35	53	Yes
R09	Residential	33	35	29	28	37	35	35	53	Yes
R10	Classrooms	31	31	26	27	34	32	32	45	Yes
R11	Commercial	50	48	46	49	52	51	53	65	Yes
R12	Future residential	34	34[1]	29[2]	29[2]	37	35	35	53	Yes
R13	Future residential	31	38[1]	37[2]	37[2]	39	38	38	53	Yes
R14	Future residential	33	37[1]	35[2]	35[2]	38	37	35	53	Yes

Notes:

1) Noise predictions of the existing landfill at the future residential receivers has been modelled using the original CadnaA model for the West Nowra Resource Recovery Park EIS Noise Assessment (GHD, Nov 2015)

2) Noise predictions of future landfill operations (Scenario 1 and Scenario 2) at the future receivers have been estimated based on the highest-predicted noise level in the vicinity of the future receiver, being R09 for R12, R07 for R13 and R05 for R14 as a worst-case

Sleep disturbance

Compliance with the noise criteria of $L_{Aeq(15minute)}$ 35 dBA during the night period and $L_{Aeq(15minute)}$ 38 dBA during the early morning shoulder period should ensure there are no sleep disturbance impacts at the nearest sensitive receivers.

Should a maximum noise level event occur within the site (external of the building) at a sound power level of 115 dBA (dropped metal at a height as a worst case), the received noise level at the nearest residences is predicted to be less than L_{AFmax} 40 dBA and complies with the sleep disturbance criterion of L_{AFmax} 53 dBA.

Operational traffic

To assess noise impacts from traffic along Flatrock Road during operation of the project, an initial screening test was undertaken to evaluate whether noise levels are predicted to, exceed the controlling criterion (increase by more than 2 dBA).

To reduce potential traffic noise impacts during operation, heavy vehicle movements along Flatrock Road should be limited to 50 kilometres per hour. Based on this, an increase of +0.9 dBA is predicted during the day period and increase of +5.6 dBA is predicted during the night period (between 6 am and 7 am). Noise levels are predicted to exceed the $L_{Aeq(1hour)}$ noise criterion of 55 dBA at 37 metres from the edge of the road. No residential dwellings have been identified as falling within this mitigation distance and as such, the noise requirements of the RNP would be met.

14.4 Environmental management measures

Table 14.17 provides a summary of the proposed noise management measures.

Table 14.17 Noise management measures

Issue	Management measure	Timing
Construction noise	• All engine covers would be kept closed while equipment is operating	Construction
	• As far as possible, materials dropping heights into or out of trucks would be minimised	Construction
	• Vehicles would be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes would be eliminated, where practicable.	Construction
	• Machines found to produce excessive noise compared to industry best practice would be removed from the site or stood down until repairs or modifications can be made	Construction
	• To reduce the annoyance associated with reversing alarms, broadband reversing alarms (audible movement alarms) would be used for all site equipment. Satisfactory compliance with occupational health and safety requirements would need to be achieved and a safety risk assessment may need to be undertaken to determine that safety is not compromised.	Construction
	• All equipment would be selected to minimise noise emissions. Equipment would be fitted with appropriate silencers and be in good working order. Machines found to produce excessive noise compared to normal industry expectations would be removed from the site or stood down until repairs or modifications can be made.	Construction

Issue	Management measure	Timing
	• All site workers would be sensitised to the potential for noise impacts on local residents and encouraged to take practical and reasonable measures to minimise the impact during the course of their activities. This would include: – Use of loud radios would be avoided – Shouting and slamming doors would be avoided – Where practical, machines would be operated at low speed or power and switched off when not being used rather than left idling for prolonged periods – Truck drivers would be informed of designated vehicle routes, parking locations and delivery hours – Reversing would be minimised – Dropping materials from height and metal to metal contact on material would be avoided – All equipment engine covers would be kept closed during operation	Construction
	• The contractor would provide a community liaison phone number and permanent site contact so that noise complaints can be received and addressed in a timely manner	Construction
	• Upon receipt of a noise complaint, monitoring would be undertaken and reported as soon as possible. If exceedances are detected, the situation would be reviewed in order to identify means to attempt to reduce the impact to acceptable levels	Construction
Operational noise	• Should any of the equipment listed in the noise impact assessment have an operating sound power level higher than what has been assumed, further noise modelling would be undertaken during the detailed design stage to ensure the requirements of the *Noise Policy for Industry* (EPA 2017) are met	Detailed design
	• The roof of the facility would be constructed of a material with a minimum Rw 30 (a suitable sandwich panel material can be specified in the detailed design phase)	Detailed design/ construction
	• The walls of the facility would be constructed of a material with a minimum Rw 45 (such as 150 millimetre thick precast concrete panel)	Detailed design/ construction
	• Louvres on the southern façade of the reception hall would be constructed using acoustic louvres with a minimum width of 100 millimetres (e.g. Acran 100 louvres or better)	Detailed design/ construction
	• Rooftop ventilation fans would be sufficiently isolated from the structure of the building (mechanically decoupled) so as to not result in structure-borne noise	Detailed design/ construction
	• All ventilation fans and exhausts would be designed to have a maximum sound power level of 90 dBA at the exhaust, including (but not limited to): – Reception Hall exhaust fan x 1 – Sorting Hall ventilation fan x 8 – Boiler flue exhaust x 1 – Dust collector exhaust x 1 – Sorting Hall ventilation fan x 1 – Noise monitoring at the nearest residential receivers would be undertaken at the	Detailed design/ construction

Issue	Management measure	Timing
	commencement of operation in accordance with any license conditions	
	• The roller doors to the reception hall would be closed, except during the ingress or egress of trucks	Operation
	• Where possible, operation of the shredder would be limited to when the roller doors to the reception hall are closed	Operation
	• Sorting of material into the external despatch bins on the northern and eastern facades of the facility would be limited to between 7 am and 6 pm Monday to Friday and 8 am to 6 pm on Saturdays	Operation
	• The following traffic noise mitigation measures would be incorporated into the Operational Environmental Management Plan: – To reduce potential traffic noise impacts during operation, heavy vehicle movements along Flatrock Road would be limited to 50 kilometres per hour. – Drivers would undergo training to understand the potential noise impacts associated with the truck movements and to ensure only the prescribed haulage route is used to access the site – The use of exhaust brakes would be limited – Mufflers would be used on trucks, where possible	Operation

15. Fire and incident management

A bushfire assessment was prepared as part of the Concept Proposal EIS (GHD 2016) and a fire and incident management review was prepared by GHD for the project (Appendix O). A summary of the assessments and proposed mitigation measures are provided in this chapter.

15.1 Bush fire

15.1.1 Assessment method

A bush fire report was prepared as part of the Concept Proposal EIS (GHD 2016) and the assessment included:

- a desktop assessment – including review of the project location, proposed roads, boundaries, vegetation, fire history of the site and immediate area and site topography (slope)
- field investigation including inspection of bordering vegetation, slope and overall fuel hazard
- consultation – including:
  - with the NSW RFS to obtain fire history information and consult with staff regarding the proposed planned mitigation measures
  - Bateman's Bay Customer Service Centre to discuss the intended approach to manage bushfire risk at the site, asset protection zones, available water sources and access roads
- analysis of the project with respect to the objectives, intent, performance criteria and solutions for bush fire protection measures detailed in NSW RFS (2010) *Planning for Bush Fire Protection* (superseded now by NSW RFS (2019) *Planning for Bush Fire Protection*)

The results of the assessment were incorporated into the Concept Proposal. The assessment has been reviewed for consistency with the more recent NSW RFS (2019) *Planning for Bush Fire Protection*) and all identified bush fire protection measures have been carried forward into design of the project and the management measures proposed for the project.

15.1.2 Existing environment

Bush fire prone land classification

The site is classified as bush fire prone land (Vegetation Category 1) according to Bush Fire Prone Land maps certified by the Commissioner of the NSW RFS for the Shoalhaven City Council.

Vegetation type

The predominant vegetation type on or within 140 metres of the site has been identified as 'dry sclerophyll forests: shrubby sub formation'. This vegetation type is broadly described as containing the following features:

- Dominated by eucalypts of 10-30 metres heights with crowns that touch or overlap (foliage cover in many areas is 20-50%)
- Prominent layer of hard-leaved shrubs
- Occurring in areas where annual rainfall exceeds 500 millimetres
- Understorey dominated by shrubs including banksias, spider flowers, gum trees, tea-trees

- Sparse groundcover.

Effective slope

The project footprint is located on a slope class of 0-5 degrees. The adjoining land parcels to the east, north, west and south are predominantly located also on a slope class of 0-5 degrees. To the west of the site (within the existing West Nowra Recycling and Waste Facility) slope classes range from 10-20 degrees. This is due to site modification undertaken to cater for the existing waste landfill operations.

Effective slope influences fire behaviour for the site, and is used to guide development of asset protection zones.

Fire weather

The site is located within the Illawarra/Shoalhaven NSW Fire Area and has a corresponding Fire Danger Index rating of 100 (NSW RFS 2019).

15.1.3 Assessment of potential impacts

Construction

The project is subject to an elevated bush fire risk given its proximity to large tracts of native forest. A number of bushfire protection measures would be incorporated into the project construction in accordance with the Aims and Objectives, and the Acceptable Solutions of the performance criteria, identified in *Planning for Bush Fire Protection* (NSW RFS 2019).

These measures seek to minimise the impact associated with a fire event and provide protection for the project and include the following during construction:

Emergency planning

To minimise the potential for ignition sources during construction, Shoalhaven Fire Control Centre would be notified of the construction dates. This is particularly important for any dates during which 'hot works' are to be conducted and would enable personnel from the Shoalhaven Fire Control Centre to advise where weather conditions are not appropriate to carry out the works proposed.

Landscaping and vegetation management

During the landscaping phase, mulch-based landscaping would be avoided.

Hot works

All hot works (such as welding, grinding etc) during construction would be managed through hot works permits or equivalent which include escalating provisions to reduce or eliminate the risk of accidental ignitions with elevated fire danger (very high, severe, extreme to catastrophic fire danger).

Operation

Development of land classified as bush fire prone land is subject to a number of bush fire related planning controls under the EP&A Act and the *NSW Rural Fires Act 1997*. The specific planning controls are detailed in *Planning for Bush Fire Protection* (NSW RFS 2019).

Planning for Bush Fire Protection (NSW RFS 2019) outlines the bush fire planning matters that need to be considered at various stages of the planning and development approval process. It applies to development on land that is classified as 'bush fire prone' on a bush fire prone land map.

The following bush fire protection measures have been developed from the bush fire assessment to assist in minimising potential impacts from bush fire. The proposed measures go beyond the requirements for a non-residential building due to the establishment of an asset protection zone to the east, south and north of the proposed building.

Asset protection zones

An asset protection zone is an area of land, adjacent to a building, in which the bush fire fuel load is managed and maintained to minimise the impact of fire on that asset. The asset protection zone acts as a buffer between an asset and the bushfire hazard.

In order to protect the building asset, an asset protection zone width of 30 metres has been applied to the northern, southern and eastern portions of the site to offer protection for the proposed buildings. Security fences surrounding the project would be constructed at the boundary of the asset protection zone.

Access routes

A new main heavy vehicles access road and perimeter road would be constructed as part of the project. This new main access road would be constructed to facilitate all weather access.

Flatrock Road (Public Access) and the new two-way main access roads would fulfil site access and property access requirements and as such there is no requirement for the additional development of fire trails.

In addition to road access, the project includes construction of a 40 space car park. The location to the south of the proposed building is considered suitable as it allows for the establishment of a defendable space for fire-fighting purposes and hardstand surfaces within the asset protection zone which would reduce the level of combustible materials in proximity to the asset.

Landscaping and vegetation management

Mulch based landscaping would be avoided. Landscaping would also avoid planting shrubs and laying woodchips within 10 metres of an exposed window or door.

Hot works

All hot works (such as welding, grinding etc) during operation would be managed through hot works permits or equivalent which include escalating provisions to reduce or eliminate the risk of accidental ignitions with elevated fire danger (very high, severe, extreme to catastrophic fire danger).

Emergency planning

A site specific Incident Response Management Plan would be developed which would identify bush fire prevention measures to be implemented in the event of a bush fire or fire incident on site, formal bush fire warning being issued or escalating fire danger.

Emergency procedures would be made available to all personnel located on site, with information such as evacuation points provided to all visitors as part of the induction process.

15.2 Fire safety

A fire and incident management review was prepared by GHD and is included in Appendix O. A summary of the assessment results is provided below.

15.2.1 Preliminary stockpile details

Table 15.1 provides an overview of the proposed preliminary sizes, locations and contents of stockpiles at the facility.

Table 15.1 Preliminary stockpile information

Stockpile name	Materials	Stockpile location	Stockpile dimensions (L/W/H)	Weight
Mixed waste stockpile	Mixed waste	Internal, waste reception hall	Height of 2.6 m ~ 750 m^3	610 tonnes
Mixed waste stockpile	Mixed waste	Internal, waste reception hall	Height of 2.6 m ~1,000 m^3	790 tonnes
Non-conforming waste stockpile	Non-conforming waste	Internal, waste reception hall	Height of 2.6 m ~250 m^3	200 tonnes
Sorted Stockpile	Biomass	Internal, northern end of sorting hall	45.0 m x 10.3 m x 3.0 m ~1,390 m^3 *Note: Each waste material is stored in separate hooklift bins, making up the sorted 'stockpile'*	397 tonnes
	PP/PE			9 tonnes
	PET			9 tonnes
	Metals (ferrous)			28 tonnes
	Fraction < 3			Included in aggregates tonnage
	Metals (non-ferrous)			3 tonnes
	Aggregates			102 tonnes
Sorted stockpile	RDF light	Internal, western end of sorting hall	40.5 m x 10.2 m x 3.0 m ~1,294 m^3 *Note: With the exception of residual waste, each waste material is stored in separate hooklift bins, making up the sorted 'stockpile'* *Glass are stored in bags.*	96 tonnes
	RDF heavy			78 tonnes
	Glass			34 tonnes
	Residual waste			100 tonnes
	Fraction 3-40			Included in aggregates tonnage
Holding bay stockpile	Residual waste	External, north of the sorting hall at covered holding bays	87.5 m x 11.0 m x 3.0 m ~2,888 m^3 *Note: Biomass is stored in hooklift compactor bins*	Landfill: 100 tonnes Biomass & RDF: TBC

The indicative location of external combustible stockpiles is shown in Figure 15.1.

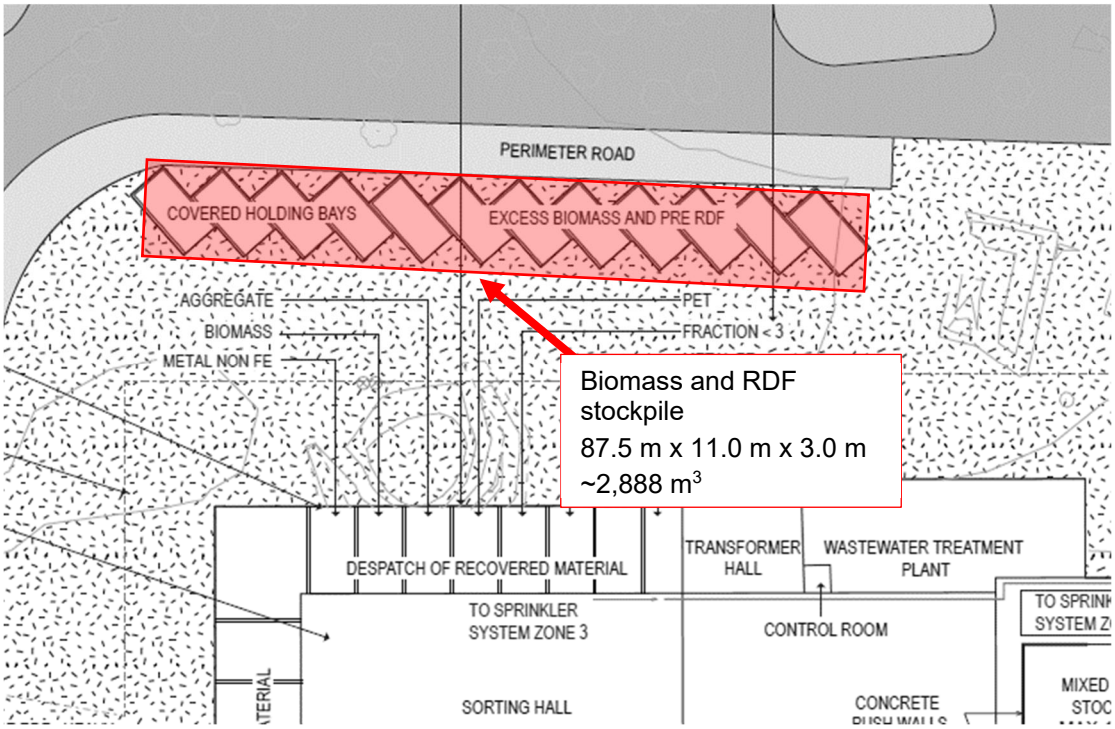
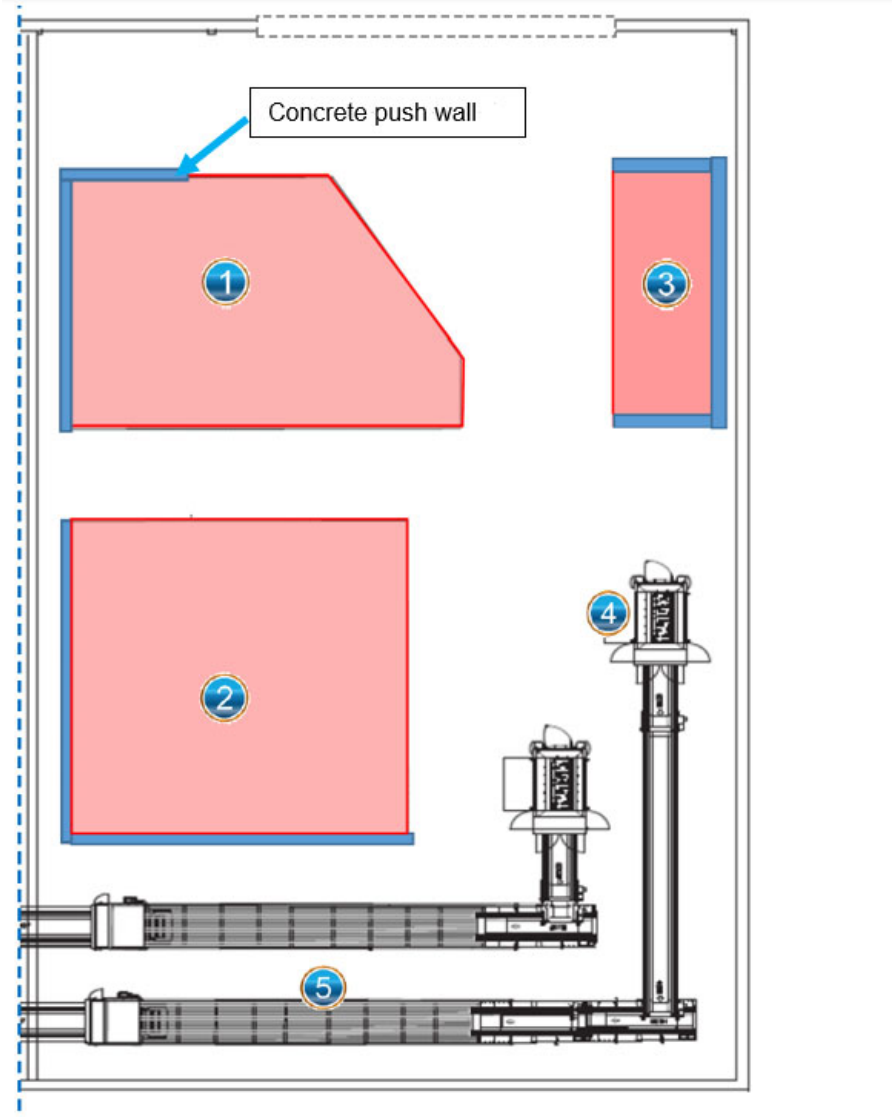


Figure 15.1 Proposed external combustible stockpile location

Figure 15.2 Proposed internal stockpile configuration - waste reception hall



1. Mixed waste (610 tonne) 2.6 m high ~ 750 m3 (Mixed weight density of 0.8 t/ m3)
2. Mixed waste (790 tonne) 2.6 m high ~ 1,000 m3 (Mixed weight density of 0.8 t/ m3)
3. Storage of non-conforming wastes (200 tonne) 2.6 m high ~250 m3
4. Shredders (x2)
5. Moving floor bunkers (x2)

Figure 15.2 and Figure 15.3 show the indicative locations of internal stockpiles within the waste reception hall and sorting hall.

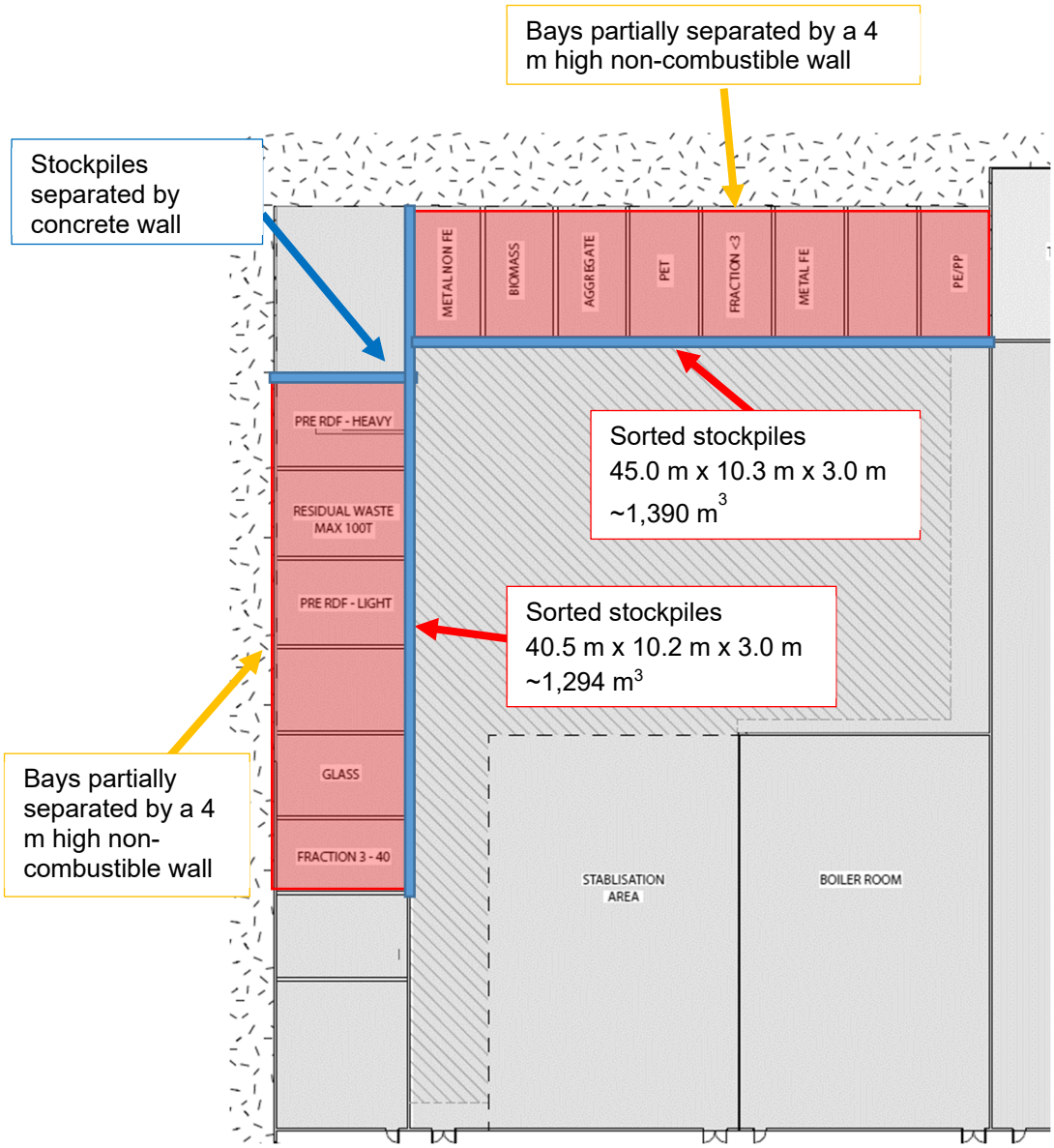


Figure 15.3 Proposed internal stockpile configuration – sorting hall

15.2.2 Access

Access for vehicles and specialist fire appliances

Figure 15.4 shows the proposed (six metre wide) perimeter access for fire appliance use for the proposed buildings and the primary access road. The design allows for close range fire brigade access to the building from the perimeter access road and apron.

Primary access road

Fire brigade perimeter access

Figure 15.4 Indicative access for FRNSW vehicles

Firefighter access

The high-level design strategy is to provide perimeter doors around the building, such that multiple access and egress options are available. This perimeter door strategy would facilitate firefighter access from multiple potential vantage points.

The hydrant network serving the building would be designed with perimeter door use in mind, with external hydrant design being preferable, so long as coverage can be met.

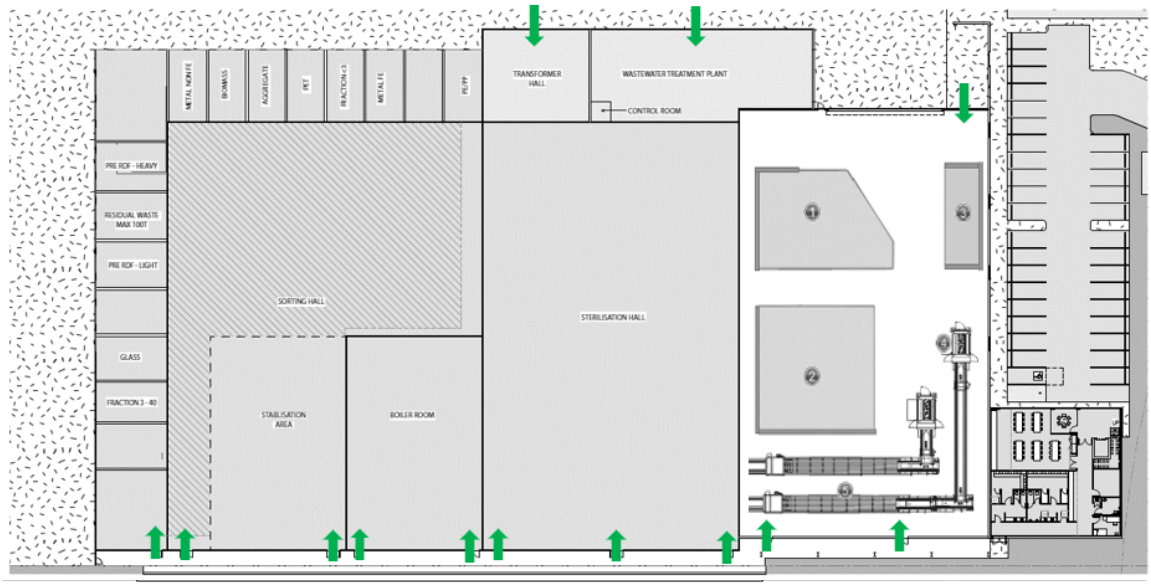


Figure 15.5 Indicative building access for FRNSW

15.2.3 Proposed fire protection equipment

The fire protection equipment for the project would include:

- Fire hydrant system
- Fire hose reel system
- Automatic fire sprinkler system
- Fire brigade booster connection for automatic fire sprinkler system, co-located with hydrant system booster
- Fire detection and alarm system
- An automatic smoke hazard management system for the building
- Roller shutters for the building for venting smoke

Details of the proposed air, water, noise and spill risk and mitigation measures are provided in Chapters 9, 11, 14 and 12 respectively.

A fire hydrant system would be installed in accordance with *AS 2419.1: Fire hydrant installations, Part 1: System design, installation and commissioning,* which would provide coverage for both internal and external stockpiles. It would be designed for at least two fire hydrants simultaneously flowing and would provide 20 litres per second simultaneous flow rate for a minimum four hours duration.

The fire hydrant system is proposed to be fed via two fire tanks (combined sprinkler and hydrant), each with a capacity of 584 kilolitres.

External combustible stockpiles are required to be provided with external hydrant coverage as per the requirements of the FRNSW (2020a) *Fire Safety in Waste Facilities Guidelines* ('FRNSW Guidelines'), namely that they will have coverage from hydrants placed at least 10 metres from the combustible stockpile. Based upon the current combustible stockpile locations provided, the coverage is demonstrated to comply with this requirement.

The internal layout will directly impact coverage requirements. The internal layout would be refined during detailed design and the hydrant system would also be developed further to ensure compliance as the design progresses.

Figure 15.6 shows a preliminary drawing which provides a proof of concept for external and internal hydrant coverage at this time.

It is expected that the hydrant design would be confirmed during detailed design, however the requirements of the FRNSW Guidelines for coverage would be adhered to.

A fire hose reel system would be installed with fire hose reels located adjacent to hydrant locations to provide coverage. Additional hose reels, where required for coverage, would be provided. The fire hose reel system would be developed further during detailed design and in consultation with FRNSW where required.

Figure 15.6 Indicative hydrant coverage to combustible stockpiles

A fire brigade booster is proposed to be located adjacent to the designated site entry point. See Figure 15.7. The fire brigade booster connection would incorporate the automatic fire sprinkler system.

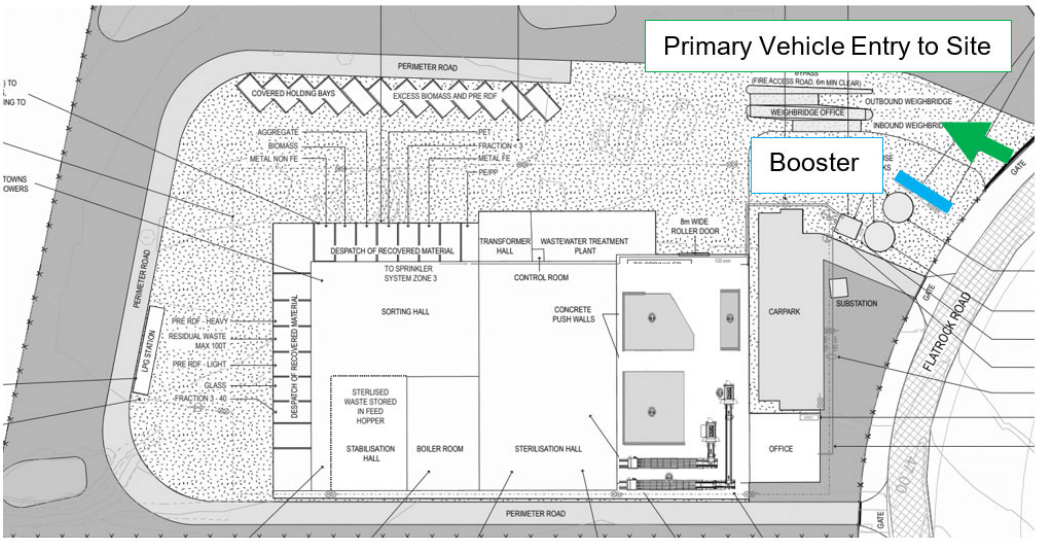


Figure 15.7 Booster location

The building would have a sprinkler system incorporated, including for high hazard as required by the FRNSW Guidelines. This would include all halls and treatment/awning areas attached to the building.

The fire sprinkler system would be fed from the sprinkler pump house, connected to two fire tanks (584 kilolitres each, totalling 1,168 kilolitres). The tanks would be refilled through infill connection from the town main.

A fire detection and alarm system in accordance with *AS1670.1 Fire detection, warning, control and intercom systems - System design, installation and commissioning* would be installed in the building. Manual alarm points would also be installed in the building. It is anticipated these would be located adjacent to exits from the building.

The waste reception hall would be provided with a smoke extraction system capable of maintaining the smoke layer above 4 metres above floor level. Extraction rates would be subject to detail design to determine exact exhaust rate requirements.

The sterilisation and sorting halls are not anticipated to incorporate stockpiles at this time. Therefore, a manually activated smoke clearance system, in lieu of automatic, is proposed, with the clearance rate being one air-change per hour.

The waste reception hall would be provided with roller doors on two separate walls which would assist with venting de-stratified smoke, as indicated in Figure 15.8. The doors would be automatically opened upon fire detection within the building, with the number of doors to be determined during detailed design prior to issuance of a construction certificate.

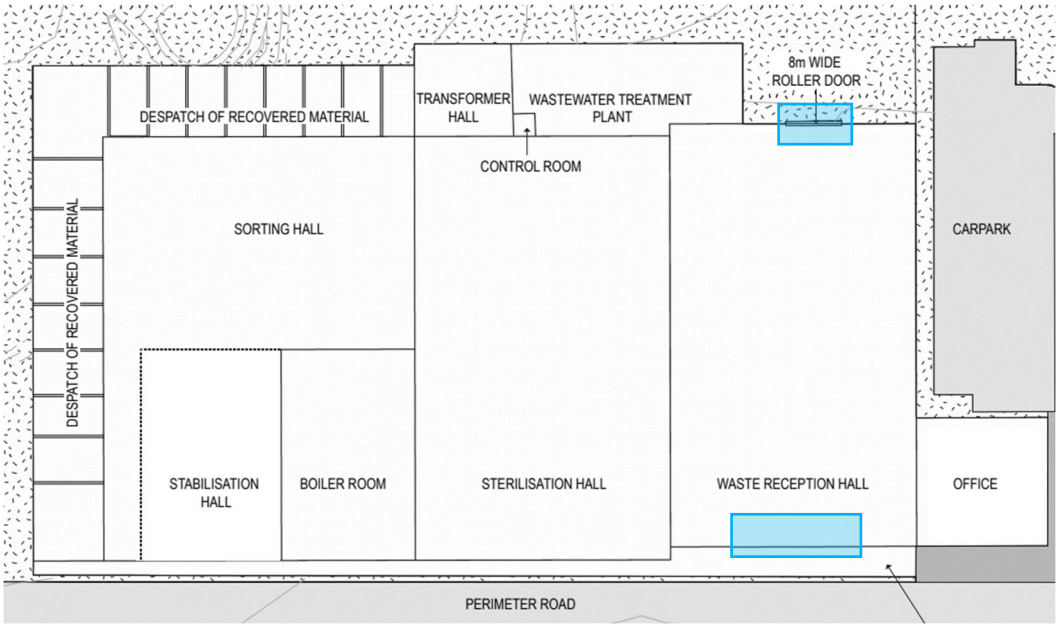


Figure 15.8 Indicative locations of roller shutters available for venting smoke

An automatic fire water run-off containment system would be provided and designed to contain the total combined hydraulic demand of the fire hydrant and fire sprinkler systems.

15.2.4 Assessment against FRNSW Guidelines

The FRNSW Guidelines has been developed to "provide guidance on fire safety in waste facilities that receive combustible waste material, including adequate provision for fire safety and facilitate safe fire brigade intervention to protect life, property and the environment".

The FRNSW Guidelines provide two development pathways for waste facilities, with respect to fire safety. They can be to design as par an 'Acceptable Solution', or a 'Performance Solution' (refer Figure 15.9). The Performance Solution pathway requires referral to FRNSW for consultation.

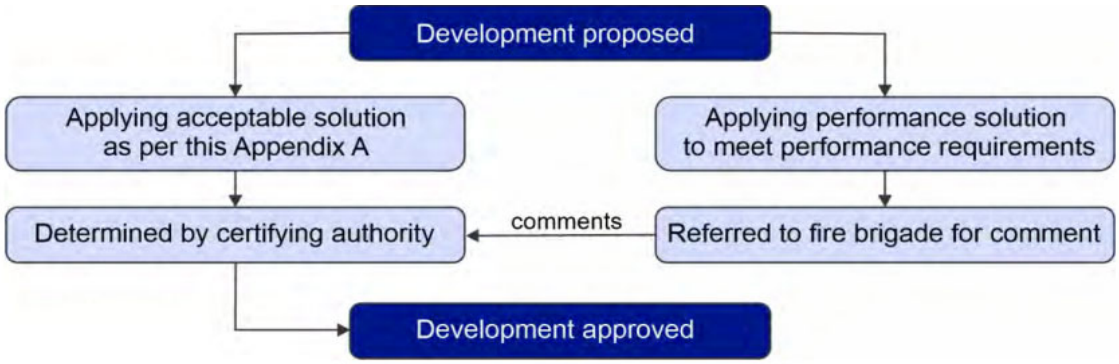


Figure 10 Pathways involving acceptable solution or performance solution

Figure 15.9 Excerpt from FRNSW Guidelines

Table 15.2 provides a summary of the results of the proposed fire safety measures for the project based on a preliminary assessment of the project against the FRNSW Guidelines. The full assessment is provided in Appendix O. The assessment and identified measures have been based on the preliminary design. As the design is refined it is expected that the fire safety system would also be refined and developed further in consultation with FRNSW where appropriate.

Table 15.2 Summary of proposed measures to meet the requirements of the FRNSW Guidelines

Requirement	Proposed measures
General	If not specifically mentioned the following fire safety measures would be provided in accordance with the Deemed-to-Satisfy provisions
Fire hydrant system	• A fire hydrant system would be provided in accordance with the ABCB (2019) *Building Code of Australia (BCA)* Clause E1.3 and would be designed to *AS2419.1-2017* • The following (summarised) FRNSW Guideline requirements shall also apply: – In addition to internal coverage requirements, hydrant coverage would be provided to all external (combustible) stockpiles – The fire hydrant system would be designed for at least 2 fire hydrants simultaneously flowing (20 litres per second) – The fire hydrant system would provide the above simultaneous flow rate for at least 4 hours minimum duration – Hydrants would not be located within 10 metres of any stockpiled storage (internal or external)
Fire hose reels	• Hose reels would be provided in accordance with BCA Clause E1.4 • The following (summarised) FRNSW Guideline requirements shall also apply: – The fire hose reels would be capable of coverage to internal and external combustible stockpiles – It is proposed to calculate coverage to combustible stockpiles for fire hose reels based upon the edge of the stockpiles, not the centre
Fire sprinklers	• The automatic fire sprinkler system for the buildings would be in accordance with BCA Clause E1.5 and be designed to *AS 2118.1-2017* • The following (summarised) FRNSW Guideline requirements shall also apply: – The sprinkler system to the buildings would be designed for High Hazard classification – The sprinkler water supply time would be at least 2 hours – Any awnings attached to the buildings which cover storage areas, or are adjacent to stockpiles, would be sprinkler protected, regardless of any exemptions in *AS 2118.1-2017*
Fire detection	• A fire detection system complying with *AS1670.1-2018* and BCA Clause E2.2 would be installed for the buildings. • Provision of aspirating detectors to the material sorting hall to minimise the potential for false alarms would likely be required. • Upon fire trip, the conveyor belt would cease to operate, limiting fire spread between different areas of the building.
Smoke hazard management	As per the FRNSW Guidelines, an automatic smoke exhaust system would be provided to the waste reception hall and provide: • Exhaust rates would be determined depending on CFD modelling results, but shall be demonstrated to maintain a smoke layer height above 4 metres A smoke clearance system would be proposed for the sorting and sterilisation halls, so long as no storage of waste is present within the halls. The smoke clearance system would be manually operated, and have a rate of one air-change per hour. The following requirements apply to all smoke hazard management systems: • Initiation switches would be located at the fire indicator panel (FIP) for any power-driven fans

Requirement	Proposed measures
	• Signs and text alerting the Fire Brigade to the operation of the smoke exhaust system would be provided at the FIP in accordance with Clause 4.15 of *AS 1668.1* • The fans, fan cabling and the cabling of any doors required for make-up air would be fire rated so fans are capable of operating at 200 ^{o}C for 2 hours • On activation of the fans make up air is to be drawn via permanent openings or automatic opening doors at low levels. These openings would be on at least two or more separate walls
Building occupant warning system	• A building occupant warning system for the buildings would be provided in accordance with *AS 1670.1-2018* and BCA Clause E2.2 • Manual alarms would be installed throughout the buildings, adjacent to each exit door
Perimeter access	• Perimeter road access of at least 6 metres in width, capable of supporting specialist fire appliance use, would be provided around each building and external stockpile, as required to satisfy the FRNSW Guidelines.
Combustible stockpile requirements	**External (combustible) stockpiles (see Figure 15.1):** • There is one external (combustible) stockpile: – Biomass and RDF • External (combustible) stockpiles are to be limited in size to 50 metres in length and 20 metres in width (so long as perimeter access is provided on both sides), except where varied through consultation with FRNSW The following variations are currently proposed: – Biomass and RDF Stockpile, 87.5 metres x 11.0 metres • Spacing and location of the external (combustible) stockpiles would adhere to Section 2.4.22 of the FRNSW Guidelines. • Note: these requirements do not apply to non-combustible stockpiles (concrete processing or soil processing areas) **Internal (combustible) stockpiles (see Figure 15.2 and Figure 15.3):** • Multiple internal (combustible) stockpiles are proposed within the buildings • Each internal (combustible) stockpile would be limited in volume to 1,000 m^3, except where varied through consultation with FRNSW. The following variations are currently proposed: – Sorted Stockpile (Metals, Biomass, Aggregate, PET, Fraction <3, PE/PP), 1,390 m^3 – Sorted Stockpile (RDF, Residual Waste, Glass, Fraction 3-40), 1,294 m^3 • Separating construction between stockpiles would be of non-combustible construction and extend at least 1 metre above maximum stockpile heights • Each internal (combustible) stockpile would maintain a minimum of 6 metres unobstructed access on accessible sides
Fire water containment	• An automatic fire water run-off containment system would be provided and designed to contain the total combined hydraulic demand of the fire hydrant and fire sprinkler systems – approximately 1000 m^3
Operational requirements	• Prior to commencement of operation of the project, the following would be developed: – An operations plan for stockpile management with a copy to be included within the Emergency Services Information Package – An Incident Response Management Plan for staff and other persons at the facility in the event of fire – An Emergency Services Information Package for firefighters in accordance with FRNSW (2019b) *Fire Safety Guideline: Emergency services information package and tactical fire plans*

Requirement	Proposed measures
	• Further to the above, the fire safety systems for the site would be inspected and maintained with corresponding fire safety statements being issued. The provision of maintenance would be covered in any leasehold contract. *AS1851-2012* would be utilised.

15.2.5 Compliance with Volume One of the National Construction Code/Building Code of Australia

A detailed BCA review and assessment would also be undertaken as part of the detailed design to confirm compliance and to identify the requirement for fire detection, automatic fire sprinkler and smoke hazard management systems for the building.

15.3 Environmental management measures

Table 15.3 provides a summary of the proposed noise management measures.

Table 15.3 Bush fire and fire safety management measures

Issue	Management measure	Timing
Bush fire protection	• asset protection zones would be provided as described in Section 15.1.3 and maintained in accordance with the asset protection zone requirements outlined in Appendix 4 of *Planning for Bush Fire Protection* (NSW RFS 2019)	Construction and operation
	• A site specific Incident Response Management Plan would be developed which would include bushfire prevention measures to be implemented during construction and operation. It would include the following measures: – Actions to be taken where a formal bush fire alert is issued – Emergency and operational protocols to be taken in response to escalation of fire weather conditions – Bush fire suppression equipment available on site and their location – Appropriate storage and maintenance of fuels and other flammable materials on site – Notification of the Shoalhaven Fire Control Centre of the dates of construction and any dates during which 'hot works' would to be conducted	Construction and operation
	• Any retained vegetation (outside the identified asset protection zone) would be managed in accordance with the Shoalhaven Bush Fire Management Committee (2018) *Bush Fire Risk Management Plan*	Operation
Fire safety	• The fire safety system for the project would be refined during detailed design and developed in consultation with FRNSW	Detailed design
	• A detailed review and assessment of the project would be undertaken during detailed design to confirm BCA compliance and to identify the requirement for fire detection, automatic fire sprinkler and smoke hazard management systems	Detailed design
	• Prior to commencement of operation of the facility, the following would be developed: – An operations plan for stockpile management with a copy to be included within the Emergency Services Information Package	Operation

Issue	Management measure	Timing
	– An Incident Response Management Plan for staff and other persons at the facility in the event of fire – An Emergency Services Information Package for firefighters in accordance with FRNSW (2019b) *Fire Safety Guideline: Emergency services information package and tactical fire plans*	

16. Hazards and risk

A preliminary hazard analysis (PHA) was prepared by GHD for the project Appendix P). A summary of the assessment and proposed mitigation measures are provided in this chapter.

16.1 Assessment method

16.1.1 SEPP 33 requirements

SEPP 33 presents a systematic approach to planning and assessing projects for potentially hazardous and offensive development for the purpose of industry or storage.

SEPP 33 applies to any project which falls under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. If not controlled appropriately some activities within these industries may create an offsite risk or offence to people, property or the environment thereby making them potentially hazardous or potentially offensive. An assessment was carried out to determine if the project is potentially hazardous or potentially offensive using the SEPP 33 risk screening process.

SEPP 33 screening

The need for a PHA under SEPP 33 is determined by a preliminary risk screening of the project. The preliminary screening methodology concentrates on the storage of specific dangerous goods classes that have the potential for significant offsite effects. Specifically, the assessment involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site with an indication of storage depot locations. Details of the methodology are described in *Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines* (Applying SEPP 33) (NSW Department of Planning 2011a).

If a PHA is not required, the process is completed at this step. For projects classified as 'potentially hazardous industry' a PHA is completed to determine the risk to people, property and the environment at the proposed location and in the presence of controls. Criteria of acceptability are used to determine if the project is classified as 'hazardous industry'. If this is the case, the project may not be permissible within most industrial zonings in NSW.

If a PHA is required, the methodology is outlined in NSW Department of Planning (2011b, 2011c) publications *Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning* (HIPAP 4) and *Hazardous Industry Planning Advisory Paper No. 6 'Guidelines for Hazard Analysis'* (HIPAP 6). The overall risk screening process, as outlined in SEPP 33 is summarised in Figure 16.1. Section 16.2.1 provides the results of the preliminary risk screening.

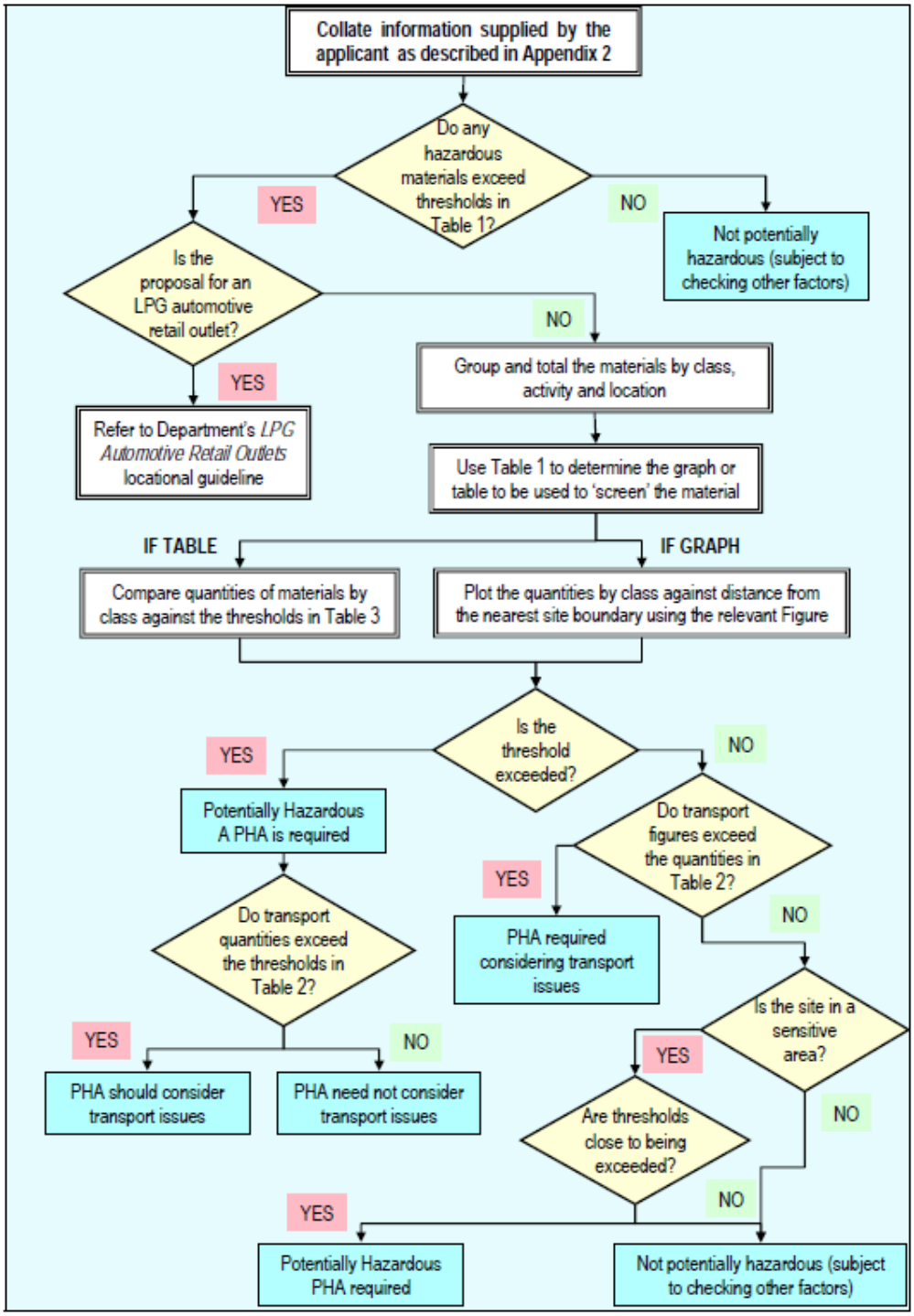


Figure 16.1 SEPP 33 risk screening process

Source: NSW Department of Planning (2011a)

Hazard identification

Following screening, SEPP 33 requires a determination as to whether the project poses significant risk or offence. This requires identification of potential hazards to highlight any risks associated with the interaction of the project (as a whole) with the surrounding environment i.e. a systematic process to identify any potential offsite impacts.

The hazard identification (HAZID) process is a desktop qualitative assessment and involves documenting possible events that could lead to a possible off-site incident. The assessment

then lists the potential causes of the incident, as well as identification of operational and organisational safeguards to prevent the incidents from occurring or mitigate their impact.

Preliminary Hazard Analysis

For projects classified as 'potentially hazardous industry', a PHA is required to be completed to determine the risk to people, property and the environment at the proposed location and in the presence of controls. Criteria of acceptability are used to determine if the project is classified as a 'hazardous industry'. If this is the case, the project may not be permissible within most industrial zonings in NSW.

The PHA prepared for this project identifies the potential hazards, analyses these hazards in terms of their impact to people and the environment and their likelihood of occurrence, quantifies the resulting risk to surrounding land uses and assess the risk to demonstrate that the project would not impose an unacceptable level of risk.

SEPP 33 identifies three levels of PHA. If a PHA is required, a judgement of the level of risk associated with the project is determined using the results of the screening and HAZID stages.

The three levels of PHA are:

- Level 1 – low potential for harm is identified, a qualitative PHA is completed
- Level 2 – if medium potential for harm is identified, a semi-quantitative PHA is completed
- Level 3 – if high potential for harm is identified, a quantitative PHA is completed

The preliminary risk screening (Section 16.2.1) identified that a PHA is required. The PHA is attached in Appendix P and a summary of the results of the PHA is provided in Section 16.2.2.

16.2 Assessment of potential impacts

16.2.1 Preliminary risk screening

Dangerous goods inventory

An onsite LPG station is proposed as part of the project, comprising a 50 tonne above ground LPG tank, pump and pipework. No other dangerous goods are proposed to be stored or transported to the site. Other chemicals used for operation of the wastewater treatment plant would include:

- Caustic soda (30% solution)
- Sulphuric acid (70% solution)
- Sodium hypochlorite (12.5% solution)
- Aluminium chloro-hydrate (ACH)
- Cationic polymer

Dangerous goods screening

An onsite LPG station is proposed as part of the project, comprising a 50 MT above ground LPG tank, pump and pipework. Other dangerous goods stored or transported to the site include minor quantities of water treatment chemicals.

The SEPP 33 screening thresholds for the onsite storage of DGs are shown in Table 16.1.

Table 16.1 SEPP 33 dangerous goods threshold figures

Chemical	DG Class/ PG	Storage Type	Max Qty	Storage threshold if stored above ground (tonnes)	Transport movements threshold (weekly peak)	Transport movements threshold (annual)
LPG	2.1	Bulk tank	50 MT	10	> 30	> 500
Caustic Soda (30% solution)	8 PG II	200 litre drums	400 kg	25	> 30	> 500
Sulphuric Acid (70% solution)	8 PG II	200 litre drums	400 kg or litre	25	> 30	> 500
Sodium hypochlorite (12.5% solution)	8 PG III	20 litre pails	40 kg	50	> 30	> 500
Aluminium Chloro-hydrate (ACH)	8 PG III	200 litre drums	400 kg	50	> 30	> 500
Cationic Polymer	9 PG III	25 litre pails	200 kg	NA	> 60	> 1000

A summary of the combined quantities of DG classes that are proposed be handled and/ or stored onsite as a result of the project and ongoing operation is shown in Table 16.2.

Table 16.2 Dangerous goods screening

Chemical	UN	DG class	Packing group	Quantity on site	Threshold
LPG (above ground)	1075	2.1	Not specified	50 tonne	10 tonne
Corrosives		8	II and III	1240 kg	25 MT
Polymer		9	NA	200 kg	Not Applicable

This shows that the proposed above ground storage capacity of LPG (50 tonnes) exceeds the screening threshold. The project is therefore a 'potentially hazardous industry' and a PHA is required. The quantities of chemicals associated with operation of the wastewater treatment plant are below the threshold values.

Potential events from loss of containment of LPG and ignition may lead to fire and explosion events. Such events may pose off-site impacts to the neighbouring land fill station. It is considered that there is a moderate potential for harm from such events, and that such events may have an impact on surrounding land uses, therefore a Level 2 semi-quantitative PHA is considered appropriate.

The results of the Level 2 PHA are summarised in section 16.2.2 and a copy of the PHA is provided in attached in Appendix P.

Transportation screening

During operation, the project would involve an increase in the number of vehicles entering the surrounding road network. Many of these vehicles would be trucks that would deliver material to the facility such as waste to the receivals area. Workers and visitors to the site would also generate additional traffic on the surrounding road network.

Due to the limited number of DGs on site, it is expected that these vehicles would only make up a small portion of the total vehicle movements. Based on a 50 tonne tank it is assumed that there would be no more than one delivery twice per week. The DG transportation screening and thresholds for the movement of LPG (both incoming and outgoing) are listed in Table 16.3 and Table 16.2 respectively.

Table 16.3 Transport screening

Chemical	UN	Class	Packing Group	Site movements	Threshold
LPG	1077	2.1	n/a	2 per week (104 per year)	More than 2 tonne per load: 30 per week 500 per year
Corrosives		8	II and III	1 per week	30 per week 500 per year
Polymer		9	NA	1 per week	60 per week 1000 per year

As number of site movements for delivery of dangerous goods is below the threshold, it is considered that the transport of dangerous goods is not potentially hazardous. However, if changes are to occur in the transport of dangerous goods, it is recommended that the screening process be repeated to determine any impact.

Emissions

The design of the project includes a variety of measures to reduce and control pollutant emissions (air quality and odour, noise and vibration). Assessment of air quality (Chapter 9), noise and vibration (Chapter 14) and visual impacts (Section 17.1) from the project has been undertaken as part of the EIS. Based on the findings from these assessments, the project would not release a quantity of pollutant emissions to be considered 'potentially offensive'.

16.2.2 Preliminary hazard analysis

Hazard identification (HAZID) and hazard analysis

The HAZID was conducted as a desktop study and focussed specifically on the operational activities of the LPG station. As part of the HAZID process, the failures of the LPG equipment items and a total of six events were considered. The events, their cause, consequences and safeguards are outlined in Table 16.4.

It is also noted for the HAZID review that a Jemena owned and operated gas pipeline runs 125 metres east of the site boundary. The risk implications of the pipeline would be the subject of a detailed Safety Management System review under *AS 2885: The Standard for Gas and Liquid Petroleum Pipelines* at the detailed design stage and prior to operations. Therefore, this activity was not considered further in the PHA, except to include this item as a recommendation for inclusion in the Incident Response Management Plan.

Table 16.4 Identified hazards for the LPG station

Hazard scenario	Causes	Consequences	Potential for offsite impact	Identified / recommended safeguards
1. 50 tonne LPG tank/hot failure	• Tank leakage and ignition and sustained jet fire impinging tank • Pressure relief valve (PRV) fails to lift or insufficient venting	• Prolonged fire weaken tank leading to boiling liquid expanding vapour explosion (BLEVE) • Fire and explosion effects over a large area	Yes	• PRVs provided and maintained • Deluge system provided over the LPG tank • All electrical equipment in the tank to be suitably specified for the specific hazardous area in which it will be installed, to minimise ignition sources
2. 50 tonne LPG tank/cold failure	• Tank leakage from corrosion or mechanical impact	• Potential leakage of LPG, and if ignited: • Jet fire • Flash fire • Vapour cloud explosion (VCE) • Fire and explosion effects over a large area	Yes	• LPG equipment provided, operated and maintained by service provider to *AS 1596:2014 The storage and handling of LP Gas* • All electrical equipment in the tank to be suitably specified for the specific hazardous area in which it will be installed, to minimise ignition sources
3. 50 tonne LPG tank PRV lifting	• Tank leakage/fire under tank, or overfill of tank and ignition of flammable liquid under tank leading to PRV lifting	• Jet fire if PRV lifts and vapour immediately ignited, if delayed ignition may lead to flash fire or VCE	No	• LPG tanks provided with automatic fill limiter to limit fill to 85% tank capacity • PRVs provided and maintained • Deluge systems over the stock tanks • All electrical equipment in the tank to be suitably specified for the specific hazardous area in which it will be installed
4. 50 tonne LPG tank/pump casing leak 5. Pump seal leak	• LP gas leak, and Ignition	• Jet fire • Flash fire • Explosion • Potential on and offsite heat radiation impact to surrounding areas	No	• Fire water supply and fire main (complying with *AS/NZS 2419*) • Deluge systems over LPG tank and pump • Foam and foam generation equipment to be available at the site for use by the fire brigade • Control of ignition sources on site • All tanks to be regularly inspected for potential leaks and corrosion impact, in the unlikely event of water build up in the tanks it is to be drained regularly to prevent internal corrosion

Hazard scenario	Causes	Consequences	Potential for offsite impact	Identified / recommended safeguards
6. 20 tonne road tanker unloading bays/ transfer hose failure	• Tanker impacts pipework adjacent to the bay • Tanker drive away whilst connected • Flexible hose failure (leak/rupture) • Operator error – incorrect connection of flexible hose (connection fails)	• Release of flammable gas/liquid into the loading bay • Jet fire • Flash fire • Explosion • Potential on and offsite heat radiation impact to surrounding areas, in particular, in case of flash fire those in vapour path at could sustain fatal injuries	Yes	• Dedicated loading bay area is to be graded to drain away spills from beneath the tank • Road tanker unloading operation is monitored by tanker drivers and plant operators during the full transfer operations • Delivery and despatch trucks are fitted with drive away protection to prevent drivers leaving the site whilst the truck is connected to the delivery pipework (via the flexible hose)

The following events were carried forward from the HAZID phase for consequence analysis and risk assessment:

1. LPG stock tank – hot failure and BLEVE/fireball
2. LPG stock tank – cold failure
3. LPG stock tank – PRV lifting
4. LPG transfer pump – casing failure
5. LPG transfer pump – mechanical seal failure
6. LPG road tanker:

a. LPG Road tanker – guillotine failure of filling/ unloading pipework (i.e. 50 mm liquid leak, 10 m length, 10 min release)

b. LPG Road tanker – guillotine failure of recovery manifold pipework, pump suction and discharge (i.e., 50 mm vapour leak, 10 m length, 30 min release)

Consequence modelling was performed using DNV's PHAST version 8.23 commercial software package..

Frequency analysis

A summary of the generalised failure frequencies for the six failure events is shown in Table 16.5. The data is generally expressed on a per annum basis; the exception to this is road tanker unloading (hose), which is expressed as 5.7 x 10^{-5} per hour, and PRV lifting.

Table 16.5 Failure frequency summary

Event item	Event	Item	Failure frequency
1. LPG tank hot failure - BLEVE	Process vessel – hot failure	Stock tank	1 x 10^{-5} per year
2. LPG tank cold failure – UVCE/flash fire	Process vessel – cold failure	Stock tank	2 x 10^{-6} per year
3. LPG tank PRV release – jet fire	PRV lifting	Stock tank	2 x 10^{-6} per year
4. LPG pump – casing failure	Centrifugal pumps – failure	Casing failure	3 x 10^{-5} per year
5. LPG Pump – seal failure	Centrifugal pumps – mechanical seal failure	Double seal	5 x 10^{-5} per year
6. LPG road tanker – guillotine failure of transfer hose	Guillotine failure of transfer hose failure	Flexi-hose	5.7 x 10^{-5} per hour
6a. LPG road tanker – guillotine failure of filling/unloading pipework	Guillotine failure of the filling/unloading pipework	50 mm pipe x 10 m	5 x 10^{-7} / m / yr or 5 x 10^{-6} for 10 m
6b. LPG road tanker – guillotine failure of recovery manifold pipework, pump suction and discharge	Guillotine failure of the recovery manifold pipework, pump suction and discharge	50 mm pipe x 10 m	5 x 10^{-7} / m / yr or 5 x 10^{-6} for 10 m

Risk evaluation

Table 16.6 provides a summary of event probability and the risk for each event, where the following definitions apply:

- The event is taken from the risk identification table (Table 16.4). The event covers the likely mode of failure of the plant item or equipment.
- Base frequency x 10^{-6} is the failure frequency of each event, taken from the generic failure rates given in Table 16.5.
- PF(E) is the probability of fatality to a person on the boundary from the event. Due to the fact that those external to the site would take shelter or emergency action the probability of fatality is estimated at less than 1.0. The Probit method and chance of fatality computations are provided below which conservatively apply a PF(E), where applicable, of 1.0. And hence our assessment can be considered very conservative.

For the purpose of the PHA, the following probability of fatalities are estimated at the site boundary:

- For Events 3, 5 and 6 – PF(E) = 0 (as the consequence effects at the boundary are negligible).
- For Event 1, 2 and 4 – PF(E) = 1.0 (due to flash fire engulfment or high heat flux (> 35 kW/m^2).
- Risk x 10^{-6} is the product of the frequency x probability of injury and is defined as the risk of exposure from the event.
- As shown in the subsequent tables, the risk at the boundary is computed by adding the risk contribution from each event. The risk level at the nearest boundary is computed to be around 52 in a million per annum at 28 metres.

Hence the boundary risk levels are considered acceptable as the 50 in a million per year contour would be approximately at the site boundary.

As the site is adjacent to a number of industrial developments, including an adjacent community recycling centre and the OEH field office and workshop, an estimate of injury contours at 23 kW/m^2 and 14 kPa at 50 in a million per year is provided.

These injury risk results are computed in the same way as the risk results, except that for each event we are adding the risk levels at distances to 23 kW/m^2 as shown in Table 16.7, and adding the risk levels at distances to 14 kPa in Table 16.8.

Table 16.7 provides the estimated risk injury contour of 50 x 10^{-6} p.a. for 23 kW/m^2, which is a circle of 28 metre diameter around the centre of LPG tank operations as shown in Figure 16.3. As the nearest building off-site is the office of the adjacent waste station situated over 90 metres away. Hence the interaction risks for 23 kW/m^2 is deemed acceptable.

Similarly, Table 16.8 provides the risk injury contour of 50 x 10^{-6} p.a. for 14 kPa, which is a circle of 50 metre diameter around the centre of LPG tank operations as shown in Figure 16.4. As the nearest building off-site is the office of the adjacent waste station situated over 90 metres away, the interaction risks for 14 kPa are also deemed acceptable.

As the nearest residential areas are located over 4 km from the site, the PHA risk results show that for a catastrophic failure of the LPG tank resulting in a BLEVE/ or UVCE event the maximum consequence distance to 4.7 kW/m^2 and 7 kPa is approximately 400 to 700 metres from the site and does not encroach on any land currently zoned residential. The contours of 50 x 10^{-6} for 4.7 kW/m^2 and 7 kPa are not provided in the PHA as they will be lower than the consequence effects to 4.7 kW/m^2 and 7 kPa and hence are deemed complied with.

Table 16.6 Overall risk evaluation at site boundary

Event item	Base frequency (x 10^{-6} per year)	Distance to boundary (m)	Effect at boundary	Pf(E)	Individual risk (x 10^{-6} per year (at boundary	Consequence effect maximum injury distance
1. LPG storage tank hot failure and BLEVE	10	30	Fireball surface flux up to 275 kW/m^2	1	10	697 m to 7 kPa (Category 5/D) 784 m to 7 kPa (Category 2/F)
2. LPG tank cold failure, unconfined vapour cloud explosion (UVCE) and flash fire	2	30	Maximum explosion overpressure of 70 kPa	1	2	364 m to 12.6 kW/m^2 (Category 5/D & Category 2/F)
3. LPG tank PRV release – jet fire	2	30	Vertical jet fire localised	0	0	21 m to 23 kW/m^2 (Category 5/D)
4. LPG pump – casing failure at 50 millimetres and 850 kPa	30	30	Flash fire envelope to lower flammability limit (LFL) extends 41 metres from source	1	30	LFL to 41 m (Category 5/D) LFL to 45 m (Category 2/F)
5. LPG pump – seal failure at 12 millimetres	50	30	Flash fire envelope to LFL extends 6 metres from source	0	0	LFL to 6 m (Category 5/D) LFL to 7.6 m (Category 2/F)
6. LPG road tanker – hose leakage at 12 millimetres	50	30	Flash fire envelope to LFL extends 6 metres from source	0	0	LFL to 26 m (Category 5/D) LFL to 29 m (Category 2/F)
6a. LPG road tanker – guillotine failure of filling/unloading pipework	5	30	Flash fire envelope to LFL extends 149 m from source (at Category 5/D)	1	5	LFL to 149 m (Category 5/D) LFL to 156 m (Category 2/F)
6b. LPG road tanker – guillotine failure of recovery manifold pipework, pump suction and discharge	5	30	Flash fire envelope to LFL extends 112 m from source (at Category 5/D)	1	5	LFL to 112 m (Category 5/D) LFL to 120 m (Category 2/F)
Total risk level at boundary (per year)					**52**	

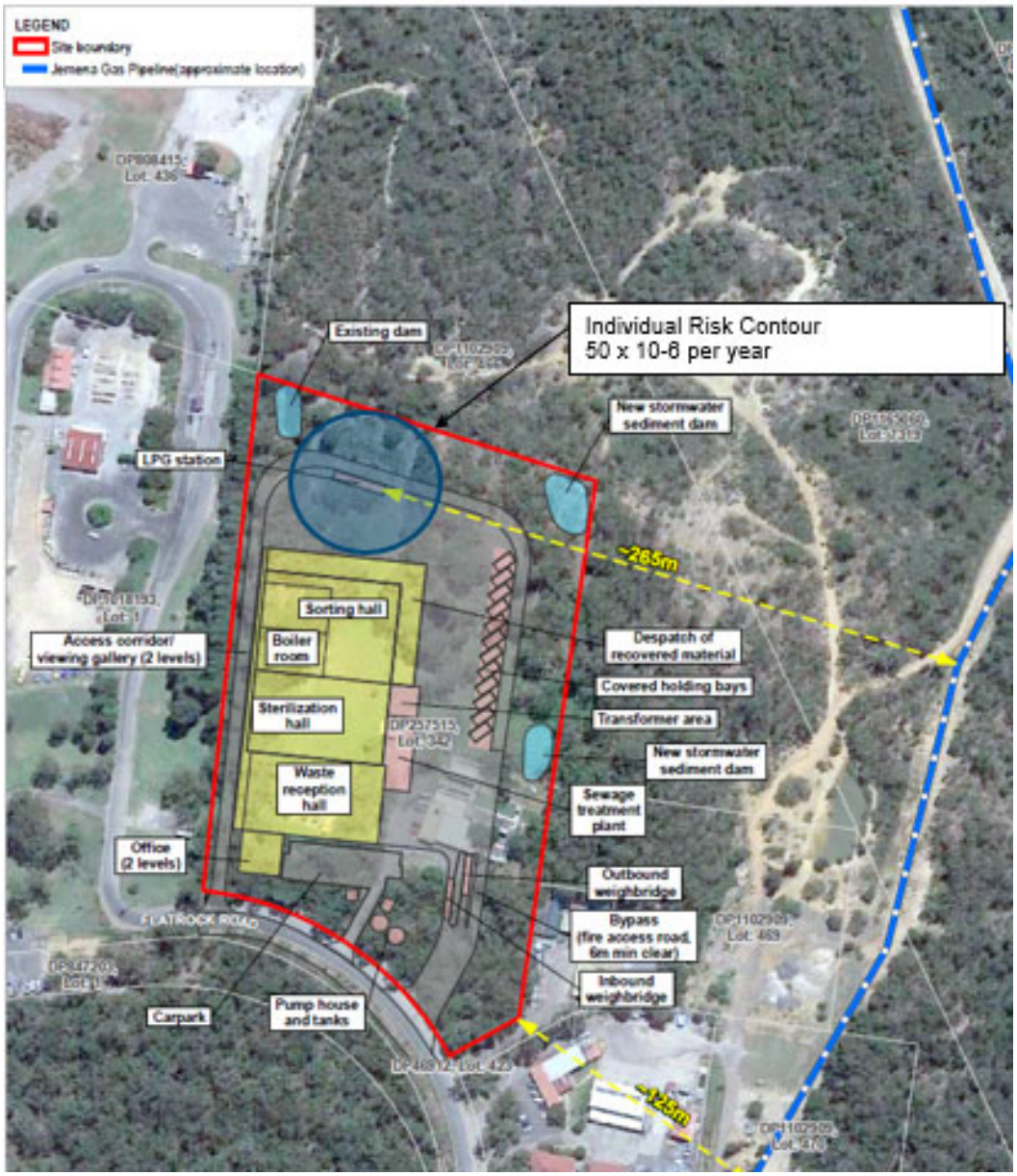


Figure 16.2 Individual fatality risk contour at 50 x 10^{-6} per year

Table 16.7 Injury risk levels for 23 kW/m^2

Event item	Base frequency (x 10^{-6} per year)	Category 5/D	Category 2/F
		Distance to 23 kW/m^2 (m)	
2. LPG tank cold failure, and flash fire	2	478	470
1. LPG storage tank hot failure and BLEVE	10	268	268
6a. LPG road tanker – guillotine failure of filling/unloading pipework – 50 mm	5	55	64
6b. LPG road tanker – guillotine failure of recovery manifold pipework, pump suction and discharge – 50 mm	5	44	51
4. LPG pump – casing failure at 50 mm and 850 kPa	30	28	26
Total	52	28	

The estimated risk injury contour of 50 x 10^{-6} p.a. for 23 kW/m^2 is a circle of 28 metre diameter around the centre of LPG tank operations as shown in Figure 16.3. The largest distance associated with the event that is driving the total risk dictates the contour size.

Table 16.8 Injury risk levels for 14 kPa

Event item	Base frequency (x 10^{-6} per year)	Category 5/D	Category 2/F
		Distance to 14 kPa	
2. LPG tank cold failure, and flash fire	2	570	637
1. LPG storage tank hot failure and BLEVE	10	100	100
6a. LPG road tanker – guillotine failure of filling/unloading pipework – 50 mm	5	167	180
6b. LPG road tanker – guillotine failure of recovery manifold pipework, pump suction and discharge – 50 mm	5	130	133
4. LPG pump – casing failure at 50 mm and 850 kPa	30	48	50
Total	52		50

The estimated risk injury contour of 50 x 10^{-6} p.a. for 14 kPa is a circle of 50 metre diameter around the centre of LPG tank operations as shown in Figure 16.4.

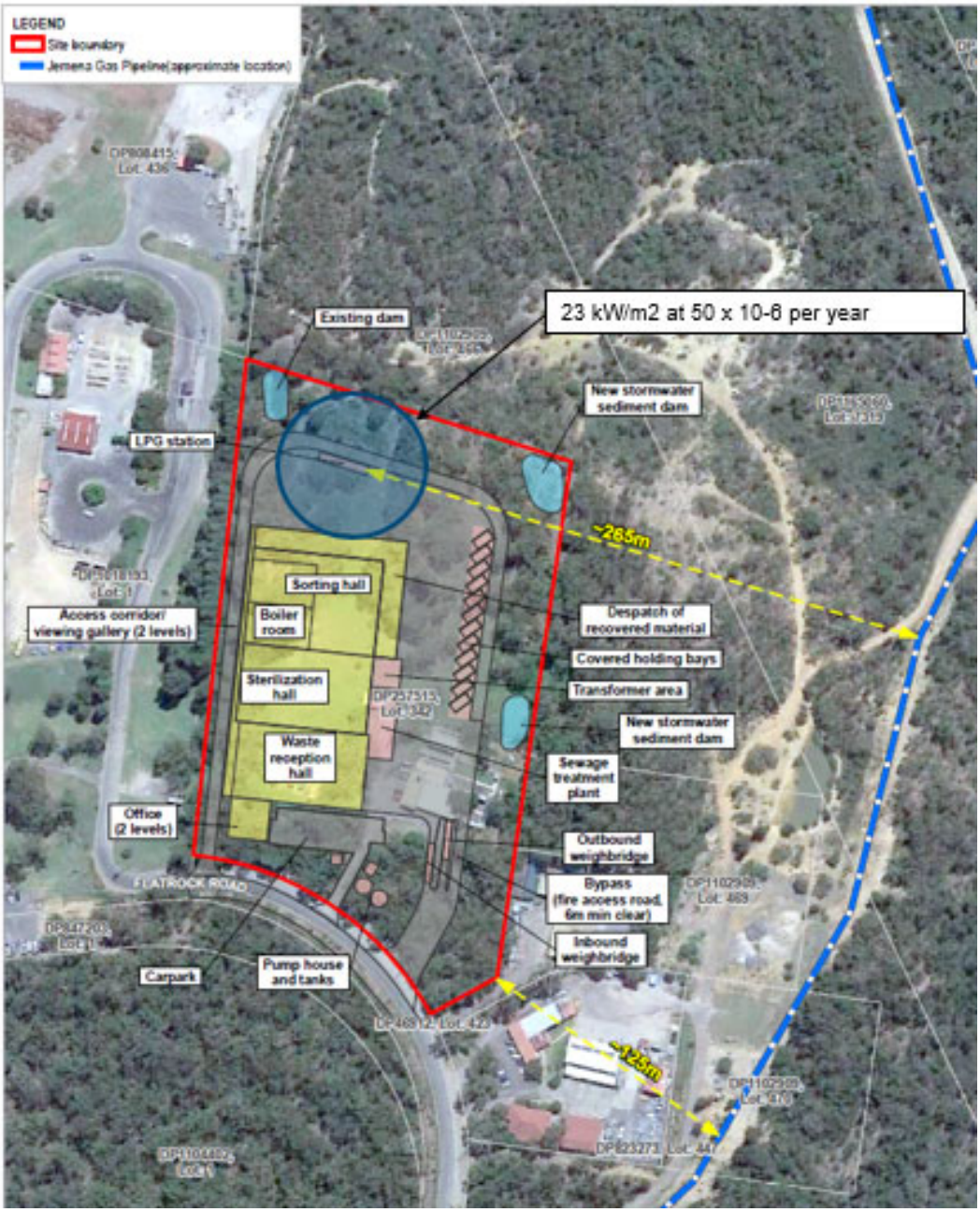


Figure 16.3 Injury contour at 23 kW/m^2 at 50 10^{-6} per year

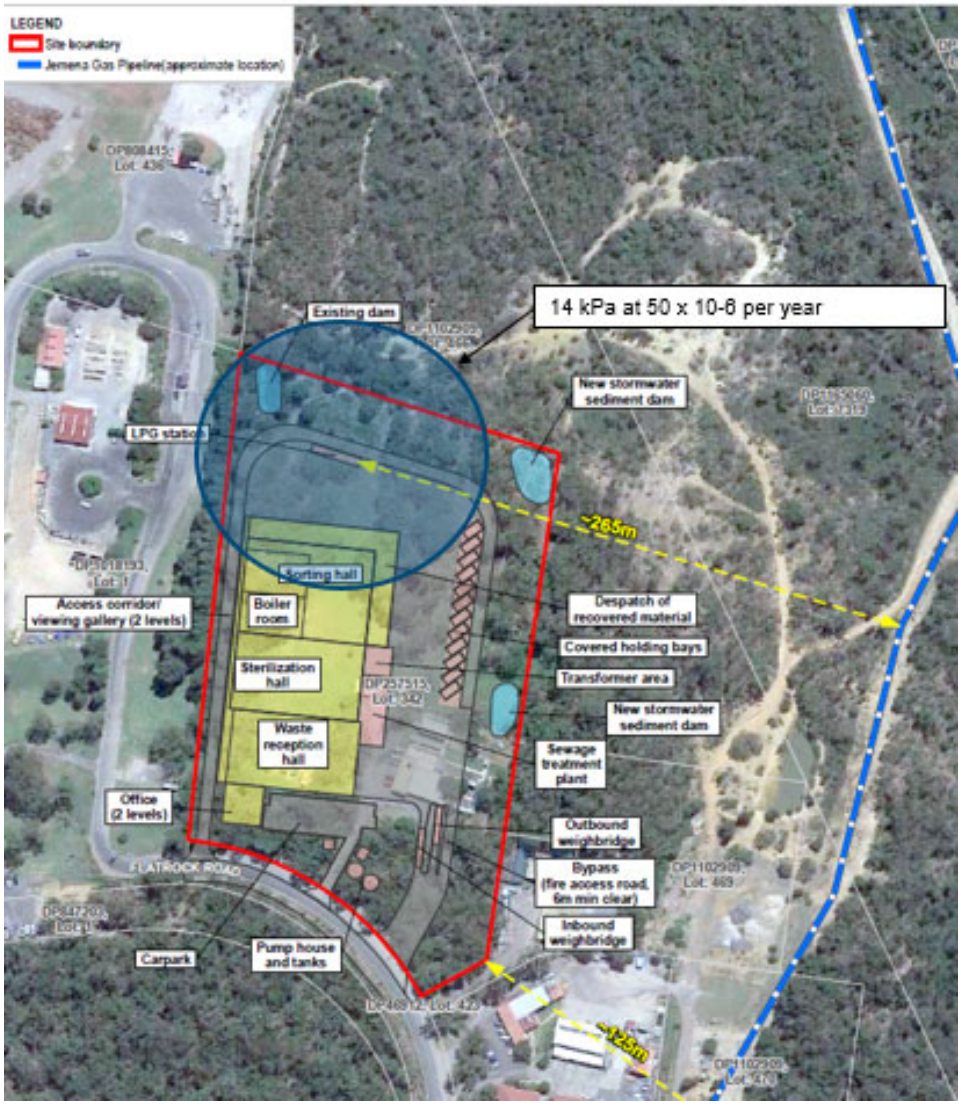


Figure 16.4 Injury contour at 14 kPa at 50 x 10^{-6} per year

16.3 Environmental management measures

Table 16.9 provides a summary of the proposed measures to manage hazards and risks.

Table 16.9 Hazards and risk management measures

Issue	Management measure	Timing
LPG tank	• The LPG tank and pump would be located a minimum of approximately 30 metres from the site boundary or as required by *AS 1596: The storage and handling of LP Gas*, whichever is the greater distance	Detailed design
	• Upon completion of the detailed design and layout of the LPG station, a final PHA would be undertaken to ensure that residual risk levels are acceptable. Options including mounding or undergrounding the LPG tank would be considered if necessary.	Detailed design
	• A site specific Emergency Management Plan would be developed covering the site and the LPG station installation. The plan would also make provision for the Jemena Gas pipeline situated approximately 125 metres form the eastern boundary of the site and any risk implications from the gas pipeline rupture relevant to the safety of the site and personnel.	Operation
Proximity to Eastern Gas Pipeline	• If required by Jemena, a detailed Safety Management System review under *AS 2885: The Standard for Gas and Liquid Petroleum Pipelines* would be conducted at the detailed design stage and prior to commencement of operations	Detailed design
	• Engagement would be undertaken with Jemena throughout design and construction, to ensure no additional protection or control measures are required by Jemena	Detailed design and construction
	• Should there be the need for any significant change to the project footprint or function, details would be provided to Jemena for review	Detailed design and construction
	• All work would be in accordance with Jemena's Design and Construction Guidelines (GAS-960-GL-PL-001)	Detailed design and construction
	• Jemena would be advised of any proposed horizontal directional drilling within the site and associated risks assessed (as required)	Detailed design and construction
Chemical and spill management	• Bulk storage of LPG would be in accordance with *AS 1596:2014: The storage and handling of LP Gas*	Detailed design and operation
	• All chemicals would have appropriate labelling, separation where necessary and disposal would be in accordance with Australian Standards	Operation
	• A safety data sheet (SDS) register of all chemicals that are located on site would be maintained	Operation
	• Appropriate safe work procedures would be implemented for the handling of all chemicals including transfer, storage, spill prevention and clean up requirements	Operation
Fire prevention and protection	• A fire protection system would be developed. The fire systems would be integrated into the design and management of the facility in accordance with *AS 2419.1:2017: Fire Hydrant Installations for Buildings* with an emphasis on fire prevention rather than mitigation	Detailed design

Issue	Management measure	Timing
	• The fire prevention and management strategies detailed in the NSW Department of Planning (2011d) *Hazardous Industry Planning Advisory Paper No 2 – Fire Safety Study Guidelines* would be considered as part of the detailed design and operation of the facility	Detailed design and operation

17. Other issues

17.1 Visual assessment

17.1.1 Assessment method

The visual assessment for the project included:

- Review of various aspects of the project including scale, façade design and landscaping.
- A desktop analysis using aerial photography and topographic maps to identify potential visual catchments and possible visual receptors.
- Description of the existing landscape character, visual amenity and sensitivity to change
- Qualitative assessment of potential impacts of the project on the existing visual character of the surrounding landscape during construction and operation based on potential sensitivity and magnitude of impacts
- Identification of potential mitigation measures to minimise any identified impacts seen to exceed community expectations or planning intents for the site and for this type of development.

The potential impacts were determined based on a combination of sensitivity of the landscape and views and magnitude of the change. Sensitivity refers to the quality of the landscape and view and how it would be affected by the project. Magnitude is the measurement of the scale, form and character of the project when compared to the existing conditions. In the case of visual assessment this also relates to how far the project is from the viewer.

Magnitude was evaluated based on variables such as the extent of the project that would be visible, the proportion of the visible parts of the project to the entire view, the nature and intensity of the impacts, whether key features were obscured or affected, the geographic extent of the impacts, the duration and reversibility of particular impacts, and the likelihood of occurrence of impacts.

Table 17.1 Visual impact magnitude rating

Rating	Descriptor
High	Severe consequences, significant at a regional level, likely to be unacceptable at a regional level. Large number of people measurably affected. Substantial / obvious changes due to the total loss of, or change to elements, features or characteristics of the landscape which are regionally significant.
Moderate	Moderate consequences, significant at a local level and likely to be unsatisfactory at a local level. Discernible changes to partial loss of, or change to several elements, features or characteristics of the landscape which are locally significant.
Low	Low consequences, significant at a local level, likely to be satisfactory at a local level provided appropriate mitigation measures are implemented. Minor change in the landscape due to the loss or change to one or two elements, features, or characteristics of the landscape which are locally significant.
Negligible	No consequence or significance Almost no perceptible or no change to the landscape as there is little or no loss of / or change to the elements, features or characteristics of the landscape.

The combination of sensitivity and magnitude determines the impact significant, from negligible to high as shown in Figure 17.1.

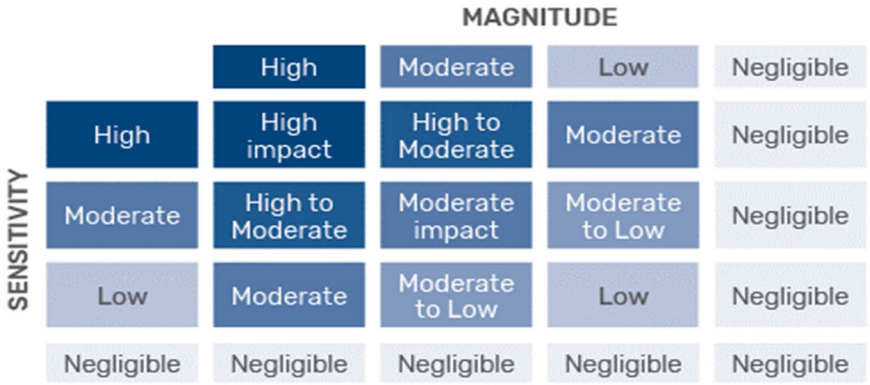


Figure 17.1 Impact significance rating matrix

17.1.2 Existing environment

The site covers an area of approximately 3.6 hectares, the main landscape features comprise:

- Natural vegetation and trees/bushland with varying density of trees in the south of the lot, in the northern portion of the site and site boundaries and dense undeveloped bushland exists to the north of the site.
- Open cleared grassy paddocks in the central and north western portion of the site
- Open cleared and disturbed landscape of the existing West Nowra landfill
- Road – Flatrock Road and Yalwal Road
- Developed areas – rural residences to the south and north east of the site and the Shoalhaven Campus of the University of Wollongong approximately 1.3 kilometres to the south east

Identified potential visual receptors are based on surrounding land elevation and include:

- Travellers along Flatrock Road
- Rural residences on Flatrock Road south of the site
- Students, staff and visitors at University of Wollongong Shoalhaven Campus

The DPIE office located to the south east of the site is the closest receptor, however due to the elevation and significant vegetation screening, this has not been identified as a potential visual receptor.

17.1.3 Assessment of potential impacts

The impact of the three visual receptors were determined to have a sensitivity of moderate or less due to the existing screening and limited interest in views towards the site or distance to the site reducing prominence of the views.

The magnitude of the impacts for the identified receptors was determined to be low or negligible due to limited visual accessibility and distance to the project. Consequently, the impact significance of the project at all identified receptors was considered to be low to negligible.

The main potential impact generator during construction is considered to be the visibility of the machinery and plant operating during construction of the buildings. In particular, operation of the mobile crane for roof structures and ventilation systems and installation of solar panel system

would be visible to people in some areas due to the heights of these activities. The temporary nature of construction work limits the magnitude of these visual impacts.

The elements of the project which have potential to be visible during operation are the buildings and ventilation and boiler stacks. The boiler stack would be located directly above the boiler room and ventilation stacks would be located on fan discharges and primarily located over the waste reception hall and processing hall. The location of ventilation and boiler stacks would be confirmed during detailed design. Vegetation surrounding the project provides screening to visual receptors. As shown in the architectural drawings (Appendix F), the building height would be 16.6 metres above ground level.

Processing and product storage would not be visible external to the site as waste unloading and processing would occur within the building and storage of product materials would be within partially enclosed structures. Vehicle movements to and from the site would be primarily limited to day time with processing within the building continuing at night.

Flatrock Road is relatively flat and has a relatively natural landscape with vegetation existing on both sides of the road including grass, shrubs and trees. The only development along this road is the West Nowra Recycling and Waste Facility west of the site, DPIE office south east of the site and some rural residences along the southernmost portion of Flatrock Road.

For road users approaching the site from the south, there would be little visual sign of the project until approaching close to the entrance.

Table 17.2 Visual impact assessment

Visual receptor	Sensitivity and magnitude rating	Impact significance
Road users on Flatrock Road	Sensitivity: **low** The sensitivity of the road users to change on the subject site would be low. Although the overall landscape character south of the area could be described as attractive natural landscape, road users are not subject to any existing significant views of regional or even local significance due to the constraints of existing roadside vegetation. Magnitude: **low** The elements of the project which are likely to be visible during construction are machinery operating, construction of buildings and other associated infrastructure. The elements of the project which are likely to be visible during operation are the buildings, ventilation and boiler stacks, entrance/weighbridge and signage. The project is unlikely to be visible from the majority of the road corridor due to the existing roadside vegetation and alignment. It would only be visible when approaching the site entrance. The majority of road users that would travel to this portion of Flatrock Road are users of the site, the adjacent landfill or the DPIE offices.	**Low**
Rural residences on Flatrock Road	Sensitivity: **moderate** The sensitivity of the nearby rural residences on Flatrock Road is moderate depending on the physical proximity and existing viewpoints of the residence. Most residences enjoy views over rural, vegetated surroundings. The nearest residence is approximately 700 m south of the site with limited views to the site due to existing vegetation. Magnitude: **negligible**	**Negligible**

Visual receptor	Sensitivity and magnitude rating	Impact significance
	The elements of the project which are likely to be visible during construction are machinery operating, construction of buildings and other associated infrastructure. The elements of the project which have potential to be visible during operation are the buildings and ventilation and boiler stacks. The site is currently not visible from the residences due to existing vegetation. Given the distance to the site and the current vegetation it is not expected that views of the project elements would be significant, if at all visible. Any potential views would be from a distance and the building colour scheme would be selected to blend with the natural environment.	
University of Wollongong – Shoalhaven Campus	Sensitivity: **low** The sensitivity of the university campus would be low with most activities being carried out indoors. The overall importance of the visual environmental for outdoor activity such as study or recreation/exercises would depend on the specific activities being carried out. However, the surrounding landscape would have only a small contribution to most users experiences associated with university activities. Magnitude: **negligible** The elements of the project which are likely to be visible during construction are machinery operating, construction of buildings and other associated infrastructure. The elements of the project which have potential to be visible are the buildings and ventilation and boiler stacks. The magnitude of any change associated with construction and operation of this infrastructure would be minimal. Particularly as the building colour scheme would be selected to blend with the natural environment. In addition, the distance to the site and the presence of extensive vegetation would screen views to the site.	**Negligible**

17.1.4 Environmental management measures

Table 17.3 provides a summary of the proposed measures to manage visual impacts.

Table 17.3 Visual amenity management measures

Issue	Management measure	Timing
Visibility	• During construction, the site and surrounds would be maintained in a clean and tidy condition at all times with appropriate bins provided for waste generated on site.	Construction
	• The building and associated infrastructure would be designed and the colour schemes selected to blend with the existing visual landscape. The building lighting system would be designed to manage light spill.	Detailed design
	• The vegetation buffer on the west, east and north boundary of the site would be maintained and provide screening to adjacent property users.	Operation

17.2 Socio-economic

17.2.1 Assessment methodology

A basic assessment of the likely potential social impacts of the project was undertaken. The assessment included:

- **Social study area**: analysis of the site surrounds to determine the socio-economic study area. The analysis was based on the ABS Census 2016 data relevant to the site. The study area was the Shoalhaven local government area.
- **Description of socio-economic environment**: identification of the existing socio-economic environment of the social study area, including analysis of the demographic indicators relevant to the assessment.
- **Assessment of socio-economic impacts**: identification and assessment of the potential socio-economic impacts and benefits during construction and operation based on a review of the project description, an understanding of the socio-economic environment, and review of the technical studies prepared for the EIS.

17.2.2 Existing environment

The project would be located within the Shoalhaven local government area. The Shoalhaven is located on the south coast of NSW, about 160 kilometres south of Sydney. The local government area is bounded by the Wingecarribee Shire and the Municipality of Kiama in the north, the Tasman Sea and Jervis Bay Territory in the east, the Eurobodalla Shire in the south and the Palerang and Goulburn Mulwaree Council areas in the west.

It covers a land area of around 4,500 square kilometres and comprises large areas of national park, state forest, bushland and beaches/lakes. The area is regional with major population centres along the coastal fringe: Nowra-Bomaderry, Milton-Ulladulla, Huskisson-Vincentia, St Georges Basin and Culburra beach and Sussex Inlet. Rural areas are mostly used for farming and agricultural activities. There are some light manufacturing industrial areas, with other main employment sectors being Government (including Defence), retail and tourism.

Table 17.4 provides a summary of relevant indicators for the socio-economic study area.

Table 17.4 Summary of relevant demographic indicators for socio-economic study area

	Shoalhaven local government area
Total population	99,650
Median age	48 years old
Private dwellings	54,388 dwellings
Labour force	38,914 persons
Resident aged 65 years and older	26.4%
Children under 15 years old	16.4%
Children under 5 years old	5.1%
Aboriginal and / or Torres Strait Islander	5.5%
Median weekly household income	$992
Born overseas	21%
Households where a non-English language is spoken	5.8%

Source: Australian Bureau of Statistics (2016) *Census Data*

The estimated resident population was 105,648 in 2019 (Profile.Id).

Based on the 2016 census data (ABS), there were 54,388 private dwellings, of which 87.4% were separate houses, 6.8% semi-detached/terrace houses, 2.5% were flats/apartments and the remainder were other dwellings.

Analysis of individual income levels in Shoalhaven compared to Regional NSW shows that there was a lower proportion of persons earning high income (more than $3,000 gross weekly income) and a higher proportion of persons earning low income (less than $650 gross weekly income).

In 2016, ABS census data showed that Shoalhaven's labour force was 38,914 persons. Of these, 50.8% of the labour force was working full-time and 36.7% was working part-time.

Key economic characteristics of the Shoalhaven local government area are as follows (Economy.id)

- Gross Regional Product was $4.73 billion in 2019, which was 0.8% of the Gross State Product.
- Health care and social assistance was the largest industry by employment in 2019
- There were 7,310 registered local businesses in 2019.

17.2.3 Assessment of potential impacts

Construction

The key potential social impacts that may result from construction of the project include:

- Change in community use of land – development of infrastructure can result in a change in land use that may affect how the community uses the land, or limit future community use of land
- Employment – there is the potential for employment to be generated during construction (temporary)
- Amenity – construction of the project has potential to result in impacts to local amenity unless appropriate design and mitigation measures are adopted. In particular, there is the potential for air quality (dust), noise, traffic and visual impacts during the construction phase

The construction of the project would not impact on community use of the land in the surrounding area. There are no community facilities near the site such as schools, churches, child care centres, open space or recreational facilities.

The project would complement existing waste related land uses at the adjacent site, and improve opportunities for resource recovery.

The project would also have a positive employment impact during construction. The construction workforce is likely to include a maximum of 200 staff working across the entire span of the project delivery. The peak workforce is expected during major concrete pours up to 80 people.

The proposed new facilities are well located with few residential dwellings in close proximity to the site. The potential for negative amenity impacts would also be significantly reduced by the implementation of appropriate environmental management controls guided by the construction environmental management plan (see Chapter 18).

Operation

The key potential social impacts that may result from operation of the project include:

- Employment – there is the potential for employment to be generated and operation (long term positions)
- Amenity – operation of the project has potential to result in impacts to local amenity unless appropriate design and mitigation measures are adopted. In particular, there is the potential for air quality (dust, odour), noise, traffic and visual impacts
- Community capacity development – providing opportunities for education and community involvement in the areas of waste reduction, recycling and sustainability.

The project would have a positive employment impact during operation. Approximately 34 fulltime permanent positions are expected to be generated during operation, with up to 16 staff per shift.

The proposed new facilities are well located with few residential dwellings in close proximity to the site. The potential for negative amenity impacts would also be significantly reduced by the implementation of appropriate design features and environmental management controls guided by the operational environmental management plan.

Council is proposing to develop a future community education centre (separate proposal) to allow the local community to visit the site and learn about the resource recovery and waste management activities of the project and the adjacent landfill.

The project would play a key role in moving the general community beyond the traditional approach of disposing waste to landfill. It would assist the community to become more aware of waste as a resource and the importance of their role in resource recovery. This would increase resource recovery and engender a sense of ownership by the community, particularly when it is recognised that the region's wastes are being managed within the region by new processes to maximise recovery and landfill life.

The increased diversion of waste from landfill would assist Council in reducing future financial liabilities associated with the waste and environment levy. This is because the project would reduce the volume of waste being disposed of to landfill and therefore reduce future waste levy payments made by users of the facility. The cost of the waste and environment levy now exceeds the underlying cost of landfill disposal and is likely to rise again in the future.

In addition, the project would extend the life of the West Nowra landfill and delay the need for a new landfill disposal site and/or the need to transport waste outside of the Shoalhaven.

17.2.4 Environmental management measures

Table 17.5 provides a summary of the proposed measures to manage socio-economic impacts.

Table 17.5 Socio-economic management measures

Issue	Management measure	Timing
Amenity	• Ongoing engagement would be undertaken with the local community and other key stakeholders during construction and operation, as discussed in Section 3.4.	Construction and operation
	• The management measures identified in the relevant chapters of the EIS would be implemented. A consolidated summary is provided in Chapter 18.	Construction and operation

17.3 Biodiversity

17.3.1 Assessment methodology

A Biodiversity Assessment Report (BAR) was prepared in accordance with the *Framework for Biodiversity Assessment* (OEH 2014) to accompany the Concept Proposal EIS (GHD 2016). This identified a small area of native vegetation and fauna habitat that would be removed from the site as part of the Stage 1 works.

Council received Concept Approval and Stage 1 Project Approval for the West Nowra Resource Recovery Park on 25 August 2016 (SSD 7015). The approved Stage 1 works included:

- Demolition of the existing animal shelter
- Site preparation and clearing of the site
- Construction of perimeter, entry/exit and service roads and line marking
- Installation of perimeter/boundary fencing
- Weighbridge and weighbridge office
- Staff and visitor car parking, including line marking
- Detention and sedimentation dams/basins
- Identification of asset protection zones.

As part of the Stage 1 approval, the following Condition of Approval relating to biodiversity was included:

> *"B1 – Prior to the commencement of Stage 1, the Applicant shall purchase and retire 133 ecosystem credits and 52 Squirrel Glider species credits in accordance with the EIS and the BOS and BAR of the RTS, and any modification approved by OEH."*

17.3.2 Existing environment

The Stage 1 BAR identified that approximately 1.2 hectares of the site was already cleared or developed including roadway, buildings, kennels and paddock areas. Approximately 2.4 hectares of the site comprised native vegetation and was identified as being within a regional biodiversity habitat corridor.

The Stage 1 BAR assessed the worst case scenario – the removal of all vegetation on the site. Therefore for the purpose of this assessment, it has been assumed that the site would be cleared in accordance with the Stage 1 Project Approval and therefore no biodiversity values would exist at the site within the project footprint.

17.3.3 Assessment of potential impacts

The construction and operation of the project would be undertaken subject to meeting the requirements of the Stage 1 Project Approval relating to site clearance and number and type of biodiversity credits. It is assumed that no biodiversity value would remain on site following Stage 1 site clearance and preparation works.

Vegetation management actions during Stage 1 would prevent additional clearing in adjacent lots, minimise additional indirect impacts on vegetation in adjacent lots and remove any movement corridors that may have existed on the site. No threatened species would occur on site following the clearing of vegetation in accordance with the Stage 1 Project Approval.

As such, a BDAR waiver request for the Stage 2 EIS was prepared and submitted to the Biodiversity and Conservation Division of DPIE. The Biodiversity and Conservation Division determined that the project is not likely to have any significant impact on biodiversity values and

therefore a BDAR is not required. A copy of the determination and approval of the BDAR waiver is provided in Appendix H.

17.3.4 Environmental management measures

No further environmental management measures relating to biodiversity are proposed.

18. Summary of management and mitigation measures

This chapter collates the environmental management measures for the project that were identified through the impact assessment process. All measures listed in Table 18.1 would be incorporated into the construction environmental management plan and/or the operational framework for the project.

Table 18.1 Summary of environmental management measures

Environmental issue	ID	Management measures	Timing
Construction waste	01	Waste would be managed during construction in accordance with a Construction Waste Management Plan to be developed for the project. The Construction Waste Management Plan would: • adopt the waste hierarchy principles contained in the *Waste Avoidance and Resource Recovery Act 2001* • define the processes, responsibilities and management measures that would be implemented during construction to manage waste • include procedures for the assessment, classification, management and disposal of waste in accordance with the *Waste Classification Guidelines* (NSW EPA 2014b).	Construction
Operational waste	02	Operational waste from site personnel and maintenance activities, would be managed in accordance with the operational environmental management plan for the project. The operational environmental management plan would adopt the waste hierarchy principles contained in the *Waste Avoidance and Resource Recovery Act 2001*.	Operation
	03	All waste received at the site during operation would be managed in accordance with the operational environmental management plan, the site EPL and EPA (2015) *NSW Energy from Waste Policy Statement*. The Operational Environmental Management Plan would include: • An Operational Waste Management Plan – including the quality control, record keeping and waste tracking steps listed in Table 8.4 • An Energy from Waste Management Plan to address and manage compliance with the EPA (2015) *NSW Energy from Waste Policy Statement*	Operation
Dust management during construction	04	• The proposed selection of construction plant would be reviewed and equipment and dust reduction measures utilised where possible • All spoil stockpiles would be covered where possible • Particulate matter generated from construction activities is typically more prominent during dry and windy conditions. Water suppression would be used during these worst case conditions and when visible plumes of dust are observed to be dispersed from the construction of the project • The frequency of water dust suppression would be increased during worst case dust dispersion meteorological conditions (dry and windy) • The construction site would be maintained and kept clean • Controlled site access would be maintained with use of cattle/shaker grids and wheel wash in order to reduce the tracking of mud off site. • All vehicles transporting spoil or other dispersible material would be appropriately covered to prevent the escape of dust or other material while in transit	Construction

Environmental issue	ID	Management measures	Timing
		• A log of all dust complaints received would be compiled and any potential causes of the complaint noted. If a trend in complaints is identified, work methods would be adjusted accordingly to minimise the likelihood of any future complaints • Visual monitoring would be undertaken by site management to ensure that construction works do not generate unacceptably high quantities of dust • Appropriate air quality mitigation measures (as provided above) would be included in the Construction Environment Management Plan	
Air quality during construction	05	• Construction plant and equipment would be properly operated and maintained to minimise excessive exhaust emissions • Appropriate air quality mitigation measures (as provided above) would be included in the Construction Environment Management Plan	Construction
Dust management during operation	06	• All building ventilation dust filters would be regularly checked and maintained and replaced in accordance with manufacturer specifications • Controlled site access would be maintained with vehicle wash down/clean down facilities (wheel wash if necessary) to be established to maintain access roads	Operation
Odour management during operation	07	• The activated carbon filter would be regularly checked, maintained and replaced in accordance with manufacturer specifications • The quantity of putrescible waste stored in the reception hall would be minimised • The reception hall would be kept as clean as possible via regular sweeping and wash down to minimise unnecessary odour emissions • The quantity of waste inside the reception hall would be minimised as much as practicable to prevent unnecessary build-up of waste • Unnecessary opening of the reception hall door would be minimised where possible • An odour complaint register to record all occurrence of odour complaints would be created • Staff would be informed of the potential odour impacts from the operation of the project and educated on appropriate mitigation measures (as outlined above)	Operation
Energy consumption	08	The project would utilise solar power	Operation
	09	Plant, equipment and vehicles selected for use would be efficient and operational activities would be optimised as far as practicable to minimise energy consumption	Operation
Soil salinity	10	The effects of salinity on foundations would be assessed as part of future geotechnical investigations in accordance with *AS 2159 – 2009 Piling – Design and Installation*	Detailed design

Environmental issue	ID	Management measures	Timing
Surface water management	11	All earthworks, filling, building, driveways or other works, would be designed and constructed (including stormwater drainage if necessary) so that at no time, would any ponding of stormwater occur on adjoining land as a result of the project.	Detailed design
	12	Before beginning major works, soil sampling would be undertaken per Landcom (2005) to determine if flocculent will be required to achieve sedimentation.	Construction
Contaminated run off	13	• Erosion and sediment control measures would be based on the design principles outlined in *Managing Urban Stormwater: Soils and Construction* (Landcom 2005) including: – Disturbed areas and the period of disturbance would be minimised – Clean run off would be diverted around disturbed areas Disturbed runoff would be collected and managed in sediment ponds.	Construction
	14	• The contractor would prepare a detailed erosion and sediment control plan which would be updated throughout the construction period.	Construction
	15	• Stockpiles of material would be located well away (minimum of five metres from concentrated flow paths) from areas of frequent inundation, any permanent stockpiles would be aligned to water flow and temporarily stabilised with vegetation.	Construction
Off site migration of sediment	16	• Access roads and disturbance activities would be managed with consideration to minimising off-site transport of sediment.	Construction
Contaminated runoff	17	• A stormwater treatment system involving a gross pollutant trap (also capable of capturing hydrocarbons) buffer strip and constructed wetland would be adopted to manage water quality in the carpark area.	Operation
Water quality	18	• A water quality monitoring program would be implemented on-site to assess the runoff discharging from the sediment basins with respect to key waste and urbanisation pollutant parameters, to confirm the basis of the water quality risk assessment. Surface water quality will be assessed with consideration of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000). • Monitoring would take place quarterly during the first year of the operational phase with samples to be taken during a discharge event from the constructed wetland occurring within the facility's operating hours. After the first year of operation, samples would be taken annually.	Operation
Landfill gas	19	• A landfill gas risk assessment would be undertaken as part of the next design phase and the results would be considered for building design elements, such as passive or active gas mitigation measures, should gas migration from the adjacent landfill site be identified and pose an unacceptable risk	Detailed design

Environmental issue	ID	Management measures	Timing
	20	• Landfill gas would be assessed through the installation of landfill gas monitoring wells installed along the western boundary of the site and also within the facility footprint. Gas accumulation monitoring would also be carried out within the existing structure and service pits. The landfill gas monitoring would be carried out over approximately six months to capture high and low pressure conditions.	Detailed design
Contamination	21	• Further targeted contamination assessment would be undertaken prior to construction commencing	Pre-construction
	22	• An Unexpected Finds Protocol would be prepared prior to construction commencing to manage previously unidentified occurrences of contamination that may be encountered during construction	Pre-construction
	23	• Any imported construction fill materials would be certified virgin excavated natural material or excavated natural material	Construction
Spills/leaks/ incidents	24	• Procedures would be developed to manage the risk of accidental spills and leaks and these would be incorporated in the construction environmental management plan for the project	Construction
	25	• Appropriate bunding and sediment and erosion control measures would be provided for the processing and maintenance areas and LPG station	Operation
	26	• Refuelling procedures and LPG tank filling procedures would be developed to manage the risk of accidental spills and leaks	Operation
	27	• A pollution incident response management plan would be developed and implemented which outlines management procedures for potential contaminants during operation	Operation
Non-conforming waste	28	• Any non-conforming wastes would be managed and disposed of in accordance with the procedure identified in Section 8.4	Operation
Construction traffic	29	• A Construction Traffic Management Plan would be prepared for the project and include: – management and timing of heavy vehicles through West Nowra • management and timing of trucks accessing the site to ensure there is sufficient room within the site to accommodate the vehicles	Construction
Parking and access	30	• Access and parking arrangements would be designed in accordance with *AS2890.1 Parking Facilities: Off-street car parking and AS 2890.2 Parking Facilities: Off street commercial vehicle facilities*.	Detailed design
	31	• During detailed design, the following amendments would be considered: – The addition of a central median at site entry (south of the weighbridge office) to minimise conflicts and vehicles 'cutting the corner'	Detailed design

Environmental issue	ID	Management measures	Timing
Operation traffic	32	• All parties would be required to coordinate visits with the office, particularly those that will access the covered holding bays and despatch (east)	Operation
Construction noise	33	• All engine covers would be kept closed while equipment is operating	Construction
	34	• As far as possible, materials dropping heights into or out of trucks would be minimised	Construction
	35	• Vehicles would be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes would be eliminated, where practicable	Construction
	36	• Machines found to produce excessive noise compared to industry best practice would be removed from the site or stood down until repairs or modifications can be made	Construction
	37	• To reduce the annoyance associated with reversing alarms, broadband reversing alarms (audible movement alarms) would be used for all site equipment. Satisfactory compliance with occupational health and safety requirements would need to be achieved and a safety risk assessment may need to be undertaken to determine that safety is not compromised.	Construction
	38	• All equipment would be selected to minimise noise emissions. Equipment would be fitted with appropriate silencers and be in good working order. Machines found to produce excessive noise compared to normal industry expectations would be removed from the site or stood down until repairs or modifications can be made.	Construction
	39	• All site workers would be sensitised to the potential for noise impacts on local residents and encouraged to take practical and reasonable measures to minimise the impact during the course of their activities. This would include: – Use of loud radios would be avoided – Shouting and slamming doors would be avoided – Where practical, machines would be operated at low speed or power and switched off when not being used rather than left idling for prolonged periods – Truck drivers would be informed of designated vehicle routes, parking locations and delivery hours – Reversing would be minimised – Dropping materials from height and metal to metal contact on material would be avoided • All equipment engine covers would be kept closed during operation	Construction
	40	• The contractor would provide a community liaison phone number and permanent site contact so that noise complaints can be received and addressed in a timely manner	Construction
	41	• Upon receipt of a noise complaint, monitoring would be undertaken and reported as soon as possible. If exceedances are detected, the situation would be reviewed in order to identify means to attempt to reduce the impact to acceptable levels.	Construction

Environmental issue	ID	Management measures	Timing
Operational noise	42	• Should any of the equipment listed in the noise impact assessment have an operating sound power level higher than what has been assumed, further noise modelling would be undertaken during the detailed design stage to ensure the requirements of the *Noise Policy for Industry* (EPA 2017) are met	Detailed design
	43	• The roof of the facility would be constructed of a material with a minimum Rw 30 (a suitable sandwich panel material can be specified in the detailed design phase)	Detailed design/ construction
	44	• The walls of the facility would be constructed of a material with a minimum Rw 45 (such as 150 millimetre thick precast concrete panel)	Detailed design/ construction
	45	• Louvres on the southern façade of the reception hall would be constructed using acoustic louvres with a minimum width of 100 millimetres (e.g. Acran 100 louvres or better)	Detailed design/ construction
	46	• Rooftop ventilation fans would be sufficiently isolated from the structure of the building (mechanically decoupled) so as to not result in structure-borne noise	Detailed design/ construction
	47	• All ventilation fans and exhausts would be designed to have a maximum sound power level of 90 dBA at the exhaust, including (but not limited to): – Reception Hall exhaust fan x 1 – Sorting Hall ventilation fan x 8 – Boiler flue exhaust x 1 – Dust collector exhaust x 1 – Sorting Hall ventilation fan x 1 • Noise monitoring at the nearest residential receivers would be undertaken at the commencement of operation in accordance with any license conditions	Detailed design/ construction
	48	• The roller doors to the reception hall would be closed, except during the ingress or egress of trucks	Operation
	49	• Where possible, operation of the shredder would be limited to when the roller doors to the reception hall are closed	Operation
	50	• Sorting of material into the external despatch bins on the northern and eastern facades of the facility would be limited to between 7 am and 6 pm Monday to Friday and 8 am to 6 pm on Saturdays	Operation
	51	• The following traffic noise mitigation measures would be incorporated into the Operational Environmental Management Plan: – To reduce potential traffic noise impacts during operation, heavy vehicle movements along Flatrock Road would be limited to 50 kilometres per hour.	Operation

Environmental issue	ID	Management measures	Timing
		– Drivers would undergo training to understand the potential noise impacts associated with the truck movements and to ensure only the prescribed haulage route is used to access the site – The use of exhaust brakes would be limited • Mufflers would be used on trucks, where possible	
	52	• asset protection zones would be provided as described in Section 15.1.3 and maintained in accordance with the asset protection zone requirements outlined in Appendix 4 of *Planning for Bush Fire Protection* (NSW RFS 2019)	Construction and operation
Bush fire protection	53	• A site specific Incident Response Management Plan would be developed which would include bushfire prevention measures to be implemented during construction and operation. It would include the following measures: – Actions to be taken where a formal bush fire alert is issued – Emergency and operational protocols to be taken in response to escalation of fire weather conditions – Bush fire suppression equipment available on site and their location – Appropriate storage and maintenance of fuels and other flammable materials on site • Notification of the Shoalhaven Fire Control Centre of the dates of construction and any dates during which 'hot works' would to be conducted	Construction and operation
	54	• Any retained vegetation (outside the identified asset protection zone) would be managed in accordance with the Shoalhaven Bush Fire Management Committee (2018) *Bush Fire Risk Management Plan*	Operation
Fire safety	55	• The fire safety system for the project would be refined during detailed design and developed in consultation with FRNSW	Detailed design
	56	• A detailed review and assessment of the project would be undertaken during detailed design to confirm BCA compliance and to identify the requirement for fire detection, automatic fire sprinkler and smoke hazard management systems	Detailed design
	57	• Prior to commencement of operation of the facility, the following would be developed: – An operations plan for stockpile management with a copy to be included within the Emergency Services Information Package – An Incident Response Management Plan for staff and other persons at the facility in the event of fire • An Emergency Services Information Package would be prepared for firefighters in accordance with FRNSW (2019b) *Fire Safety Guideline: Emergency services information package and tactical fire plans*	Operation

Environmental issue	ID	Management measures	Timing
LPG tank	58	• The LPG tank and pump would be located a minimum of approximately 30 metres from the site boundary or as required by *AS 1596: The storage and handling of LP Gas*, whichever is the greater distance	Detailed design
	59	• Upon completion of the detailed design and layout of the LPG station, a final PHA would be undertaken to ensure that residual risk levels are acceptable. Options including mounding or undergrounding the LPG tank would be considered if necessary	Detailed design
	60	• A site specific Incident Response Management Plan would be developed covering the site and the LPG station installation. The plan would also make provision for the Jemena Gas pipeline situated approximately 125 metres form the eastern boundary of the site and any risk implications from the gas pipeline rupture relevant to the safety of the site and personnel.	Operation
Proximity to Eastern Gas Pipeline	61	• If required by Jemena, a detailed Safety Management System review under *AS 2885: The Standard for Gas and Liquid Petroleum Pipelines* would be conducted at the detailed design stage and prior to commencement of operations	Detailed design
	62	• Engagement would be undertaken with Jemena throughout design and construction, to ensure that no additional protection or control measures are required by Jemena	Detailed design and construction
	63	• Should there be the need for any significant change to the project footprint or function, details would be provided to Jemena for review	Detailed design and construction
	64	• All work would be in accordance with Jemena's Design and Construction Guidelines (GAS-960-GL-PL-001)	Detailed design and construction
	65	• Jemena would be advised of any proposed horizontal directional drilling within the site and associated risks assessed (as required)	Detailed design and construction
Chemical and spill management	66	• Bulk storage of LPG would be in accordance with *AS 1596:2014: The storage and handling of LP Gas*	Detailed design and operation
	67	• All chemicals would have appropriate labelling, separation where necessary and disposal would be in accordance with Australian Standards	Operation
	68	• A safety data sheet (SDS) register of all chemicals that are located on site would be maintained	Operation
	69	• Appropriate safe work procedures would be implemented for the handling of all chemicals including transfer, storage, spill prevention and clean up requirements	Operation
Fire prevention and protection	70	• A fire protection system would be developed. The fire systems would be integrated into the design and management of the facility in accordance with *AS 2419.1:2017: Fire Hydrant Installations for Buildings* with an emphasis on fire prevention rather than mitigation.	Detailed design

Environmental issue	ID	Management measures	Timing
	71	• The fire prevention and management strategies detailed in the NSW Department of Planning (2011d) *Hazardous Industry Planning Advisory Paper No 2 – Fire Safety Study Guidelines* would be considered as part of the detailed design and operation of the facility	Detailed design and operation
Visibility	72	• During construction, the site and surrounds would be maintained in a clean and tidy condition at all times with appropriate bins provided for waste generated on site	Construction
	73	• The building and associated infrastructure would be designed and the colour schemes selected to blend with the existing visual landscape. The building lighting system would be designed to manage light spill	Detailed design
	74	• The vegetation buffer on the west, east and north boundary of the site would be maintained and provide screening to adjacent property users	Operation
Amenity	75	• Ongoing engagement would be undertaken with the local community and other key stakeholders during construction and operation, as discussed in Section 3.4	Construction and operation
	76	• The management measures identified in the relevant chapters of the EIS would be implemented	Construction and operation

19. Conclusions and justification

This chapter presents a justification of the project and a conclusion to the EIS. The justification considers how the project balances strategic and project needs against the protection of the environment and planning outcomes outlined in the objects of the EP&A Act, including ecologically sustainable development and community consultation.

19.1 Justification

19.1.1 Project justification

The justification for the project is based on a number of factors:

- The project is consistent with the objects of the EP&A Act
- The project is consistent with the strategic direction for waste management in NSW and Australia
- The site is suitable for the project
- The project is in the public interest
- the project is generally consistent with the requirements, development standards and environmental impact envelope of the Concept Proposal (SSD 7015)

19.1.2 Objects of the EP&A Act

The objects of the EP&A Act provide a framework within which the justification of the project can be considered. A summary of this assessment is provided in Table 19.1.

Table 19.1 Objects of the EP&A Act

EP&A Act objective	Comment
(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,	The project responds to an identified need to provide waste management capacity for the Shoalhaven and in particular to provide additional resource recovery processing capacity for mixed waste municipal waste. The project forms an important part of the infrastructure required to respond to the needs of the local community and provide for future growth and development. The project design and mitigation measures have been based on consideration of the natural and artificial resources of the Shoalhaven and wider region.
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	Ecologically sustainable development has been considered in Section 19.1.3.
(c) to promote the orderly and economic use and development of land,	Resource recovery and waste processing forms a key part of the infrastructure necessary to support development of land. The project would assist in diverting significant quantities of waste from landfill (through sterilisation and sorting).
(d) to promote the delivery and maintenance of affordable housing,	Not relevant to the project

EP&A Act objective	Comment
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	The project has been sited and designed to minimise the impacts to the environment. Potential impacts have been identified within the EIS and mitigation and management measures have been proposed to encourage the protection of the environment.
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	Not relevant to the project.
(g) to promote good design and amenity of the built environment,	The project has been sited and designed to minimise the impacts to the environment. Potential impacts have been identified within the EIS management measures have been proposed to encourage the protection of the environment and amenity.
(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	The project has considered the requirements of relevant standards and guidelines and identified management measured through the EIS process with a view to ensuring the site and the facility is suitable for its intended future use and safe occupation.
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	Not relevant to the project.
(j) to provide increased opportunity for public involvement and participation in environmental planning and assessment.	The project has involved public consultation through its development and during preparation of the EIS.

19.1.3 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the project.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

Precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

A range of environmental studies have been undertaken as part of development of the project and the environmental assessment process, to ensure that the potential impacts are fully understood. The assessment of the potential impacts of the project is considered to be consistent with the precautionary principle. It is considered that the assessments that have been undertaken are consistent with accepted scientific and assessment methodologies, and have taken into account relevant statutory and agency requirements.

The project has evolved to avoid impacts where possible and to reflect the findings of the studies undertaken. For example, the footprint of the project and the layout has been developed to avoid potential biodiversity impacts where possible (some vegetation may be retained and

maintained as asset protection zones), while maintaining sufficient space for engineering and operational requirements.

Similarly, there has been consideration of air quality, noise, vibration and water quality impacts in locating the various components of the facility. The project incorporates design features to reduce the potential for air quality (including dust and odour), noise and vibration and also visual impacts.

A number of safeguards have also been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the project. No safeguards have been postponed as a result of lack of scientific certainty. The selected construction contractor(s) would be required to prepare construction and operational environment management plans prior to commencing construction and operation. These requirements would ensure that the project achieves a high-level environmental performance.

Inter-generational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

It is recognised that the project has potential for short-term amenity impacts such as noise, dust, traffic and visual changes. The EIS has assessed these impacts and has concluded that with appropriate mitigation measures, the project would not have a significant impact to local residents, or the quality of the surrounding environment.

The project would facilitate improved diversion of waste from landfill into uses with higher resource value (value adding). This would be achieved through a combination of improved technology to sterilise and separate the waste into component product streams. The technology selected would recover valuable materials which would otherwise have gone to landfill. This helps to conserve raw material resources such as iron ore, bauxite and fossil fuels (used for production of steel, aluminium and plastics). The project would also produce RDF streams which would be beneficially reused as feedstock in cement kilns – as a replacement for fossil fuel derived feedstock. This is a direct benefit to future generations.

Diversion of waste from landfill would also extend the life of the landfill at the adjacent West Nowra Recycling and Waste Facility. Any extension to the life of the landfill would further delay the need for a new site for landfilling/disposal and the associated costs and potential impacts.

Recycling also captures the embodied energy contained within the recyclables – significantly reducing the energy demand that would be required to manufacture using virgin materials.

In addition, the project would improve local employment potential and contribute to economic growth in the local area.

Conservation of biological diversity and ecological integrity

The site was originally selected to minimise potential direct and indirect impacts on the biodiversity of the locality, especially in relation to threatened species. As part of the Stage 1 Approval, Council committed to develop an offset strategy to offset the impacts of vegetation removal as a result of Stage 1.

The project would be constructed and operated subject to meeting the requirements of the Stage 1 Project Approval relating to site clearance and number and type of biodiversity credits. The project would not have any significant biodiversity impacts.

Improved valuation and pricing of environmental resources

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a project, including air, water, land and living things.

The assessment has identified the environmental and other consequences of the project and has identified mitigation measures where appropriate to manage any adverse impacts. The project would be undertaken in accordance with relevant legislation and the construction and operation environmental management plans.

Requirements imposed in terms of implementation of these measures would result in an economic cost to the proponent. Implementation of mitigation measures increases the capital and ongoing management costs of the project, signifying that environmental resources have been given appropriate valuation.

The design of the project has been developed with an objective of minimising potential impacts on the surrounding environment, reducing the need for mitigation measures. This is in accordance with sustainability principles.

19.1.4 Consistency with the strategic direction for waste management

The project would deliver outcomes consistent with national and state legislation and strategies for sustainable waste management. These include the *2018 National Waste Policy* (DEE 2018), the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA 2014a), and the NSW *20-Year Waste Strategy* (draft).

The project aligns with the philosophy of viewing waste as a resource – and recovering resources in their highest net resource value state. The recovery of resources in this manner creates value from the waste stream.

The project forms part of an overall strategy for the Council to become a leader in the recovery of recyclable materials from the waste stream, and minimise the quantities of waste disposed to landfill by re-using and processing waste types that would normally end up in landfill. It would provide capacity for processing of mixed municipal waste from the Shoalhaven region and provide capacity to cope with expected increases in waste generation associated with population growth in the region.

19.1.5 Suitability of the site and public interest

Suitability of the site

The site is considered suitable for the project for the following reasons:

- It is located adjacent to a licensed landfill (West Nowra Recycling and Waste Facility), which also provides for disposal of residuals from the project
- It is central to the main population and growth centre of Nowra
- It is close to major transport routes (Princes Highway)
- It is owned by Council, which has awarded Bioelektra with the contract for delivery of Stage 2 of the works at the site and Council supports the project

Public interest

The project would facilitate the continued provision of essential waste management and resource recovery services for the Shoalhaven local government area. Through application of advanced technologies to recover resources from the waste stream, the project would help

extend the life of the landfill at the West Nowra Recycling and Waste Facility, which is the only general solid waste (putrescible) landfill that services the local government area.

The project layout and design has been developed with due consideration of the sensitivity of the surrounding environment.

The project would also develop new industry and generate employment opportunities.

Therefore, the project is considered to be in the public and community's interest.

19.1.6 Consistency with the Concept Proposal (SSD 7015)

Table 19.2 provides a comparison between the approved Concept Proposal and the project.

This shows that although there are some differences, the key features, overall intent and predicted environmental impacts of the project are generally consistent with the Concept Proposal. Figure 19.1 shows that that development footprint for the project would be substantially the same as the Concept Approval (SSD 7015) footprint. The perimeter road was adjusted based on the vehicle swept path analysis. The asset protection zone is maintained to site structures.

The proposed waste throughput (130,000 tonnes per year) of the project is the same as the Concept Proposal.

There are some differences in the proposed waste processing technologies and a reduction in number of waste streams to be received. However, the overall intended function of the resource recovery park (receival and recovery of mixed wastes through various waste processing and materials recovery technologies) is considered to be consistent.

To support the selected waste processing technology, there are also some differences in overall site layout and ancillary infrastructure. However, the overall footprint of the resource recovery park remains the same and overall scale of the proposed buildings is similar.

The proposed construction hours are entirely consistent. However, the hours of operation proposed with the project differ to those presented in the Concept Proposal. The Concept Proposal assumed operation 8 am to 5 pm seven days per week. The project proposes 24 hours per day operation (seven days per week), however it is noted that waste acceptance would be restricted to weekdays between 6 am and 6 pm. Notwithstanding this, the technical studies for air quality and odour and noise and vibration undertaken for the project confirmed that there would be no significant amenity impact on any sensitive receivers during operation – including during the night time periods.

The environmental assessments undertaken for the EIS also confirmed that similar to the Concept Proposal, the predicted air quality and odour, noise and vibration, water, traffic and visual amenity would not result in any significant negative impacts. The project is considered to have a higher potential level of hazard associated with the LPG station, however with appropriate design and management measures, the risks are considered acceptable.

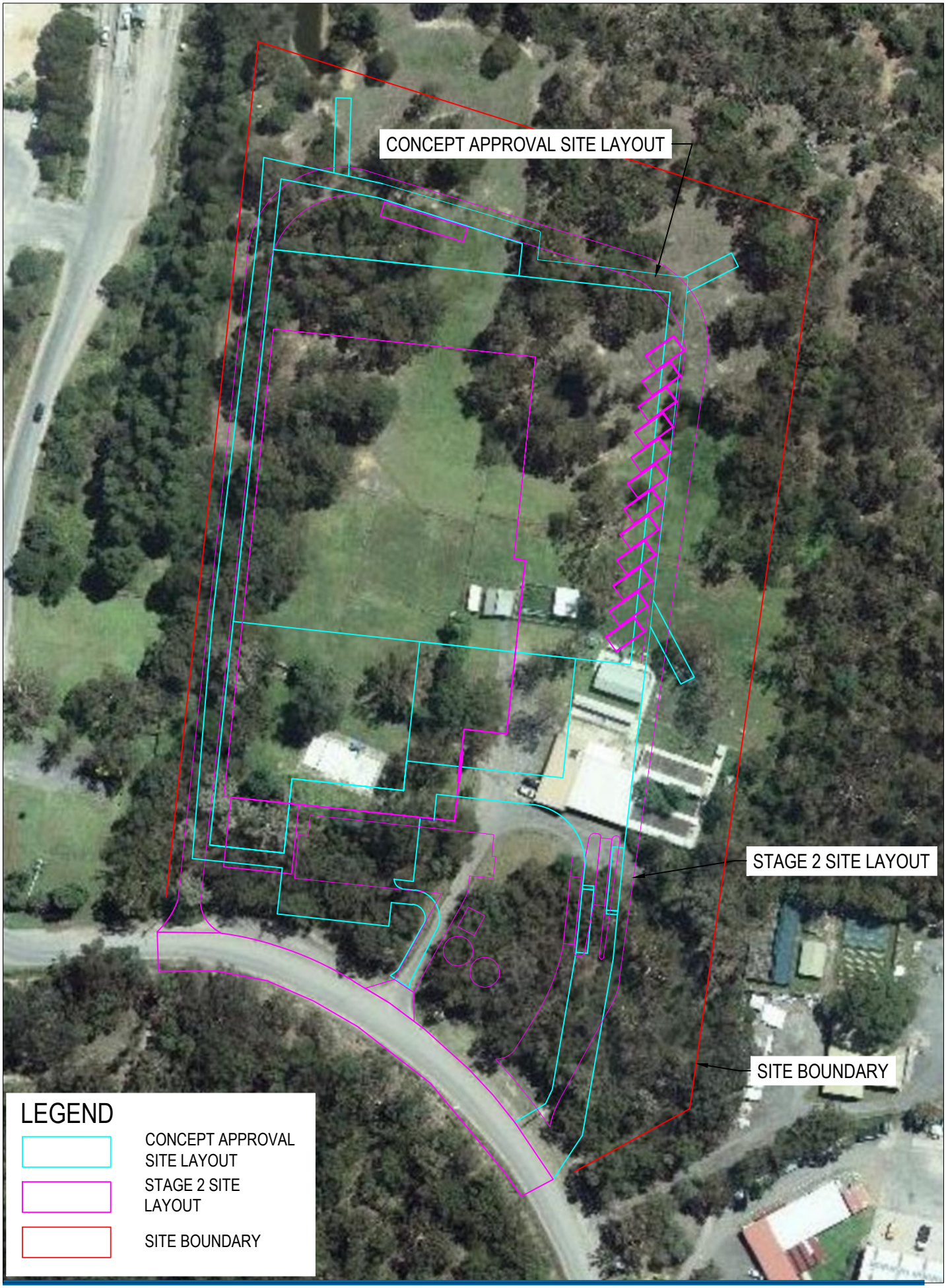
Table 19.2 Consistency with the Concept Proposal

	Concept Proposal (SSD 7015)	This project	Consistency / discussion
Key features			
Total capacity (throughput)	• 130,000 tonnes per year	• 130,000 tonnes per year	The total waste capacity (throughout) of the project would be consistent with the Concept Proposal.
Waste types	• 65,000 tonnes of mixed waste • 40,000 tonnes of dry waste • 15,000 tonnes of construction and demolition waste • 10,000 tonnes of other waste	• 130,000 tonnes of mixed municipal waste	The project would receive mixed municipal waste compared to a combination of mixed municipal waste, dry waste, construction and demolition and other waste under the Concept Proposal.
Offsite/outgoing material	• Finished compost/fertiliser products • Recovered construction and demolition material • Kerbside recyclables • Other recovered dry recyclable materials • Residual waste	• Biomass • RDF (light and heavy) • Aggregates • Metals • Recovered PP and PET • Residual waste	Outgoing materials/products from the project would include some similar streams as the Concept Proposal (recovered dry recyclables e.g. PP and PET, metals as well as aggregates) but would also include RDF streams and biomass. No compost/fertiliser products would be produced and as the facility would not received construction and demolition waste, no recovered construction and demolition material would be produced.
Facilities and infrastructure	• Buildings for composting and materials recovery (1.1 hectares) • Shed for construction and demolition waste sorting (0.2 hectares) • Offices and amenities (324 square metres) • Biofilter (0.1 hectares)	• Waste reception hall and processing building – including boiler room and transformer hall (1.08 hectares) • Offices and amenities (341 square metres)	The overall footprint project would be consistent with the Concept Proposal. The receival and processing building footprints proposed for the project would be slightly smaller compared to the Concept Proposal and there would be no biofilter. The offices and amenities would be similar in scale.
	• Weighbridge • Perimeter service road (6 metres) • Two main accesses off Flatrock Road (gated)	• Weighbridge • Perimeter service road (6 metres) • Two main accesses off Flatrock Road (gated) • Additional egress point off Flatrock Road (fire service vehicles and LPG tanker only) (gated)	Access and internal roadways within the site would be generally consistent with the Concept Proposal, including provision of a weighbridge and perimeter service road. The Concept Proposal included two main (gated) accesses - one to the car park and one for heavy vehicles accessing the facility. The project is consistent with this (two main accesses), but also proposes as an additional gated egress only point for use by fire services vehicles and the LPG tanker only (which would not be required to pass over the weighbridge).

	Concept Proposal (SSD 7015)	This project	Consistency / discussion
	• Parking for up to 30 vehicles and 10 visitor spaces (40 total) • Bus parking offsite, on neighbouring land to the north of the site	• Parking for up to 40 vehicles including 1 disabled parking space, 1 emergency parking space and 1 visitor space • Bus parking offsite, on neighbouring land to the north of the site	The total number of car spaces provided (40 spaces) would be three less than the Concept Proposal. The proportion of spaces allocated to visitor parking would be lower (1 compared to 10 in the Concept Proposal). However it is noted that the maximum number of staff per shift is 16. A total of 34 spaces has been allowed for staff changeover times.
	• 2 metre high cyclone fencing	• 2 metre high cyclone fencing	The fencing would be consistent with the Concept Proposal.
	• Three sediment / detention basins	• Two sediment / detention basins	There would be a reduction in the number of stormwater basins with the project compared to Concept Proposal. This is as a result of the updated stormwater management design which would accommodate refinements to the roofed areas and layout of the facility.
	• Asset protection zones (min 30 metres)	• Asset protection zones (min 30 metres) • Pumping station and fire fighting tanks	Asset protection zones and buffers identified in the Concept Proposal would be retained as part of this project. The project would also include a pumping station and fire fighting tanks.
	• Electricity supply	• Electricity supply • LPG station (50 tonne) • Solar panels	An electricity supply connection was required for the Concept Proposal, and is also proposed for the project. The project would include an LPG station to supply gas for the boilers as well as solar panels on the building(s) roof, which were not included in the Concept Proposal.
Waste and product storage	• Storage of raw and processed materials outdoors	• Storage of finished products in hooklift bins, bags or stockpiled in covered bays	The Concept Proposal included outdoor storage of raw waste and processed materials. The project would not include storage of raw waste outdoors and all finished product/outputs would be stored either within bins, bags or stockpiled in covered bays.
Waste processing technology	• Composting • Materials recovery • Construction and demolition waste sorting	• Pre-treatment with autoclaving • Materials recovery	There are some differences in the proposed waste processing technologies and a reduction in number of waste streams to be received. However, the overall intended function of the resource recovery park (receival and recovery of mixed wastes

	Concept Proposal (SSD 7015)	This project	Consistency / discussion
			through various waste processing and materials recovery technologies) is considered to be consistent.
Hours of operation	• 8 am to 5 pm seven days per week	• Operation 24 hours per day, seven days per week • Waste acceptance Monday to Friday between 6 am and 6 pm	The hours of operation proposed with the project differ to those adopted in the Concept Proposal. The Concept Proposal assumed operation 8 am to 5 pm seven days per week. The project proposes 24 hours per day operation (seven days per week), however waste acceptance would be restricted to weekdays between 6 am and 6 pm.
Construction timeframe	• 12-18 months	• 12 months plus 3 months commissioning	The estimated construction timeframe is for the project is similar to the Concept Proposal.
Construction hours	• 7 am to 6 pm Monday to Friday • 8 am to 1 pm Saturdays • No work on Sundays or Public Holidays	• 7 am to 6 pm Monday to Friday • 8 am to 1 pm Saturdays • No work on Sundays or Public Holidays	The proposed project construction hours are the same as the construction hours proposed in the Concept Proposal.
Environmental impact envelope			
Noise	• No residential receiver was predicted to exceed the construction noise management levels. • Noise modelling showed that the increase in operational noise levels associated with the Concept Proposal would be minimal. The predicted operational noise levels do not exceed the day time or night time operational noise criteria. Sleep disturbance impacts from operational noise were not expected. • Road traffic noise due to the Concept Proposal was not anticipated to be perceptible in relation to ambient traffic noise.	• No residential receiver was predicted to exceed the construction noise management levels. • Noise modelling showed that the increase in operational noise levels associated with the project would be minimal. The predicted operational noise levels do not exceed the day time or night time operational noise criteria. Sleep disturbance impacts from operational noise were also not expected. • Road traffic noise due to the Concept Proposal was not anticipated to be perceptible in relation to ambient traffic noise.	• The predicted construction and operational noise impacts of the project is consistent with the impacts predicted for the Concept Proposal
Air quality and odour	• Indicative worst-case dust modelling showed that the dust	• Worst-case dust modelling showed that the dust emission	• The predicted dust impacts from the project is lower than the impacts predicted for the

	Concept Proposal (SSD 7015)	This project	Consistency / discussion
	emission increment from the site was below the 50 µg/m^3 criteria at all times at all surrounding receptors • Modelling demonstrated that for the combined Concept Proposal and adjacent landfill operations, the predicted 99th percentile odour concentrations at closest receptors would be 4.6 OU and 2 OU at the OEH office (now DPIE) and 43 Flatrock Road respectively. The combined Concept Proposal and landfill operations were expected to comply with the 5 OU odour criterion at all sensitive receptors	increment from the site was low and well below the 50 µg/m^3 criteria at all times at all surrounding receptors • Odour modelling showed that for the combined project and landfill at the adjacent West Nowra Recycling and Waste Facility operations, the predicted 99th percentile odour concentrations at the same two closest receptors would be 3.8 OU and 0.9 OU at the DPIE office and 43 Flatrock Road respectively. The combined project and landfill operations were expected to comply with the 5 OU odour criterion at all sensitive receptors	Concept Proposal and would be well below the dust criteria at all sensitive receptors at all times • The predicted cumulative odour impacts from the project and adjacent landfill at the adjacent West Nowra Recycling and Waste Facility is lower than the impacts predicted for the Concept Proposal, and would comply with the odour criterion at all sensitive receptors
Visual amenity	• All of the receptors were determined to have a sensitivity of moderate or less. This was largely due to existing vegetation and limited interest in views towards the site, or distance to the site, reducing the prominence of the views. • The magnitude of impacts on each of the identified receptor groups was also determined to be low or less, largely due to vegetation which limits visual accessibility of the Concept Proposal elements. • The consequent assessment of impact significance found that all the identified receptors would be exposed to impacts of low to negligible significance.	• All of the receptors were determined to have a sensitivity of moderate or less. This was largely due to existing vegetation and limited interest in views towards the site, or distance to the site, reducing the prominence of the views • The magnitude of impacts on each of the identified receptor groups was also determined to be low or less • The consequent assessment of impact significance found that all the identified receptors would be exposed to impacts of low to negligible significance	• The visual amenity impacts of the project is predicted to be consistent with the Concept Proposal



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BIOELEKTRA AUSTRALIA PTY LTD
WEST NOWRA RESOURCE RECOVERY PARK STAGE 2
COMPARISON OF CONCEPT APPROVAL AND STAGE 2 FOOTPRINT

Job Number 12536311
Revision A
Date APR 2021

Figure 19.1

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Plot Date: 28 April 2021 - 9:10 AM Plotted by: Nathan Griffiths Cad File No: \\ghdnet\ghd\AU\Sydney\Projects\21\12536311\CADD\Drawings\12536311-SK002-RA (Footprint comparison).dwg

19.2 Conclusion

This EIS has considered the objects of the EP&A Act, including the encouragement of ESD. The assessment integrates all significant economic and environmental considerations and seeks to avoid any potential serious or irreversible damage to the environment. Bioelektra and Council as part of Stage 1 has also considered a number of alternatives to the project (including the alternative of not proceeding) and is satisfied that the project is consistent with the objects of the EP&A Act.

This EIS has addressed the issues identified in the SEARs issued under Part 4 of the EP&A Act and the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. A checklist showing where the SEARs are addressed in this environmental assessment is provided in Appendix B.

20. References

Adpost Group (2020), *Distribution map*, REF: Q40350v2

Aerofloat Wastewater Treatment Specialists (2019), *Proposal: Aerofloat Industrial Wastewater Treatment Plant and Sewage Treatment Plant*, Prepared for Bioelektra Group, Shoalhaven

Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*

Arcadis (2019), *West Nowra Landfill Extension – Environmental Impact Statement*

Australian Building Codes Board (ABCB) (2019), *Building Code of Australia (BCA),* being Volumes One and Two of the *National Construction Code (NCC)*

Australian Bureau Statistics (2020), Regional Population Growth

Australian Bureau Statistics (2016), Census Data

Austroads (2020), *Guide to Traffic Management – Part 6: Interchanges, Intersections and Crossing Management*

British Standards Institute (1993), *BS 7385-2: 1993: Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration*

Commonwealth Department of Industry, Science, Energy and Resources (2020), *National Greenhouse Accounts (NGA) Factors*

Department of Environment and Climate Change (DECC) (2008), *Managing Urban Stormwater: Soils and Construction – Volume 2B Soils and Construction*, DECC, June 2008

Department of Environment and Climate Change (DECC) (2009), *Interim Construction Noise Guidelines*

Department of Environment, Climate Change and Water (DECCW) (2011), *NSW Road Noise Policy*

Department of the Environment and Energy (DEE) (2018), *2018 National Waste Policy: Less waste, more resources*

Department of the Environment and Energy (DEE) (2020a), *Quarterly Update of Australia's National Greenhouse Gas Inventory: March 2020*, 30 October 2020

Department of the Environment and Energy (DEE) (2020b), *State and Territory Greenhouse Gas Inventories 2018*, May 2020

Department of Industry, Science, Energy and Resources (2020)*, State and Territory Greenhouse Gas Inventories 2018*

Department of Land and Water Conservation (DLWC) (2002), *Site Investigations for Urban Salinity*

Department of Planning and Environment (DPE) (2015), *Illawarra Shoalhaven Regional Plan*

Department of Planning, Industry and Environment (DPIE) (2020), *Illawarra Shoalhaven Regional Plan 2041*, draft, November 2020

Department of Planning, Industry and Environment (DPIE) and NSW Environment Protection Authority (2018), *Contaminated Land Planning Guidelines,* draft, January 2018

Department of Planning, Industry and Environment (DPIE) (2018), *Remediation of Land SEPP Explanation of Intended Effect,* January 2018

Profile.id, Shoalhaven City Council, accessed online at https://profile.id.com.au/shoalhaven

E2W (2008), *Detailed Assessment and Analysis of Environmental Monitoring Data, West Nowra Recycling and Waste Facility*

Eggersmann (2019), *no title*, 28 May 2019

ELGAS Limited (2005), *no title*, Job number 200512, Sheets 4 and 5 of 5*,* dated 24/11/05

Fire and Rescue NSW (FRNSW) (2020a), *Fire Safety in Waste Facilities Guidelines*

Fire and Rescue NSW (FRNSW) (2019b), *Fire Safety Guideline: Emergency services information package and tactical fire plans*

GHD (2016), *West Nowra Resource Recovery Park: Environmental Impact Statement*, for Shoalhaven City Council, January 2016

International Organisation for Standardisation (ISO) (2019), *ISO 14064-2:2019: Greenhouse gases — Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements*

Jacobs (2017), *Southern Region Waste Program - Regional Waste Avoidance and Resource Recovery Strategy 2017-21*

Landcom (2005), *Managing Urban Stormwater: Soils and Construction – Volume 1* NSW Department of Environment and Climate Change, June 2008

Melbourne Water (2017) *Design, Construction and Establishment of Wetlands, Wetlands Design Manual*

McMahon T et al (2013), *Supplementary Material to paper 'Estimating actual, potential, reference crop and pan evaporation using standard meteorological data: A pragmatic synthesis*

National Transport Commission (2020), *Australian Code for the Transport of Dangerous Goods by Road & Rail*, Edition 7.7

National Environment Protection Council (NEPC) (2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council

NSW Department of Planning (2011a), *Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines*

NSW Department of Planning (2011b), *Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning* (HIPAP 4)

NSW Department of Planning (2011c), *Hazardous Industry Planning Advisory Paper No. 6 'Guidelines for Hazard Analysis'* (HIPAP 6)

NSW Department of Planning (2011d), *Hazardous Industry Planning Advisory Paper No 2 – Fire Safety Study Guidelines*

NSW Department of Planning (2011e), *Multi-Level Risk Assessment*

NSW Environment Protection Authority (EPA) (2014a), *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*

NSW Environment Protection Authority (EPA) (2014b), *Waste Classification Guidelines*

NSW Environment Protection Authority (EPA) (2016a), *NSW Energy from Waste Policy Statement*

NSW Environment Protection Authority (EPA) (2016b), *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales. NSW Government Gazette of 26 August 2005, minor revisions Novemeber 2016*. Sydney, NSW: Department of Environment and Conservation NSW (DEC)

NSW Environment Protection Authority (EPA) (2017), *Noise Policy for Industry*

NSW Environment Protection Authority (EPA) (2020a), *Cleaning Up Our Act: The Future for Waste and Resource Recovery in NSW*

NSW Environment Protection Authority (EPA) (2020b), *Consultants reporting on contaminated land – Contaminated Land Guidelines*

NSW Rural Fire Service (NSW RFS) (2019), *Planning for Bush Fire Protection*

Office of Environment and Heritage (OEH) (2014), *Framework for Biodiversity Assessment*, NSW OEH

Shoalhaven City Council (2017) *Waste Reduction Management Strategy*

Shoalhaven Bush Fire Management Committee (2018), *Bush Fire Risk Management Plan*

Standards Australia (2004), *AS 2890.1-2004: Parking facilities: Off-street car parking*

Standards Australia (2009), *AS 2159-2009: Piling – Design and Installation*

Standards Australia (2014), *AS 1596-2014: The storage and handling of LP Gas*

Standards Australia (2016), *AS 1668-2016: The use of ventilation and air conditioning in buildings Set*

Standards Australia (2017), *AS 2118.1-2017: Automatic fire sprinkler systems – General Systems*

Standards Australia (2017), *AS 2419.1-2017: Fire hydrant installations, Part 1: System design, installation and commissioning*

Standards Australia (2017), *AS/NZS 2419: Fire hydrant installations Set*

Standards Australia (2018), *AS 1670.1-2018: Fire detection, warning, control and intercom systems - System design, installation and commissioning*

Standards Australia (2018), *AS 2890.2-2018: Parking Facilities: Off street commercial vehicle facilities*

Standards Australia (2020), *AS 2885-2020: The Standard for Gas and Liquid Petroleum Pipelines*

United Kingdom Department of Transport (1988), *Calculation of Road Traffic Noise*

WaterNSW (2012), *Using MUSIC in Sydney Drinking Water Catchment*

WMAwater (2002), *Riverview Road Area, Nowra - Floodplain Management Plan*

Wong, T. Breen, P. Somes, N. and Lloyd, S. (1998*) Managing Urban Stormwater Using Constructed Wetlands*

Wright Corporate Strategy Pty Ltd (Wright) (2008), *Cost Benefit Analysis – Resource Recovery Park, West Nowra*, Report prepared for Shoalhaven City Council

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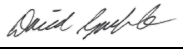
3	GHD	D Gamble		D Gamble		03/06/21

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