

GREENSPOT HUNTER VALLEY

EIS for 200,000tpa Nutrient Recycling Facility – Ravensworth NSW

SSD 9418



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REPORT

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STATEMENT OF VALIDITY

Submission of Environmental Impact Statement (EIS) prepared under the Environmental Planning and Assessment Act 1979

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Development Application

Proponent Name	Bettergrow Pty Ltd
Proponent Address	48 Industry Road, Vineyard NSW 2756

Environmental Impact Statement

An EIS is attached.

Declaration

Certificate	<p>I certify that I have prepared the contents of this EIS and to the best of my knowledge It is in accordance with Clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i>;</p> <p>It contains all available information that is relevant to the Environmental Assessment (EA) of the development to which this statement relates; and</p> <p>It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.</p>
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Signature	
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Date	14.11.2019

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EXECUTIVE SUMMARY

Overview

Bettergrow, trading as 'Greenspot Hunter Valley' (the Applicant), is proposing to undertake the expansion of an existing nutrient recycling facility (the Proposal) on Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW.

Bettergrow currently operates a range of recycling facilities across NSW and Queensland (QLD). The expansion of this operation will benefit the existing rehabilitation activities across AGL Macquarie lands, and also assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.

The site is located at Ravensworth No. 2 mine and is formally described as Lot 10 DP1204457 at 74 Lemington Road, Ravensworth, NSW. Current composting operations at the site are approved by DA140/2016 to receive up to 76,000 tonnes per annum (tpa) of biosolids and garden organics. The Applicant for DA140/2016 was Bettergrow Pty Ltd who are contracted by AGL Macquarie (the Landowner) to supply manufactured soil ameliorant and rehabilitation products for use, in part, for approved rehabilitation works at the Ravensworth No. 2 mine and Ravensworth South mine.

The subject application seeks to authorise the receipt of up to 200,000tpa of organic materials, including new feed sources of food waste and to facilitate the sale of a portion of the composted material to third parties.

Site Description

The site is cleared of native vegetation and is located on part of a capped open cut mining void which has been filled with ash from the AGL Bayswater Power Station. Significant disturbance of the natural environment within and surrounding the development site has occurred as a result of the long history of mining and power generating activities in the area.

The development footprint, including the existing approved composting facility, is located on a graded hardstand area, surrounded by perimeter bunding. Access to the facility is provided via an internal access road off Lemington Road which connects to the New England Highway.

Project Description

The proposal includes the following key components:

- The continued operation of the existing facility in accordance with DA140/2016 as modified;
- Receive a total of up to 200,000 tpa of organics;
- Transfer of the composted material to other AGL Macquarie sites such as the Liddell Ash Dam, Liddell Power Station and Bayswater Power Station for use in rehabilitation as per existing approval;
- Sale of a portion of the finished 'compost' to third parties as per DA140/2016 as modified;
- Upgrading of a proportion of the hardstand area and installation of an aerated composting system such as the Mobile Aerated Floor (MAF) (or equivalent) suitable for the management and composting of other organics including a combined Food Organics and Garden Organics (FOGO) resource stream;
- Completion of the capping of the hardstand area and expansion of an existing leachate dam as approved as part of the Stage 2 development application to facilitate the management and storage of the increase in organic inputs;
- Installation of a single lane weigh bridge approximately 27.5m long;
- Installation of covered hard stand areas for the receipt and blending, if required, of incoming organics including FOGO;

- Installation of a dedicated trailer wash bay;
- Installation of two 50,000 litre recycled drill water storage tanks; and
- Installation of a machinery shelter that will allow storage of tools and machinery for servicing.

Project Need and Alternatives

AGL currently have over 700 ha of land that requires progressive rehabilitation and further areas are likely to become available in the future as mine voids are filled with fly ash from their coal fired power generators. Previous rehabilitation activities have been unsuccessful in re-establishing robust and diverse vegetation communities. Long term successful rehabilitation is dependent on creating a biologically active soil with a sustainable carbon and nutrient cycle.

The Project will provide the biologically active organic material required to ameliorate the soils across AGLs lands which will facilitate successful rehabilitation at the Ravensworth No. 2 and Ravensworth South Mines. Organic material would be used to improve the soil across existing rehabilitated areas and new rehabilitation areas. The Project will also expedite the rehabilitation of AGLs disturbed areas through supplying organic materials produced onsite and provide a sustainable and cost-effective option for soil improvement.

The development of the facility up to 200,000 tpa will also provide the additional capacity to process an increased source of organic materials and also service the demand for composted organics in the broader supply market.

The alternative approach to the project is the 'do nothing' option which would involve the continuation of existing rehabilitation activities at the Project site without the onsite composting of organic material. This option would result in the continuation of low rehabilitation success across AGLs lands due to the existing poor soil conditions.

Planning Approval Pathway

Pursuant to Section 4.36 of the EP&A Act, projects are classified as State Significant Development (SSD) if they are declared to be such under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). Clause 23 of Schedule 1 of the SRD SEPP identifies the following types of developments to be SSD:

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

Based on the intended handling capacity of the nutrient recycling facility of up to 200,000tpa, the development is classified as SSD.

The Minister for Planning (or their delegate) determines development applications for SSD under Part 4 of the EP&A Act.

Consultation and Stakeholder Engagement

Bettergrow has engaged with a range of stakeholders regarding the proposed expansion of the nutrient recycling facility. The purpose of the engagement was to provide information on the proposal as early as possible in the planning process to allow for the up-front identification, and where possible, resolution, of relevant issues or concerns. Consultation has been undertaken with relevant Government agencies, Council, and surrounding landowners through meetings and the distribution of project factsheets.

Issues raised during the consultation process have been considered in the design of the proposed facility and addressed within the EIS.

Environmental Impact Assessment

Air Quality

The key potential odour emission sources associated with the activities include material composting in windrows, finished product, leachate water contained in the storage dam and short-term storage of intake streams in the semi-enclosed receival shed.

The key dust emission source associated with the facility is the movement of trucks on the unsealed internal haul road.

Due to the remoteness of the facility and the nature and extent of the proposed composting activities, no issues were identified in relation to emissions of greenhouse gases, odour or dust.

Results of the air quality and odour assessment for the facility suggest that the proposed mitigation measures and management strategies proposed for the operation of the facility will be sufficient to ensure compliance with the regulatory requirements for odour and dust and to manage odour and dust impacts at off-site locations.

In terms of greenhouse gases, the total Scope 1 and Scope 2 emissions of greenhouse gases per annum associated with site activities is estimated to be 379.3 tonnes of CO₂-e.

By way of comparison, Australia's annual total emissions for the year to September 2017 were estimated to be 557.7 megatonnes (Mt) of CO₂-e (DEE, 2018). A comparison of the Project emissions with those of the waste sector indicates that the Project will contribute an additional 0.003% to this sector and an additional 0.0001% to the annual national total (excluding land use, land use change and forestry).

Surface Water

While the proposed expansion of the composting facility introduces a risk of additional volumes of leachate (and associated contaminant load) being generated and subsequently entering the surface water drainage environment, the overall risk of harm to the surface water environment is currently low and will continue to be low as it is adequately managed through existing surface water management infrastructure which will be extended.

The potential impacts can be mitigated through a range of measures. The facility will continue to be managed in accordance with the requirements of EPL 7654, including surface water monitoring requirements. The Surface and Groundwater Management Plan and other existing environmental management plans are to be updated to include expanded operations.

The site is also well elevated at approximately 40m higher than surrounding watercourses. There is no outside flood risk to the site and the area is not shown as flood prone land or within flood planning areas within Singleton LEP 2013 – Flood Planning Maps.

Ground Water

The proposed expansion increases the potential for groundwater pollution impacts associated with leachate infiltration to the groundwater aquifers beneath the site. The potential risk and impact are considered minor however given the negligible volumes of rainfall seepage below the site (3% of total water balance or 9 megalitres per annum), groundwater depth is greater than 40m below the site and groundwater is saline. In addition, groundwater beneath the site flows into Void 4 immediately to the south, providing opportunity to capture and recycle water infiltrated throughout the site.

Potential impacts to ground water can be mitigated through a range of measures including effective management of surface water. The facility will also continue to be managed in accordance with the requirements of EPL 7654, including surface water monitoring requirements. The Surface and Groundwater Management Plan and other existing environmental management plans are to be updated to include expanded operations.

Traffic and Access

The site is located within an area that is dominated by coal mining and heavy industrial activities. Access to the facility is provided via an internal road off Lemington Road which connects to the New England Highway. The expansion of the facility will result in the quantities of organic materials received and despatched from the site increasing. Accordingly, truck movements to and from the site will also increase.

Based on the increased annual production amount of 200 000tpa, the following traffic volumes are anticipated:

- Peak truck movements maximum of 108 per day; and
- Peak light vehicles movements maximum of 38 per day.

On the basis that all deliveries and compost transfers will require in-bound and out-bound movements, the worst-case traffic movements generated from the increased operations would be up to 146 movements per day (73 in-bound and 73 out-bound). The actual traffic movements will be less than 146 due to the use of as many inbound trucks as possible to also take out finished product for delivery to sites.

Traffic modelling has concluded that the proposed expansion will have minimal impact on the existing performance of the New England Highway/Lemington Road intersection with no deterioration in current levels of service. There are no traffic engineering related matters which would preclude approval of the proposed expansion to 200 00tpa.

Noise and Vibration

The site is located on a rehabilitated open cut mining pit and is surrounded by five open cut mines. The nearest noise sensitive receivers are located approximately 7.5km away to the south-east in the village of Camberwell.

The Noise Impact Assessment prepared in support of the proposed expansion concludes that the noise and vibration generated by the proposal would have minimal to no impact on the nearest residential receivers to the site. The New England Highway and five operating mines surrounding the development already produce considerably more noise than would be emitted from the proposed compost facility expansion. In practical terms, the total measured sound power of all operational mobile and fixed plant on site combined is approximately equivalent to a single 300 tonne rear dump truck typically deployed at an open cut coal mine.

Biodiversity and Bushfire

The site comprises land located on part of a capped open cut mining void which has been filled with spoil and ash from the Bayswater Power Station. The development footprint is located on a graded hardstand area surrounded by perimeter bunding. The ecological investigations carried out in support of the proposed expansion have found that there is no suitable habitat present over the site or immediate surrounds to support any threatened species, endangered ecological communities, critical habitat or endangered populations.

The development area is also not mapped as bush fire prone land. Notwithstanding that, mitigation measures are proposed with respect to ensuring access and emergency evacuation as well as the supply of water.

Visual Amenity

Project design has considered potential visual impacts on surrounding areas including the distance to potentially affected areas and shielding provided by natural topographic features and the landforms associated with rehabilitated mining areas in the project area.

The Project does not require any site infrastructure that is elevated in nature, visually intrusive during the day or night, and which dominates the landscape. The most visually prominent feature is the slightly raised location of the site office and staff amenities. The organics processing hardstand is located on a flat recessed area created from the capping of Void 3. Current operations, and proposed operations, will remain visually shielded by the surrounding vegetation and topography.

Aboriginal Heritage

The site is heavily disturbed, having previously been used as an open cut mine. The Aboriginal Cultural Heritage Assessment prepared in support of the proposed expansion concludes that no Aboriginal objects were identified and there is no evidence on the basis of the survey conducted that Aboriginal objects are present in the project area. It is also highly unlikely that they will be uncovered as part of the proposed

development. In addition, the project area has nil archaeological value and is not significant on the basis of research potential, representativeness, rarity or education potential.

Historic Heritage

The Historic Heritage Assessment prepared in support of the proposed expansion concludes that there are no heritage items identified in the project area. It is not anticipated that the expansion will have any impact on any items of historic heritage due to the highly disturbed nature of the site and the lack of any listed sites in the vicinity.

Socio-Economic

There are clear socio-economic and community benefits associated with extending the existing nutrient recycling facility. The expansion of this operation will benefit the existing rehabilitation activities across AGL Macquarie lands, and also assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.

At the micro level, the proposed expansion will result in employment creation during both the construction and operation phases.

Fire and Incident Management

Bettergrow currently operate a number of recycling facilities across NSW and QLD. Established fire management control measures, pollution incident response management plans and emergency procedures and protocols from Bettergrow's existing operations are to be updated for the expanded development. This will ensure that the site has the appropriate checks and balances in place to safeguard the protection of life and the prevention of environmental harm, including air, water or land pollution.

Hazard and Risk

A Preliminary Risk Screening (PRS) under State Environmental Planning Policy No. 33 Hazardous and Offensive Development (SEPP 33) has been undertaken for the development. The screening indicates that the development is below the SEPP thresholds and therefore is not considered a hazardous or offensive development in accordance with the guidelines.

Waste Management

The waste streams presently received at the facility will continue to be managed in the same way as currently. Waste generated from construction and operation of the expanded facility would be managed in accordance with the established waste hierarchy which underpins the objectives of the Waste Avoidance and Resource Recovery Act 2001 to ensure that the diversion of waste from landfill is maximised. A WMP has been prepared for the proposed expansion and will be updated and implemented as required.

The facility, once operational, will provide critical waste management infrastructure which will be able to service existing and future waste management needs and assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.

Cumulative Impacts

The assessment of cumulative impacts considers the potential for the impacts from the proposed development to combine with impacts from existing and potential future developments in the vicinity of the site. This may lead to more significant impacts being identified compared to the individual development specific assessment.

Cumulative impacts of the development with other projects in the vicinity of the site have been considered in technical studies undertaken as part of the EIS, particularly in relation to odour and traffic. The mitigation measures proposed in each of the specialist assessments in **Section 9** have also been designed to ameliorate potential impacts associated with the development in its own right as well as minimising overall cumulative impacts of the development when considered alongside other future developments.

Conclusion

The expanded facility will provide critical waste management infrastructure which will be able to service existing and future waste management needs in the Hunter Valley region and surrounds, and assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.

A range of environmental issues were identified and assessed with appropriate mitigation and management measures proposed to be carried through to the construction and operational phase. The Traffic Impact Assessment prepared in support of the proposed expansion concludes that the additional traffic generated by the facility will not adversely impact on existing road capacity, and that as there would be no impact on the performance of the local road network, road upgrades are not required.

The proposal provides enhanced social and economic benefits by increasing the processing capacity for organic and commercial waste into recycled materials, thereby reducing the amount of waste going to landfill, and increasing availability of recycled products. Utilisation of recycled materials contributes to the conservation of natural resources and biodiversity and is consistent with the principles of ESD.

It has been demonstrated throughout this EIS that any minor impacts associated with the proposed expansion can be addressed through the implementation of appropriate management and mitigation strategies. Overall, the expansion of the facility in the form proposed is a logical extension of the existing operations and has significant environmental, sustainability and public interest benefits.

1 INTRODUCTION

1.1 Background

This Environmental Impact Statement (EIS) has been prepared by RPS Australia East Pty Ltd (RPS) on behalf of Bettergrow Pty Ltd (Bettergrow) to accompany an application for State Significant Development (SSD 9418) to the NSW Department of Planning, Industry, and Environment (DoPIE). This application seeks *Development Approval under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act)* for the proposed expansion of an existing composting and nutrient recycling facility. The site is located approximately 20 kilometres (km) north of the township of Singleton, New South Wales (NSW), (refer **Figure 1**) within the Singleton Council Local Government Area (LGA).

Bettergrow, trading as 'Greenspot Hunter Valley' (the Applicant), is proposing to undertake the expansion and operation of an existing nutrient recycling facility (the Proposal) on Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW (the site)(refer **Figure 2**).

Current composting operations at the site are approved by DA140/2016 to receive up to 76,000 tonnes per annum (tpa) of biosolids and garden organics. The Applicant for DA140/2016 was Bettergrow Pty Ltd who are contracted by AGL Macquarie (the Landowner) to supply manufactured soil ameliorant and rehabilitation products for use, in part, for approved rehabilitation works at the Ravensworth No. 2 mine and Ravensworth South mine.

The subject application seeks to authorise the receipt of up to 200,000tpa of organic materials, including new feed sources of food waste, to facilitate the sale of a portion of the composted material to third parties.

Bettergrow currently operates a range of recycling facilities across NSW and Queensland (QLD). The expansion of this operation will benefit the existing rehabilitation activities across AGL Macquarie lands, and also assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.

1.2 Purpose of this Report

The purpose of this EIS is to assess, and propose mitigation measures for, the environmental and social implications of proceeding with the development. This EIS has also been prepared to meet the Secretary's Environmental Assessment Requirements (SEARs) for the proposed facility, issued by the DP&E on 11 July 2018 (refer to **Section 1.7**), as well as the recommendations of other consulted agencies and relevant stakeholders. The document has been prepared in accordance with the EP&A Act and the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation).

In addition to describing the Project, the EIS presents a comprehensive and focussed assessment of the associated planning and environmental issues to a level of detail commensurate with the scale of the development, the characteristics and previous use of the site, and the legislative framework under which the development is to be assessed and determined. The matters dealt with in the EIS are presented in a manner that clearly addresses the specific requirements of the SEARs, as well as the requirements of other consulted government agencies and stakeholders.

1.3 The Applicant

The Applicant for the development is Bettergrow Pty Ltd (trading as Greenspot Hunter Valley), who has become one of the most innovative recyclers of organic residuals and by-products in Australia. Bettergrow offer a range of practical solutions for a variety of organic products that can be converted to products suitable for beneficial use in a range of markets applications.

Bettergrow is at the forefront in developing various beneficial re-use markets for a large range of organic products. Products currently recycled and produced by Bettergrow include drilling muds, biosolids, garden organics, food waste organics, grease trap waste, and bulk landscape supplies.

Bettergrow currently operates recycling facilities across NSW and QLD, including sites at:

- Vineyard, NSW – drill mud and landscape supplies;
- Bathurst, NSW – liquid wastes (existing operations), and forestry residues, biosolids, food organics, and garden organics;
- Swanbank, QLD – construction and demolition waste, concrete, scrap metal, soils, clean fill;
- Ravensworth, NSW – organics recycling, composting, garden organics, and bio-solids;
- St Mary's, NSW – biosolids;
- Parkes, NSW – farming enterprises; and
- Wetherill Park, NSW - liquid wastes, landscape supplies, food organics, and garden organics (approved only).

1.4 Project Site

The site is located at Ravensworth No. 2 mine and is formally described as Lot 10 DP1204457 at 74 Lemington Road, Ravensworth, NSW. The site is cleared of native vegetation and is located on part of a capped open cut mining void which has been filled with ash from the AGL Bayswater Power Station. Access to the facility is provided via an internal access road off Lemington Road which connects to the New England Highway. The site location is shown on **Figure 2**.

The existing composting facility is located on a graded hardstand area, surrounded by perimeter bunding. A detention basin and spillway are located towards the southern end of the facility. A diversion wall and channel direct stormwater runoff from the eastern corner of the facility into the spillway. A spillway channel connects the spillway to the lower basin. Access to the facility is off Lemington Road and along an internal access road. Further detail on existing infrastructure is provided in **Section 3.2.1** below.

1.5 Approval Pathway

The development assessment and approval system in NSW is subject to Parts 4 and 5 of the EP&A Act. Division 4.1 of Part 4 provides for the assessment and determination of State Significant Development (SSD). Pursuant to Section 4.36 of the EP&A Act, projects are classified as SSD if they are declared to be such under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). Clause 23 of Schedule 1 of the SRD SEPP identifies the following types of developments to be SSD:

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

Based on the intended handling capacity of the nutrient recycling facility of up to 200,000tpa, the development is classified as SSD.

The Minister for Planning (or their delegate) determines development applications for SSD under Part 4 of the EP&A Act. The Minister may delegate the consent authority function to the NSW Independent Planning Commission (IPC) in certain circumstances where there is objection from local government, or over 25 submissions are received during the EIS exhibition period.

1.6 Capital Investment

A Capital Investment Value (CIV) report has been prepared for the development which has estimated the value of the expansion works at \$4.8 million based on current rates for equipment, infrastructure, and labour hire. The full CIV report is attached as **Appendix A**.

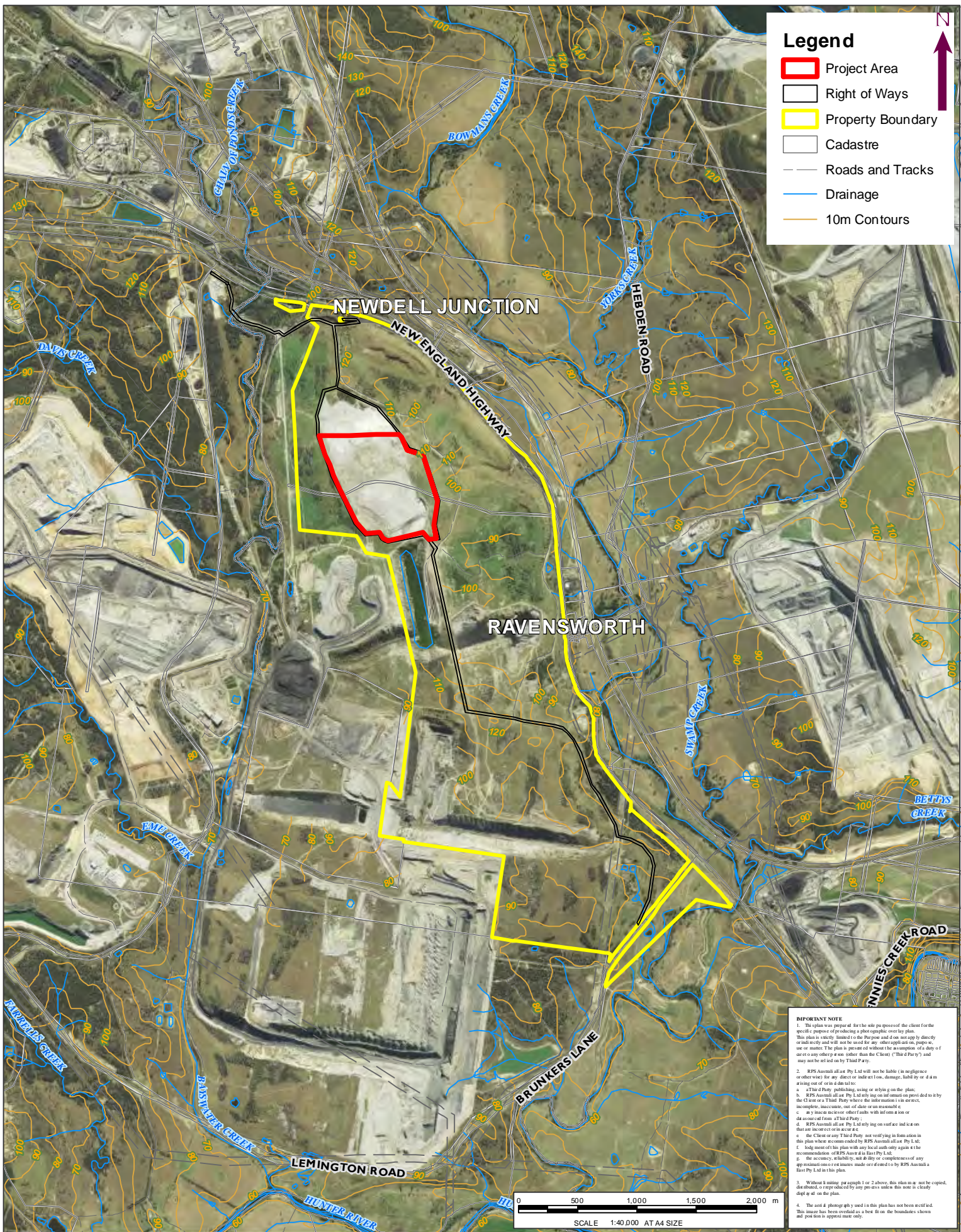


FIGURE 2: PROJECT SITE (LOCAL CONTEXT)

LOCATION :	RAVENSWORTH	DATUM: GDA94
JOB NO.:	PR 141357	PROJECTION: MGA Zone 56
PURPOSE: PLANNING		Data Sources: RPS, Client Land and Property 2017
Technician: Natalie Wood	Date: 9/09/2019	

CLIENT: BETTERGROW

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
Unit 2A, 45 Fitzroy Street, Carrington, NSW, Australia, 2294 PO Box 120, Carrington, NSW, 2294
T: 02 4940 4200 F: 02 4940 4299 www.rpsgroup.com.au



1.7 Secretary's Environment Assessment Requirements

A request for Secretary's Environmental Assessment Requirements (SEARs) for the nutrient recycling facility expansion was submitted to DoPIE on 14 June 2018. The SEARs were subsequently issued by the DoPIE on 11 July 2018.

Table 1 presents the general requirements and key issues to be addressed in the EIS in accordance with the SEARs and identifies where each requirement is addressed in this EIS. A copy of the formal SEARs for SSD 9418 is contained within **Appendix B**.

Table 1 Summary of Secretary's Environmental Assessment Requirements (SSD 9418)

Secretary's Environmental Assessment Requirements	Reference within EIS
General Requirements	
The Environmental Impact Statement (EIS) for the development must comply with the requirements in clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i> .	Entire EIS
In particular, the EIS must include:	
<ul style="list-style-type: none"> detailed description of the development, including: <ul style="list-style-type: none"> existing activities carried out on the site and how the site operates lawfully under the Environmental Planning and Assessment Act 1979 (EP&A Act) including any reliance on existing use rights and/or planning approvals and how these will be consolidated; accurate history of the site, including development consents; need for the proposed development; justification for the proposed development; likely staging of the development – including demolition, construction, and operational stage/s; likely interactions between the development and existing, approved and proposed operations in the vicinity of the site; plans of any proposed building works; and contributions required to offset the proposal. 	Section 2 Section 3 Section 4 Appendix C
<ul style="list-style-type: none"> consideration of all relevant environmental planning instruments, including identification of any inconsistencies with these instruments; 	Section 5
<ul style="list-style-type: none"> consideration of issues discussed in Attachment 2 (public authority responses to key issues); 	Section 9
<ul style="list-style-type: none"> risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment; 	Section 8
<ul style="list-style-type: none"> detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes: <ul style="list-style-type: none"> a description of the existing environment, <u>using sufficient baseline data</u>; an assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes; a description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the development, including proposals for adaptive management and/or contingency plans to manage and significant risks to the environment; and 	Section 9
<ul style="list-style-type: none"> a consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS. 	Section 10

The EIS must also be accompanied by a report from a qualified quantity surveyor providing:

Secretary's Environmental Assessment Requirements	Reference within EIS
<ul style="list-style-type: none"> a detailed calculation of the capital investment value (as defined in Clause 3 of the <i>Environmental Planning and Assessment Regulation 2000</i>) of the proposal, including details of all assumptions and components from which the CIV calculation is derived; a close estimate of the jobs that will be created by the development during the construction and operational phases of the development; certification that the information provided is accurate at the date of preparation. 	Appendix A
Key Issues	
The EIS must address the following specific matters:	
<ul style="list-style-type: none"> Community and Stakeholder Engagement – including: <ul style="list-style-type: none"> a detailed community and stakeholder participation strategy which identifies who in the community has been consulted and a justification for their selection, other stakeholders consulted and the form/s of the consultation, including a justification for this approach. a report on the results of the implementation of the strategy including issues raised by the community and the surrounding occupiers and landowners that may be impacted by the proposal. details of how issues raised during community and stakeholder consultation have been addressed and whether they have resulted in changes to the proposal. details of the proposed approach to future community and stakeholder engagement based on the results of the consultation. 	Section 7 Appendix E
<ul style="list-style-type: none"> Suitability of the Site – including: <ul style="list-style-type: none"> details of all the development consents and approved plans for the existing facility, including for all structures, plant and equipment. results of an independent audit of the operation of the existing facility against the conditions of all development consents and all Environmental Protection Licences in force in respect of the existing facility to ascertain the baseline of the site. a detailed justification that the site can accommodate the proposed increase in processing capacity, having regard to the scope of the operations of the existing facility and its environmental impacts and relevant mitigation measures. 	Section 6
<ul style="list-style-type: none"> Waste Management – including: <ul style="list-style-type: none"> a description of the waste streams that would be accepted at the site including maximum daily, weekly and annual throughputs and the maximum size for stockpiles and any liquid waste storage. a description of waste processing operations (including flow diagrams for each waste stream) including a description of the technology to be installed, resource outputs, and the quality control measures that would be implemented including proposed procedures to ensure general solid waste is not contaminated by restricted, hazardous and/or liquid waste. details of how waste would be stored (including the maximum daily waste storage of the site) and handled on site and transported to and from the site including details of how the receipt of non-conforming waste, particularly asbestos, would be dealt with. details of the waste tracking system for incoming and outgoing waste. details of the final dispatch locations of the waste. details of the waste management strategy for construction and ongoing operational waste generated. the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the <i>NSW Waste Avoidance and Resource Recovery Strategy 2014-2021</i>. 	Section 9.13 Appendix S
<ul style="list-style-type: none"> Air Quality and Odour – including: <ul style="list-style-type: none"> a quantitative assessment of the potential air quality, dust, and odour impacts of the development in accordance with relevant Environment Protection Authority guidelines. This is to include the identification of existing and potential future sensitive receivers and consideration of approved and/or proposed developments in the vicinity. 	Section 9.1 Appendix G

Secretary's Environmental Assessment Requirements	Reference within EIS
<ul style="list-style-type: none"> – the details of buildings and air handling systems and strong justification (including quantitative evidence) for any material handling, processing or stockpiling external to a building. – a greenhouse gas assessment. – details of proposed mitigation, management and monitoring measures. 	
<ul style="list-style-type: none"> • Soil and Water – including: <ul style="list-style-type: none"> – a description of erosion and sediment controls. – consideration of salinity and acid sulphate soil impacts. – an assessment of potential impacts to soil and water resources, topography, hydrology, groundwater, drainage lines, watercourses and riparian lands on or nearby the site, including mapping and description of existing background conditions and cumulative impacts. – a detailed site water balance, including identification of water requirements for the life of the project, measures that would be implemented to ensure an adequate and secure water supply is available for the proposal and a detailed description of the measures to minimise the use of water at the site. – characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from waste into the wastewater, proposed mitigation measures to manage any impacts to receiving waters, and monitoring activities and methodologies). – Details of the stormwater/wastewater/leachate management systems and measures to treat, reuse or dispose of water. 	<p>Section 9.2 Appendix H Section 9.3 Appendix I</p>
<ul style="list-style-type: none"> • Traffic and Transport – including: <ul style="list-style-type: none"> – details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes. Traffic flows are to be shown diagrammatically to a level of detail sufficient for easy interpretation. – plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network. – an assessment of the predicated impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model. – detailed plans of the proposed layout of the internal road network and parking onsite in accordance with the relevant Australian Standards and Council's DCP. – swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site. – plans of any proposed road upgrades, infrastructure works, or new roads required for the development. – An assessment of potential impacts on local road pavement lifespan. 	<p>Section 9.4 Appendix J</p>
<ul style="list-style-type: none"> • Noise and Vibration – including: <ul style="list-style-type: none"> – a quantitative assessment of potential demolition, construction, operational and transport noise and vibration impacts in accordance with relevant Environmental Protection Authority guidelines. – details and justification of the proposed noise mitigation and monitoring measures. – specified times of operation for all phases of the development and for all noise producing activities. 	<p>Section 9.5 Appendix K</p>
<ul style="list-style-type: none"> • Fire and Incident Management – including: <ul style="list-style-type: none"> – identification of the aggregate quantities of combustible waste productions to be stockpiled at any one time. – technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment and fire (including location of fire hydrants and water flow rates at the hydrant) management and containment measures. – detailed information relating to the proposed structures addressing relevant levels of compliance with Volume One of the National Construction Code (NCC). – details of how Clauses E.10 and E2.3 of the NCC would be addressed. 	<p>Section 9.11</p>

Secretary's Environmental Assessment Requirements	Reference within EIS
<ul style="list-style-type: none"> • Hazards – including: <ul style="list-style-type: none"> – A preliminary risk screening prepared in accordance with <i>State Environmental Policy No. 33 – Hazardous and Offensive Development</i> and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is “potentially hazardous” a Preliminary Hazard Analysis (PHA) must be prepared in accordance with <i>Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis</i> (DoP, 2011) and <i>Multi-Level Risk Assessment</i> (DoP, 2011). 	Section 9.12
<ul style="list-style-type: none"> • Biodiversity – including: <ul style="list-style-type: none"> – a detailed assessment of biodiversity impacts of the proposal in accordance with the <i>Biodiversity Assessment Method BAM</i>. 	Section 9.6 Appendix L
Plans and Documents	
The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the <i>Environmental Planning and Assessment Regulation 2000</i> . These items should be included as part of the EIS rather than as separate documents.	Appendix C
Consultation	
During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups, and affected landowners.	Section 6 Appendix E
In particular, you must consult with:	
<ul style="list-style-type: none"> • Singleton Council; • Department of Primary Industries; • Environmental Protection Authority; • NSW Rural Fire Service; • Mine Subsidence Board; • Office of Environment and Heritage; • Roads and Maritime Services; and • The surrounding landowners and occupiers that may be affected by the proposal. 	
The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	

1.8 Project Team

RPS has prepared the subject EIS on behalf of Bettergrow. Specialist consultants were also engaged to undertake technical assessments for the development and to provide relevant input into the EIS. Details of the Project team are provided below in **Table 2**.

Table 2 EIS Project Team

Name	Organisation	Area of Assessment
Shaun Smith	RPS	Project Director and EIS author
Andrew Biller	RPS	Chapter Preparation
Rob Dwyer	RPS	Socio-economic
Alex Byrne	RPS	Aboriginal and Heritage
Ted Smith	Peak Land Management	Biodiversity
Todd Corbett	RPS	Quantity Survey
Shaun Smith	RPS	Community and Stakeholder Engagement

Name	Organisation	Area of Assessment
Dr Darlene Heuff	Advance Environmental Dynamics	Odour, Dust, and Greenhouse Gas
Nathan Heinrich	Fifteen50 Consulting	Surface Water
Nathan Heinrich	Fifteen50 Consulting	Groundwater
Natalie Wood	RPS	Visual
David Pavey	Pavey Consulting	Traffic
Tony Welbourne	Global Acoustics	Noise and Vibration
Ted Smith	Peak Land Management	Bush Fire
Nathan Heinrich	Fifteen50 Consulting and RPS	Fire and Incident Management
Luke Zambelli	Zambelli Environmental	Compost Management Plan Leachate Management Plan EPL and Consent Audits
John Vyse	Bettergrow Pty Ltd	Project Design and Review

1.9 Document Structure

This EIS is provided in two volumes. **Volume 1** comprises the main report (this document) and describes the development in the context of the existing environment, planning considerations, key environmental issues, potential impacts, and mitigation measures.

Volume 2 contains the technical assessments which have been summarised into **Section 9** of the main EIS document (Volume 1).

Sections of the EIS are summarised below in **Table 3**.

Table 3 EIS Structure and Content

Volume 1 – Main Report	
Executive Summary	Provides an overview of the entire EIS
Section 1 – Introduction	Provides a summary of the proposed development, including the site, development, applicant, and content of the EIS
Section 2 – Site Description	Provides a description of the site at a regional and local level
Section 3 – Project Description	Provides a description of the proposed development, including all operational and construction aspects
Section 4 – Project Need and Alternatives	Provides the reasons for the development of the Project, including the alternative locations, designs and impacts of not proceeding with the development
Section 5 – Planning and Statutory Framework	Describes the relevant planning and environmental approvals applicable to the development
Section 6 – Site Suitability	Describes the suitability of the site for the existing and proposed use, and discusses the results of an independent audit of DA140/2016 and EPL7654
Section 7 – Consultation and Stakeholder Engagement	Describes the consultation process with stakeholders, including local community and surrounding businesses, government agencies, and interested parties
Section 8 – Environmental Risk Assessment	Provides a list of the key environmental issues for the Project, including a risk ranking for each issue identified and proposed mitigation
Section 9 – Impact Assessment, Mitigation, and Management	Provides a description of the existing environment, the methodology used for impact assessment, predicted

Volume 1 – Main Report

	impacts from the proposal, and a description of the management and monitoring measures
Section 10 – Statement of Commitments	Describes the measures to avoid and/or mitigate the potential environmental impacts of the Project
Section 11 – Justification and Conclusion	Provides a justification for the Proposal, including taking into consideration the positive and negative social, economic and environmental impacts as well as the principles of Ecologically Sustainable Development (ESD)
Section 12 - References	Provides a list of the reference material used to prepare the EIS, including guidelines, reports prepared for other projects, and specialist assessments prepared for the EIS

Volume 1 – Appendices

Appendix A	Statement of Capital Investment Value (CIV)
Appendix B	Secretary's Environmental Assessment Requirements
Appendix C	Land Survey and Design Information
Appendix D	Figures, Consents and Documents Relating to DA140/2016
Appendix E	Correspondence and Consultation
Appendix F	Project Environmental Risk Assessment

Volume 2 – Appendices

Appendix G	Air Quality Impact Assessment
Appendix H	Surface Water Impact Assessment
Appendix I	Groundwater Impact Assessment
Appendix J	Traffic Impact Assessment
Appendix K	Noise Impact Assessment
Appendix L	Preliminary Biodiversity Assessment
Appendix M	Bushfire Threat Assessment
Appendix N	Aboriginal Cultural Heritage Assessment
Appendix O	Historic Heritage Assessment
Appendix P	Consent and EPL Audits
Appendix Q	Compost Management Plan
Appendix R	Surface and Groundwater Management Plan
Appendix S	Waste Management Plan

2 SITE DESCRIPTION

2.1 Overview

The site is located at Ravensworth No. 2 mine and is formally described as Lot 10 DP1204457 at 74 Lemington Road, Ravensworth, NSW. The Project area covers approximately 57 hectares (ha) and is located approximately 20 km north-west of Singleton, 23 km south-east of Muswellbrook, 14 km east north-east of Jerry's Plans, and 2 km north-west of Ravensworth. Access to the facility is provided via an internal access road off Lemington Road which connects to the New England Highway 2 km south of Ravensworth village.

The site comprises lands located on part of a capped open cut mining void which has been filled with ash from the Bayswater Power Station. The development footprint, including the existing approved composting facility, is located on a graded hardstand area, surrounded by perimeter bunding. A detention basin and spillway are located towards the southern end of the facility. A diversion wall and channel direct stormwater runoff from the eastern corner of the facility into the spillway. A spillway channel connects the spillway to the lower basin.

Significant disturbance of the natural environment within and surrounding the development site has occurred as a result of the long history of mining and power generating activities in the area. The Project area is clear of any remnant or native vegetation due to past land activities. The Hunter River is located 6 km to the south of the site, while Bowmans Creek is located 1.6 km to the east.

Details of the site including local roads, surrounding development, and natural features are shown on **Figure 3**.

2.2 Site History

Peabody Resources Ltd (Peabody) was responsible for the operation the Ravensworth No. 2 mine until it was decommissioned in 1993 following the completion of coal mining. AGL Macquarie now owns the decommissioned mine and is therefore responsible for its rehabilitation, including five existing mine voids (referred to as Voids 1, 2, 3, 4 and 5). Rehabilitation works involve the disposal of fly ash from the nearby Bayswater Power Station.

Voids 1 and 2 on the site have previously been filled with fly ash, capped and rehabilitated. Void 3 was filled with fly ash and capped in 2014. Void 4 is used as a water storage dam and provides additional capacity for surface water runoff during significant rainfall events. The placement of Bayswater Power Station fly ash into Void 5 commenced in 2014 and is expected to be completed by 2032.

Rehabilitation works at Voids 1 to 5 are undertaken in accordance with the following development consents:

- DA No. 86/51 for the Ravensworth South mine granted by the NSW Department of Planning and Environment on 16 December 1986;
- DA No. 144/93 granted by Singleton Shire Council on 8 December 1993 (as modified); and
- DA No. 138/93 granted by Muswellbrook Shire Council on 13 December 1993 (as modified).

The above listed existing development consents issued for the site in the 1980s and 1990s allow the use of composting material as part of the mine rehabilitation process. However, these development consents do not explicitly allow for the on-site processing of composting material.

In 2016, a Statement of Environmental Effects (SEE) and Development Application (referred to as DA140/2016) was prepared for the establishment and operation of on-site composting to facilitate the rehabilitation of Ravensworth No. 2 mine and Ravensworth South mine. The application was assessed as integrated development (and not designated development) on the basis that the project was entirely ancillary to the existing rehabilitation works approved as part of the Bayswater Power Station and Ravensworth mine.

On 25 November 2016, Council granted consent to DA140/2016, pursuant to Section 80 of the EP&A Act and subject to conditions.

On 16 April 2018, DA140/2016 was subsequently modified to facilitate an increase in volume of organic material received on site to 76,000 tonnes per. In September 2018, DA140/2016 was again modified to allow for the sale of compost material from the site to surrounding markets.

2.3 Current Site Use

The facility currently operates in accordance with DA140/2016, as modified, and Environment Protection License No 7654. The hours of operation at the site are from 6am to 6pm Monday to Saturday. Vehicle access to the site is via an entry gate at Lemington Road located to the south.

Organic materials for composting are transported to the site and are unloaded to the existing hardstand area for blending and processing. The hardstand covers approximately 16.58 hectares. The material currently authorised to be accepted comprises a mix of general solid waste (non-putrescible) and liquid waste limited to:

- Urban wood residues;
- Paper Crumble;
- Wastewater from Bayswater mine Void 4;
- Natural organic fibrous material;
- Coal ash;
- Biosolids; and
- Garden Waste.

The existing composting facility has been designed and approved as a staged development by DA140/2016. Two stages form the overall development. Currently Stage 1 has been developed and is operational. Stage 2 has not been constructed or developed to date. The existing approved operations under DA140/2016 are shown on **Figure 4**.

Components of the development authorised under DA140/2016 that have been installed and commissioned to date include:

- Compacted earth processing pad for Stage 1 only;
- Surface water drainage for Stage 1 only;
- Leachate dam built to full capacity to accommodate both Stages 1 and 2; and
- Portable site office and staff amenities.

In addition to the above, there is an existing water tank at the site that is utilised for raw water storage.

This EIS seeks approval to incorporate all activities currently approved under DA140/2016, with the addition of increasing capacity to 200,000tpa and adding the ability to receive food and garden organics.

Further details on site infrastructure are provided in **Section 3 – Project Description**.



FIGURE 3: PROJECT SITE AND SURROUNDING DEVELOPMENT

LOCATION:	RAVENSWORTH	DATUM: GDA94
JOB NO.:	PR 141357	PROJECTION: MGA Zone 56
PURPOSE: PLANNING		Data Sources: RPS, Client Land and Property 2017
Technician: andrea.stevkova	Date: 9/09/2019	

CLIENT: BETTERGROW

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FIGURE 4: EXISTING APPROVED OPERATIONS DA 140/2016

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PURPOSE: PLANNING		Data Sources:
Technician: andrea.stevkova	Date: 9/09/2019	RPS, Client
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2.4 Land Ownership

The Development site (Lot 10 DP1204457) is owned by AGL. AGL acquired Macquarie Generation from the NSW Government in 2014 and hence took ownership of the subject lands as part of this transaction. AGL is an Australian integrated energy company which owns and operates a number of base, peaking, and intermediate power generation plants across the country that are powered by thermal generation and renewable sources.

Owners consent has been obtained for the lodgement of the Development Application (DA) and supporting EIS documentation from AGL.

2.5 Zoning and Permissibility

The site is zoned RU1 Primary Production under the Singleton Local Environmental Plan 2013 (Singleton LEP). The objectives of the RU1 zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
- To encourage diversity in primary industry enterprises and systems appropriate for the area;
- To minimise the fragmentation and alienation of resource lands; and
- To minimise conflict between land uses within this zone and land uses within adjoining zones.

Composting operations are neither permissible with or without consent within the RU1 zone and as such are considered a prohibited land-use under the Singleton LEP. However, resource recovery including composting is permissible with consent within the RU1 zone under *State Environmental Planning Policy (Infrastructure) 2007*.

Section 1.9 of the Singleton LEP identifies that it is subject to the provisions of any State environmental planning policy that prevails as provided by Section 3.28 of the EP&A Act. Under Section 3.28 of the EP&A Act, in the event of an inconsistency between environmental planning instruments and unless otherwise provided, there is a general presumption that a State environmental planning policy prevails over a local environmental plan or other instrument made before or after that State environmental planning policy. As such the proposed development for the purpose of composting and resource recovery is permissible within the RU1 zone with consent. Further discussion on zoning and permissibility is provided below in **Section 5.4.2**. Land zoning for the site and surrounds is shown as **Figure 5**.

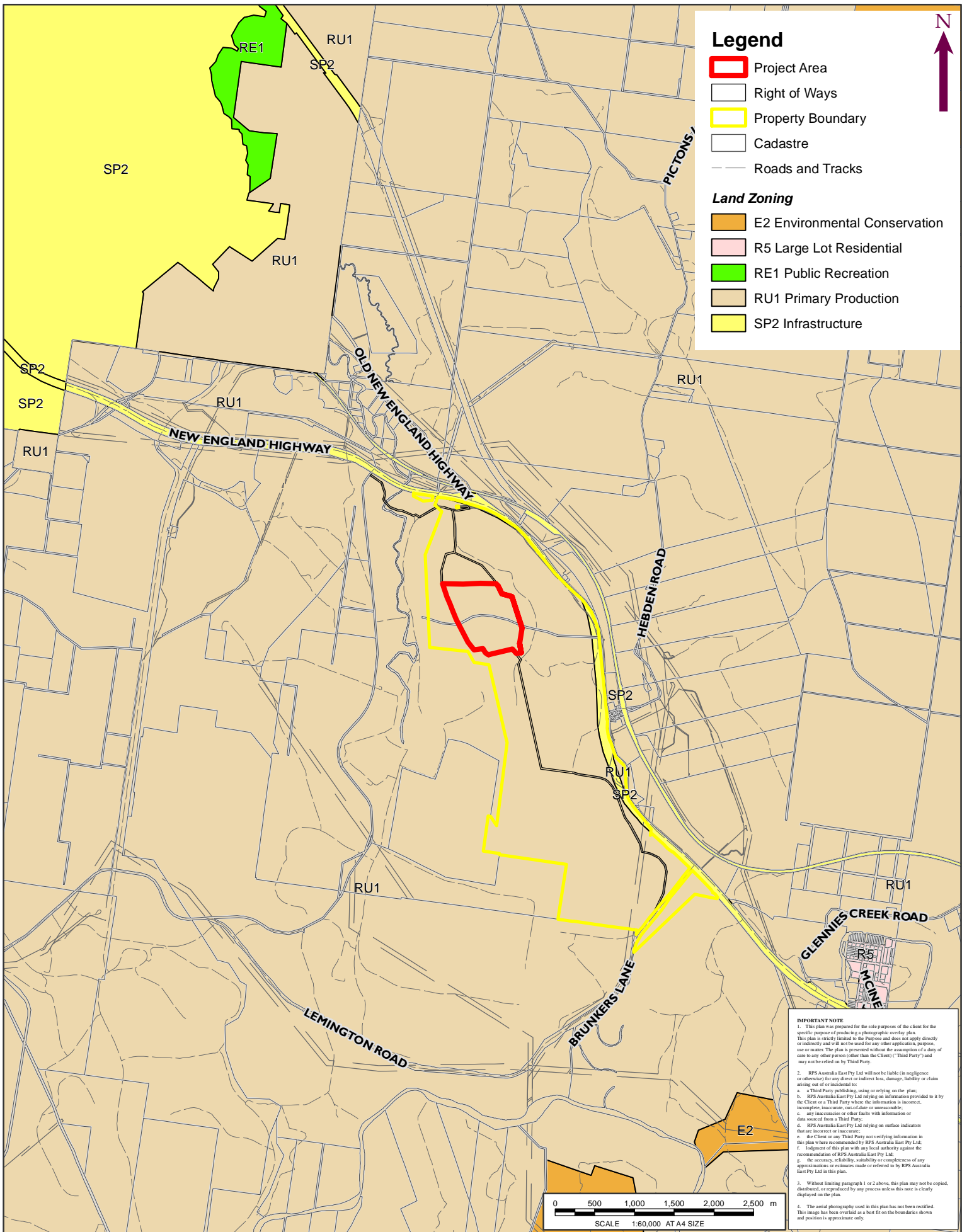


FIGURE 5: LAND ZONING

LOCATION:	DATUM: GDA94
RAVENSWORTH	PROJECTION: MGA Zone 56
JOB NO.: PR 141357	Data Sources:
PURPOSE: PLANNING	RPS, Client
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2.6 Surrounding Land Use

The development is located within an area that is dominated by coal mining and heavy industrial activities, including power generation and related activities. As such the development is within a highly altered environment and is generally compatible with surrounding land use. The following land uses surround the development site:

- Liddell and Bayswater Power Station, including Lake Liddell to the north-west;
- Liddell Coal Operations to the north-west;
- New England Highway to the east;
- Ravensworth North Open-cut Coal Mine to the west;
- Integra Coal Mine to the south-east; and
- Loop Organics Compost Facility to the south.

Locations of the above operations are shown on **Figure 3**.

2.7 Topography, Hydrology, Geology, and Soils

The topography of the area is influenced by the underlying geology which is comprised of sedimentary coal measures overlain by alluvial sediments in low-lying flood plains. Topographic elevations range from RL 130m within the north to RL 90m within the south of the broader area. The land survey provided in **Appendix C** shows the relief of the site and the area immediately surrounding the development footprint.

The Hunter River alluvium to the south of the site is at RL 62m and falls to approximately RL 60m further to the east. Similarly, the bed of the Hunter River falls from RL 54m to approximately RL 50m. Bayswater Creek is ephemeral and flows in a southerly directly to the west of the development footprint, while Bowmans Creek flows in a southerly directly to the east of the site.

The stratigraphic sequence across the wider area comprises unconsolidated Quaternary alluvium and Permian bedrock sediments. The Quaternary alluvium overlies and Permian sediments and consist of clay, silt and sand. The Permian sediments comprise coal seams with interbedded sequences consisting of sandstone, siltstone, tuffaceous mudstone, and conglomerate.

The Project Area is situated within the Liddell Soil Landscape (Kovac & Lawrie 1991) characterised by Yellow Soloths on slopes and yellow Solodic Soils on concave slopes. Earthy and Siliceous Sands occur on mid to lower slopes where the parent material is sand. Red Soloths, Red Solodic Soils and Red Podzolic Soils may also occur (Kovac & Lawrie 1991). Soloth soils are acidic soils usually typical of humid regions. Solodic soils have a strong contrast between A and B horizon textures, with A horizons being often acidic and B horizons often alkaline (Agriculture Victoria 2018). Podsol soils are characterised by B horizons dominated by the accumulation of organic compounds, aluminium and/or iron (Agriculture Victoria 2018). Minor to severe sheet erosion and low to moderate flood hazard are common within the Liddell Soil Landscape (Kovac & Lawrie 1991).

2.8 Biodiversity

The existing and proposed composting operations are located on a capped fly ash dam which is devoid of any vegetation. The areas immediately adjoining the development site are previous mining areas that have been backfilled with overburden, topsoiled, and rehabilitated. These areas consist predominantly of Rehabilitated Pasture Grasslands, with isolated pockets of Rehabilitated Woodland (Cumberland Ecology, 2013).

The rehabilitated woodland and grassland communities are unlikely to support any threatened flora species known to occur in the wider locality. Previous disturbance to these areas, combined with the general isolation of the rehabilitated woodland from other similar habitat has resulted in limited opportunities for threatened

flora species to recolonise these areas in the short time since the completion of rehabilitation (Cumberland Ecology, 2013).

Whilst threatened fauna species are known to occur in the wider locality surrounding the development area, most of these species occur in natural or semi-natural habitats rather than in rehabilitated environments. It is unlikely that threatened species would occur within the development area, or in surrounding areas, as there is limited habitat available (Cumberland Ecology, 2013). Further discussion on biodiversity is provided in **Section 9.6**.

2.9 Surrounding Receivers

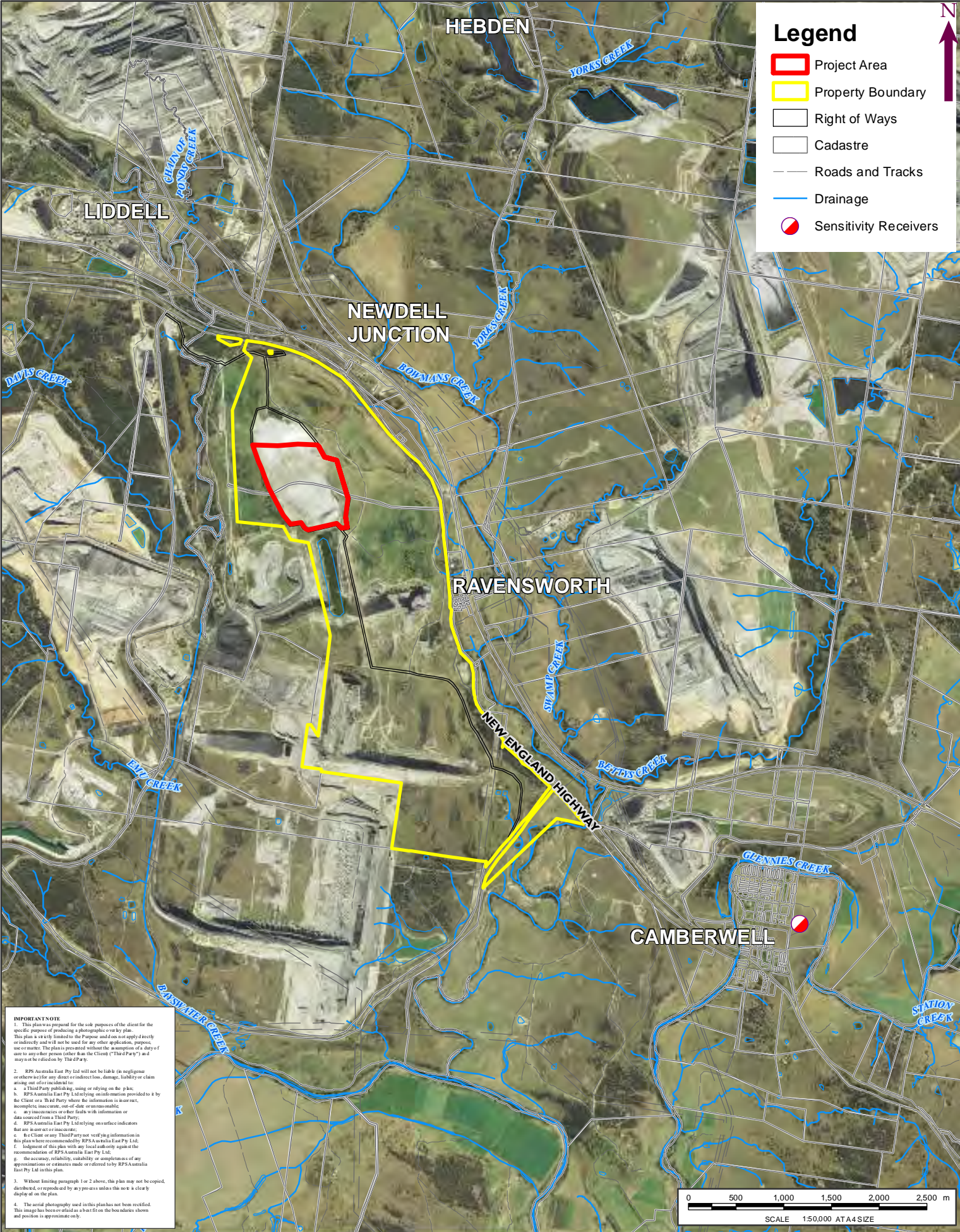
The closest sensitive receivers to the development are a number of private rural residential properties at Camberwell Village which is approximately 7km to the south-east. The location of these receivers is shown on **Figure 6**.

2.10 Climate

Meteorological data has been sourced from the Bureau of Meteorology (BoM) website from the Jerry's Plains Station (No 0601270). A summary of the data for this monitoring location is provided in **Table 4**.

Table 4 Jerry's Plains BoM Station 0601270

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Monthly Mean													
Maximum Temperature (oC)	31.8	30.9	28.9	25.3	21.3	18.0	17.4	19.4	22.9	26.3	29.1	31.2	25.2
Minimum Temperature (oC)	17.2	17.1	15.0	11.0	7.4	5.3	3.8	4.4	7.0	10.3	13.2	15.7	10.6
Rainfall (mm)	77.1	73.1	59.7	44.0	40.7	48.1	43.4	36.1	41.7	51.9	61.9	67.5	645



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4. The aerial photography used in this plan has not been rectified. This image has been overlaid as a best fit on the boundaries shown and position is approximate only.

FIGURE 6: SENSITIVE RECEIVERS

LOCATION:	DATUM: GDA94
RAVENSWORTH	PROJECTION: MGA Zone 56
JOB NO.: PR 141357	Data Sources:
PURPOSE: PLANNING	RPS, Client
Technician: Natalie Wood	Land and Property 2017
Date: 4/11/2019	

3 PROJECT DESCRIPTION

3.1 Overview

Bettergrow is currently contracted by AGL to supply purpose manufactured soil ameliorant and rehabilitation products suitable for use in the rehabilitation of their landholdings which include the Bayswater and Liddell power stations and associated ash dams and former mining areas. Increased demand for soil amelioration products has been identified due to the significant rehabilitation works in the Hunter Valley associated with mining and farming operations where compost products would be beneficial.

As such, Bettergrow are proposing to expand the current nutrient recycling operations at the site from 76,000tpa to 200,000tpa which will facilitate the increased composting of available organic material and allow for the sale of excess material to third parties.

The recovered resources would be transferred either directly to end use markets or to other facilities or processors for value adding to achieve maximum value for the beneficial use. Further details on the waste types and streams to be received at the facility are provided below in **Section 3.6**.

3.2 Design and Layout

Bettergrow proposes to expand the existing composting facility up to a capacity of 200,000tpa and sell compost that exceeds the rehabilitation needs of AGL to the wholesale market. The proposal responds to the availability of organic material and the demonstrated suitability of the site for a compost facility. The proposal includes the following key components:

- The continued operation of the existing facility in accordance with DA140/2016 as modified;
- Receive a total of up to 200,000 tpa of organics;
- Transfer of the composted material to other AGL Macquarie sites such as the Liddell Ash Dam, Liddell Power Station and Bayswater Power Station for use in rehabilitation as per existing approval;
- Sale of a portion of the finished 'compost' to third parties as per DA140/2016 as modified;
- Upgrading of a proportion of the hardstand area and installation of an aerated composting system such as the Mobile Aerated Floor (MAF) (or equivalent) suitable for the management and composting of other organics including a combined Food Organics and Garden Organics (FOGO) resource stream;
- Completion of the capping of the hardstand area and expansion of leachate dam as approved as part of the Stage 2 development application to facilitate the management and storage of the increase in organic inputs;
- Installation of a single lane weigh bridge approximately 27.5m long;
- Installation of covered hard stand areas for the receipt and blending, if required, of incoming organics including FOGO;
- Installation of a dedicated trailer wash bay;
- Installation of two 50,000 litre recycled drill water storage tanks; and
- Installation of a machinery shelter that will allow storage of tools and machinery for servicing.

The proposed site layout, including the existing built features, are shown on **Figure 8. Table 5** below provides a summary of infrastructure approved under DA140/2016, currently constructed, and proposed. All works approved and completed under DA140/2016 (as modified) to date are to be authorised under SSD 9418.

Further detail on the project design, infrastructure, and layout are provided in the following sections.

Table 5 Approved, Constructed, and Proposed Infrastructure

Approved under DA140/2016	Constructed under DA140/2016	Proposed under SSD 9814 (including works constructed under DA140/2016)
Stage 1 Pad Area	Stage 1 Pad Area	Stage 2 Pad Area
Stage 2 Pad Area	Site Office	Installation of a Mobile Aerated Floor (MAF)
Site Office	Onsite Water Storage Tank	Extension of Stormwater Management System to cater for Stage 2 Pad Area
Onsite Water Storage Tank	Leachate Detention Basin for Stage 1 Pad Area	Machinery Storage Shelter
Leachate Detention Basin for Stages 1 & 2 Pad Areas	Access Road	Trailer Wash and Inground Sump
Access Road	Stormwater Management System for Stage 1 Pad Area	Product Receival and Blending Shelter
Stormwater Management System for Stage 1 and Stage 2 Pad Areas		Weigh Bridge
		Drill Water Receival Storage Tanks

3.2.1 Existing Infrastructure

Existing composting operations at the Project site have been assessed and approved via a number of Development Applications (DA) lodged with Singleton Council. These operations are approved under DA 140/2016 (as modified) to accept up to 76,000tpa of materials as outline above in **Section 3.1**, with the exception of FOGO, which is included as part of this EIS. DA140/2016 also approved the development of a significant amount of infrastructure, including a hard stand processing pad, weighbridge, buildings, trailer wash, leachate management dam, and surface water drainage. Due to a gradual increase in processing capacity at the site, not all the approved infrastructure under DA140/2016 (as modified) has been constructed. As such, the remainder of the infrastructure will be constructed as part of the larger 200,000tpa expansion subject of this application. A summary of approved, existing, and proposed infrastructure is provided in **Table 5**. Existing constructed infrastructure at the site is shown as **Figure 7**.

3.2.1.1 Processing Pad

DA 140/2016 approved the development of a compacted earth processing pad on which composting operations are undertaken. The total approved pad area is up to 16.58 ha. This area has been separated into 2 areas to be constructed in stages as the demand for additional processing area is required (refer **Figure 4**). To date only Stage 1 has been constructed and utilised for composting activities (refer **Figure 7**). This pad has been engineered to a permeability of 10^{-7}ms^{-1} to control the penetration of leachate generated from the composting process. Details of the engineering design and subsequent construction quality assurance are provided in **Appendix D**.

The development of Stage 1 also required the construction of surface water drainage to capture flows and leachate from this area and direct them to a purpose-built leachate management dam (refer **Figure 7**). Further detail on surface water drainage and leachate management is provided below in **Section 3.2.1.2** and **Section 3.2.1.3** respectively. **Plate 1** shows the existing processing pad.



Plate 1 View of Existing Processing Pad and Mulch Windrows



FIGURE 7: EXISTING INFRASTRUCTURE

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3.2.1.2 Surface Water Drainage

As part of the development of Stage 1, there was also the need to design and install surface water drainage to manage stormwater and leachate. Bunding and diversion drains have been constructed to divert leachate and runoff into the leachate and sediment control dam.

Perimeter bunding has been constructed around the Stage 1 pad area to divert clean water runoff away from the composting area to the surrounding voids. A diversion wall and channel direct stormwater runoff from the eastern corner of the facility into the spillway of the sediment barrier. Bunds have been constructed using overburden and have been stabilised using compost produced onsite and a suitable grass seed mix. A detailed stormwater and leachate management plan has been prepared as part of the site **Surface Water and Groundwater Management Plan** attached as **Appendix R**. Further discussion on surface water is provided in **Section 9.2**. **Plate 2** below shows the existing clean water diversion onsite.



Plate 2 Existing Clean Water Diversion

3.2.1.3 Leachate Dam

As part of the approved operations under DA 140/2016 was the requirement to construct a combined site leachate and sediment control dam to capture stormwater and leachate from the entire processing pad. This dam was required to capture polluted waters from the Stage 1 and Stage 2 pad areas. To date only the Stage 1 pad area has been constructed, therefore the dam has been sized and constructed to treat water from the Stage 1 area only. The current capacity of the leachate dam is 14.7 ML.

The bed and banks of the leachate dam have been constructed from compacted clay, screened compacted overburden and other approved materials to achieve the required permeability of less than 10⁻⁹ ms⁻¹. Engineering design and construction quality assurance is attached as **Appendix D**.

The location of the combined leachate and sediment control dam is shown on **Figure 7**. **Plate 3** shows the existing leachate dam and inlet and **Plate 4** shows an internal leachate drain.



Plate 3 Existing Leachate Dam and Dirty Water Inlet from Composting Pad



Plate 4 Internal Drain to Leachate Dam

3.2.1.4 Site Access and Parking

An internal haul road, with access from Lemington Road, currently exists on the site (refer **Figure 7**). This road was present prior to the development of the existing composting operations at the site. Prior to the commencement of the existing composting operations the haul road was widened to 2m to accommodate incoming and outgoing heavy vehicle movement, the road surface was also upgraded to allow all-weather access, and surface water drainage was installed to divert stormwater away from the roadway onto suitably stable areas.

Parking for staff vehicles is located adjacent to the site office. There is adequate parking space to accommodate in excess of 10 light vehicles. Trucks entering the site are unloaded directly on the pad area. If trucks are required onsite for an extended period there is adequate room to park adjacent to the composting pad. **Plate 5** shows the existing carpark.



Plate 5 **Site Carpark and Heavy Vehicle Parking**

3.2.1.5 Site Office and Staff Amenities

There is an existing demountable site office and a separate storage building located at the facility which will continue to be used as part of the increased operations. The larger of these buildings (approximately 12m x 3m x 2.4m in size) is used for administration purposes, staff lunchroom, first aid, and as a sign in point for compost deliveries. The smaller building (approximately 6m x 3m x 2.4m in size) is used as a secure lockable area for smaller hand equipment. A toilet for staff is located separately to this building and consist of a single portaloo which is pumped out by a licenced waste contractor as required. The location of the existing site office is shown on **Figure 7**. **Plate 6** shows the existing site office and **Plate 7** shows the staff amenities.



Plate 6 Existing Site Office



Plate 7 Existing Site Amenities

3.2.1.6 Water Storage

Bettergrow currently access water from AGLs integrated water management system. Fly ash from AGLs power stations is placed into remaining voids across the Ravensworth No. 2 and Ravensworth South mine sites as part of the approved rehabilitation of the site. This fly ash is pumped as a thick slurry from the Bayswater Power Station and is currently deposited into Void 5. As a result of this process, water from the

flash seeps from Void 5 into Void 4 and is pumped from Void 4 back to the Bayswater Power Station for further re-use. Void 3, which has also been subject of filling from fly ash, seeps water into Void 4 also. Bettergrow currently access water from Void 4 for the composting process, and for dust suppression, via an existing AGL storage tank located on the eastern extent of the development footprint (refer **Figure 7**). This tank has an approximate capacity of 300,000 litres and is filled remotely from Void 4 by operators at the Bayswater Power Station. **Plate 8** shows the 300,000 litre onsite water storage and **Plate 9** shows the diesel supply pump from the tank.



Plate 8 300,000 Litre Onsite Raw Water Storage Tank



Plate 9 Diesel Pump used to Supply Water from the Raw Water Tank

3.2.2 Proposed Infrastructure

As discussed above in **Section 3.2.1**, not all of the infrastructure approved under DA 140/2016 has been constructed, and as such the remaining infrastructure will be constructed as part of the expanded 200,000tpa operations. The following sections detail the remaining infrastructure to be installed at the site. **Figure 8** below details the existing infrastructure at the site and also the proposed remaining infrastructure to be constructed.

3.2.2.1 Processing Pad Extension

As part of the expansion of the development up to 200,000tpa, the remaining pad processing area (Pads 3 and 4) will be constructed, including the related surface water drainage. The pad has been designed in accordance with the requirements of the *Environmental Guidelines: Composting and Related Organics Processing Facilities* (DECC 2003).

Works for the extension of the pad will comprise the preparation of an operations area by placing and compacting a sub-base of 300-400mm of site won overburden. The 300-400mm of site won overburden will be placed over an existing cap that has been constructed over the Void No. 3 fly ash dam. The capping layer over the fly ash material has been confirmed by geotechnical testing pitting to comprise a 400mm layer of overburden. The existing capping layer has been subject to rolling, compaction, and compaction testing during its construction, therefore providing a stable sub-base for the construction of Pads 3 and 4. Details of the engineering design and subsequent construction quality assurance are provided in **Appendix D. Plate 10** shows the pad extension area.



Plate 10 **Proposed Pad Extension Area**

3.2.2.2 Surface Water Drainage Extension

The construction of Pads 3 and 4 will also require the extension of the existing surface water drainage system. This will involve an extension to the perimeter bunding for Pads 3 and 4 to divert clean water runoff away from the composting area to the surrounding voids. An existing diversion bank and channel direct stormwater runoff from the eastern corner of the facility into the spillway of the sediment barrier. Bunds will be constructed using overburden and will be stabilised using compost produced onsite and a suitable grass seed mix. A detailed **Surface and Groundwater Management Plan** has been prepared for the site, in

addition to a **Surface Water** Assessment, and is attached as **Appendix R**. Further discussion on surface water is provided in **Section 9.2**.

3.2.2.3 Leachate Dam Expansion

The proposed expanded operations require increasing the existing leachate dam to its maximum design capacity of 50.2 ML to treat water from the Stage 1 and Stage 2 pad areas. The dam will be extended in an easterly direction and encompass the existing leachate dam. The bed and banks of the leachate dam will be constructed from compacted clay, screened compacted overburden and other approved materials to achieve the required permeability of less than 10-9 ms-1.

The leachate/sediment dam has been sized to provide a minimum capacity for a 1 in 25 year, 24 hour rainfall event (approximately 50 megalitres of water storage) which is in excess of the requirements of the *Environmental Guidelines: Composting and Related Organics Processing Facilities* (DECC 2003). This excess capacity will provide for the storage and use of additional process water. Whilst the leachate dam has an overall capacity to contain a 1 in 100 year, 24 hour rainfall event, Bettergrow is committed to ensuring the containment capacity within the onsite detention basin is sufficient to contain the volume of stormwater runoff generated over the operational catchment area of the site during a 1 in 25 year annual exceedance probabilities (AEP) 24 hour rainfall event (~ 5.99 mm/hr) or less.

3.2.2.4 Mobile Aerated Floor (MAF)

The expansion of the development up to 200,000tpa will also involve the installation of a Mobile Aerated Floor (MAF) (or equivalent) on a portion of the processing pad to allow for the composting of FOGO waste streams. A MAF is a compost aeration system that uses a computer-controlled fan that pushes air through movable perforated pipes underneath the compost pile. The system allows for the control of oxygen levels within the composting materials. The pipes for the system are 15m poly tubes with holes for air distribution and are laid on the ground parallel to each other at 4 metre spacings, and the material to be composted is piled up on top. Further details on the use of the MAF are provided in **Section 3.9.2**.

3.2.2.5 Machinery Storage Shelter

An equipment and machinery storage shelter will be constructed onsite as part of the expansion of the Project. This structure will be used for the onsite storage and maintenance of plant and equipment. The building will be an all-shelter design with shipping containers on the eastern and northern ends of the structure and a curved steel-supported tarp centrally as the roof. The floor of the shed will consist of compacted earth or road base to provide a solid and level work area. The structure will be approximately 36m long, 20m wide, and 5.7m high at the central section of the roof. The location of the machinery shelter in relation to the site is shown on **Figure 8**. **Plate 11** shows the typical design for the machinery shed proposed and **Appendix C** contains design plans for the structure.



Plate 11 Typical Machinery Storage Shelter

3.2.2.6 Trailer Wash

Trucks and equipment requiring cleaning at the site will be washed down with raw water pumped from the Ravensworth No. 4 void. A purpose-built trailer wash will be constructed onsite that will capture dirty water washed from trucks and equipment. A sump will be constructed as part of the wash bay that will collect sediment and water. The water will be decanted from the sump and re-used in the composting process, while the sediments will be extracted from the sump by a front-end loader and integrated into the composting process. The trailer wash is proposed to be located on the eastern side of the development area and is shown on **Figure 8**.

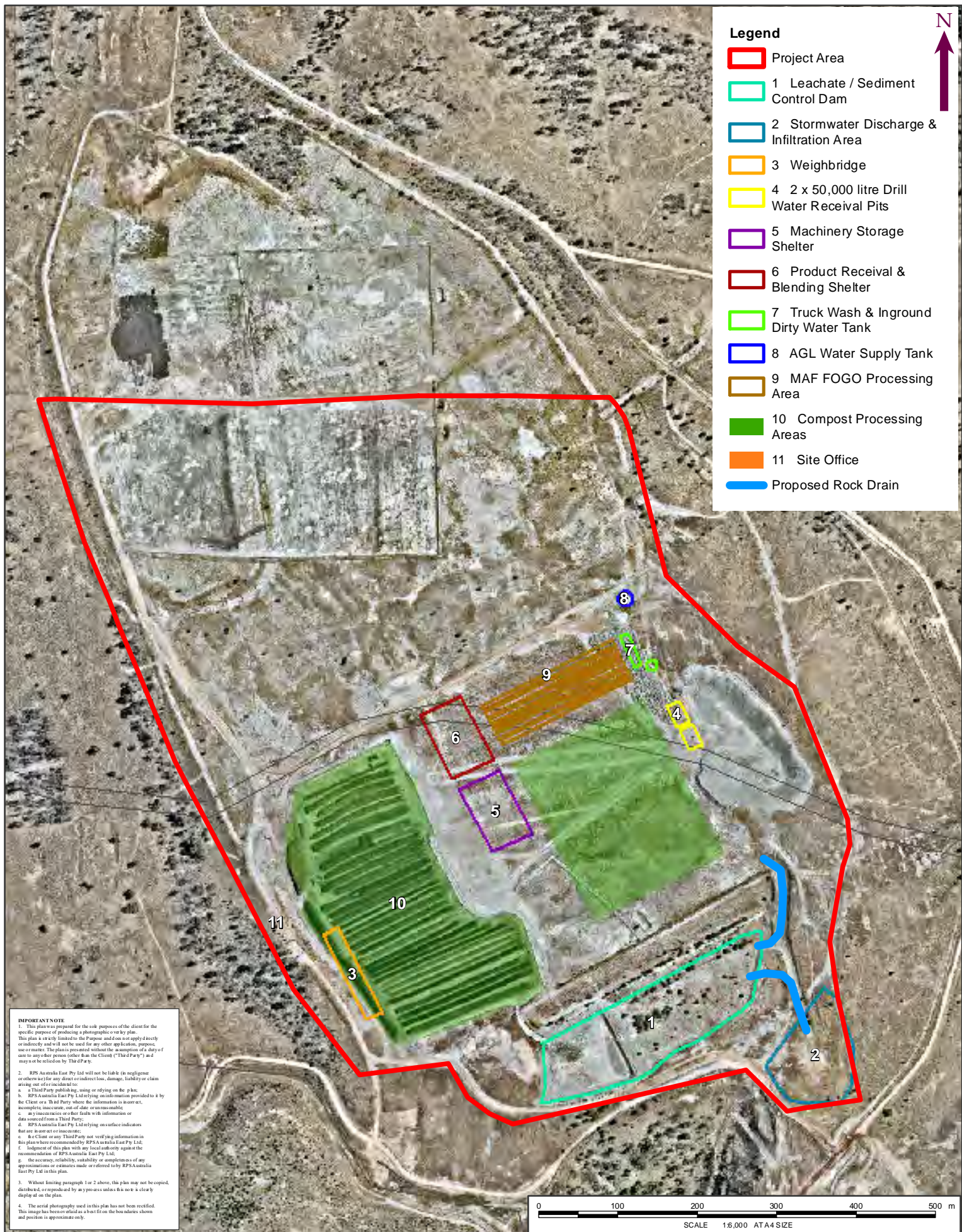


FIGURE 8: PROPOSED SITE INFRASTRUCTURE AND LAYOUT

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3.2.2.7 Product Receival and Blending Shelter

A product receival and blending shelter is proposed to be constructed as part of the expansion of the development to 200,000tpa. The building will be a receivals area for blending various organic wastes prior to being integrated into the composting process on the pad area. The building will be an all-shelter design with a push-wall along the left and right perimeters, with the floor constructed of concrete. The structure will be approximately 60m long, 20m wide, and 5.7m high.

The building will drain internally towards the composting area and any leachate will be contained and treated within the site leachate and sediment control management system. The structure location is shown on **Figure 8** and the typical building design is shown as **Plate 12**. Design plans for the structure are also provided in **Appendix C**.



Plate 12 Typical Product Receival Shelter

3.2.2.8 Weighbridge

A single weighbridge is proposed to be installed at the south-western corner of the development site adjacent to the processing pad. The bridge will weigh trucks entering the site with loads of organics, and also weigh outgoing trucks once unloaded.

The weighbridge will be designed to accommodate vehicles up to 27.5m in length, with the weighbridge structure having a reinforced concrete foundation, steel sub-structure, and concrete deck which will be raised above the surrounding ground surface. The location of the proposed weighbridge is shown on **Figure 8** and a typical weighbridge is shown as **Plate 13**.



Plate 13 Typical Weighbridge to be Installed On-site

3.2.2.9 Drill Water Receival Storage

It is proposed to install two 50,000 litre drill water receival pits at the operation for the storage and re-use of recycled drill water. This recycled water will be trucked from one of Bettergrow's existing drill mud processing facilities at either Vineyard or Wetherill Park in NSW and used in the organics composting process and for dust suppression on roads onsite. Each pit will be 5m long, 5m wide, and 2.5m deep which will provide for a 0.5m of freeboard in the storage capacity. Each storage will be constructed of reinforced concrete poured in situ on site or from pre-cast tanks delivered to site. The location of the storages is shown on **Figure 8**.

3.3 Services and Utilities

3.3.1 Site Power

There is currently mains power to the AGL water storage tank onsite, however there is no plan to extend this power supply to service the development. Power for the existing site office and staff amenities is currently sourced from a mobile generator. It is proposed that a generator will continue to be used to provide power for the expanded Project, however some components such as the weighbridge that require nominal power supplies are likely to be powered by solar and battery storage.

3.3.2 Water and Sewerage Disposal

There is no water supply (potable or raw) from a mains system available at the site. Bettergrow currently access water from Void 4 for the composting process, and for dust suppression, via an existing AGL storage tank located on the eastern extent of the development footprint (refer **Figure 8**). This tank has an approximate capacity of 300,000 litres and is filled remotely from Void 4 by operators at the Bayswater Power Station. It is proposed that this water supply will continue for the expanded development. Potable water for staff amenities is currently trucked to site and stored in 2 x 1000 litre tanks. It is proposed that potable water will continue to be trucked in.

There is no sewerage main available at the site, therefore a portaloo is used for sanitary purposes for site staff and visitors. This toilet is pumped out by a licenced waste contractor on an as needs basis dependant on the frequency of use. Due to the small number of staff onsite it is proposed that a portaloo will continue to be used for the expanded operations rather than installing a larger pump out system or Biocycle.

3.3.3 Communications

There are no fixed line communications available at the site. All staff will carry a UHF 2-way radio while onsite and when operating plant and equipment. 4G mobile phone services are available from all the major carriers at the site, however due to site rules mobile phones can only be utilised in the office and staff amenities building.

3.4 Plant and Equipment

3.4.1 Construction

During construction activities for the expansion of the operations, the following plant and equipment is likely to be utilised:

- 1 x truck and dog for civil works;
- 1 x D6 dozer for earthworks;
- 1 x 24 tonne excavator for earthworks;
- 1 x grader for earthworks;
- 1 x 7 tonne vibrating roller for earthworks;
- 1 x 33 tonne front end loader for earthworks;
- 1 x water truck for earthworks and dust suppression;
- 1 x Franna crane for erection of structures;
- 1 x portable generator for temporary site power;
- Hand power tools and equipment.

3.4.2 Operations

The following plant and equipment will be utilised at the site for composting and maintenance activities:

- 1 x green waste shredder (if required);
- 1 x trommel or stardeck screener;
- 1 x 24 tonne excavator;
- 3 x 33 tonne front end loader;
- 1 x top turn windrow turner;
- 2 x 15,000 litre water truck; and
- 4 x light vehicles.

A designated trailer wash is proposed to be constructed onsite and all vehicles leaving the facility will be required to wash down. Refuelling of vehicles and machinery would be undertaken within a bunded hardstand area adjacent to the proposed machinery shed.

3.5 Construction Activities

3.5.1 Site Preparation

Site preparation activities will generally involve the following:

- Undertake land survey, geotechnical and other preliminary investigations;
- Establishment and demarcation of work areas;
- Establishment of temporary sediment control structures, such as sediment fencing;
- Remove or move any impacted site infrastructure such as fencing or water lines;
- Establishment of ancillary facilities including an equipment compound and laydown areas; and
- Undertake grubbing and clearing as required.

3.5.2 Construction Materials

The majority of the construction materials for the expanded pad area will be sourced from either onsite or from local quarries. Prefabricated structures, such as the machinery shed and receival buildings, will be sourced either locally or from Newcastle. All other materials will be sourced from specialised waste equipment suppliers. The main construction materials required for the expansion will include:

- Overburden, aggregates, and road base for construction of the extended pad area, floors for the machinery shed and receivals buildings, and surface water bunds and drains;
- Ready mix concrete for lining drains, shed and building foundations, and culverts;
- Prefabricated pits and pipes for stormwater and leachate management;
- Shipping containers and prefabricated frame for the all-shelter roof;
- All-shelter roof tarp;
- Prefabricated posts and beams;
- Prefabricated weighbridge and associated concrete approaches;
- Trailer wash and associated sump and spray equipment;
- MAF system, including perforated poly pipe and aeration fan;
- Poly pipe water line to extend existing water supply from existing onsite water storage tank; and
- Geotextile fabric, compost, and grass seed mix for stabilising disturbed areas following construction activities.

3.5.3 Infrastructure Installation

The proposed 200,000tpa nutrient recycling facility will require the installation of additional infrastructure at the existing development. Additional construction activities and infrastructure required for the expansion of the facility will include:

- Complete the capping of the balance of the already approved platform;
- Installation of additional water management works including clean water diversion bunding and expanded stormwater and leachate management structures in accordance with the existing development approval;

- Installation of aerated organics processing area (or MAF);
- Installation of a single lane weigh bridge approximately 27.5m long;
- Installation of a dedicated trailer wash bay;
- Installation of covered hard stand areas for the receipt and blending of incoming organics including FOGO (if required); and
- Installation of a machinery shelter that will allow storage of tools and machinery for servicing.

3.5.4 Construction Schedule

Construction of activities for the expansion of the development are expected to be completed over a 6 month period, with a commencement date in mid-2020. Each construction aspect and duration are detailed below in Table 6.

Table 6 Construction Schedule

Activity	Month					
	1	2	3	4	5	6
Site preparation						
Civil Works (pad & drainage)						
Installation of machinery shed and receivals buildings						
Installation of weighbridge						
Installation of trailer wash						
Installation of MAF						
Stabilisation and rehabilitation of disturbed areas						
Commissioning						

3.6 Processing Operations

3.6.1 Accepted Wastes

The main waste types and materials to be accepted at the site will include:

- Urban wood residues for Composting (as defined in 'The compost order 2016');
- Paper Crumble for Composting (defined as General or Specific Exempted Waste);
- Wastewater from Bayswater mine Void 4;
- Drill mud process water (as defined in 'The Treated Drill Mud Order 2014');
- Natural organic fibrous Composting material (as defined in Schedule 1 of the POEO Act);
- Coal ash which meets the conditions of 'The coal ash order 2014';

- Biosolids;
- Garden Waste (as defined in Schedule 1 of the POEO Act); and
- Food and Garden Organics (FOGO) (as defined in Schedule 1 of the POEO Act).

Mixed waste organics is not proposed under this application and is not permissible in NSW.

3.6.2 Waste Sources

The organic wastes accepted at the facility come from a range of sources and industries, however none of the feedstock comes from mixed waste organics sources. Sources of waste include:

- Commercial kitchens and restaurants (food organics);
- Kerbside green waste collection from residential households (food and garden organics);
- Hunter Water and Sydney Water (biosolids);
- Sawmills (wood residues);
- Paper processors (paper crumble);
- Infrastructure projects (drill muds);
- Power stations (coal ash);
- Mines (raw water); and
- Food processors (organic fibrous material).

Kerbside organics (FO and FOGO) will originate from local Council waste collection services typically in Sydney, Central Coast, and Hunter Valley.

3.6.3 Composting Process

Composting operations at the site involve receiving a mix of organic material (as detailed above in **Section 3.6.1**) which are composted and blended before being used as part of existing approved rehabilitation activities to create a final compost layer for rehabilitated land.

Organic material is transported to the site and unloaded directly onto the existing hardstand area of approximately 16.58 ha. Organic material will comprise generally of garden organics, FOGO, clean timber, biosolids, drill mud process water, paper pulp, fly ash, lime, and manures and will be mixed and composted to create a dry and stable material suitable for rehabilitation.

Generally, the composting operations will involve the following key components:

- Biosolids received at the site will either be stored for a period to allow for reduction in volatile solids or will be immediately blended with garden organics and fly ash and placed into windrows for pasteurisation and turning;
- Windrows will be frequently turned with either a front-end loader, or a specialised windrow turner to ensure they remain aerobic and that pasteurisation of all products is achieved. Windrows may initially be covered with previously composted material to act as an odour filter or odour neutralising agents such as BioActive may be used to aid the process;
- Mixed organic material will continue to be composted in windrows and will be turned to maintain aerobic conditions. On windy days, water will be sprayed over the compost or biosolids to prevent dust

generation during the turning of windrows. The moisture content of windrows will be monitored and adjusted as required to maintain a moisture content of 45 – 50% w/w during composting;

- The temperature of the windrows will be monitored weekly as a minimum to create a temperature profile. The internal temperature of the windrows will need to reach a minimum temperature of 55°C which will be maintained for at least three consecutive days before each turn. It is anticipated that the internal temperature of 55°C will need to be maintained for a minimum of 15 days (with windrows being turned at least 5 times) to create a stabilised product;
- Compost windrows may reach temperatures higher than 55 °C during the initial phase of composting. When windrows reach internal temperatures greater than 62 °C, the windrow will be turned to dissipate heat and to provide oxygen which is essential for maintaining aerobic conditions;
- Compost windrows will be constructed so as to run parallel with the stormwater flows, in order to minimise the transport of leachate and gross solids to the leachate dams. Dimensions of open windrows would be typically 2.5m high x 4m wide x 150m long;
- The composting process is expected to take approximately 8 weeks, after which maturation will occur. Compost must be dried to a moisture content of approximately 35% w/w or less. Finished compost material will be sorted and may be screened and blended with other ingredients to create the required final product. Final compost material will be loaded onto trucks using a front-end loader and transported to the relevant area for rehabilitation use;
- The existing hardstand processing pad area will be used for the storage and processing of up to 200,000 tonnes per year of composted material. The existing hardstand area has been constructed to cater for increased operations at the site. Existing perimeter bunding around the hardstand area will be extended prevent clean stormwater flows from entering the composting hardstand area. Stormwater runoff generated as a result of rainfall on the hardstand area will be directed to the leachate dam for capture and management; and
- It is proposed to install a diesel pump at the leachate dam and utilise water for irrigation or use in the composting process. This may include wetting of hardstand pads and roadways and wetting of dry solid wastes to control the moisture content of windrows.

Further detail on waste management is provided in **Section 9.13**, including process flow diagrams.

3.7 Hours of Operation

3.7.1 Construction

It is anticipated that construction activities will occur during the hours of 7am to 5pm Monday to Friday and 8am to 1pm on Saturdays. No activities to occur on Sundays or Public Holidays. During this time, normal composting operations will continue to occur during the hours outlined below.

3.7.2 Operations

Hours of operation are expected to be from 6am to 6pm, Monday to Saturday. Deliveries would be received on weekdays from 6.30am to 5pm.

3.8 Work Force

3.8.1 Construction

During various construction phases, it is anticipated that there will be up to 15 staff and contractors required at any one time.

3.8.2 Operations

Approximately 4-6 staff will work at the facility and will be involved in the receiving of organic materials, turning the materials and spreading composted product onto rehabilitated areas.

3.9 Traffic Generation

3.9.1 Construction

It is anticipated that the average traffic generation during the construction phase will peak at an additional 10 movements per day. Concurrent construction and operations will occur during this period. Construction traffic will be generated from the following sources:

- Light vehicle movements for construction workers;
- Delivery of shipping containers;
- Delivery of prefabricated buildings and related materials;
- Delivery of miscellaneous building supplies and products;
- Mobilisation and de-mobilisation of heavy plant and equipment; and
- Delivery of aggregate materials and concrete for civil works.

Further detail on traffic movements and impacts are discussed below in **Section 9.4**.

3.9.2 Operations

As a result of the expansion of the facility, the quantities of organic materials received and dispatched from the site will increase. Accordingly, truck movements to and from the site will also increase. However, not all finished compost will be exported from the Ravensworth site as a portion will be utilised across the Ravensworth rehabilitation areas. The projected outgoing traffic volumes below assume all finished compost will leave the site via Lemington road, hence these figures are regarded as worst-case scenario.

Based on the increased annual production amount of 200,000tpa, the following traffic volumes are anticipated:

- Peak truck movements up to 108 per day; and
- Peak light vehicle movements up to 38 per day.

On the basis that all deliveries and compost transfers will require in-bound and out-bound movements, the worst-case traffic movements generated from the increased operations would be up to 146 movements per day (73 in-bound and 73 out-bound). The average vehicle movements will be considerably less than 146 due to the use of as many inbound trucks as possible to also take out finished product for delivery to sites.

Further detail on traffic movements and impacts are provided below in **Section 9.4**.

3.10 Fire Protection and Fire Water Management

The site currently has access to draw water from Void 4 which is pumped to a 300,000 litre tank in the north-eastern corner of the site. From this tank water trucks are able to be filled and water is supplied to compost rows within the pad area.

As a backup supply for firefighting, water can also be accessed from the leachate dam (when available) and can also be drawn directly from Void 4 should there be a pump failure at the 300,000 litre onsite tank.

Two water tankers are available on site at all times, with a combined capacity of 27,000 litres. Both tankers also double for use in the event of a fire. The tankers are fitted with high pressure sprays and pumping equipment which can be used for firefighting purposes until such time that the Rural Fire Service can attend.

Other measures employed to reduce the risk of fire are:

- No smoking in the proximity of combustible materials;
- Monitoring of windrow temperatures;
- Windrows are maintained at a moisture content above 40% weight for weight (w/w);
- Operational equipment onsite is able to be utilised to spread or remove materials in the event of a fire;
- Implementation of a site emergency response plan and procedures;
- Staff are trained in the use of onsite firefighting appliances;
- Access to soil materials that can be used to smother fires;
- All plant and equipment are regularly serviced to ensure that combustible materials are not accumulating in areas close to exhausts or engines;
- Fire extinguishers are provided on all mobile plant.

As detailed below in **Section 3.11**, the surface water drainage for the pad area is within a closed system and all water from within this closed system reports to the onsite leachate dam. Any overflow from this leachate dam then reports to Void 4 which does not discharge. As such fire water produced in the event of a fire will be captured in the onsite leachate dam which will have an expanded capacity of 16ML. This leachate dam rarely receives inflow and the storage would always be kept low through re-using the water in the composting process rather than accessing raw water. In the event of a fire, contaminated fire water captured in the leachate dam would be removed off site by a water tanker for treatment and disposal at an EPA licenced facility.

Further detail on fire protection and fire water management (including emergency response and compost management) are provided in **Section 9.11**.

3.11 Surface Water Management

The existing surface water drainage environment at the site is highly modified due to historic land use activities including mining, power generation and agriculture. Surface water currently drains to both Bowmans Creek and Bayswater Creek located east and west of the site, respectively. Both creeks converge with the Hunter River approximately 7km south of Ravensworth Void 3.

An integrated surface water management system is currently in place for the existing composting operations at the development site. This system has been designed such that it can be easily augmented to service the expanded operations, with only minor additional earthworks required to the rock drain to the east, expansion of the existing leachate dam, and the installation of some minor additional drains. All leachate contaminated surface water is designed to report to an expanded leachate dam (refer **Figure 8**) and clean water will be directed into clean water catchments. Further detail on surface water management is provided in **Section 9.2** and in **Appendix H**.

3.12 Environmental Management

The development currently operates under several management plans relevant to the activities undertaken at the site. The management plans are updated as necessary to incorporate any key operational changes. The documents include the following key sections as a minimum:

- Introduction
- Environmental Policy
- Organisational Structure

- Description of Activities
- Identification of Environmental Issues and Impacts
- Environmental Management
- Management Procedures
- Contingency Plans and Emergency Response
- Complaints Management
- Auditing and Reporting
- Continuous Improvement

Existing management plans will be updated in accordance with the proposed increased processing capacity, operational changes, and any post-consent requirements.

3.13 Site Decommissioning

3.13.1 Infrastructure Removal

At the end of the operational life of the development, all aboveground infrastructure would be removed. Key elements of Project decommissioning would include:

- Removal of all infrastructure, including buildings, sheds, underground pipes and cabling, foundations, weighbridge, and trailer wash;
- Recycling of any decommissioned items where possible;
- Removal of any remaining compost material they may be in excess to rehabilitation requirements; and
- Removal of any surface water management structures not required as part of the rehabilitation works.

Prior to the commencement of decommissioning activities, a rehabilitation and decommissioning plan will be prepared in consultation with AGL (or the landowner at that time) and submitted for approval by the NSW Department of Primary Industries (or equivalent). A decommissioning plan would include the following key elements:

- Rehabilitation strategies and objectives;
- Rehabilitation design criteria;
- Productivity targets to ensure the re-establishment of the site to the required land class;
- Expected timeline for rehabilitation works; and
- Monitoring and mitigation measures.

3.13.2 Site Rehabilitation

Site rehabilitation will involve firstly the removal of all infrastructure as detailed above in **Section 3.13.1**. Following infrastructure removal, the following will be undertaken to rehabilitate the disturbed areas:

- Removal of gravel from internal tracks and roads;
- Deep ripping of the entire pad area, ring roads, and hardstand areas to a depth of 400mm to reduce compaction;

- Re-contour and re-grade deep ripped areas and ensure suitable surface water management structures are in place to manage stormwater;
- Existing leachate and sediment control dam to remain in place to treat and manage stormwater flows from the rehabilitated areas until such time that the areas are stable;
- Disturbed areas to be spread with 150mm of topsoil, ameliorated with remaining compost, and treated with a suitable grass seed mix; and
- Use of groundcover species that are compatible with the existing species composition; and
- Establishment of suitable drainage and erosion and sediment control.

3.13.3 Final Land Use

At the conclusion of the Project all site infrastructure will be removed, and the site rehabilitated to enable post-development activities to resume. The most likely use for the site would be for grazing cattle.

4 PROJECT NEED AND ALTERNATIVES

4.1 Project Need

AGL currently have over 700 ha of land that require progressive rehabilitation and further areas are likely to become available in the future as mine voids are filled with fly ash from their coal fired power generators. Previous open cut mining operations across AGLs lands have resulted in the removal and disturbance of the topsoil, and the remaining sub-soils have limited value as a plant growth medium due to their poor structure, low nutrient levels, low organic matter, and high sodicity and salinity. Previous rehabilitation activities have been unsuccessful in re-establishing robust and diverse vegetation communities. Long term successful rehabilitation at the site is dependent on creating a biologically active soil with a sustainable carbon and nutrient cycle.

The Project will provide the biologically active organic material required to ameliorate the soils across AGLs lands which will facilitate successful rehabilitation at the Ravensworth No. 2 and Ravensworth South Mines. Organic material would be used to improve the soil across existing rehabilitated areas and new rehabilitation areas. The Project will also expedite the rehabilitation of AGLs disturbed areas through supplying organic materials produced onsite and provide a sustainable and cost-effective option for soil improvement.

The development of the facility up to 200,000 tpa will also provide the additional capacity to process an increased source of organic materials and also service the demand for composted organics in the broader supply market.

In order to reach State waste diversion targets, the NSW government has identified that additional waste infrastructure is required to receive, process, and convert organics for beneficial use. The decision by the NSW EPA to cease approval of the application Mixed Waste Organics to land will further increase the need for infrastructure capable of processing FOGO from council kerbside collections as well as GO and FO.

Bettergrow's proposal for Greenspot Hunter Valley will complement its other operations across NSW, including Greenspot Wetherill Park (SSD 7401), which are key pieces of waste infrastructure assisting the State government to meet its diversion of waste from landfill objectives. Greenspot Wetherill Park has existing approvals in place permitting the receipt and processing of GO, mixed FOGO and FO from Sydney councils and C&I food waste collectors.

4.2 Project Alternatives

4.2.1 Do Nothing

The 'do nothing' option was considered for the Project. The 'do nothing' option would involve the continuation of existing rehabilitation activities at the Project site without the onsite composting of organic material. This option would result in the continuation of low rehabilitation success across AGLs lands due to the existing poor soil conditions.

To successfully rehabilitate the Ravensworth No. 2 and Ravensworth South Mine voids, the 'do nothing' option would require the purchase and transportation of composted organic material from an external supplier. This would potentially limit the quantity or quality of composted material available for rehabilitation, which would ultimately reduce the quality of future rehabilitation. Composted organic material from an external supplier would still be required to be stored at the Project site and the appropriate environmental controls and water related infrastructure would still be required.

The processing of compost at the Project site provides a cost-effective outcome to improve the quality of rehabilitation at the Ravensworth No. 2 and Ravensworth South Mines and is therefore the preferred option for the Project.

If the capacity of the composting operations was not increased the excess organic materials available would likely be disposed of direct to landfill rather than being utilised as a sustainable re-use option.

5 PLANNING AND STATUTORY REQUIREMENTS

5.1 Overview

This chapter outlines the statutory framework that applies to the proposal. It describes the relevant Commonwealth and NSW legislation, and the regulatory framework under which the proposal would be assessed.

5.2 Commonwealth Legislation

5.2.1 Environmental Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is administered by the Commonwealth Department of the Environment (DoE) and provides a legal framework to protect and manage places defined as Matters of National Environmental Significance (MNES). The EPBC Act lists the following places as MNES:

- World Heritage properties;
- National heritage places;
- Wetlands of International Significance (including Ramsar wetlands);
- Listed threatened species and ecological communities;
- Listed Migratory Species protected under international agreements (CAMBA and JAMBA);
- The Great Barrier Reef Marine Park;
- Water resources (relating to coal seam gas development and large coal mining development);
- Protection of the Environment from Nuclear Actions; and
- Marine Environment.

Under Part 9 of the EPBC Act, actions that may have a significant impact on a MNES are deemed 'controlled actions' and require approval from the Commonwealth Minister for the Environment.

The assessment of the significance of the impact is based on the criteria listed in the DoE's *Significant Impact Guidelines 1.1* (DoE 2003). Should the Environment Minister decide the action will be taken in a manner that will ensure it will be likely to not have an adverse impact on the MNES, approval will be granted.

The proposal will not have an impact on MNES, and accordingly, approval from the Commonwealth Minister for the Environment is not required.

5.2.2 Native Title Act 1993

The Native Title Act provides a national framework for the recognition and protection of native title i.e. the rights and interests, recognised by common law, possessed under traditional laws and customs of Aboriginal and Torres Strait Islander people.

The Act recognises the ownership of land or waters by Aboriginal and Torres Strait Islander groups prior to European settlement and provides a mechanism for determining where native title exists, who holds it, and identifies compensation for actions affecting it. The Act establishes ways in which future dealings affecting native title may proceed and sets standards for those dealings.

People who hold native title have a right to practice their traditional laws and customs, whilst respecting Australian laws, and have a right to a) be consulted with regarding any proposed action on their land b) receive compensation for that action. In areas where native title existence has not been determined, a

compensation application can be made by a registered native title body corporate or group of people asserting native title rights.

A Native Title search has been undertaken for the development and it has been determined that there are no registered claims over the Project area.

5.3 NSW Legislation

5.3.1 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the planning and approvals process in NSW. The EP&A Act provides for the making of Environmental Planning Instruments (EPIs) including Local Environmental Plans (LEPs) and State Environmental Planning Policies (SEPPs), which set out requirements for particular localities and/or particular types of development. The applicable EPIs and the Regulations made under the EP&A Act determine the relevant planning approval pathway and the associated environmental assessment requirements for proposed development activities.

The existing composting activities at the site are currently approved under DA140/2016 (as modified) which allows for the processing of up to 76,000tpa of waste for use in rehabilitation. The proposed development subject of this application introduces new activities, including the sale of compost products, which will exceed the 100,000tpa threshold. A resource recovery facility proposing to receive and process waste in excess of 100,000tpa is deemed to be State significant development. Therefore, should the subject application be approved the existing approvals related to the operation will be surrendered. Section 4.12(8) of the EP&A Act requires that "A development application for State significant development or designated development is to be accompanied by an environmental impact statement prepared by or on behalf of the applicant in the form prescribed by the regulations".

Under Section 4.41 of the EP&A Act, the following authorisations that may be relevant to the proposal are not required for State significant development that is authorised by a development consent and accordingly the provisions of any Act that prohibit an activity without such an authority do not apply:

- An approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977;
- An Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974;
- A bushfire safety authority under section 100B of the Rural Fires Act 1997; and
- 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 of the Water Management Act 2000.

Division 8 of Part 6 of the *Heritage Act 1977* does not apply to prevent or interfere with the carrying out of State significant development that is authorised by a development consent granted after the commencement of this Division.

Under Section 4.42 of the EP&A Act an authorisation of the following kind cannot be refused if it is necessary for carrying out State significant development that is authorised by a development consent and is to be substantially consistent with the consent:

- An approval under section 15 of the Mine Subsidence Compensation Act 1961;
- An environment protection licence under Chapter 3 of the Protection of the Environment Operations Act 1997 (for any of the purposes referred to in section 43 of that Act); and
- A consent under section 138 of the Roads Act 1993.

5.3.2 Environmental Planning and Assessment Regulation 2000

The *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) contains key operational provisions for the NSW planning system. This includes procedures relating to development applications,

requirements for environmental assessments, environmental impact assessments, building regulations and other miscellaneous matters.

Schedule 2, Part 2 of the EP&A Regulation outlines the process for preparing and EIS.

Clause 13 of Schedule 3 of the EP&A Regulation identifies composting facilities or works that process more than 5,000 tonnes per year of organic materials to be designated development. However, Section 4.10 of the EP&A Act identifies that while, designated development is development that is declared to be designated development by an environmental planning instrument or the regulations, designated development does not include State significant development despite any such declaration.

5.3.3 Other Relevant State Legislation

5.3.3.1 Biodiversity Conservation Act 2016

As of 25th August 2017, the NSW Government repealed the *Threatened Species Conservation Act 1995* and replaced it with the *Biodiversity Conservation Act 2016* (BC Act) and its regulation (2017). This change has resulted in a new two-tiered approach to assessing a developments impact on biodiversity.

The first tier of assessment (i.e. thresholds tests) for 'local development' assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) initially focuses on 'triggers' that otherwise indicate a requirement, or not, for a second tier of assessment performed under Part 7 of the BC Act. Threshold tests applied to determine if a development or activity is "*likely to significantly affect threatened species*" are listed below:

- Impacts exceed the biodiversity offsets scheme thresholds (Section 7.2 of the BC Act); or
- Impacts are likely to significantly affect threatened species or ecological communities, or their habitats (Section 7.3 of the BC Act); or
- Impact on declared area of outstanding biodiversity value.

'Yes' to any of the above triggers a requirement for an impact assessment performed in accordance with the Biodiversity Assessment Methodology (BAM) by an Accredited Person (Section 7.7 of the BC Act). A **Preliminary Biodiversity Assessment** has been prepared for the development with detail provided in **Section 9.6**.

5.3.3.2 National Parks and Wildlife Act 1974

The NSW National Parks and Wildlife Act 1974 (NPW Act) provides for the conservation of places, objects and features of significance to Aboriginal people and protection of native flora and fauna. A person must not harm or desecrate an Aboriginal object or place without an Aboriginal heritage impact permit under Section 90 of the NPW Act. However, a Section 90 permit is not required for SSD approvals by provisions of Section 4.41 of the EP&A Act.

Places or objects of Aboriginal cultural heritage on or in the vicinity of the site will need to be managed in accordance with the NPW Act. Clause 86 of this Act states: a person must not harm or desecrate an object that the person knows is an Aboriginal object.

Potential impacts on Aboriginal heritage objects or places are unlikely due to the current highly disturbed nature of the site. Further detail is provided in the **Aboriginal Cultural Heritage Assessment** attached as **Appendix N** and is discussed further in **Section 9.8**.

5.3.3.3 Heritage Act 1977

The Heritage Act 1977 provides a legal framework for the management of items and places of State heritage significance, providing for their protection. The Act encourages conservation of the States heritage and provides for the identification and registration of items of State heritage significance.

Under Section 4.41 of the EP&A Act, an approval under Part 4, or an excavation permit under section 139 of the Heritage Act 1977 would not be required for an SSD.

A **Historic Heritage Assessment** (refer **Appendix O**) has been prepared for the development which included a search of the Local and State heritage registers (refer to **Section 9.9**). These searches found that there are no recorded heritage items within the Project site. It is considered there will be no impact to historic heritage in the locality of the development.

5.3.3.4 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) aims to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development. The POEO Act prohibits any person from causing pollution of waters or air and applies penalties for pollution offences.

Schedule 1 of the POEO Act identifies scheduled activities that require a license for the premises at which the activity is carried out. In accordance with clause 12 of Schedule 1, the composting activities carried out on the site require an environmental protection license (EPL) as it receives more than 5,000 tonnes per year of non-putrescible organics from an off-site source.

Bettergrow currently hold EPL 7654 for the existing composting and waste activities on the site. The proposed expansion of composting operations will require a variation to EPL 7654 to allow for the receipt and processing of up to 200,000 tonnes of organic waste per year. Variation of the EPL will be sought in consultation with the Environmental Protection Authority (EPA), subject to the approval of the State significant development.

5.3.3.5 Mine Subsidence Compensation Act 1961

The *Mine Subsidence Compensation Act 1961* (MSC Act) provides for the regulation of development on land potentially affected by mine subsidence. The erection or alteration of an improvement or subdivision of land within a mine subsidence district requires approval by the mine subsidence board under Section 15 of the Mine Subsidence Compensation Act 1961.

A review of the Mine Subsidence Districts information held by Subsidence Advisory NSW indicates the Project is located within the Patrick Plains Mine Subsidence District and that the extent of works would be classified as an improvement under the MSC Act. The approval cannot be refused following approval of the proposal as State significant development. Subsidence Advisory NSW will be consulted during the assessment process and the proposal will be required to satisfy development standards as per Subsidence Advisory NSW requirements.

5.3.3.6 Roads Act 1993

The Roads Act 1993 (Roads Act) provides a framework for the management of roads in NSW. It provides for the classification of roads and the declaration of the Roads and Maritime Services (RMS) and other public authorities for both classified and unclassified roads. The Roads Act confers functions on RMS and other roads authorities and allows distribution of such functions between RMS and other roads authorities.

The Roads Act sets out procedures for the opening and closing of public roads and regulates the carrying out of various activities on public roads. As part of the development assessment, a **Traffic Impact Assessment** (refer **Appendix J**) has been prepared which outlines the requirements for use of roads in the area. If required, approval from the RMS or Singleton Council will be sought under section 138 of the Roads Act. Traffic and road impacts are discussed further in **Section 9.4**.

5.4 Environmental Planning Instruments, Policies, and Plans

5.4.1 State Environmental Planning Policies

5.4.1.1 State Environmental Planning Policy (Infrastructure) 2007

Under Clause 121 of the *State Environmental Planning Policy (Infrastructure) 2007*, development for the purpose of waste or resource management facilities, other than development referred to in subclause (2), may be carried out by any person with consent on land in a prescribed zone. Resource management facilities are defined as including composting activities and the Prescribed Zones include the RU1 zone. Composting facilities are not referred to in subclause (2) and as such the existing composting activity and proposal are permissible with development consent under *State Environmental Planning Policy (Infrastructure) 2007*.

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

Under clause 23(3) of *State Environmental Planning Policy (State and Regional Development) 2011*, development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per year of waste is considered State significant development. As the proposal would exceed 100,000 tonnes per annum the proposal is considered State significant development.

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

State Environmental Planning Policy No 33 – Hazardous and Offensive Development (SEPP 33) aims to ensure that measures are employed to reduce the impact of a development that is a hazardous or offensive industry. Under SEPP 33 a consent authority must not consent to the carrying out of any development on land without considering:

- Current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development;
- Whether any public authority should be consulted concerning any environmental and land use safety requirements with which the development should comply;
- In the case of development for the purpose of a potentially hazardous industry—a preliminary hazard analysis prepared by or on behalf of the applicant;
- Any feasible alternatives to the carrying out of the development and the reasons for choosing the development the subject of the application (including any feasible alternatives for the location of the development and the reasons for choosing the location the subject of the application), and
- Any likely future use of the land surrounding the development.

The proposal involves the expansion of existing composting operations on a site that is appropriately zoned and isolated from sensitive receptors. The proposal does not involve the use of hazardous chemicals above screening levels that would trigger consideration as potentially hazardous development. While the proposal requires an EPL, extensive buffer lands exist which are owned by the landowner and are appropriately zoned to prevent encroachment.

5.4.1.4 State Environmental Planning Policy No 44 – Koala Habitat Protection

State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44) applies to the Singleton LGA. The aim of SEPP 44 is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

A **Preliminary Biodiversity Assessment** (refer **Appendix L**) has been prepared for the development and has determined that the Project site does not support vegetation suitable as koala habitat. Further, the Project will not involve the interaction with, or potential impact on any habitat trees located in the vicinity of the site.

The proposal would be limited to the highly disturbed areas only and would not result in any impacts to core koala habitat.

5.4.1.5 State Environmental Planning Policy No 55 – Remediation of Land

State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55) aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. Clause 7 of SEPP 55 requires a consent authority to consider whether the land is contaminated and whether it is suitable (or can be made suitable) for the proposed development.

Previous applications prepared for the development (including DA140/2016) determined the development site has no known contamination. The site is underlain by capped ash deposited in association with the operation of the Bayswater power station. Interaction with this ash is not expected to be required in association with the proposal.

5.4.2 Singleton Local Environment Plan 2013

5.4.2.1 Zoning and Permissibility

The site is zoned RU1 Primary Production under the Singleton Local Environment Plan 2013 (Singleton LEP). The objectives of the RU1 zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
- To encourage diversity in primary industry enterprises and systems appropriate for the area;
- To minimise the fragmentation and alienation of resource lands; and
- To minimise conflict between land uses within this zone and land uses within adjoining zones.

Composting operations are neither permissible with or without consent within the RU1 zone and as such are considered a prohibited land-use under the Singleton LEP. However, resource recovery including composting is permissible with consent within the RU1 zone under *State Environmental Planning Policy (Infrastructure) 2007*.

Section 1.9 of the Singleton LEP identifies that it is subject to the provisions of any State environmental planning policy that prevails as provided by Section 3.28 of the EP&A Act. Under Section 3.28 of the EP&A Act, in the event of an inconsistency between environmental planning instruments and unless otherwise provided, there is a general presumption that a State environmental planning policy prevails over a local environmental plan or other instrument made before or after that State environmental planning policy. As such the proposed development for the purpose of composting and resource recovery is permissible within the RU1 zone with consent.

Section 7.1 of the Singleton LEP requires earthworks for which development consent is required to not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.

Land zoning of the site and surrounding area is shown as **Figure 5**.

6 SITE SUITABILITY

6.1 Overview

This chapter provides an overview of the Development Consents that relate to the existing operations at the site, results of an independent consent and EPL audit, and a justification of the suitability of the site for the expanded operations.

6.2 Development Consents

Existing and past approvals that apply to the site are summarised below in **Table 7**.

Table 7 Summary of Development Consents

Application No.	Date Determined	Description of Development
DA 86/51	16.12.1986	Ravensworth South mine approval granted by NSW Department of Urban Affairs and Planning
DA 144/93	8.12.1993	Mine rehabilitation works issued by Singleton Council
DA 138/93	13.12.1993	Mine rehabilitation works issued by Muswellbrook Council
DA 140/2016.1	25.11.2016	Establishment and operation of a 50,000tpa composting facility to support the rehabilitation of the Ravensworth No. 2 mine and Ravensworth South mine
DA 140/2016.2	16.4.2018	Modification to increase materials from 50,000tpa to 76,000tpa
DA 140/2016.3	18.12.2018	Modification to sell processed material off-site from the facility

Current approved plans for the operations authorised under DA/140/2016.1, DA/140/2016.2, and DA/140/2016.3 are attached as **Appendix D**.

6.3 Independent Environmental Audit

An independent audit has been undertaken by Zambelli Environmental of DA/140/2016 against the current approved operations at the development site. This audit was undertaken on 17 July 2019 and 22 July 2019 and was desktop only.

In addition, an independent audit has been prepared by Zambelli Environmental of the conditions of EPL7654 against the current approved operations at the development site. This audit was undertaken on 17 July 2019 and 31 July 2019 and was desktop only.

Relevant information was supplied by Bettergrow to Zambelli Environmental for review to determine compliance with the consent and EPL conditions. Bettergrow staff were also interviewed as part of the audit process.

The following sections provide a summary of the performance of each environmental aspect relating to the consent and EPL conditions.

6.3.1 Noise

Zambelli Environmental has confirmed that there have been no instances of noise complaints since commencement of activities at the site. Noise from plant and equipment utilised on site is barely perceptible when moving away from the operational areas. Background noise from mining is audible at the site. The site is well positioned from sensitive receptors such that noise would not be audible at the closest sensitive receptor.

6.3.2 Odour

Zambelli Environmental has confirmed that there have been two instances of odour complaints since the commencement of activities. One instance was where an employee of Bettergrow observed a neutral composting odour and the second instance was when a person observed an odour offsite. The odour records did not highlight any attributing factors.

6.3.3 Dust

Zambelli Environmental has confirmed that the operation has access to significant water stored in void 4. This water is utilised to maintain moisture within the compost and control dust across process areas and on the access road. The haulage road is regularly watered, as to the hardstand pad and composting windrows. There have been no complaints received relating to dust.

6.3.4 Surface and Groundwater

Zambelli Environmental has reviewed photograph evidence from Bettergrow showing the presence of a water level marker post within the detention basin. The level marker displays marked graduations in increments which correspond to the volume of water contained within the dam. Incremental volumes correspond to 200 mm increases in water height.

Further images provided by Bettergrow also indicated that highly turbid water is not discharging from the site. Water within the lower basin (ie. the point of discharge) is shown to have a low turbidity which suggests that this water was not the result of a release from the leachate detention basin.

6.3.5 Drainage, Erosion Control and Nutrient Management

A review by Zambelli Environmental of recent photographs indicates that drainage conditions have not changed since the commencement of the operations at the site. Rock lined drains remain stable and indicate effective management of stormwater, with no erosion occurring. Perimeter drainage of the compost hardstand pad allows water to flow to the site leachate detention basin.

A review of leachate water quality 29/05/2019 indicated minimal amounts of ammonia, nitrate, slightly elevated TKN and slightly elevated phosphorous within the water column of the leachate detention basin. Leachate water is suitable for addition to compost windrows and also as dust suppression water on the composting hardstand pad. Water is not suitable for use outside of the leachate drainage area.

6.3.6 Waste Processing

Zambelli Environmental confirmed records from Bettergrow on 18/07/2019 that confirm waste received from offsite between 22/06/2018 to 21/06/2019 was under the 76,000tpa limit by 11,033.59 tonnes.

6.3.7 Complaints

Zambelli Environmental have confirmed from Bettergrow that the dedicated telephone complaints number 02 4577 6950 is displayed on incoming trucks. Zambelli Environmental also confirmed that the telephone number is displayed on Bettergrow's web site under Enquiry / Complaints: 02 4577 6950 which is diverted to a mobile phone at night for 24/7 attendance.

6.3.8 Training and Awareness

A review of training and awareness records by Zambelli Environmental indicates that regular training of onsite personnel is occurring, and competency achieved is being recorded. Records indicate that toolbox meetings are utilised to discuss key elements of control including the operation of plant and equipment.

The consent audit report and EPL audit report are provided as **Appendix P**.

6.4 Site Suitability Justification

As shown by both the consent and EPL audit results, the existing approved operations have been performing in accordance with the requirements of DA/140.2016 and EPL7654. Results show that the site is highly suitable for the existing composting operations and that these operations are being managed appropriately. The expansion of the operation to 200,000tpa will result in no increase to the current approved footprint. Site infrastructure within the existing approved footprint will be further developed to allow for the increase in throughput to 200,000tpa. The site would continue to be operated in the same manner as it has been and maintain its high level of compliance.

While there will be some environmental impacts as a consequence of the proposed expansion, such as increased traffic movements and odour generation potential, these can be adequately managed through existing and proposed site-specific safeguards. The site is considered appropriately located away from sensitive human or ecological receptors such that the expanded Project would be unlikely to result in adverse environmental consequences.

The site is a highly disturbed environment as a result of previous mining activities and the potential for additional biophysical impacts are considered as limited.

7 CONSULTATION AND STAKEHOLDER ENGAGEMENT

7.1 Overview

This chapter provides an overview of stakeholder engagement for the Project, a description of the stakeholder engagement activities undertaken and a summary of the findings that have been incorporated into this EIS. Further detail on the consultation undertaken for the Project is provided in **Appendix E**.

7.1.1 Formal Consultation Requirements

Stakeholder engagement and consultation is an integral component in the preparation of an EIS for State Significant Development (SSD) projects. The SEARs regarding consultation state that:

“During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups, and affected landowners. In particular you must consult with:

- *Singleton Council*
- *Department of Primary Industries*
- *Environment Protection Authority*
- *NSW Rural Fire Service*
- *Mine Subsidence Board*
- *Office of Environment and Heritage*
- *Roads and Maritime Services*
- *the surrounding landowners and occupiers that may be affected by the proposal.*

The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.”

7.2 Government Consultation

Consultation with government agencies was initiated by the Department of Planning, Industry, and Environment (DoPIE) during the preparation of the Secretary’s Environmental Assessment Requirements (SEARs). Government agencies that provided a response to DoPIE for inclusion in the SEARs included:

- Singleton Council;
- NSW Department of Planning, Industry, and Environment;
- NSW Environment Protection Authority;
- NSW Office of Environment and Heritage;
- NSW Roads and Maritime Services;
- Subsidence Advisory NSW;
- NSW Department of Primary Industries; and
- NSW Rural Fire Service.

Consultation with the above agencies has continued during the preparation of this EIS. A summary of the consultation undertaken with Government agencies is provided in **Appendix E**.

7.3 Aboriginal Community Consultation

Consultation with the local Aboriginal community was undertaken by RPS in accordance with clause 80C of the NPW Regulation and the four-stage process as detailed in *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCRs) (DECCW 2010). An overview of the consultation process is outlined below. Further detailed information is provided in the **Aboriginal Cultural Heritage Assessment** (ACHA) attached as **Appendix N**.

7.3.1 Stage 1 – Notification of Project and Registration of Interest

Formal consultation for the Project commenced on 10 September 2018 with the distribution of letters to the following parties requesting the identification of interested Aboriginal groups that may have an interest in the Project:

- National Native Title Tribunal;
- Native Title Services Corporation Limited;
- Registrar of Aboriginal Owners NSW Department of Aboriginal Affairs;
- Singleton Council;
- Office of Environment and Heritage (OEH) - Parramatta;
- Wanaruah Local Aboriginal Land Council; and
- Local Land Services.

Letters were then sent to the interested Aboriginal groups on 10 September 2018 inviting a registration of interest in the Project consultation process.

In addition, an advertisement was placed in the Singleton Argus on 12 September 2018 inviting registration of interest from Aboriginal parties in the Project consultation process. A list of the interested aboriginal parties and those that registered an interest in the Project are included in the **ACHA** in **Appendix N**.

7.3.2 Stage 2 – Provision of Project Information

Project information was provided to the Registered Aboriginal parties on 18 October 2018 which included an outline of project activities, proposed impact areas and the environmental assessment process.

7.3.3 Stage 3 – Gathering Information on Cultural Significance

Stage 3 included the gathering of information regarding cultural significance. The aim of Stage 3 was to facilitate a process by which the RAPs could have input into the heritage assessment methodology and management options and provide information on the cultural significance of Aboriginal objects or places.

The RAPs were provided with a proposed methodology for the cultural heritage assessment on 18 October 2018 and given a minimum of 28 days to respond. Eight groups returned their comments on the methodology.

Due to the project specifics, it was deemed appropriate that two RAPs be offered the opportunity to participate in the fieldworks. Selection of representatives was based on the RAPs who responded to the methodology and those who provided their insurances to work.

7.3.3.1 Survey

Two RAPs attended the survey on 29 January 2019. The purpose of the survey was to inspect visible ground surfaces, observe exposed soil profiles and other visible features such as gardens, access paths, mature trees and exposed areas around mature trees, and to assess the potential for archaeological deposits in the

Project Area. The survey also aimed to record any cultural sites or Aboriginal landscapes, if identified by the Aboriginal stakeholders.

No archaeological deposits were discovered in the Project Area and no cultural sites or Aboriginal landscapes were identified during the survey due to the highly disturbed nature of the site from previous mining activities.

7.3.4 Stage 4 – Review of Draft Aboriginal Cultural Heritage Assessment

The draft ACHA for the Project was provided to the RAPs on 26 March 2019 for review and comment and 3 responses were received. Following a review and integration of feedback the ACHA was made final on 15 April 2019.

Further detail on Aboriginal consultation is provided in **Section 9.8** below and in the **ACHA** attached as **Appendix N**.

7.4 Community and Stakeholder Consultation

The purpose of the community consultation program was to identify the key community stakeholders, present the stakeholders with details of the proposed Project and give the stakeholders an opportunity to provide feedback and identify any issues or concerns they may have.

The community consultation program focused upon those landowners adjacent to or likely to be directly impacted upon by the construction and or the operation of the Project.

7.4.1 Project Factsheet

A Project factsheet was prepared to introduce the Project to surrounding landowners and to provide contact details where individuals could obtain additional information on the Project and to provide their feedback. The Project factsheet provided information on Bettergrow, Greenspot Hunter Valley, a summary of proposed operations, received wastes, and site infrastructure. The factsheet also included an indicative Project timeline, need for the Project, and the employment and economic benefits.

The Project factsheet was distributed to surrounding landowners by mailout and to interested individuals upon request. A copy of the factsheet was also provided to Singleton Council by email and was posted on Bettergrow's website. A total of 60 copies of the factsheet were distributed. A copy of the Project factsheet is provided in **Appendix E**.

7.4.2 Project Feedback Form

A feedback form was distributed with the Project factsheet to surrounding landowners and interested parties. Stakeholders were invited to record any issues or concerns along with any other comments they may have on the Project. In addition, stakeholders could also include their contact details to receive further information on the Project. No feedback forms were received back from this mailout. A copy of the feedback form is provided in **Appendix E**.

7.4.3 Individual Meetings

Meetings with individual stakeholders were provided upon request or where it was considered there was a specific issue to be addressed with a surrounding landowner.

7.4.4 Consultation Database

A consultation database has been created and maintained to record stakeholder contact details and any issues, concerns or feedback received on the Project. A copy of the log is included in **Appendix E**.

7.4.5 Project Website

Project information has been provided on the Bettergrow website at <https://www.bettergrow.com.au/location>. The website includes an overview of Bettergrow's business, the Greenspot Hunter Valley operations, and a link to a Project feedback form.

7.4.6 Issues Raised

No responses were received from surrounding landholders from the consultation process, however Bettergrow will continue to liaise with stakeholders as part of their ongoing commitment to community engagement.

7.5 Ongoing Consultation

Bettergrow will continue to undertake consultation with stakeholders as necessary throughout all phases of the Project. Contact between Bettergrow, government agencies, and stakeholders will remain open through the regular communication mediums.

7.5.1 EIS Public Exhibition and Post Exhibition

This EIS will be placed on public exhibition for a minimum period of 30 days. Bettergrow will continue to commit resources to satisfy consultation requirements during the public exhibition phase and throughout the life of the Project. Bettergrow will actively engage with key stakeholders to ensure they are aware the EIS is on public exhibition.

The proponent will continue to undertake consultation with stakeholders as necessary post determination of the EIS.

8 ENVIRONMENTAL RISK ASSESSMENT

8.1 Overview

To assist in identifying the key environmental and social impacts associated with the Project and the likely severity, an Environmental Risk Assessment (ERA) was undertaken in accordance with Australian Standard AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines. The risk assessment is presented in full in **Appendix F**. The methodology used for the ERA process, and a summary of the results, are outlined below in the following sections.

8.2 Methodology

8.2.1 Key Environmental Impacts

The key environmental and social impacts associated with the Project and requiring further assessment and reporting were identified through:

- The existing environmental context of the site and surrounding locality (**Section 2**);
- The outcomes of consultation undertaken to date with government agencies and other relevant stakeholders (**Section 7**);
- Project SEARs (**Section 1.7**);
- Legislative and statutory framework (**Section 5**); and
- Specialist studies undertaken as part of the preparation of this EIS (**Section 9**).

The key environmental and social impacts identified for the Project, in no particular order, were:

- Traffic and transport;
- Odour, dust and greenhouse gas;
- Noise and vibration;
- Surface water;
- Groundwater;
- Aboriginal cultural heritage;
- Historic heritage;
- Biodiversity;
- Visual amenity;
- Socio-economic;
- Waste management;
- Fire and incident management; and
- Hazard and offence.

8.2.2 Evaluating Likelihood

The key environmental and social impacts for the Project were assigned a likelihood between almost impossible and certain in accordance with **Table 8** (column 1). Column 2 provides a description that elaborates on the possible likelihood categories and column 3 provides the frequency.

Table 8 Likelihood Table

Likelihood	Description	Frequency
Certain	Common Occurrence	At least daily
Very Likely	Expected to occur in most circumstances	Once per week
Likely	Probably will occur or has happened in the past	Once per month
Unlikely	Occurs Infrequently	Less than once per year
Possible	Could happen at some time	Less than once per 10 years
Almost Impossible	Not Likely to Occur	Less than 1 per 100 years

8.2.3 Evaluating Consequence

The key environmental and social impacts were assigned a consequence between catastrophic and negligible in accordance with **Table 9** (column 1). Columns 2 to 7 provide a guide to the elements considered when evaluating a consequence and column 8 provides the severity level.

Table 9 Consequence Table

	Health and Safety	Natural Environment	Community Relations & Cultural Heritage	Reputation/Media	Legal	Damage/Loss/business Interruption	Severity Level
Catastrophic	Multiple Fatality	Significant and irreversible impact on threatened species, habitat(s) or ecosystem(s)	Irreparable damage to sites of high cultural significance	Undeniably justified Government condemnation for illegal / unacceptable behaviour	Major prosecutions and fines resulting in incarcerations for senior executives	Significant Financial Loss. >\$10 million	6
Critical	Fatality	Very serious long-term environmental impairment of ecosystem function	Very serious widespread social impact. Irreparable damage to valued cultural items	Prolonged condemnation by media and/or NGO (national outcry)	Significant prosecutions and fines. Very serious litigation, including class actions	Major \$1 M - \$10 M	5
High	Lost Time Injury	Serious medium-term environmental effects	Ongoing serious social issues. Significant but repairable damages to structures/items of cultural significance	Serious public and/or media outcry	Major breach of regulation. Major litigation	High \$100,000 - \$1 M	4
Moderate	Medical Treatment required. Medical Treatment Injury	Moderate short-term effects but not effecting overall ecosystem function	Ongoing social issues. Minor permanent damage to items of cultural significance.	Attention from media and/or heightened concern by local community	Moderate legal issues, non-compliances and breaches of regulation	Low financial Loss <\$100,000	3
Minor	First Aid Treatment	Minor effects on biological or physical environment	Minor medium-term social impacts	Minor adverse local public or media attention and complaints	Minor legal issues, non-compliances and breaches of regulation.	Low Financial Loss <\$10,000	2
Almost Impossible	No medical attention. Report only	Limited damage to minimal areas of low significance	Low level repairable damage to commonplace structures	Public concern restricted to local complaints	Low level legal issues	Min Financial Loss <\$1000	1

8.2.4 Risk Assessment Matrix

The key environmental and social impacts were assigned a risk ranking between negligible and catastrophic in accordance with **Table 10**, based on the assessment of likelihood and consequence as described above.

Table 10 Risk Matrix Table

Likelihood	Consequence					
	Negligible	Minor	Moderate	High	Critical	Catastrophic
6 – Certain	6	12	18	24	30	36
5 – Very Likely	5	10	15	20	25	30
4 – Likely	4	8	12	16	20	24
3 – Unlikely	3	6	9	12	15	18
2 – Possible	2	4	6	8	10	12
1 – Almost Impossible	1	2	3	4	5	6

Risk Scores: 1 - 3 = Low; 4 - 10 = Moderate; 12 - 16 = High; 18 - 24 = Very High; 25 - 36 = Extreme

8.2.5 Summary of Risk Rankings

Table 11 below provides a summary of the risk rankings for the environmental and social impacts considered as part of the ERA. The risk assessment did not identify any aspects of the Project with a residual risk of catastrophic or critical.

Table 11 Summary of Environmental Risk Assessment

Category	Issue
Extreme	None
Very High	None
High	None
Moderate	Traffic and Access Noise and Vibration Air Quality Surface Water Groundwater Waste Management Hazard and Offense Aboriginal Heritage Fire and Incident Management Biodiversity Socio-economic Cumulative Impacts
Low	Greenhouse Gas Historic Heritage Visual

Where the individual risks were deemed unacceptable, or where a knowledge gap was identified, specialist technical studies were undertaken and additional mitigation measures and or management responses proposed. The following sections provide a detailed assessment of the key environmental and social impacts for the Project as identified above.

9 IMPACT ASSESSMENT, MITIGATION, AND MANAGEMENT

This section of the EIS provides a summary of the potential environmental and social impacts of the development and the measures that will be implemented to mitigate and manage these impacts. The issues have been prioritised in accordance with the SEARs, the risk assessment detailed above in **Section 7.0**, and the outcomes of stakeholder engagement.

9.1 Air Quality

9.1.1 Introduction

An assessment of odour, dust, and greenhouse gas (GHG) impacts from the proposed development has been undertaken by Advanced Environmental Dynamics. The purpose of this report was to determine the potential odour, dust, and GHG generating sources from the Project, undertake modelling of the worst case scenarios likely at the site, determine the likely impacts, and propose suitable mitigation measures and strategies. The **Air Quality Impact Assessment** is attached as **Appendix G**.

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

Air Quality and Odour – including:

- *a quantitative assessment of the potential air quality, dust, and odour impacts of the development in accordance with relevant Environment Protection Authority guidelines. This is to include the identification of existing and potential future sensitive receivers and consideration of approved and/or proposed developments in the vicinity.*
- *the details of buildings and air handling systems and strong justification (including quantitative evidence) for any material handling, processing or stockpiling external to a building.*
- *a greenhouse gas assessment.*
- *details of proposed mitigation, management and monitoring measures.*

A full copy of the SEARs requirements (including agency responses) are included within **Appendix B**.

9.1.2 Existing Environment

The development is located within an area that is dominated by coal mining and heavy industrial activities, including power generation and related activities (refer **Figure 3**). As such, the development is within a highly disturbed environment. The following land uses surround the development site:

- Liddell and Bayswater Power Station, including Lake Liddell to the north-west;
- Liddell Coal Operations to the north-west;
- New England Highway to the east;
- Ravensworth North Open-cut Coal Mine to the west; and
- Integra Coal Mine to the south-east.

It is additionally noted that Loop Organics have approval from Singleton Council (DA173/2016) for a composting facility on Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW with a capacity of 55,000 tpa. The location of Loop Organics relative to the Project site is depicted in **Figure 3**.

The nearest sensitive receivers (NSRs) to the development are a number of private rural residential properties at Camberwell Village which is approximately 7km to the southeast (refer **Figure 6**).

9.1.3 Greenhouse Gas

9.1.3.1 Methodology

A Green House Gas (GHG) inventory for the proposed development has been prepared based on the accounting and reporting principles detailed within the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard Revised Edition (WBCSD & WRI).

The Greenhouse Gas Protocol defines direct and indirect emissions through the concept of emission scopes, including:

- **Scope 1:** Direct GHG emissions. Direct GHG emissions occur from sources that are owned or controlled by a company. For example, emissions from combustion in owned or controlled boilers, furnaces or vehicles.
- **Scope 2:** Electricity indirect GHG emissions. This accounts for GHG emissions from the generation of purchased electricity consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated but the emissions are allocated to the organisation that owns or controls the plant or equipment where the electricity is consumed.
- **Scope 3:** Other Indirect GHG emissions. This is an optional reporting category that allows for the treatment of all other indirect GHG emissions resulting from a company's activities, which occur from sources not owned or controlled by the company. Examples include extraction and production of purchased materials; transportation of product by contractors; use of sold products and services; and employee business travel and commuting.

9.1.3.1.1 Calculation Approach

The GHG emission inventory for the Project is based on the methodology detailed in the Greenhouse Gas Protocol (WBCSD & WRI) and the relevant emission factors in the National Greenhouse Accounts (NGA) Factors (DEE, 2017a).

There are several GHGs including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). However, to simplify inventory accounting, a single unit of measurement, the carbon dioxide equivalent (CO_{2-e}) is used. This unit of measure accounts for the various global warming potentials of non-CO₂ gases as specified by DEE (2017a).

9.1.3.1.2 Emission Factors

The National Greenhouse Accounts Factors (DEE, 2017a) provides emission factors for a variety of activities. Scope 1 emissions factors associated with the proposed development are provided in **Table 12**, while Scope 2 emissions factors detailed in **Table 13**.

Table 12 Scope 1 Emission Factors: Consumption of Liquid Fuel for Transport (DEE, 2017a)

Category	Fuel Type	Energy Factor (GJ/KL)	EF (kg CO _{2-e} /GJ)		
			CO ₂	CH ₄	N ₂ O
General Transport	Diesel Oil	38.6	69.9	0.10	0.5
Post-2004 Vehicles	Diesel Oil	38.6	69.9	0.01	0.5
Heavy Vehicles – Euro iv	Diesel Oil	38.6	69.9	0.06	0.5
Heavy Vehicles – Euro iii	Diesel Oil	38.6	69.9	0.10	0.5
Heavy Vehicles – Euro i	Diesel Oil	38.6	69.9	0.20	0.5

Table 13 Scope 2 Emission Factors: Consumption of Electricity (DEE, 2017a)

Category	State	Units
Electricity Use	NSW	Kg CO _{2-e} /kwh

9.1.3.1.3 Emissions of GHG During Composting

In order to confirm the materiality (or otherwise) of emissions of GHG's during composting, direct measurement was undertaken of emissions of carbon dioxide, methane and nitrous oxide from a variety of samples on site as summarised in **Table 14** below.

Table 14 GHG Sampling at Ravensworth Facility (22.11.2018)

Sample Location	Description	Carbon Dioxide (CO ₂) (%)	Methane (CH ₄) (%)	Nitrous Oxide (N ₂ O) (PPM)
		Geotech GEM5000 Landfill Gas Analyser	Geotech GEM5000 Landfill Gas Analyser	ISO 21258
		± 2%	± 2%	± 2%
BG 1	Organic Sample, windrow SP1, fresh green waste	<0.1	<0.01	<0.1
BG 2	Five week old compost windrow No. 26, 3:1 mix (3 parts green organic + 1 part biosolids)	<0.1	<0.01	<0.1
BG 3	Product sample Windrow No. 13/14, 3:1 mix (3 parts green organic + 1 part biosolids)	<0.1	<0.01	<0.1
BG 4	Freshly opened compost windrow No. 23/2	<0.1	<0.01	<0.1
BG 5	One-week old compost windrow, test windrow, 3:1 mix (3 parts green organic + 1 part biosolids)	<0.1	<0.01	<0.1
BG 6	Biosolids sample windrow 3020 (20/11/2018)	<0.1	<0.01	<0.1

9.1.3.1.4 Materiality

Materiality is a concept used in accounting and auditing to minimise time spent verifying amounts and figures that do not impact a company's accounts or inventory in a material way. The exact materiality threshold that is used in GHG emissions accounting and auditing is subjective and dependant on the context of the site and the details of the inventory.

All emissions that originate within the boundary are to be included in the inventory unless they are excluded on materiality grounds. Information is considered to be material if, by its inclusion or exclusion it can be seen to influence any decisions or outcomes. However, emissions are assumed to be immaterial if they are likely to account for less than 5% of the overall emissions profile.

The following emissions are not included in the inventory for this Project on the basis of materiality:

- Based on the results from the GHG emissions sampling that was undertaken on site (**Table 14**) the inventory does not consider emissions associated with composting; and
- The consumption of unleaded petrol (ULP) which is limited to c. 1,500 litres per annum.

9.1.3.2 Impact Assessment

9.1.3.2.1 Greenhouse Gas Emission Sources

The facility does not consume electricity from the grid. A small petrol generator is currently used to generate electricity for the site office (consuming an estimated 1,500 litres per annum under peak operating conditions) and will continue to be used for the expanded Project. Electricity for the weigh bridge facility will be generated using solar power with battery storage.

Approximately 139,000 litres per annum of diesel will be consumed on site. A breakdown of the estimated fuel consumption under peak conditions is provided in **Table 15**.

Table 15 Emissions Sources and Fuel Consumption

Activity	Fuel Type	Diesel (Litres)
Loaders x 3	Diesel	76,500
Excavators x 1	Diesel	22,500
Windrow Turner x 1	Diesel	25,000
Water Cart x 2	Diesel	5,000
Trommel x 1	Diesel	10,000
Diesel Use Annual Total		139,000
Generator	Petrol	1,500
Petrol Use Annual Total		1,500

9.1.3.2.2 Greenhouse Gas Emissions

Scope 1 Emissions

Based on the use of the worst-case Scope 1 emission factors for the consumption of diesel fuel (refer **Table 12**) and an annual total of 139,000 litres of diesel fuel consumed on site, Scope 1 emissions associated with diesel consumption are estimated to be 379.3 tonnes of CO_{2-e} per annum (refer **Table 16**).

Table 16 Scope 1 Emissions: Diesel Consumption

Activity	Diesel (Litres)	CO ₂	CH ₄	N ₂ O	Total
		t CO _{2-e}	t CO _{2-e}	t CO _{2-e}	t CO _{2-e}
Loaders	76,500	206.4	0.6	1.8	208.8
Excavators	22,500	60.7	0.2	0.5	61.4
Windrow Turner	25,000	67.5	0.2	0.6	68.2
Water Carts	5,000	13.5	0.0	0.1	13.6
Trommel	10,000	27.0	0.1	0.2	27.3
Site Total (annually)	139,000	375.0	1.1	3.2	379.3

Scope 2 Emissions

As the site does not consume electricity, there are no Scope 2 emissions associated with the Project.

Total Greenhouse Gas Emissions

The total Scope 1 and Scope 2 emissions of greenhouse gases per annum associated with site activities is estimated to be 379.3 tonnes of CO_{2-e}.

Comparison with National Total

Australia's annual total emissions for the year to September 2017 were estimated to be 557.7 megatonnes (Mt) of CO_{2-e} (DEE, 2018). A comparison of the Project emissions with those of the waste sector indicates that the Project will contribute an additional 0.003% to this sector and an additional 0.0001% to the annual national total (excluding land use, land use change and forestry).

9.1.4 Odour

9.1.4.1 Methodology

9.1.4.1.1 Dispersion Modelling

This odour assessment has been undertaken in consideration of and/or in accordance with:

- (NSW DEC, 2005): Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC).
- Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW (DEC).
- Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW (DEC).

Further, the modelling has also been undertaken using the following:

- Odour dispersion modelling has been undertaken using a combination of the US EPA approved CALMET/CALPUFF modelling system with numerically simulated upper air data based on TAPM. Regional, three-dimensional wind fields that are used as input into the dispersion model were prepared using a combination of The Air Pollution Model (TAPM) developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Hurley, 2008), and CALMET, the meteorological pre-cursor for CALPUFF.
- A total of three years of hourly meteorology was developed corresponding to years 2015, 2016 and 2017.
- Odour emission sources have been represented in the dispersion model using area sources.

- When applying a peak to mean ratio to the results of the dispersion model which is based on hourly averages, consideration was given to Table 6.1 of the NSW DEC (2005).

Additional information pertaining to the technical set up of the specific models is provided in the **Air Quality Impact Assessment** attached as **Appendix G**.

9.1.4.1.2 Odour Emission Sources

The key odour emission sources associated with the activities include:

- Material composting in windrows;
- Finished product;
- Leachate water contained in the storage dam; and
- Potential odour associated with the short-term storage of intake streams in the semi-enclosed receival shed.

Specific odour emission rates (SOERs) based on odour sampling undertaken at the Greenspot Composting Facility are summarised in **Table 17** below. The facility does not currently undertake composting using forced aeration, therefore relevant information was sourced from previous data (AED, 2015) collected from another Greenspot facility to estimate the potential increase in odour emissions associated with forced aeration (refer **Table 18**). SOERs for FOGO which does not form part of the current operations was sourced from publicly available information which is present in **Table 19**.

Table 17 Specific Odour Emission Rates - Composting

Sample Location	Description	SOER ⁽¹⁾ (OU/m ³ /m ² /s)
BG 1	Organic Sample, windrow SP1, fresh green waste	0.027
BG 2	Five week old compost windrow No. 26, 3:1 mix (3 parts green organic + 1 part biosolids)	0.03
BG 3	Product sample windrow No. 13/14, 3:1 mix (3 parts green organic + 1 part biosolids)	0.032
BG 4	Freshly opened compost windrow No. 23/2	0.041
BG 5	One-week old compost windrow, test windrow, (3 parts green organic + 1 part biosolids)	0.045
BG 6	Biosolids sample windrow 3020 (20.11.2018)	0.553
Note (1): Results based on flux hood odour sampling undertaken at the Greenspot Facility on 22.11.2018		

Table 18 Specific Odour Emission Rates – Composting (AED, 2015)

Sample No	Sample	Description	Age (weeks)	SOER ⁽¹⁾ (OU/m ³ /m ² /s)
20	Fresh shredded green waste		0	0.266
11	P7	Uncovered (not aerated)	6	0.1
13	P7	Uncovered (aerated)	6	0.22
12	P8	Uncovered (not aerated)	7	0.065
14	P8	Uncovered (aerated)	7	0.133

Note (1): Based on data that was reported in support of the Greenspot Recycling Park Odour Assessment (AED, 2015)

Table 19 Specific Odour Emission Rates – Literature

Odour Source	SOER (OU/m ³ /m ² /s)
Green waste (shredded, uncovered)	2.37 ⁽¹⁾
Solid food processing wastes	2.5-5.0

Note (1): GHD Pty Ltd, 2003 – Camden Soil Mix Composting and Recycling Facility Local Environmental Study – Air Quality Assessment

9.1.4.1.3 Odour Emission Scenarios

Due to the remoteness of the site and the scale of the proposed operations, a single conservative odour scenario was considered based on peak volumes of material.

The SOERs adopted for the existing composting pad (refer **Figure 9** below) were based on site-specific measurements (**Table 17**) for recently turned and unturned composting windrows.

Based on the information provided in **Table 18** a factor of 2 was applied to the SOERs for the existing composting pad and used to represent potential SOERS for activities associated with the aerated composting pads (ACP).

The SOERs for the receival & blending shed as well as for the leachate/stormwater dam were adopted from the information summarised in **Table 19**.

Odour emission scenarios are provided in **Table 20**.

Table 20 Odour Emission Scenario

Source ID	Description	Surface Area (m ²)	SOER (OU/m ³ /m ² /s)		Odour Emission Rate	
			During Working Hours	Outside Working Hours	During Working Hours OU/s	Outside Working Hours OU/s
Aerated Composting Pad	Aerated Composting	10,800	0.072 ⁽²⁾	0.068 ⁽²⁾	772	734
Existing Composting Pad + New Composting Pad	Composting	34,560	0.034 ⁽¹⁾	0.034 ⁽¹⁾	1,175	1,175
	Freshly Turned Compost	8,640	0.041 ⁽¹⁾	0.034 ⁽¹⁾	354	294
	Product	12,000	0.032 ⁽¹⁾	0.032 ⁽¹⁾	384	384
Receival & Blending	Area	200	5.00 ⁽³⁾	0.00	1000	0
Leachate Pond	Area	19,800	1.00 ⁽¹⁾	1.00 ⁽¹⁾	19,800	19,800

Note:

- (1) Based on site-specific odour sampling results (Table 16).
- (2) Based on site-specific odour sampling results scaled by a factor of 2 to account for the potential increased odour emission rate associated with forced aeration (Table 16, Table 17).
- (3) Based on publicly available information (Table 18).

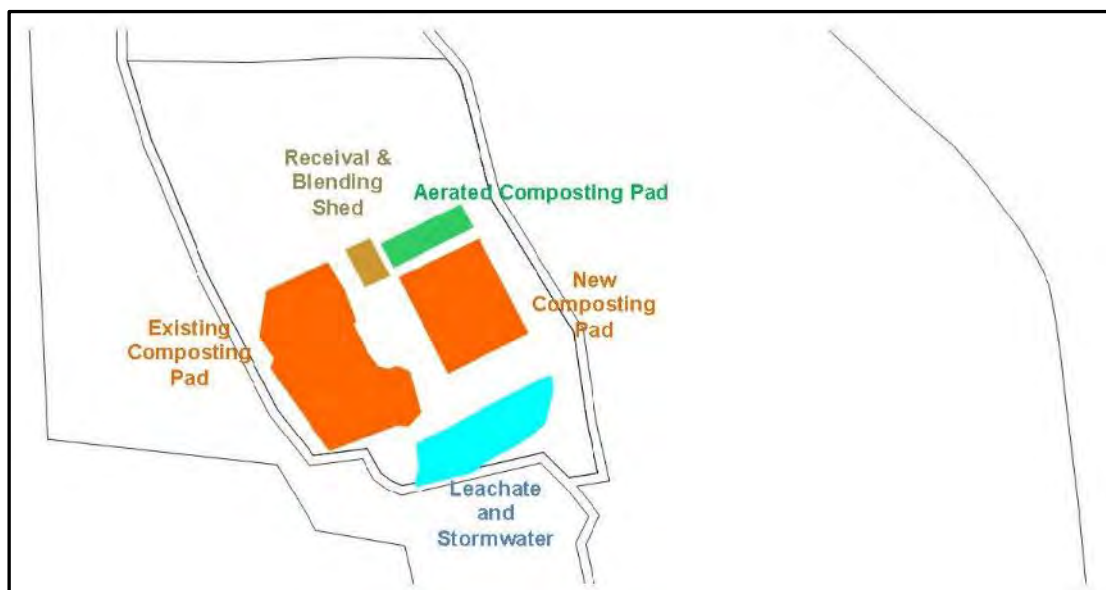


Figure 9 Location of Odour Emission Sources

9.1.4.2 Impact Assessment

Presented in **Table 21** is the maximum 99th percentile 1-second average concentration of odour that is predicted to occur at the nearest sensitive receptor location. Results of the odour modelling suggest that there will be no perceptible odour at the nearest receptor location (i.e. Camberwell) due to the Project with the maximum odour impact predicted to be less than 1 OU. Note that the minimum perceptible level of odour is 1.0 OU and the strictest regulatory criterion is 2 OU.

Table 21 Results for the 99th Percentile 1-Second Average Concentration of Odour

Scenario	Project Capacity	Meteorological Year	Camberwell (OU)
1	Peak	2015	<0.1
		2016	<0.1
		2017	<0.1

Presented in **Figure 10** through **Figure 12** are contour plots of the 99th percentile, 1-second average concentration of odour as predicted using the CALPUFF dispersion model for meteorological years 2015 through 2017 for the peak tonnage scenario. Contours are colour coded with:

- green contours associated with an odour concentration less than 0.1 OU;
- yellow contours for values between 0.1 OU and 1.0 OU;
- orange contours for values between 1.0 OU and 2.0 OU; and
- red contours for values over the minimum regulatory criterion of 2 OU.

Plots show that no significant issues are indicated by the results of the dispersion modelling at any off-site location.



Figure 10 Peak Tonnage Scenario – 99th Percentile 1-Second Average Concentration of Odour (2015 Meteorology)



Figure 11 Peak Tonnage Scenario – 99th Percentile 1-Second Average Concentration of Odour (2016 Meteorology)

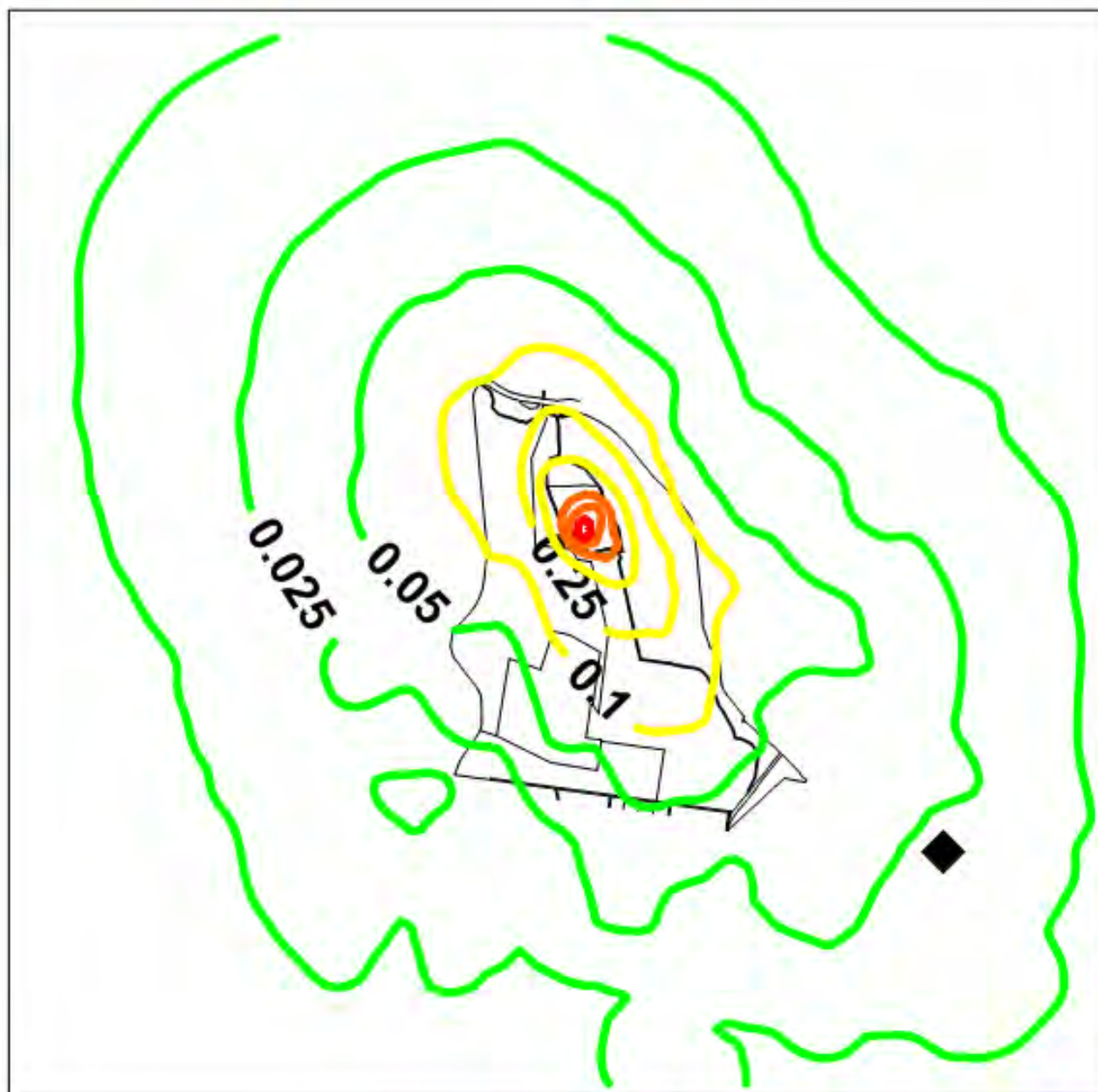


Figure 12 Peak Tonnage Scenario – 99th Percentile 1-Second Average Concentration of Odour (2017 Meteorology)

9.1.4.3 Cumulative Impacts

As noted in **Section 9.1.2**, a second composting facility operated by Loop Organics is located to the south of the Greenspot Ravensworth facility with the potential for 55,000 tpa. Both composting facilities utilise a common entrance on Lemington Road.

Due to the scale of the predicted impacts of odour associated with composting activities at the Greenspot Facility, and since the Loop Organics Environmental Protection Licence requires that the facility be operated in a manner designed to minimise the risk of offensive odour, cumulative impacts of odour have not been explicitly modelled as they are expected to be minimal.

9.1.5 Dust

9.1.5.1 Methodology

9.1.5.1.1 Ambient Air Quality Objectives

Assessment criteria related to dust as prescribed in NSW DEC (2005) include dust deposition, total suspended particulates (TSP) and particulate matter with an aerodynamic radius less than 10 micrometres (PM₁₀) (refer **Table 22**).

As particulate matter with an aerodynamic diameter less than 2.5 microns (PM_{2.5}) is of interest to the National Environmental Protection Council (NEPC) the associated advisory levels as noted in the National Environment Protection Measure (NEPM) Ambient Air Quality (AAQ) are included in the table for completeness.

Table 22 Dust Impact Assessment Criteria

Pollutant	Averaging Period	Project Goal	Source
TSP	Annual	90 µg/m ³	NHMRC (1996)
PM ₁₀	24 Hour	50 µg/m ³	NEPC (1998)
	Annual	30 µg/m ³	EPA (1998)
PM _{2.5}	24 Hour	25 µg/m ³	NEPM - advisory
	Annual	8 µg/m ³	NEPM - advisory
Dust Deposition	Monthly ⁽¹⁾	2 mg/m ² /day	NERDDC (1988)
	Monthly ⁽²⁾	4 mg/m ² /day	NERDDC (1988)

Note:

- (1) Maximum increase in deposited dust levels
- (2) Maximum total deposited dust level

Due to the high moisture content of both the composting material and final product, wheel generated dust on unsealed roads is considered the primary emission source of dust associated with the Project. As such, the focus of the dust assessment has been on the larger size particulate ranges, and in particular PM₁₀, TSP, and dust deposition. PM_{2.5} particles have not been considered as part of the dust assessment as they are related primarily to combustion-type emission sources.

9.1.5.1.2 Existing Air Quality

The nearest dust monitoring location to the proposed development is the NSW Office of Environment and Heritage's (OEH) Camberwell monitoring station. PM₁₀ and PM_{2.5} are measured at this location only.

A summary of the 24-hour average and annual average concentration of PM₁₀ and PM_{2.5} at the Camberwell monitoring station for 2015, 2016 and 2017 are provided in **Table 23**.

Exceedances of the ambient air criterion of 50 µg/m³ for the 24-hour average concentration of PM₁₀ is a frequent occurrence at this location with 11 to 33 exceedances days per year recorded during the 3 year period 2015 through 2017. Monitoring data suggest that air quality at this location is significantly impacted upon by surrounding mining operations.

Table 23 24 Hour Average and Annual Average Concentration of PM₁₀ and PM_{2.5} at Camberwell Station

Region	Station	Year	PM ₁₀					PM _{2.5}				
			Annual Average	Max Daily Avg	Date	Days Above Standard		Average Annual	Max Daily Avg	Date	Days Above Standard	
						(a)	(b)				(a)	(b)
Upper Hunter	Camberwell	2015	22.0	86.7	6/5	11	*	7.2	23.9	10/3	0	0
		2016	24.5	65.7	23/5	11	*	7.5	21.1	8/5	0	0
		2017	27.4	101.5	13/9	33	*	7.4	24.7	12/2	0	0

Note: (1) Levels above standards are shown in bold

(2) Days above standard are divided into (a) non-exceptional and (b) exceptional events. Exceptional events are those related to dust storms, fires etc.

(3) Camberwell is a Small Upper Hunter Air Quality Monitoring Network community monitoring station which is not suitable for assessing performance against NEPM standards

9.1.5.1.3 Estimates of the Background Level of PM₁₀

In NSW, the treatment of how to incorporate estimates for existing levels of pollutants depends on the assessment type (i.e. Level 1 – screening, or Level 2 – refined) (NSW EPA, 2005). For a Level 1 assessment, the maximum recorded concentration obtained at a ‘representative’ monitoring location is added to the maximum predicted concentration based on project-related emission sources. Based on the information contained in **Table 23**, a Level 1 background estimate for the Camberwell monitoring location based on a maximum recorded 24-hour average concentration of PM₁₀ will exceed the assessment criteria of 50 µg/m³.

For a Level 2 assessment (NSW EPA, 2005), a time series of measured dust levels (representing the background-level) is combined with a time series of modelled dust levels from which a resultant maximum concentration is determined. This approach is considered to be a more accurate representation of the temporal variability of naturally occurring dust levels.

Based on the summary of monitoring results from the Camberwell monitoring station, the average 75th percentile 24-hour average concentration of PM₁₀ over the 3 year period 2015 through 2017 is c.31 µg/m³.

For this assessment, the focus of the presentation of results is on Project only impacts (ie. in isolation of natural and other local emission sources). However, the interpretation of results in consideration of the aforementioned discussion in relation the various approaches that may be adopted to represent estimates of current dust levels will be discussed.

9.1.5.1.4 Dust Emission Sources

The key dust emission source associated with the facility is the movement of trucks on the unsealed internal haul road. A breakdown of heavy vehicle movements during the operational phase of the Project is provided in the **Air Quality Impact Assessment** attached as **Appendix G**.

9.1.5.1.5 Dust Emissions Scenario

Two dust emissions scenarios have been considered based on average and peak vehicle movements:

- **Peak Scenario:** Considers the emission of dust based on 108 heavy vehicle movements per day during normal operating hours; and
- **Average Scenario:** Considers the emission of dust based on 73 heavy vehicle movements per day during normal operating hours.

9.1.5.1.6 Dust Emission Inventory

Estimates for dust emission rates have been sourced from the National Pollutant Inventory Emissions Estimation Technique Manual for Mining version 3.1 (NPI EETM) dated January 2012 (NPI EETM, 2012). The NPI EETM (2012) includes a number of options for emission factors including default values (to be used in the absence of site-specific information) as well as emission factor formulas.

A summary of the heavy vehicle information is provided in **Table 24** with dust emission factors and dust emission rates provided in **Table 25** and **Table 26** respectively.

Table 24 Heavy Vehicle Information

Vehicle	Truck Mass (t) (used in model)	Truck Mass (t)	
		Tare	Gross
Truck and Dog	57.5	18	57.5
Semi Tippers & Walking Floors	43.5	14.6	43.5
19m B Doubles	62.5	26.4	62.5
Semi Tippers	43.5	14.6	43.5
Semi Liquid Tankers	62.5	26	62.5

Table 25 Dust Emission Factor Options (NPI EETM, 2012)

Vehicle	Uncontrolled Emission Factor (kg/KVT) ⁽¹⁾		Control (%)	Controlled Emission Factor (kg/KVT)	
	TSP	PM ₁₀		TSP	PM ₁₀
Truck and Dog	2.657	0.662	75%	0.664	0.166
Semi Tippers & Walking Floors	2.344	0.584	75%	0.586	0.146
19m B Doubles	2.759	0.688	75%	0.690	0.172
Semi Tippers	2.344	0.584	75%	0.586	0.146
Semi Liquid Tankers	2.759	0.688	75%	0.690	0.172

Note (1): A silt content of 4.3% based on USE EPA AP42 Table 11.9.3 has been assumed.

Table 26 Dust Emission Rates

Activity	Units	Average		Peak	
		TSP	PM ₁₀	TSP	PM ₁₀
Haul Road Length	km	5.3	5.3	5.3	5.3
Wheel Generated Dust	kg/VKT/day	47.7	11.9	70.7	17.6
	kg/day	251	63	372	93

9.1.5.2 Impact Assessment

9.1.5.2.1 Dispersion Modelling

Presented in **Table 27** are the results of the dispersion modelling at the location of the nearest receptor, ie. Camberwell for the peak and average scenarios. As the haul route is a shared corridor with other users, the site boundary has not been defined to include the haul road. Therefore, presenting Project-only results based on 'outside the site boundary' was not considered representative of potential impacts to off-site receptors.

Table 27 Dispersion Modelling – Facility in Isolation

Scenario	Vehicle Movement Scenario	Pollutants (units)	Averaging Period	Meteorological Year	Project Only Maximum Camberwell (g/m ² /month)	Assessment Criteria (total including background)
1	Peak (108 truck movements /day)	TSP (µg/m ³)	Annual ⁽¹⁾	2015	0.4	90
				2016	0.4	90
				2017	0.3	90
		PM ₁₀ (µg/m ³)	24hour	2015	1.6	50
				2016	12.6	50
				2017	1.5	50
			Annual ⁽¹⁾	2015	0.2	30
				2016	0.2	30
				2017	0.2	30
		Dust Depositional (g/m ² /month)	Monthly ⁽¹⁾	2015	<0.1	2.0/4.0 ⁽³⁾
				2016	<0.1	2.0/4.0 ⁽³⁾
				2017	<0.1	2.0/4.0 ⁽³⁾
2	Average (63 truck movements /day)	TSP (µg/m ³)	Annual ⁽¹⁾	2015	0.2	90
				2016	0.3	90
				2017	0.2	90
		PM ₁₀ (µg/m ³)	24hour	2015	1.1	50
				2016	1.0	50
				2017	1.0	50
			Annual ⁽¹⁾	2015	0.1	30
				2016	0.1	30
				2017	0.1	30
		Dust Depositional (g/m ² /month)	Monthly ⁽¹⁾	2015	<0.1	2.0/4.0 ⁽³⁾
				2016	<0.1	2.0/4.0 ⁽³⁾
				2017	<0.1	2.0/4.0 ⁽³⁾

Note: (1) Assumes peak movements 365 days per year

(2) Assumes average movements 365 days per year

(3) Assessment criterion is: Project only contribution not to exceed 2 g/m²/month with total (including background) not to exceed 4 g/m²/month

(4) Reported results are conservative as they are based on vehicle movements at the specified daily rate 365 days per year

A Screening Level 1 approach involves the adding of the maximum recorded concentration to the results of the dispersion modelling. Independent of the magnitude of the predicted impact from the facility, a Level 1 approach will lead to an exceedance of the impact assessment criteria for the 24 hour average concentration of PM₁₀ as maximum levels of PM₁₀ recorded at the Camberwell monitoring station exceeded 50 µg/m³ during 2015, 2016 and 2017 which correspond to each of the three meteorological years modelled.

This limitation noted, results of the dispersion modelling highlights that Project related dust emission sources will be immaterial at the nearest off-site receptor location i.e. Camberwell.

9.1.5.2.2 Contour Plots

Presented in **Figure 13** through **Figure 15** are contour plots of the maximum 24-hour average concentration of PM₁₀ predicted using the CALPUFF dispersion model for meteorological years 2015 through 2017 for the two scenarios modelled.

Note that the results are presented for the development in isolation and do not include an estimate of background levels. Thus, the results presented are not directly comparable with the impact assessment criteria presented above in **Table 27**.

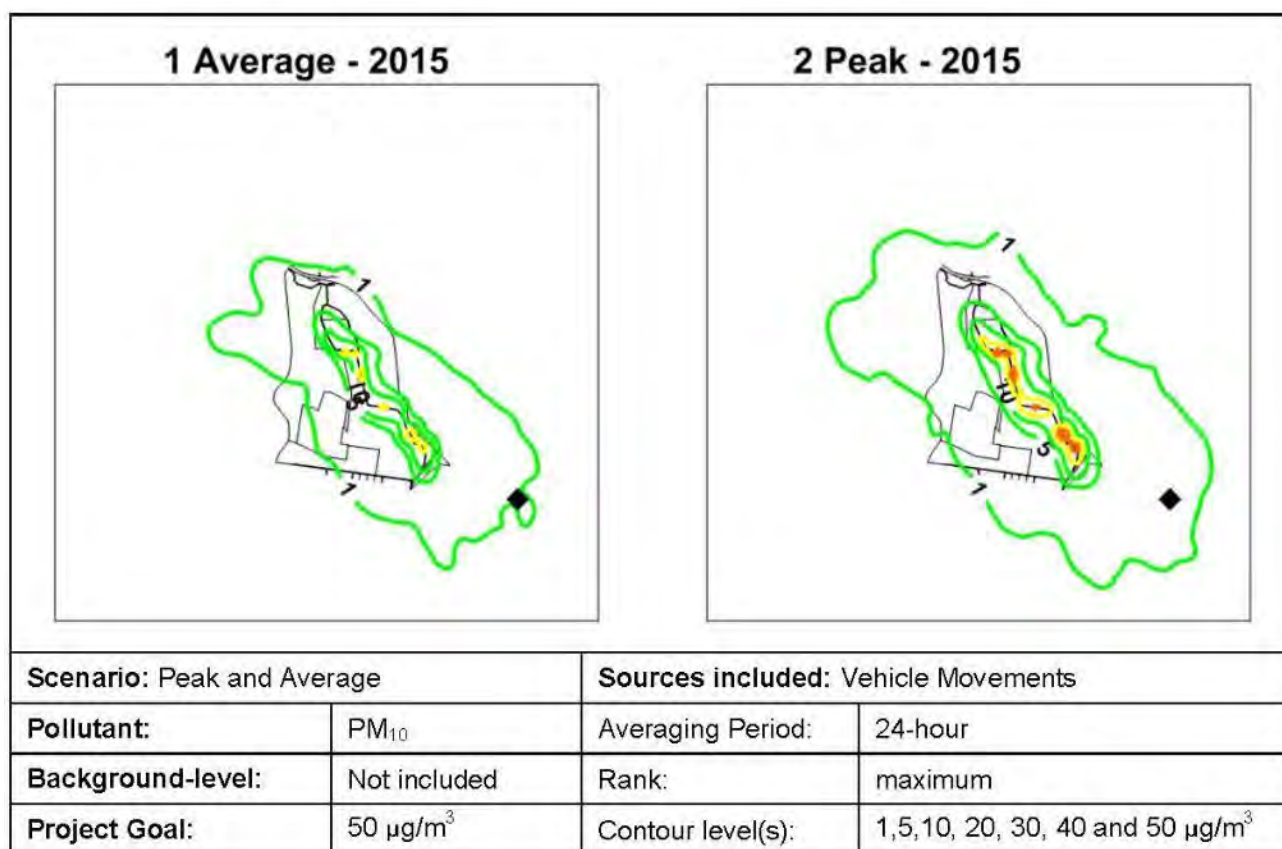


Figure 13 Development in Isolation – Maximum 24 Hour Average Concentration of PM₁₀ (2015 Meteorology)

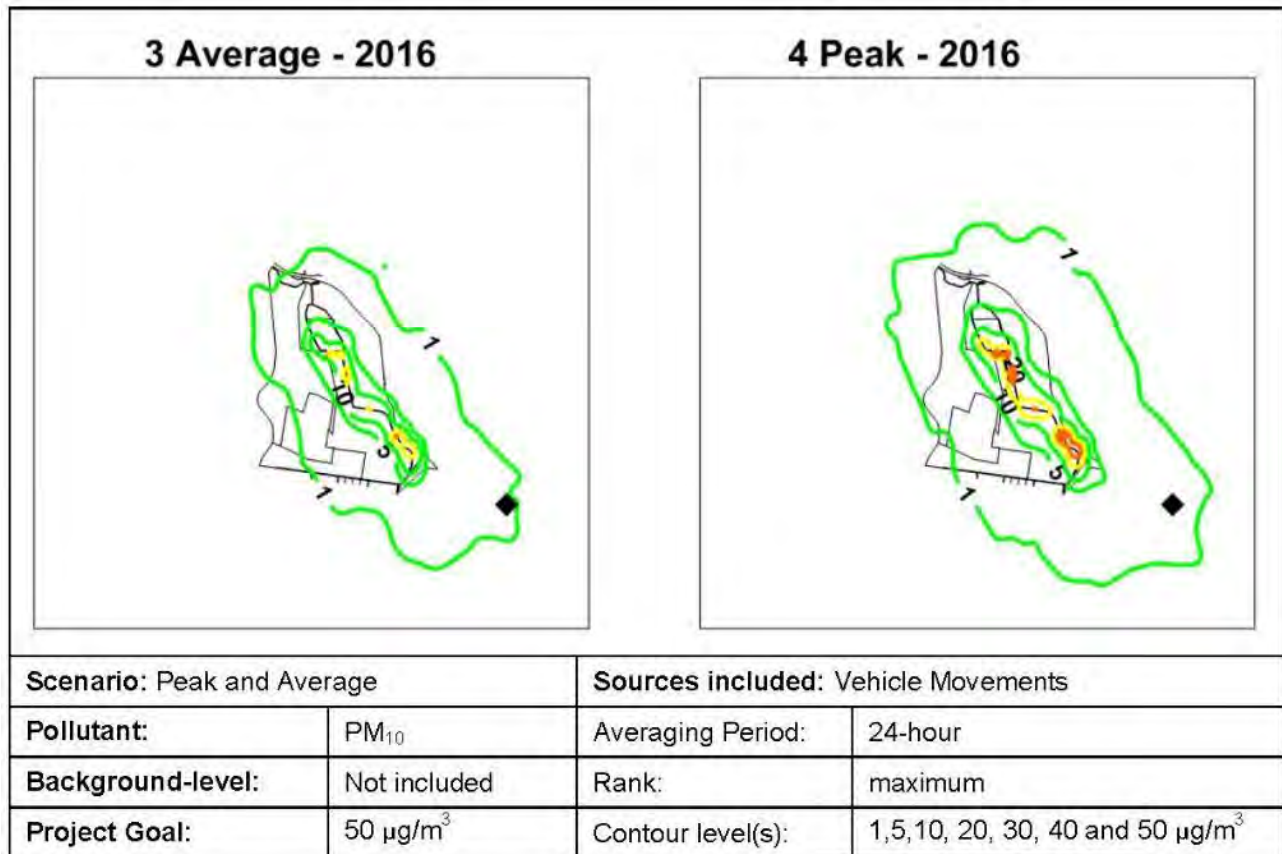


Figure 14 Development in Isolation – Maximum 24 Hour Average Concentration of PM₁₀ (2016 Meteorology)

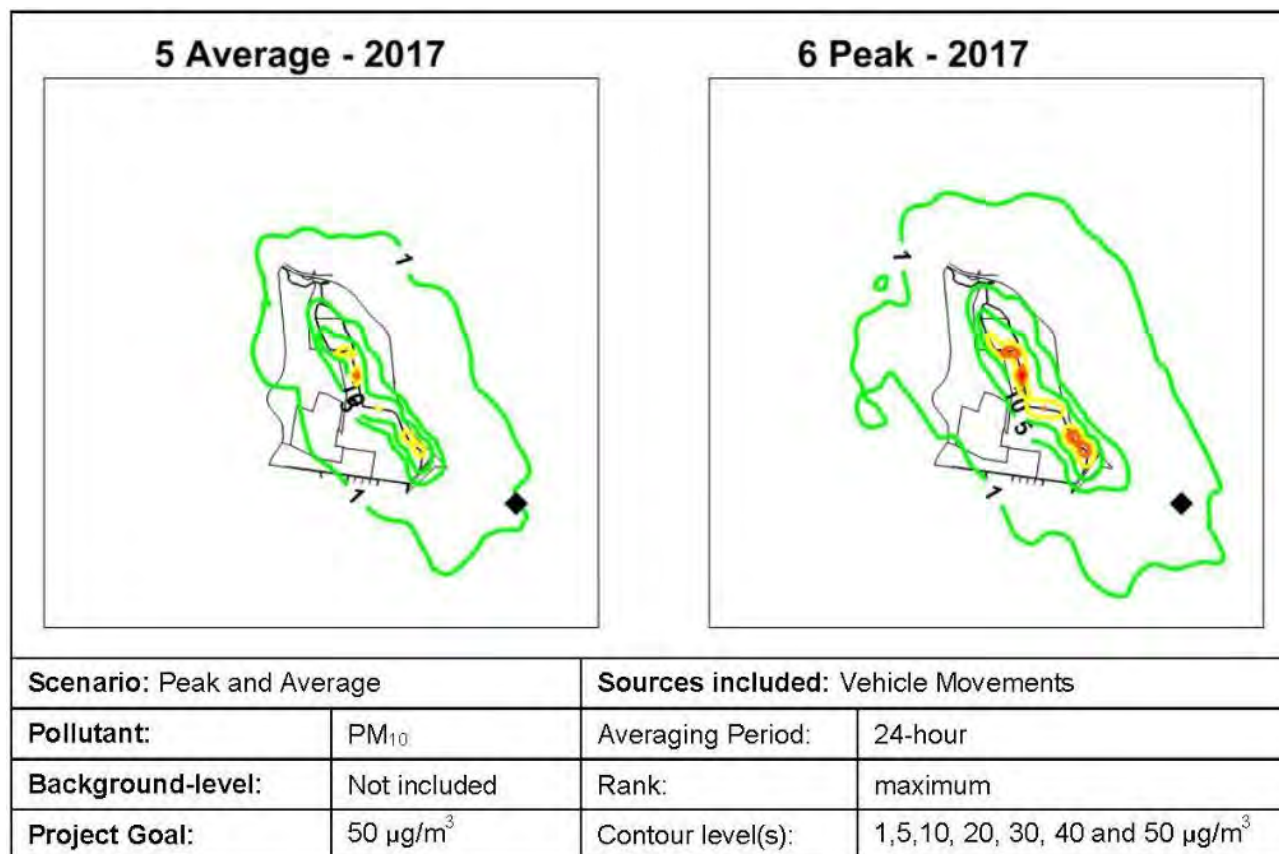


Figure 15 Development in Isolation – Maximum 24 Hour Average Concentration of PM₁₀ (2017 Meteorology)

The plots indicate no significant issues from the results of the dispersion modelling at any off-site location for the scenarios considered.

9.1.6 Mitigation and Management

9.1.6.1 Greenhouse Gas

Although the scale of GHG emissions associated with the Project are minimal, opportunities to further reduce GHG emissions should be considered whenever possible and practicable. Potential mitigation and management strategies that could assist in reducing greenhouse gas emissions through improved energy efficiencies include (but may not be limited to):

- Use of building materials for walls, floors, roofs, that provide insulation and aid in reduced energy costs;
- Maximisation of natural ventilation and energy efficient cooling;
- Use of natural lighting;
- Use of light sensors to minimise lighting related electricity usage;
- Use of high efficiency lighting;
- Whenever practicable, vehicles to leave site with full loads to reduce the number of traffic movements and diesel consumption; and
- All vehicles/plant and machinery will be turned off when not in use and regularly serviced in accordance with manufacturers specifications to ensure efficient operation.

9.1.6.2 Odour

The potential for odour related impacts to off-site receptors will be managed through the adopted odour reduction measures that form part of the site's Composting Management Plan (CMP) (LZE, 2016). In particular it is noted that Section 11.1.2 *Odour Management*, Section 11.2.1 *Stormwater Management*, Section 11.2.2 *Basin Water Health and Management*, and Section 12. *Management Procedures*, of the CMP (LZE, 2016) include references to odour management strategies to be implemented on site as/if required to minimise the potential for off-site odour impacts. Odour management strategies detailed in the CMP include:

- Staff will receive training on methods to reduce odour generation;
- Onsite dams, stormwater, and leachate to be suitably managed through separation, reuse, and sampling;
- Only approved wastes will be accepted onsite;
- Windrows will be managed in accordance with site operational procedure for windrow construction and maintenance;
- All odorous wastes are to be mixed immediately with less odorous wastes to reduce odour generation. Where this is not possible odorous wastes will be covered temporarily with green waste or saw dust;
- Homogeneous mixing will be undertaken;
- Compost materials will be watered to a moisture content such as not to create an anaerobic environment; and
- Odour monitoring will be undertaken as required should an issue be identified at a sensitive receiver.

The CMP is attached as **Appendix Q**.

9.1.6.3 Dust

The potential for dust related impacts to off-site receptors will be managed through the adopted dust reduction measures that form part of the site's Composting Management Plan (CMP) (LZE, 2016). In particular it is noted that Section 11.1.1 *Dust and Particulate Management*, Section 12.4.2.4 *Hardstand Pads* and Section 12. *Management Procedures*, of the CMP (LZE, 2016) include references to dust management strategies to be implemented on site as/if required to minimise the potential for off-site dust impacts. Dust management strategies detailed in the CMP include:

- Hardstand pads and the internal roadways will be regularly watered to suppress dust using site water carts;
- Staff will undertake visual inspections of dust generation to ensure dust is not spreading beyond the site boundary;
- Loads leaving the site will be required to be watered and tarped to prevent dust generation;
- Windrows and stockpiles will be maintained by water cart and will have a minimum moisture content of 45%, with increased watering to occur prior to adverse weather conditions;
- A site weather station will be utilised to inform of onsite weather conditions which will dictate operational activities;
- During excessive wind conditions, loading activities will be reduced until more favourable conditions prevail; and
- Staff will receive training on methods to reduce dust generation.

The CMP is attached as **Appendix Q**.

9.1.7 Conclusions

Advanced Environmental Dynamics has conducted greenhouse gas, odour and dust assessments of the Greenspot Ravensworth composting and nutrient recycling facility expansion project.

Due to the remoteness of the facility and the nature and extent of proposed composting activities, no issues were identified in relation to emissions of greenhouse gases, odour or dust.

Results of the odour and dust assessment suggest that the current mitigation measures and management strategies will be sufficient to ensure compliance with regulatory requirements for odour and dust and manage odour impacts at off-site locations.

Further details of the **Air Quality Impact Assessment** are provided in **Appendix G**.

9.2 Surface Water

9.2.1 Introduction

An assessment of surface water impacts from the proposed development has been undertaken by Fifteen50 Consultants. The purpose of this report was to determine the existing hydrogeological conditions of the site, determine any potential surface water and flooding impacts, storm water management, and to recommend strategies to mitigate these impacts. The **Surface Water Impact Assessment** is attached as **Appendix H**.

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

Soil and Water – including:

- A description of erosion and sediment controls.
- Consideration of salinity and acid sulphate soil impacts.
- An assessment of potential impacts to soil and water resources, topography, hydrology, groundwater, drainage lines, watercourses and riparian lands on or nearby to the site, including mapping and description of existing background conditions and cumulative impacts.
- A detailed site water balance, including identification of water requirements for the life of the project, measures that would be implemented to ensure an adequate and secure water supply is available for the proposal and a detailed description of the measures to minimise the use of water at the site.
- Characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from waste into the wastewater, proposed mitigation measures to manage any impacts to receiving waters, and monitoring activities and methodologies).
- Details of stormwater/wastewater/leachate management systems including the capacity of onsite detention systems and measures to treat, reuse or dispose of water.

A full copy of the SEARs requirements (including agency responses) are included within **Appendix B**.

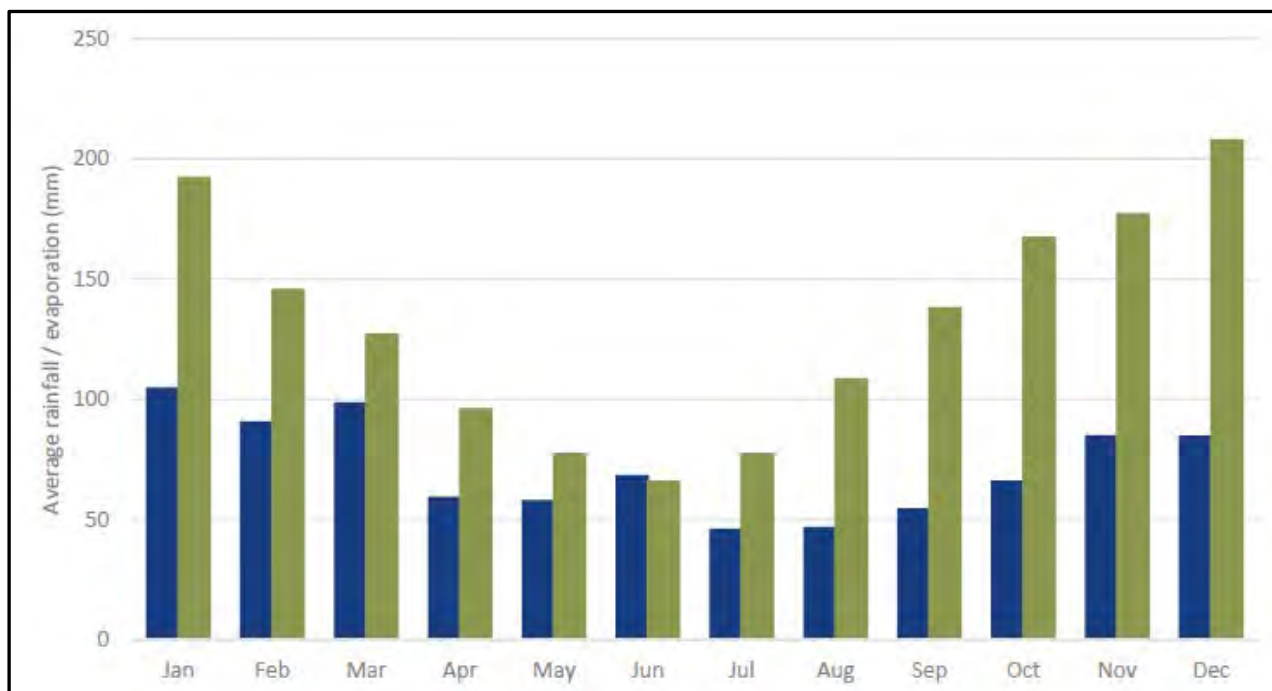
9.2.2 Existing Environment

The existing composting facility is located on a graded hardstand area and surrounded by perimeter bunding. The site is located on a capped open cut mining void (Void 3) which has been filled with fly ash from the AGL Bayswater Power Station and rehabilitated. The Ravensworth No. 2 mine was decommissioned in 1993 following the completion of coal mining. The following sections provide more specific details of the existing surface water environment.

9.2.2.1 Surface Water Hydrology

9.2.2.1.1 Rainfall

Rainfall data for the surface water assessment has been sourced from the BoM Station at Bowmans Creek (61270) and evaporation data has been sourced from the BoM Lostock Dam Station (061288). Annual rainfall patterns are consistent with that of the summer climate zone (higher rainfall in warmer months and vice-versa) despite being on the boundary of the summer and uniform climate zones as defined by BoM. There is a rainfall deficit in all months apart from June. Average rainfall and evaporation are shown as **Figure 16**.



Source: Bureau of Meteorology 2019

Figure 16 Average Rainfall and Evaporation

9.2.2.1.2 Topography and Drainage

The site is in the Hunter River catchment, with the Hunter River located 6 kilometres to the south and Lake Liddell approximately 5 kilometres to the north. The Hunter River drains the largest coastal catchment in New South Wales, covering some 22,000 square kilometres.

The site sits atop a 40 metre high ridge that runs approximately north south in between Bayswater Creek, 600 metres west and Bowmans Creek, 1,200 metres east of the site. As a result of the natural topography, and due to modification from mining and power generation activities, there is little upstream catchment draining toward the site and no waterways running through the site. Diversion bunds are in place to exclude minor upstream catchment flows from entering the site. Any runoff generated upstream is diverted to the clean stormwater infiltration wetland. There is no surface water discharge from the site into local waterways due to the highly modified nature of the site from historical mining operations. All site runoff is managed and captured in the surface water management system and ultimately discharges to Void 4 in extreme events.

9.2.2.1.3 Water Quality and Flow

Both Bayswater and Bowmans Creeks are highly modified due to mining and power generation activities and exhibit elevated salinity levels and generally low flows.

Bayswater Creek flows are generally low (median flow of less than 1 megalitre per day) and are influenced by discharges from Lake Liddell and Bayswater Power Station. Bayswater Creek is saline with median

electrical conductivity (EC) measurements above 3,000 $\mu\text{S}/\text{cm}$ (Bayswater Creek 210110 Station; NSW EPA, 2013).

Bowmans Creek is also saline (Foy Brook Downstream Bowmans 210130 Station) with median EC measurements of 1,297 $\mu\text{S}/\text{cm}$ (NSW EPA, 2013) and a median flow of 2.8 megalitres per day.

These median EC values are well in excess of the ANZECC water quality trigger values for upland/lowland south-eastern Australian streams (upland 30-350 $\mu\text{S}/\text{cm}$; lowland 125-220 $\mu\text{S}/\text{cm}$).

9.2.2.2 Flooding

The site is well elevated at approximately 40 metres higher than surrounding watercourses. There is no outside flood risk to the site and the area is not shown as flood prone land or within flood planning areas within the *Singleton Local Environment Plan 2013 – Flood Planning Maps*. Ravensworth Void 3 and Void 4 are listed as prescribed dams under the NSW Dam Safety Act 1978 and in the Singleton LGA Local Flood Plan and are managed accordingly. The site is not flood prone, thereby negating the need for a detailed flood impact assessment.

9.2.2.3 Wetlands and Riparian Land

There are no wetland areas located within the site, as identified in the *Singleton Local Environment Plan 2013* and as per the **Preliminary Biodiversity Assessment** prepared for the Project (refer **Appendix L**). Riparian land is identified as 40 metres from the top of the bank of a watercourse. The site is not located in a riparian zone given its location being 600 metres from Bayswater Creek and 1,200 metres from Bowmans Creek.

9.2.2.4 Surface Water Supply

9.2.2.4.1 Source

Bettergrow currently access water for composting from the leachate dam and make-up water from the Void 4 mine water storage (approximately 500 megalitre capacity), part of AGLs integrated water management system. Water for dust suppression is sourced from Void 4 only. Fly ash from AGLs power stations is placed into remaining voids across the Ravensworth No. 2 and Ravensworth South mine sites as part of the approved rehabilitation of the site.

This fly ash is pumped as a thick slurry from the Bayswater Power Station and is currently deposited into Void 5. As a result of this process, water from the fly ash seeps from Void 5 into Void 4 and is pumped from Void 4 back to the Bayswater Power Station for further re-use. Void 3, which has also been subject of filling from fly ash, also seeps water into Void 4.

Bettergrow access water from Void 4 for the composting process and for dust suppression via an existing AGL storage tank located on the eastern extent of the development footprint. This tank has an approximate capacity of 300,000 litres and is filled remotely from Void 4 by operators at the Bayswater Power Station. Water is also pumped directly from Void 4 into water trucks by Bettergrow for haulage road dust suppression and to supplement use in composting operations.

No water is sourced from outside the AGL Ravensworth mining operations, including water bodies, creeks or groundwater bores.

9.2.2.4.2 Quantity

Bettergrow estimate that the annual water consumption for the existing composting operation is 58 megalitres per year, with usage peaking at 80 kilolitres per weekday (57.1 kilolitres per day) for dust suppression and 230 kilolitres per weekday (164.3 kilolitres per day) for compost moisture conditioning.

Water use is minimised by:

- Optimising water application for proper curing of the compost, with too much or too little water impacting the quality of the finished product;
- Water is required to be pumped from the source (leachate dam, AGL storage tank or Void 4) and trucked for use within the compost operation or for dust suppression. Hence there is a commercial incentive to minimise this cost of transport through efficient use of water; and
- Excess water application to compost will leach out and cause access issues for machinery movements between compost rows, adding further incentive to minimise water use.

A site water balance of the existing operations has been prepared and is shown as Table 6 of **Appendix H**.

9.2.2.4.3 Quality

Earlier reports prepared for AGL (Ravensworth South Final Void Plan, Aurecon 2012) indicated that the water within Void 4 is likely to be alkaline as a result of seepage through fly ash and overburden. Data also indicated that the conductivity of water contained within Void 4 is brackish with various anionic and cationic salts present.

Void 4 water quality is regularly tested by Bettergrow. Recent testing (February, August & November 2018) delivered the following results:

- Electrical conductivity: range 4,520-7,580 $\mu\text{S}/\text{cm}$ (brackish to saline);
- Total suspended solids: <5 - 40 mg/L (negligible); and
- pH: 8.35-8.36 (alkaline).

Water quality, whilst not potable, is considered by Bettergrow to be fit-for-purpose in use for moisture conditioning of compost.

9.2.2.4.4 Security and Management

Aurecon (2012) states that Void 4 is effective at holding water due to a depression in the Bayswater Syncline Axis and when the water level is kept below the maximum RL of 46.5 metres AHD it is unlikely to seep beyond the boundary of the facility.

AGL manages water levels accordingly through two mechanisms; usage by Bettergrow in processing compost, and with excess water disposed via pumping through to Lake Liddell. The pump capacity is 120 L/s, and it is estimated that, in years of average rainfall, 500 megalitres per annum is disposed to Lake Liddell. There are no other demands on water from Void 4. Bettergrow's current water use of 58 megalitres per year is negligible given the storage volume of Void 4, being in excess of 500 megalitres, and the available volume of water otherwise disposed to Lake Liddell.

9.2.2.5 Surface Water Users

There are no other demands on water from Void 4, meaning that there are no impacts to other surface water users as a result of extractions. Excess water is disposed via pumping through to Lake Liddell for use in power generation.

The site does not extract water from, nor discharge water to, Bayswater or Bowmans Creeks, meaning that there are no impacts to surface water users on these streams.

9.2.2.6 Acid Sulphate Soils

The presence of acid sulphate soils on the site is unlikely as indicated by the Australian Soil Resource Information System (ASRIS). ASRIS mapping for the area shows the site as having a low probability of occurrence of acid sulphate soils.

9.2.2.7 Surface Water Salinity

Both Bayswater and Bowmans Creeks exhibit high levels of salinity. The facility controls and captures all internal runoff and provides for beneficial reuse of excess water produced as part of mining and power generation activities. The facility does not discharge water off-site and as such, does not exacerbate existing salinity issues in either of these streams.

9.2.2.8 Existing Surface Water Management

The facility currently utilises a surface water management system that was constructed for the existing development. Key components of this system include:

- A 20.22 ha compacted earth processing pad engineered to a permeability of 1×10^{-9} m/s to control the penetration of leachate generated from the composting process;
- Leachate and sediment control dam and spillway (currently sized and constructed for Stage 1 only);
- Clean water diversion and sediment bund – located on the eastern side of the Stage 1 pad;
- Clean water diversion – located along the western side of the facility;
- Diversion wall and channel directing clean stormwater runoff from the eastern side of the site into the spillway;
- Channel connecting the clean stormwater spillway to the lower basin.

Water captured in the leachate dam is available for reuse in composting and is prioritised over Void 4, given its proximity to the compost pad and to quickly drawdown water levels and reinstate storage capacity for the next storm event.

Any leachate water that does overflow via the spillway, resulting from a rainfall event less frequent than the 1% AEP, 24-hour event, is able to be captured in the lower basin, which has an approximate capacity of 50 megalitres (approximately three times the capacity of the leachate basin). In the exceedingly rare event that the lower basin fills, water can overflow into Void 4, which has in excess of 40 metres depth of available airspace above its normal operating level (i.e. thousands of megalitres). This means that enough emergency storage capacity is available to ensure that the risk of discharge from the site is negligible.

Existing water management infrastructure is shown on Figure 12 of **Appendix H**.

9.2.2.9 Existing Surface Water Monitoring

Existing surface water monitoring is undertaken in accordance with the requirements of EPL7654. **Table 28** details the surface water monitoring locations and the pollutants monitored. Figure 7 of **Appendix H** provides the locations of the surface water and groundwater monitoring sites.

Table 28 Existing Surface Water Monitoring

EPL 7654 Point No.	Type of Monitoring Point	Type of Discharge Point	Description	Pollutant Concentration Limit as Per Condition L2
1	Leachate Dam Characterisation	N/A	Star Picket in Dam Wall as a marker gauge	N/A
2	Leachate Dam Emergency Spillway	Leachate Dam Emergency Spillway	Eastern Embankment of Leachate Dam	Ammonia – 0.9mg/L pH – in range 6.5-8.5 TSS – 50mg/L
3	Process Water Tank	N/A	North-East Corner of Compost Dad	N/A
4	Sediment Basin	Sediment Basin	Star Picket at Sediment Basin Outlet	pH – in range 6.5-8.5 TSS – 50mg/L

Recent monitoring results from EPL7564 (refer Appendix D of **Appendix H**) indicate that:

- Point 2: No samples taken; no discharge from the leachate dam. Sampling from stored water in the leachate dam (Point 1) demonstrated pollutant concentrations were within Condition L2 limits for ammonia and pH, TSS exceeds limits (315 mg/L) however it is likely that this exceedance was due to the dry weather and limited leachate in storage; and
- Point 4: Sampling demonstrated that pollutant concentrations were within the limits of Condition L2.

Therefore, it can be concluded that the quality of process and leachate water meets licence conditions. The risk of discharge to the environment is very low and ensures that potential for environmental harm is minimised.

9.2.2.10 Existing Erosion and Sediment Controls

The surface water management infrastructure described above, and in conjunction with implementation of the **Surface and Groundwater Management Plan** (The LZ Environmental Company, 2016) adequately identifies and mitigates risks of erosion and sedimentation. The **Surface and Groundwater Management Plan** provides:

- Details of control measures and procedures that will minimise contamination of stormwater and groundwater;
- Demonstrates that clean surface waters are not mixed with leachate (contaminated surface water) by way of appropriately positioned and constructed infrastructure that provides for the diversion of uncontaminated (or clean) stormwater;
- Demonstrates that the volume of leachate contained on site will be greater than what is ordinarily considered to be representative of industry practice and how containment will be assured;
- The mass movement of sediment or significant erosion will not occur;
- Demonstrates that the quality of leachate contained will be maintained as far as possible such that offensive or noxious odours are not released;
- Demonstrates that the quality of leachate contained within the detention basin will be of such a pH that any seepage from the detention basin will not mobilise heavy metals in the underlying fly ash;
- Demonstrates that whilst highly unlikely, (due to rarity of occurrence), that the quality of leachate that may be released in an emergency event (defined as an abnormal rainfall event that causes a release

offsite) will in no way cause material harm to receiving waters or will result in worsening water quality conditions downstream of the facility, (i.e. Void 4, including groundwater) due to onsite leachate management practices, onsite uses and the volume of secondary containment provided; and

- Demonstrates only clean stormwater will leave the site from remaining areas not included within the operational area.

The full **Surface and Ground Water Management Plan** is attached as **Appendix R**.

9.2.3 Proposed Surface Water Management

9.2.3.1 Expansion of Surface Water Infrastructure

As previously detailed, not all infrastructure authorised by DA140/2016 has been constructed. The remaining Stage 2 surface water infrastructure will be constructed as part of the proposed expansion and will include:

- Extension to the processing pad area (identified as Stage 2 in DA140/2016, shown as Figure 3 in **Appendix H**), comprising the following works:
 - Preparation of an operations area by placing and compacting a sub-base of 300-400 mm of site won overburden with 100-150 mm compacted gravel as a wearing course. The overburden will be placed over the existing capping layer that has been constructed over Void No.3
- Expansion of the existing surface water drainage system, comprising the following works:
 - Extension of perimeter bunding for Stage 2 to divert clean water runoff away from the composting area to the surrounding voids;
 - Bunding will be constructed using overburden and will be stabilised using compost produced onsite and a suitable grass seed mix; and
 - Expansion of the leachate dam as approved as part of the Stage 2 development application (DA140/2016).

The location of the above infrastructure and modifications are illustrated in Figure 4 of **Appendix H**, and design plans are shown in Appendix C of **Appendix H**.

The expansion of the pad and the surface water management system will be undertaken to the same standard as employed for the existing infrastructure. In accordance with *Ravensworth Composting Pad Leachate Detention Basin – Construction Report* (Aurecon, 2017) the design specifications will similarly include:

- Designed to capture storm water runoff from the facility in excess of the minimum EPL 7654 requirement (4% AEP, 24-hour event). The detention basin will be enclosed on the southern, western and eastern sides by embankments up to 1.5 metres in height. The basin has enough storage volume (50,200 m³) to capture all runoff up to the 1% AEP, 24-hour storm event without any uncontrolled discharge off site. An overflow spillway is provided at RL 107.1 mAHD on the eastern wall to assist in discharging runoff in excess of design;
- The northern and western perimeters feature earth fill buttresses added to the existing batters, to separate and seal the pond storage area from loose overburden;
- Runoff will enter the basin from the north east, via a shotcrete lined channel, connecting from the composting pad to the leachate detention basin. The channel will have enough capacity to discharge the peak flow during a 1% AEP, 24-hour storm event; and
- Soil overburden used for the detention basin embankment, is compacted to a minimum 98% maximum dry density (MDD) to achieve low permeability (1x10⁻⁹).

Water captured in the leachate dam will be available for reuse and is prioritised over Void 4, given its proximity to the compost pad and to quickly drawdown water levels and reinstate storage capacity for the next storm event.

Any leachate water that does overflow via the spillway, resulting from a rainfall event less frequent than the 1% AEP, 24-hour event, is still able to be captured in the lower basin, which has an approximate capacity of 50 megalitres, effectively doubling the available storage capacity. In the exceedingly rare event that the lower basin fills, water can overflow into Void 4, which has in excess of 40 metres depth of available airspace above its normal operating level (i.e. thousands of megalitres). This means that enough storage capacity is available to ensure that discharges from site are never required.

9.2.3.2 Water Supply

The expanded facility will continue to operate within a closed drainage system, whereby leachate water is captured and reused, makeup water is sourced from Void 4 and there are no direct discharges to the surrounding watercourses.

The composting process is a net user of water, with water and leachate generated from operation of the facility to be managed on site by the proposed water infrastructure.

A monthly site water balance, using the key input parameters/assumptions has been prepared for the proposed operations and is shown in Table 9 of **Appendix H**.

The water balance shows that water import requirements increases from 47.6 megalitres to 125.2 megalitres (increase of 77.7 megalitres). This water is to be sourced from the leachate dam or Void 4. There is enough available water from Void 4 to meet this additional requirement. As noted above, approximately 500 megalitres of water is disposed from Void 4 to Lake Liddell annually.

Therefore, the expansion of the facility makes use of a greater volume of water for beneficial reuse, rather than disposal, reducing the risk of discharge from the facility itself and Void 4.

9.2.4 Potential Impacts to Surface Water

9.2.4.1 Construction

The development of the facility to receive 200,000 tonnes of green waste for composting requires the expansion of existing infrastructure such as the leachate dam, hardstand pad, diversion bunding and spillways, as well as the construction of additional built infrastructure.

Activities involved in construction of the proposal have the potential to impact on surface water quality with negative associated ecological and aesthetic effects and may include:

- Spillage of fuels, oils or chemicals from plant and equipment on site;
 - Pollution impacts to waterway ecology and downstream water users
- Erosion of bare earth surfaces during earthworks and sediment transport off-site;
 - Increased turbidity / suspended solids / nutrient load increasing risk of eutrophication
- Escape of leachate stored on site during expansion earthworks;
- Uncontained construction waste;
 - Gross pollutants in waterways.

9.2.4.2 Operations

The proposed expansion of the composting facility introduces a risk of additional volumes of leachate (and associated contaminant load) being generated and subsequently entering the surface water drainage environment. Leachate, if discharged to the environment, has the potential to cause impacts to water quality through reduced oxygen, high nutrient levels, increased organic matter and turbidity. Decreased water quality could impact waterways and aquatic environments by the following means:

- Dissolved oxygen is vital for the survival of fish, aquatic invertebrates and amphibians. Dissolved oxygen levels in waterways depend on the physical, chemical and biological activities in the water body. Oxygen is lost from water when temperature and salinity increase, and consumption and decay of organic matter occur. Oxygen is likely to be lost due to the increase in oxygen demanding wastes contained in leachate;
- Phosphate/nitrogen levels in most Australian waterways are naturally low. High nutrient levels could lead to water bodies choked with weeds or algae, changes in aquatic flora and fauna composition and increased fluctuations in dissolved oxygen;
- Turbidity is a measure of the ability of light to pass through the water and is a measure of the water's clarity. The greater quantity of suspended solids in the water (higher turbidity) affects the photosynthesis process of plants, due to reduced sunlight;
- Leachates can be acidic in anaerobic conditions, liberating heavy metal compounds and nutrients into waterways with associated ecological and aesthetic effects; and
- Poor maintenance of the bed or banks of stormwater drains and/or the onsite stormwater, sediment and leachate detention basins could increase the risk of release of leachate (through embankment failure) and erosion/sedimentation.

Other surface water impacts that may result from the operation of the facility include:

- Reduced aesthetic values of receiving waters due to increased turbidity and odour effects from ongoing anaerobic decomposition of organic material
- Health impacts to livestock and persons extracting water from the receiving waters
- Reduced health (species richness and biodiversity) of the receiving ecosystems
- Reduced water quality due to erosion and sedimentation in waterways.

These potential impacts have been mitigated to date for Stage 1 and additional mitigation of potential impacts can be achieved for the proposed expanded site.

9.2.5 Mitigation and Management

The potential impacts outlined above can be mitigated through a range of measures. The facility will continue to be managed in accordance with the requirements of EPL 7654, including surface water monitoring requirements. The **Surface and Groundwater Management Plan** (refer **Appendix R**) and other existing environmental management plans are to be updated to include the expanded operations. The following measures, as detailed in **Table 29**, will be implemented to mitigate impacts of the development.

Table 29 Surface Water Mitigation Measures

Potential Impact	Mitigation Measures
Pollution from sedimentation, oil/chemical spills and gross pollutants	<ul style="list-style-type: none"> • Surface and Groundwater Management Plan to be updated to include the expanded facility • Limit fuels and chemicals stored onsite to a minimum • All required chemicals and fuels must be located within a bunded enclosure located away from drainage lines and stormwater drains • Plant and equipment must be regularly inspected and serviced to limit risk of oil loss • Refuelling of vehicles or machinery is to occur within a containment or hardstand area designed to prevent the escape of spilled substances to the surrounding environment • Wash down areas must be appropriately constructed to capture and treat all wastewater, with collected solid material disposed off-site to a licensed facility • All staff to be appropriately trained in the spill response plan for the minimisation and management of unintended spills • A high standard of site housekeeping is to be maintained to limit risk of gross pollutants entering surface waters (i.e. construction waste, litter) • All reasonable and practicable measures must be taken to prevent pollution of any existing waterways as a result of silt or untreated leachate run-off, and oil or grease spills from any machinery. Wastewater for cleaning equipment must not be discharged or indirectly to any watercourses or stormwater systems • Exposed bare earth areas within the composting facility site must be minimised. Unused areas are to be revegetated
Contamination of clean storm water with organics processing increasing leachate volumes	<ul style="list-style-type: none"> • The facility must be designed to prevent surface water from mixing with the organics received and processed at the premises and the final products, process residuals and contaminated materials stored at the premises. This includes: <ul style="list-style-type: none"> – Drains and spillways – Bunding – Sediment controls during construction • Clean stormwater must be diverted around waste and leachate catchments through the installation of clean water catch drains and diversion bunds
Increased soil infiltration of contaminated surface water and leachate	<ul style="list-style-type: none"> • Maintain surface gradient of the hardstand pad and orientation/geometry of windrows to minimise leachate generation and to ensure that leachate flows directly to the primary detention basin without mixing with compost organics • Maintain all water related infrastructure, during construction and operation of expanded infrastructure, and operation, designed to maximise runoff and reduce infiltration including: <ul style="list-style-type: none"> – Low permeability base in the composting processing areas – Lining of the leachate dams – Bunding and arrangement of windrows – Perimeter bunding and diversion drains
High contaminant load in leachate	<ul style="list-style-type: none"> • Procedures for testing, treatment and discharge of leachate to be established and implemented, including monitoring anaerobic conditions • Undertake aeration of the leachate dam (increase oxygen) if required (i.e. if hydrogen sulphide, dissolved oxygen or pH levels are outside limits)
Uncontrolled releases of contaminants through the bed and banks of the onsite basins or through poorly maintained hardstand pads, bunding and stormwater drains	<ul style="list-style-type: none"> • Monitor water levels of the detention basin to ensure that the water levels do not drop below the anticipated use of water for composting and evaporation. • Maintain integrity of hardstand pad by repairs to areas damaged by plant and machinery movements • Ensure drains and surface water gradients are free of excess vegetation and debris so that the flow of stormwater or leachate is not impeded, and the

	<p>moisture / compaction levels achieved in embankment construction are maintained</p> <ul style="list-style-type: none"> Regular inspections of onsite infrastructure and structural integrity of drains, hardstand and leachate dam Repair and maintain any cracks observed in the base and side walls of the dam using clay, preferably bentonite or bentonite clay mixture
Contamination due to poor waste management	<ul style="list-style-type: none"> Waste to be accepted at the facility is to be in accordance with the EPA licence. Waste must be effectively vetted so prohibited wastes are not accepted at the facility Waste is only to be received, stored or processed in areas where the leachate barrier has been installed Monitoring of pollutants must be undertaken as per EPL 7654
Surface and groundwater contamination from leachate	<ul style="list-style-type: none"> Leachate collection and storage facilities must be maintained to collect and impound all leachate in accordance with the design storm event Leachate is not to be used for dust suppression on haul roads Leachate is to be recycled through moisture conditioning of compost, to drawdown on basin volumes and ensure the design capacity of the basin is maintained for future storm events Management of windrows and gradients to ensure no ponding or pooling occurs. Depressions must be filled promptly by using screened or sieved overburden All water that has entered processing and storage areas and water that has been contaminated by leachate must be handled and treated in the same manner as leachate
Ineffective collection and storage of leachate	<ul style="list-style-type: none"> Leachate must be collected and stored in a lined basin capable of capturing the 1% AEP, 24-hour runoff event. The hardstand pad and basin liner shall be constructed recompacted overburden/clay with an in-situ permeability (K) of less than 1×10^{-9} m/s in accordance with Aurecon (2017) The leachate dam must be designed in accordance with AS 3798-2007 - <i>Guidelines on Earthworks for Commercial and Residential Developments</i> Leachate basin is to be regularly desilted in order to maintain design storage capacity, without compromising basin liner integrity

9.2.6 Conclusions

The proposed expansion of operations at the facility to accept up to 200,000 tonnes per annum of compostable waste is to be undertaken with extension to the existing controlled surface water environment.

The risk of harm to the surface water environment is currently low and will continue to be low as it is adequately managed through the controls proposed surface water management infrastructure and extension of the existing management plans.

The implementation of the mitigation measures described and EPL conditions will ensure that the proposal will not result in significant, adverse environmental impacts associated with surface water management.

9.3 Groundwater

9.3.1 Introduction

An assessment of groundwater impacts from the proposed development has been undertaken by Fifteen50 Consultants. The purpose of this report was to determine the existing hydrogeological conditions of the site, assess the potential of the proposed development to impact groundwater or groundwater dependant ecosystems, and to recommend strategies to mitigate these impacts. The **Groundwater Impact Assessment** is attached as **Appendix I**.

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

Soil and Water – including:

- *A description of erosion and sediment controls.*
- *Consideration of salinity and acid sulphate soil impacts.*
- *An assessment of potential impacts to soil and water resources, topography, hydrology, groundwater, drainage lines, watercourses and riparian lands on or nearby to the site, including mapping and description of existing background conditions and cumulative impacts.*
- *A detailed site water balance, including identification of water requirements for the life of the project, measures that would be implemented to ensure an adequate and secure water supply is available for the proposal and a detailed description of the measures to minimise the use of water at the site.*
- *Characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from waste into the wastewater, proposed mitigation measures to manage any impacts to receiving waters, and monitoring activities and methodologies).*
- *Details of stormwater/wastewater/leachate management systems including the capacity of onsite detention systems and measures to treat, reuse or dispose of water.*

A full copy of the SEARs requirements (including agency responses) are included within **Appendix B**.

9.3.2 Existing Environment

The existing composting facility is located on a graded hardstand area and surrounded by perimeter bunding. The site is located on a capped open cut mining void (Void 3) which has been filled with fly ash from the AGL Bayswater Power Station and rehabilitated. The Ravensworth No. 2 mine was decommissioned in 1993 following the completion of coal mining. The following sections provide more specific details of the existing groundwater environment.

9.3.2.1 Local Aquifers

The Bioregional Assessment Program (BAP) is undertaken by the Australian Government to assess the impact of mining and coal seam gas on water resources and water dependant assets over six bioregions.

The site is located within the Hunter subregion, part of the Northern Sydney Basin bioregion. Aquifers in the Hunter subregion can be broadly classed into three hydrogeological types: alluvial, coastal sands and fractured (including porous) rock aquifers. The facility at Ravensworth is located above the fractured and porous rock across the subregion, where the deeper, more extensive aquifer systems occur.

Shallow regolith aquifers overlying the coal measures are generally unreliable, exhibit slow recharge rates from rainfall and are usually depleted during dry periods. Coal seam aquifers are generally confined, above and below, by massive and relatively impermeable conglomerates which also limits rainfall recharge. Alluvial aquifers at the site are the Hunter River Alluvium, Bowmans Creek Alluvium and Bayswater Creek Alluvium and recharge rates vary from very good to poor, depending on the aquifer material.

Alluvial aquifers are highly connected to surface water, supporting most of the consumptive use for urban and agricultural water supply in the local area. As such, these water sources are controlled by the *NSW Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*. The regolith aquifers and coal seam aquifers are less reliable for water supply and consumptive use is limited. These aquifers are obviously intercepted by coal mining activities in and around the site.

Groundwater vulnerability maps have been prepared by the NSW Department of Industry for some catchments in NSW. A groundwater vulnerability map has not been prepared for the Hunter River catchment, including the site. Given that the site and surrounding areas have historically been used for open cut and underground mining, the groundwater in the area is not considered to be vulnerable.

9.3.2.2 Pit Void Geometry

The facility is located on Ravensworth Void 3 that has been filled with fly ash, capped and rehabilitated. The groundwater depth is more than 40 metres below the site surface level. Rainfall seepage into the filled Void 3 is contained and eventually moves into the lower Void 4, where it is captured and stored for reuse.

As detailed in the **Surface Water Impact Assessment** attached as **Appendix I**, the rainfall leakage volume below the existing site is conservatively estimated at 0.1 mm/day, equivalent to a seepage rate of 1×10^{-9} m/s. Across the site, this results in an annual leakage of less than 4 megalitres, or 3% of the total water balance.

9.3.2.3 Existing Groundwater Supply

The facility does not source water for consumptive use from groundwater resources. All water use is sourced from captured leachate (recycled water) or the surface water supply available in Void 4. Further detail regarding site surface water can be found in the **Surface Water Impact Assessment** attached as **Appendix I** or as detailed in **Section 9.2**.

9.3.2.4 Surrounding Groundwater Bores

The proposal site is located within a mining region, with aquifers supporting considerable consumptive use for mining and agriculture. As such, there are numerous bores in the local area. The existing NSW groundwater work records for the bores nearby to the site are provided in **Table 30**. Groundwater bores surrounding the site are shown on Figure 7 of **Appendix I**.

Table 30 Surrounding Groundwater Bores

Bore Site	Type	Distance to site (m)	Date Drilled	Status	Bore Depth (m)	Drilled Bore Depth (m)
GW18328	Well	2,963	1/1/1959	Supply Obtained	5.8	
GW18329	Well	3,044	1/1/1959	Collapsed Bore	4.9	
GW24385	Well	1,183	1/1/1926	Unknown	4.6	
GW27690	Well	2,851	1/1/1966	Unknown	5.5	5.5
GW028247	Well	2,816	1/1/1962	Unknown	2.4	2.4
GW035474	Bore	2,456		Filled	3.9	3.9
GW046786	Well	1,296	1/1/1972	Unknown	6.9	7
GW046787	Well	1,138		Unknown	6.2	8
GW046788	Well	1,428		Unknown	6.1	6.2
GW046789	Well	1,494		Unknown	6.9	6.9
GW078054	Bore	894		Unknown	16.2	16.2
GW079793	Well	2,168		Manual Observations	2.82	
GW080725	Bore	3,246	8/10/2000	Unknown	130	
GW201957	Bore	3,253	15/7/2006	Equipped	77.75	77.75
GW201958	Bore	3,167	15/8/2006	Equipped	71.1	71.1
GW201959	Bore	3,103	15/8/2006	Equipped	69.2	69.2
GW203056	Vibrating Wire Piezometer	2,351	18/4/2014	Equipped	262	262
GW203058	Vibrating Wire Piezometer	3,199	18/4/2014	Equipped	251	251
GW203059	Vibrating Wire Piezometer	3,269	10/5/2014	Equipped	248	248
GW203063	Vibrating Wire Piezometer	2,736	18/4/2014	Equipped	300	300

9.3.2.5 Groundwater Monitoring

9.3.2.5.1 Water Level

There are no WaterNSW groundwater monitoring bores within a 10 km radius of the site. Glencore undertakes routine monitoring of several bores nearby to the site, within the Ravensworth Complex, and reports on these annually (Glencore, 2018). These bores are shown in Figure 7 of **Appendix I**, with water level data shown in Figure 8 of **Appendix I**. Water levels are generally steady over time, with major changes in water level generally due to encroaching mining activities.

9.3.2.5.2 Water Quality

There are no WaterNSW groundwater monitoring bores within a 10 km radius of the site. Glencore undertakes routine water quality monitoring of basic parameters (pH, EC) of several bores nearby to the site, within the Ravensworth Complex, and reports on these annually (Glencore, 2018). These bores are shown in Figure 7 of **Appendix I**.

The three monitoring bores closest to the site are MW01, MW02 and NPZ5b adjacent to Bayswater Creek. Only NPZ5b is routinely sampled for water quality analysis, with the most recent results (Glencore, 2018) showing an average pH of 7.4 (slightly alkaline) and average EC of 4,550 $\mu\text{S/cm}$ (brackish to saline). These results are consistent with historical averages over the past six years.

Several bores shown in Figure 7 of **Appendix I** are blocked, dry or had been mined through and therefore water quality monitoring was not undertaken (Glencore, 2018). Nine other bores within the Ravensworth Complex have been sampled and tested, showing similar results to NPZ5b, with pH tending from neutral to alkaline (7.0-8.3) and EC ranging from 4,550 to 9,670 $\mu\text{S/cm}$.

Water of this quality is generally limited to industrial use, with salinity levels being in excess of acceptable limits for stock and domestic consumption, and detrimental to crops and soils when used for irrigation.

Bores BR-MW01, BR-MW05 and BR-MW06, as shown in Figure 6 of **Appendix I**, are also routinely monitored. Recent field sampling results were provided by AGL for the purposes of this report and are shown in **Table 31**. This data is consistent with the results as reported by Glencore (2018).

Table 31 Water Quality Data (AGL, 2019)

Bore ID	Nov 2016		Nov 2017		May 2018		Dec 2018	
	pH	EC ($\mu\text{S/cm}$)	pH	EC ($\mu\text{S/cm}$)	pH	EC ($\mu\text{S/cm}$)	pH	EC ($\mu\text{S/cm}$)
BR-MW01	7.1	8330	7.1	8240	7.2	8260	7.2	8360
BR-MW05	8.0	2410	8.1	2220	8.2	1964	8.3	2070
BR-MW06	6.8	3580	6.8	3140	6.9	3110	7.1	3180

9.3.2.5.3 Groundwater Dependiant Ecosystems

Groundwater dependent ecosystems (GDEs) are defined as ecosystems that require access to groundwater to meet all or some of their water requirements to maintain their communities of plants and animals, ecological processes and ecosystem services.

A search of the Groundwater Dependent Ecosystem Atlas from the Bureau of Meteorology indicates that there are no aquatic or terrestrial Groundwater Dependent Ecosystems (GDEs) within or immediately adjacent to the Ravensworth site, as indicated in Figure 9 of **Appendix I**.

The site is highly modified and disturbed by mining and power generation activities. There is no evidence of GDEs on or nearby to the site as confirmed by the **Preliminary Biodiversity Assessment** (refer **Appendix L**).

9.3.2.5.4 Existing Groundwater Management

The surface water management infrastructure described in the **Surface Water Impact Assessment** in **Section 9.2** (also Figure 2 of **Appendix H**) and the **Surface and Groundwater Management Plan** (The LZ Environmental Company 2016), adequately identifies and mitigates potential risks to groundwater. The **Surface and Groundwater Management Plan** is included as **Appendix R**, and provides information that:

- Details control measures and procedures that will minimise contamination of stormwater and groundwater;
- Demonstrates that clean surface waters are not mixed with leachate (contaminated surface water) by way of appropriately positioned and constructed infrastructure that provides for the diversion of uncontaminated (or clean) stormwater;
- Demonstrates that the volume of leachate contained on site will be greater than what is ordinarily considered to be representative of industry practice and how containment will be assured;
- The mass movement of sediment or significant erosion will not occur;
- Demonstrates that the quality of leachate contained will be maintained as far as possible such that offensive or noxious odours are not released;
- Demonstrates that the quality of leachate contained within the detention basin will be of such a pH that any seepage from the detention basin will not mobilise heavy metals in the underlying fly ash;
- Demonstrates that whilst highly unlikely, (due to rarity of occurrence), that the quality of leachate that may be released in an emergency event (defined as an abnormal rainfall event that causes a release offsite) will in no way cause material harm to receiving waters or will result in worsening water quality conditions downstream of the facility, (i.e. Void 4, including groundwater) due to onsite leachate management practices, onsite uses and the volume of secondary containment provided; and
- Demonstrates only clean stormwater will leave the site from remaining areas not included within the operational area.

9.3.3 Proposed Groundwater Management

The expanded facility proposes to manage groundwater by construction of infrastructure that contains runoff and minimises infiltration and seepage below the compost pad and leachate basin. The expansion infrastructure includes:

- Extension to the processing pad area (identified as Stage 2 in DA140/2016, shown in Figure 3), comprising the following works:
 - Preparation of an operations area by placing and compacting a sub-base of 300-400 mm of site won overburden with 100-150 mm compacted gravel as a wearing course. The overburden will be placed over the existing capping layer that has been constructed over Void No.3.
- Expansion of the existing surface water drainage system, comprising the following works:
 - Extension of perimeter bunding for Stage 2 to divert clean water runoff away from the composting area to the surrounding voids;
 - Bunding will be constructed using overburden and will be stabilised using compost produced onsite and a suitable grass seed mix; and
 - Expansion of the leachate dam as approved as part of the Stage 2 development application (DA140/2016).

The location of the above infrastructure and modifications are illustrated in Figure 4 of **Appendix H**, and on design plans shown in Appendix C of **Appendix H**.

The expansion of the pad and the surface water management system will be undertaken to the same standard as employed for the existing infrastructure. In accordance with *Ravensthorpe Composting Pad Leachate Detention Basin – Construction Report (Aurecon 2017)* the design specifications will similarly include:

- Designed to capture storm water runoff from the facility in excess of the minimum EPL 7654 requirement (4% AEP, 24-hour event). The detention basin will be enclosed on the southern, western and eastern sides by embankments up to 1.5 metres in height. The basin has enough storage volume (50,200 m³) to capture all runoff up to the 1% AEP, 24-hour storm event without any uncontrolled discharge off site. An overflow spillway is provided at RL 107.1 mAHD on the eastern wall to assist in discharging runoff in excess of design;
- The northern and western perimeters feature earth fill buttresses added to the existing batters, to separate and seal the pond storage area from loose overburden;
- Runoff will enter the basin from the north east, via a shotcrete lined channel, connecting from the composting pad to the leachate detention basin. The channel will have enough capacity to discharge the peak flow during a 1% AEP, 24-hour storm event; and
- Soil overburden used for the detention basin embankment, is compacted to a minimum 98% maximum dry density (MDD) to achieve low permeability (1×10^{-9}).

Water captured in the leachate dam will be available for reuse and is prioritised over supply from Void 4, to quickly drawdown water levels to limit potential seepage.

9.3.4 Potential Impacts to Groundwater

9.3.4.1 Construction

The expansion of the facility to receive 200,000 tonnes of green waste for composting requires the expansion of existing infrastructure such as the leachate dam, hardstand pad, diversion bunding and spillways, as well as the construction of additional built infrastructure.

Activities involved in construction of the proposal have the potential to impact on groundwater quality with negative associated ecological and aesthetic effects. Generally, this is limited to soil contamination from spillage of fuels, oils or chemicals from plant and equipment on site.

9.3.4.2 Operations

The site is located on a remediated mining void that has been filled with fly ash. Given the extensive mining activities that have previously occurred on the site, the landform of the site is not considered to be a high-risk environment.

However, there are potential groundwater pollution impacts associated with leachate infiltration to groundwater aquifers beneath the site. This potential risk and impact are considered minor given the negligible volumes of rainfall seepage below the site (3% of total water balance or 9 megalitres per annum - refer **Surface Water Impact Assessment**), groundwater depth is greater than 40 m below the site and groundwater is saline.

In addition, groundwater beneath the site flows into Void 4 immediately to the south, providing opportunity to capture and recycle water infiltrated through the site.

Infiltration of leachate of low pH (acidic) can mobilise heavy metal compounds from the fly ash into groundwater aquifers with associated negative impacts to groundwater quality. However, groundwater in the area is not suitable for consumptive use apart from industrial and as such health impacts to humans and livestock is minimal.

Given the minimal risk of impact, additional groundwater monitoring is not considered necessary.

These potential impacts have been mitigated to date for the existing operations and additional mitigation of potential impacts can be achieved for the proposed expanded development.

9.3.5 Mitigation and Management

The potential impacts outlined above can be mitigated through a range of measures. Effective management of surface water, as outlined in the **Surface Water Assessment**, will minimise risks of leachate infiltration below the site and impacts to groundwater. The facility will continue to be managed in accordance with the requirements of EPL 7654. The **Surface and Groundwater Management Plan** (refer **Appendix R**) and other existing environmental management plans are to be updated to include the expanded operations. The following measures, as detailed in **Table 32**, will be implemented to mitigate impacts of the development.

Table 32 Groundwater Mitigation Measures

Potential Impact	Mitigation Measures
Pollution from sedimentation, oil/chemical spills and gross pollutants	<ul style="list-style-type: none"> • Surface and Groundwater Management Plan to be updated to include the expanded facility • Limit fuels and chemicals stored onsite to a minimum • All required chemicals and fuels must be located within a bunded enclosure located away from drainage lines and stormwater drains • Plant and equipment must be regularly inspected and serviced to limit risk of oil loss • Refuelling of vehicles or machinery is to occur within a containment or hardstand area designed to prevent the escape of spilled substances to the surrounding environment • Wash down areas must be appropriately constructed to capture and treat all wastewater, with collected solid material disposed off-site to a licensed facility • All staff to be appropriately trained in the spill response plan for the minimisation and management of unintended spills • A high standard of site housekeeping is to be maintained to limit risk of gross pollutants entering surface waters (i.e. construction waste, litter) • All reasonable and practicable measures must be taken to prevent pollution of any existing waterways as a result of silt or untreated leachate run-off, and oil or grease spills from any machinery. Wastewater for cleaning equipment must not be discharged or indirectly to any watercourses or stormwater systems • Exposed bare earth areas within the composting facility site must be minimised. Unused areas are to be revegetated
Increased soil infiltration of contaminated surface water and leachate	<ul style="list-style-type: none"> • Maintain surface gradient of the hardstand pad and orientation/geometry of windrows to minimise leachate generation and to ensure that leachate flows directly to the primary detention basin without mixing with compost organics • Maintain all water related infrastructure, during construction and operation of expanded infrastructure, and operation, designed to maximise runoff and reduce infiltration including: <ul style="list-style-type: none"> – Low permeability base in the composting processing areas – Lining of the leachate dams – Bunding and arrangement of windrows – Perimeter bunding and diversion drains
Contamination of clean stormwater with organics processing increasing leachate volumes	<ul style="list-style-type: none"> • The facility must be designed to prevent surface water from mixing with the organics received and processed at the premises and the final products, process residuals and contaminated materials stored at the premises. This includes: <ul style="list-style-type: none"> – Drains and spillways – Bunding – Sediment controls during construction

	<ul style="list-style-type: none"> • Clean stormwater must be diverted around waste and leachate catchments through the installation of clean water catch drains and diversions bunds
High contaminant load in leachate	<ul style="list-style-type: none"> • Procedures for testing, treatment and discharge of leachate to be established and implemented, including monitoring anaerobic conditions • Undertake aeration of the leachate dam (increase oxygen) if required (i.e. if hydrogen sulphide, dissolved oxygen or pH levels are outside limits)
Uncontrolled releases of contaminants through the bed and banks of the onsite basins or through poorly maintained hardstand pads, bunding and stormwater drains	<ul style="list-style-type: none"> • Monitor water levels of the detention basin to ensure that the water levels do not drop below the anticipated use of water for composting and evaporation. • Maintain integrity of hardstand pad by repairs to areas damaged by plant and machinery movements • Ensure drains and surface water gradients are free of excess vegetation and debris so that the flow of stormwater or leachate is not impeded, and the moisture / compaction levels achieved in embankment construction are maintained • Regular inspections of onsite infrastructure and structural integrity of drains, hardstand and leachate dam • Repair and maintain any cracks observed in the base and side walls of the dam using clay, preferably bentonite or bentonite clay mixture
Surface and groundwater contamination from leachate	<ul style="list-style-type: none"> • Leachate collection and storage facilities must be maintained to collect and impound all leachate in accordance with the design storm event • Leachate is not to be used for dust suppression on haul roads • Leachate is to be recycled through moisture conditioning of compost, to drawdown on basin volumes and ensure the design capacity of the basin is maintained for future storm events • Management of windrows and gradients to ensure no ponding or pooling occurs. Depressions must be filled promptly by using screened or sieved overburden • All water that has entered processing and storage areas and water that has been contaminated by leachate must be handled and treated in the same manner as leachate
Ineffective collection and storage of leachate	<ul style="list-style-type: none"> • Leachate must be collected and stored in a lined basin capable of capturing the 1% AEP, 24-hour runoff event. The hardstand pad and basin liner shall be constructed recompacted overburden/clay with an in-situ permeability (K) of less than 1×10^{-9} m/s in accordance with Aurecon (2017) • The leachate dam must be designed in accordance with AS 3798-2007 - <i>Guidelines on Earthworks for Commercial and Residential Developments</i> • Leachate basin is to be regularly desilted in order to maintain design storage capacity

9.3.6 Conclusions

The proposed expansion of operations at the facility to accept up to 200,000 tonnes per annum of compostable waste is to be undertaken with extension to the existing controlled surface water environment, ensuring that the risk of polluted leachate seeping below the facility into groundwater will remain low.

The risk of harm to the groundwater environment is currently low and this risk level is maintained as it is adequately managed through the controls proposed, surface water management infrastructure and extension of the existing management plans.

The implementation of the mitigation measures described, and the conditions of the existing development approval and environment protection licence will ensure that the proposal will not result in significant, adverse environmental impacts associated with groundwater management.

9.4 Traffic and Access

9.4.1 Introduction

An assessment of traffic and access impacts of the proposed development has been undertaken by Pavey Consulting Services. The purpose of this report was to determine the potential traffic impacts resulting from the proposed development and to recommend treatments to mitigate these impacts. The **Traffic Impact Assessment** is attached as **Appendix J**.

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

Traffic and Transport – including:

- details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes. Traffic flows are to be shown diagrammatically to a level of detail sufficient for easy interpretation.
- plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network.
- an assessment of the predicated impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model.
- detailed plans of the proposed layout of the internal road network and parking onsite in accordance with the relevant Australian Standards and Council's DCP.
- swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site.
- plans of any proposed road upgrades, infrastructure works, or new roads required for the development.
- An assessment of potential impacts on local road pavement lifespan.

A full summary of the SEARs requirements (including agency responses) are included within **Appendix B**.

9.4.2 Existing Environment

Access to the facility is provided via an internal access road off Lemington Road which connects to the New England Highway. The existing composting facility is located on a graded hardstand area, surrounded by perimeter bunding.

Key roads that provide access to the site are the New England Highway and Lemington Road. The New England Highway is part of the national highway linking Sydney to Brisbane and is an alternative route to the Pacific Highway. In the vicinity of the site the highway has a speed limit of 100km/h on an undivided carriageway with overtaking lanes.

The most recent traffic volume data from the Roads and Maritime Services count station (ID 6156) north of Singleton indicates the average daily traffic volumes are 13984 vehicles per day (two-way).

Lemington Road is a rural two-way two-lane road that predominantly provides access to the various coal mines in the area. It has a speed limit of 100km/h and provides links between The Golden Highway and the New England Highway.

9.4.3 Impact Assessment

9.4.3.1 Site Access

An internal haul road, with access from Lemington Road, currently exists on the site. This road has been previously designed for mine traffic, therefore is more than adequate to accommodate incoming and

outgoing heavy vehicle movement. The road surface provides all-weather access and is suitably graded to divert stormwater away from the roadway onto stable shoulder areas and cut off drains. No additional works are proposed on internal access roads.

9.4.3.2 Traffic Generation

As a result of the expansion of the facility, the quantities of organic materials received and dispatched from the site will increase. Accordingly, truck movements to and from the site will also increase. However, not all finished compost will be exported from the Ravensworth site as a portion will be utilised across AGLs rehabilitation areas on the Ravensworth site itself.

The projected outgoing traffic volumes below assume all finished compost will leave the site via Lemington road, hence these figures are regarded as worst-case scenario. Based on the increased annual production amount of 200,000 tpa, the following traffic volumes are anticipated:

- Peak truck movements maximum of 108 per day; and
- Peak light vehicles movements maximum of 38 per day.

On the basis that all deliveries and compost transfers will require in-bound and out-bound movements, the worst-case traffic movements generated from the increased operations would be up to 146 movements per day (73 in-bound and 73 out-bound). The actual traffic movements will be less than 146 due to the use of as many inbound trucks as possible to also take out finished product for delivery to sites.

As shown on **Figure 17** and **Figure 18** the intersection of Lemington Road with the New England Highway is a seagull type which minimises the impacts of the right turn traffic movements on the through traffic flows on the New England Highway and allows vehicles turning right out of Lemington Road to do so in two stages.

The assessment has assumed that heavy vehicles movements will be distributed evenly throughout the day across the 12-hour operation period from 6am to 6pm and that light vehicle movements will be distributed evenly across the two hours at the start and end of the day.

The additional vehicle movements added into the intersection during morning and evening peak hour would likely be:

- 108 heavy vehicles per day distributed as follows:
 - 80% to and from the north to other AGL rehabilitation projects accessed via the Bayswater Power Station and Liddell Power Station).
 - 20% from the south from Singleton and Newcastle.
- 38 light vehicles per day distributed as follows:
 - 20% to and from the north to other AGL rehabilitation projects accessed via the Bayswater Power Station and Liddell Power Station).
 - 80% from the south from Singleton and Newcastle.

The Project site and surrounding area have no public transport facilities and minimal active transport activities. Therefore, the project would likely have no impacts on public transport and active transport.

9.4.3.3 Proposed Haulage Routes

The proposed haulage routes include south-east along the New England Highway to the lower hunter valley and Newcastle, and north-west along the New England Highway to Bayswater and Liddell Power Stations, surrounding mine sites, and the upper hunter valley. Haul routes are shown on **Figure 17** and **Figure 18** below.



Figure 17 South-East Haul Route Towards Newcastle and Lower Hunter



Figure 18 North-West Haul Route Towards Muswellbrook and the Upper Hunter

9.4.3.4 Onsite Parking Provisions

The development is located within a total project area of approximately 57 ha. This provides ample space for the parking and movement of light and heavy vehicles. The operations are located approximately 4.8 km by road distance from the site entrance on Lemington Road, therefore queuing of trucks onto Lemington Road is not possible. **Figure 19** shows the general movement of traffic onsite.

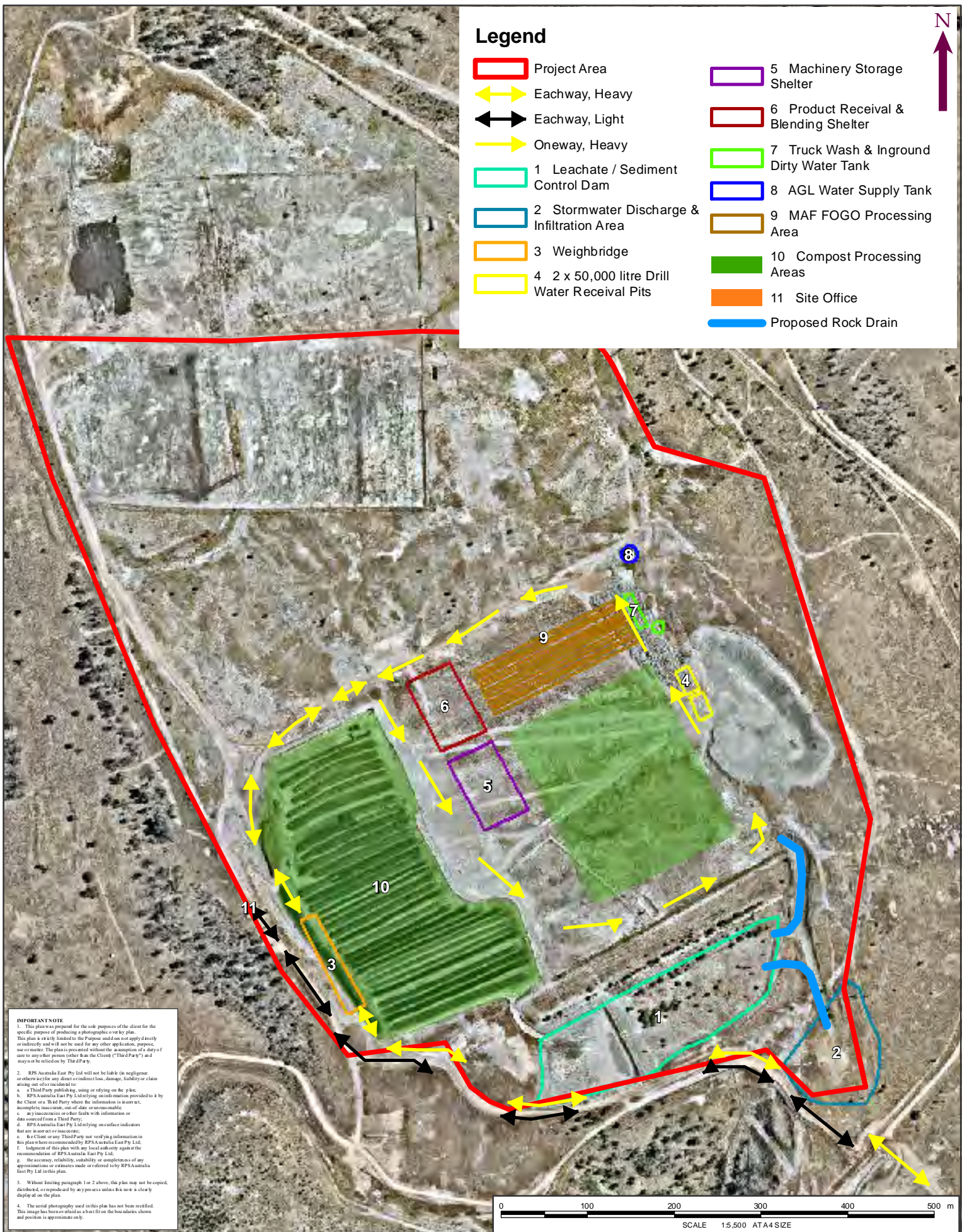


FIGURE 19: INTERNAL TRAFFIC MOVEMENT

LOCATION:	RAVENSWORTH	DATUM: GDA94
JOB NO.:	PR 141357	PROJECTION: MGA Zone 56
PURPOSE: PLANNING		Data Sources: RPS, Client Land and Property 2017
Technician: Natalie Wood	Date: 4/11/2019	

CLIENT: BETTERGROW

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
Unit 2A, 45 Fitzroy Street, Carrington, NSW, Australia, 2294 PO Box 120, Carrington, NSW, 2294
T: 02 4940 4200 F: 02 4940 4299 www.rpsgroup.com.au



9.4.3.5 Traffic Volumes

A traffic count was undertaken on 10.2.2019 between the hours of 6:30am and 8:30am to determine traffic movements at the intersection of Lemington Road with the New England Highway. The following peak hour movements are detailed below for the above period. **Figure 20** below shows the turning paths of traffic during the count period and **Table 32** shows the traffic counts for the period.

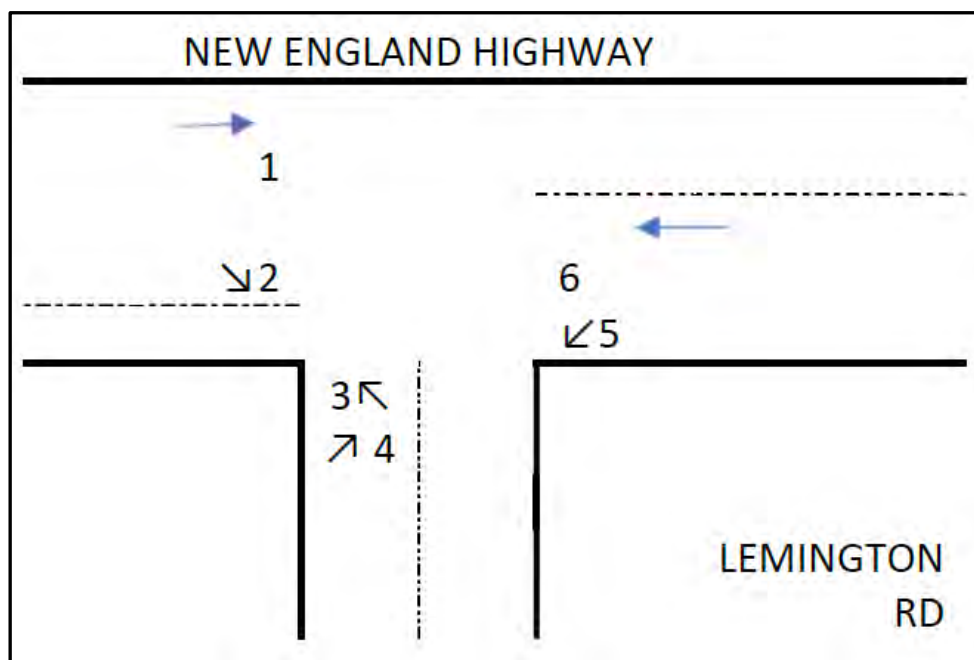


Figure 20 Vehicle Turning Paths

Table 33 provides the type and number of movements for each path during the count period.

Table 33 Traffic Counts

Path	Total 6:30am to 7:30am	Total 7:30am to 8:30am
1 - LV	229	464
1 - HV	54	111
2 - LV	8	9
2 - HV	4	5
3 - LV	17	4
3 - HV	5	5
4 - LV	33	15
4 - HV	4	5
5 - LV	33	29
5 - HV	8	5
6 - LV	371	290
6 - HV	62	75

Based on the most recent traffic volume data from the Roads and Maritime Services count station (ID 6156) north of Singleton, there is an average growth rate in traffic volumes of 1.8% annually.

9.4.3.6 Intersection Performance

9.4.3.6.1 New England Highway and Lemington Road

To determine if the proposed movements would have an effect on the operation of the existing intersection a SIDRA analysis has been undertaken. Full details of the outputs of the SIDRA analysis are found in the **Traffic Impact Assessment** provided in **Appendix J**, however a summary of this analysis is provided below.

Traffic Modelling Assumption

The following assumptions were applied to the SIDRA analysis:

- Analysis was undertaken for AM peak periods only as this is the worst-case scenario for traffic;
- Existing intersection geometry, including lane lengths and widths were measured using aerial images;
- SIDRA default values were adopted; and
- Level of Service Method is set to RTA NSW.

Intersection Operation

The modelling outputs provided in the **Traffic Impact Assessment** attached as **Appendix J** illustrate that there is no deterioration of Average Delay (Av Delay), Level of Service (LoS), or Queue Length when development traffic is added to either of the 2018 or 2028 simulations of the intersection.

In 2028 (in either scenarios) the intersection operates at LoS of C or above on all legs and turn movements in the morning peak hour.

Further, the Queue Length for the right turn into Lemington Road under the development scenario of 10 years with a queue length of 20m does not exceed the 200m available for storage of the current road layout.

The relatively low number of additional traffic movements generated by the expanded operations are considered to be within the normal day to day variation of traffic volumes and would have minimal impacts on this intersection.

9.4.3.6.2 Lemington Road and Private Access Road

The relatively low number of additional traffic movements generated by the modification are considered to be within the normal day to day variation of traffic volumes and would have minimal impacts on this intersection.

9.4.4 Mitigation and Management

As there would be no impact on the performance of the local road network, road upgrades are not required. While the traffic assessment concludes that the additional traffic generated by the facility will not adversely impact on road capacity, Bettergrow will, where possible, schedule its heavy vehicle movements to avoid the busy morning and afternoon peak hours. The movement of trucks into and out of the facility will be maximised through trucks entering and leaving with a full load where possible.

9.4.5 Conclusions

Bettergrow proposed to increase the capacity of the Ravensworth Composting Facility from 76,000 tonnes per year to 200,000 tonnes per year and transport composted materials to wholesale markets and the Bayswater and Liddell power stations for use in rehabilitation activities.

The proposal expansion would generate 108 heavy vehicle movements per day and 38 light vehicle movements per day.

Given the efficient operation of seagull intersections and its existing performance, the impact of the proposal on the intersection would be minimal as no deterioration on level of service is evident from the SIDRA modelling.

Accordingly, it is anticipated that this development will have no unacceptable traffic implications on the operation of:

- intersection of New England Highway and Lemington Road,
- intersection of Lemington Road and Private Access Road, or
- the surrounding area.

The traffic assessment has concluded that there are no traffic engineering related matters that would preclude approval of the proposed expansion to 200,000tpa.

Full details are provided in the Traffic Impact Assessment attached as **Appendix J**.

9.5 Noise and Vibration

9.5.1 Introduction

An assessment of noise and vibration impacts from the proposed development has been undertaken by Global Acoustics. The purpose of this assessment was to determine potential noise and vibration impact at the nearest residential and industrial receivers to the site. The assessment also considered construction, operational and transport noise impacts associated with the development.

The assessment has been prepared in accordance with the *NSW Industrial Noise Policy (INP)*, *NSW Interim Construction Noise Guideline (ICNG)*, *NSW Road Noise Policy (RNP)*, *NSW Assessing Vibration: a Technical Guideline*, and *NSW Draft Industrial Noise Guideline (DING)*. The **Noise Impact Assessment** is attached as **Appendix K**.

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

Noise and Vibration – including:

- a quantitative assessment of potential demolition, construction, operational and transport noise and vibration impacts in accordance with relevant Environmental Protection Authority guidelines.
- details and justification of the proposed noise mitigation and monitoring measures.
- specified times of operation for all phases of the development and for all noise producing activities.

A full summary of the SEARs requirements (including agency responses) is included within **Appendix B**.

9.5.2 Existing Environment

The site is located on a rehabilitated open cut mining pit and is surrounded by five open cut mines. The nearest Noise Sensitive Receivers (NSR) are located approximately 7.5 kilometres to the south-east in the village of Camberwell. The surrounding area, including NSRs, are shown on **Figure 6**.

9.5.3 Methodology

9.5.3.1 Sound Power Levels

In order to predict potential operational noise impacts, sound power levels of mobile and fixed plant on site were measured in general accordance with the following standards: ISO 3744:2010, ISO 6393:2008, and ISO 6395:2008. The results of sound power testing are provided in **Table 34**.

Table 34 Measured Sound Power Levels (dB)

Plant Item	L _w	L _{WA}
Komptech Topturn X55 Windrow Turner	118	112
Volvo L150F Loader	114	102
Greenspot Water Cart	117	109
Generic Water Cart	122	108
Edge TRT 622 Trommel	118	107
Water Tank Pump	118	107

Information regarding specific makes and models of equipment to be used for construction activities was not available at the time of undertaking onsite sound power testing. As such, sound power data for noise sources were sourced from Global Acoustics database of sound power levels for representative equipment. Sound power levels for construction equipment are provided in **Table 35**.

Table 35 Construction Equipment Power Levels (dB)

Plant Item	L _w	L _{WA}
Road Truck	115	109
CAT D6 Bulldozer	119	114
24 tonne Excavator	116	104
Grader	114	108
7 tonne Roller	115	110
33 tonne Front End Loader	119	110
Road Water Cart	106	100
Crane	114	101

9.5.3.2 Noise Modelling

Noise levels have been calculated using DataKustik CadnaA noise modelling software to determine the acoustic impact of site operations and construction at NSRs. Standard meteorological and noise enhancing meteorological conditions have been considered in accordance with Table D1 of the Noise Policy for Industry (NPfI) (refer **Table 36**).

Table 36 Table D1 of the Noise Policy for Industry

Meteorological Conditions	Meteorological Parameters
Standard meteorological conditions	Day/evening/night: stability categories A-D with wind speed up to 0.5 m/s at 10 m Above Ground Level (AGL)
Noise-enhancing meteorological conditions	Daytime/evening: stability categories A-D with light winds (up to 3 m/s at 10 m AGL). Night-time: stability categories A-D with light winds (up to 3 m/s at 10 m AGL) and/or stability category F with winds up to 2 m/s at 10 m AGL

Stability categories are based on the Pasquill-Gilford stability classification.

Meteorological effects have been calculated using the CONCAWE calculation methodology within the CadnaA software. As a conservative measure, the following assumptions have also been made in the noise model:

- All mobile and fixed plant has been assumed to be operating simultaneously and continuously;
- Acoustic shielding provided by surrounding landforms has not been considered; and

- Minimum daytime project intrusiveness noise limits outlined in the NPfI have been adopted.

Given the conservative modelling approach, site noise levels at receivers are expected to be significantly lower than those predicted.

9.5.4 Results

9.5.4.1 Operational Noise

Table 37 below provides operational noise model predictions for neutral and enhancing atmospheric conditions.

Table 37 $L_{Aeq,15 \text{ minute}}$ Operational Noise Predictions

Receptors	Period	Wind Speed m/s	Wind Direction ¹	Stability Class	Predicted Site L_{Aeq} dB	PNTL L_{Aeq} dB ²	Potential Exceedance
Camberwell	7am – 6pm	0.0	-	D	23	40	Nil
Camberwell	7am – 6pm	3.0	Source to Receiver	D	27	40	Nil
Camberwell	6am – 7am	2.0	Source to Receiver	F	27	35	Nil

Notes:

- Source to receiver winds have been considered for all receptors as a conservative measure in accordance with the NPfI. “-” in this column denotes calm conditions and therefore no wind direction; and
- Minimum RBL outlined in the NPfI for the day period has been adopted for all NSR.

These levels represent worst-case impact for continuously operating noise sources. No exceedances of the Project Noise Trigger Levels (PNTL) are predicted.

9.5.4.2 Construction Noise

Table 38 below provides construction noise model predictions for neutral and enhancing atmospheric conditions.

Table 38 $L_{Aeq,15 \text{ minute}}$ Construction Noise Predictions

Receptors	Period	Wind Speed m/s	Wind Direction ¹	Stability Class	Predicted Site L_{Aeq} dB	PNTL L_{Aeq} dB ²	Potential Exceedance
Camberwell	7am – 6pm	0.0	-	D	25	45	Nil
Camberwell	7am – 6pm	3.0	Source to Receiver	D	30	45	Nil

Notes:

- Source to receiver winds have been considered for all receptors as a conservative measure in accordance with the NPfI. “-” in this column denotes calm conditions and therefore no wind direction; and
- The minimum L_{Aeq} project intrusiveness noise level outlined in the NPfI for the relevant period has been adopted for all NSR.

These levels represent worst-case impact for construction activities on site in conjunction with continuous operations. No exceedances of the construction management level are predicted.

9.5.4.3 Road Traffic Noise

Road traffic noise associated with construction and expanded operations has been considered in this report. It is anticipated that worst-case traffic movement generated from increased operations would be 146 vehicle

movements per day. Construction activities on site are predicted to generate up to 10 additional vehicle movements per day.

Existing traffic volume data from the Roads and Maritime Services count station (ID 6156) north of Singleton indicates the average daily traffic volume of the New England Highway (NEH) to be 13,293 vehicles per day. An increase to 146 vehicles movements per day represents a <1 % increase of overall traffic volume on the NEH. This equates to a 0.1 dB increase in traffic noise, which is insignificant and would be imperceptible to the human ear. Relative to the high traffic volumes already present on NEH, traffic generated by the proposal should have negligible acoustic impact.

9.5.5 Impact Assessment

Results above in **Table 37** and **Table 38** show that worst-case L_{Aeq} noise levels generated by site would be at least 8 dB(A) below the minimum PNTL outlined in the NPfI during the morning shoulder period from 6am to 7am. At all other times, operational and construction L_{Aeq} noise levels were predicted to be 13 dB(A) or more below relevant noise criteria. Given the conservative modelling approach, site noise levels at receivers are expected to be significantly lower than those predicted.

In practical terms, the total measured sound power of all operational mobile and fixed plant on site combined is approximately equivalent to a single 300 tonne rear dump truck typically deployed at an open cut coal mine. There are five open cut coal mines closer to or the same distance to Camberwell village as the site. Noise from the site is expected to be imperceptible at NSRs due to higher noise levels generated by local mines and the NEH, plus additional shielding provided by predominantly day-only operations and source to receiver geographic landforms.

Vibration impacts from proposed construction and operational activities on site are negligible, considering the extremely large distance to receptors. Road traffic noise impacts are also insignificant, resulting in a 0.1 dB increase in traffic noise from the NEH.

9.5.6 Mitigation and Management

As there would be no construction and operational noise impacts as a result of the development, no specific noise mitigation measures or monitoring is required. This reflects the location of the development and the background noise already present from the NEH and five surrounding mining operations.

9.5.7 Conclusions

Results of this assessment indicate noise and vibration generated by the proposal would have minimal to no impact on the nearest residential receivers to the site. These residential receivers are located more than 7 km away. Noise from the NEH and five operating mines surrounding the development already produce considerably more noise than would be emitted from the proposed compost facility expansion. It is considered highly unlikely proposed operations would be discernible at residential locations.

The noise and vibration impact assessment has considered impacts from operational noise, construction noise, sleep disturbance, road traffic noise, and vibration, all of which are predicted to be insignificant.

Operational noise, construction noise, sleep disturbance, road traffic noise, and vibration impacts are predicted to comply with relevant criteria at all receptors.

Compliance with relevant assessment noise level targets is predicted for all activities, therefore no specific noise management or monitoring is proposed.

The full **Noise Impact Assessment** is attached as **Appendix K**.

9.6 Biodiversity and Bushfire

9.6.1 Introduction

A **Preliminary Biodiversity Assessment** (refer **Appendix L**) and a **Bushfire Assessment** (refer **Appendix M**) have been prepared by Peak Land Management for the proposed development. The purpose of the **Preliminary Biodiversity Assessment** was to determine the presence and impact to threatened species under the Biodiversity Conservation Act 2016. Whilst the purpose of the **Bushfire Assessment** was to determine the hazards and risks associated with bushfire at the development site and how these risks could be suitably reduced and managed in accordance with the *Planning for Bushfire Protection Guidelines (PBP)* 2006.

The assessments were also prepared to satisfy the SEARs and agency comments, which requested the following be considered:

Biodiversity – including:

- *a detailed assessment of biodiversity impacts of the proposal in accordance with the Biodiversity Assessment Method BAM.*

Bushfire – including:

- *an environmental assessment addressing:*
 - *the aims and objectives of Planning for Bushfire Protection 2006;*
 - *potential ignition sources, including grass fire impacting the site;*
 - *proposed bushfire protection measures, including vegetation management and fire suppression capabilities;*
 - *operational access for firefighting appliances; and*
 - *emergency management procedures.*

A full summary of the SEARs requirements (including agency responses) are included within **Appendix B**.

As the site has been highly disturbed from previous mining activities, has no natural vegetation remaining over the site, and will not impact on natural vegetation or waterways, it was considered that a detailed biodiversity assessment was not required.

9.6.2 Existing Environment

The site comprises lands located on part of a capped open cut mining void which has been filled with mine spoil and ash from the Bayswater Power Station. The development footprint, including the existing approved composting facility, is located on a graded hardstand area, surrounded by perimeter bunding. A sediment barrier is located on the eastern corner of the facility and a clean water catch drain is located along the western side of the facility. A detention basin and spillway are located towards the southern end of the facility. A diversion wall and channel direct stormwater runoff from the eastern corner of the facility into the spillway. A spillway channel connects the spillway to the lower basin.

Significant disturbance of the natural environment within and surrounding the development site has occurred as a result of the long history of mining and power generating activities in the area. The Project area is clear of any remnant or native vegetation due to past land activities.

9.6.3 Statutory Considerations

9.6.3.1 Biodiversity

9.6.3.1.1 Environmental Protection and Biodiversity Conservation Act 1999

This Act relates to actions which may have a detrimental impact on matters of National Environmental Significance (NES) and is implemented by the Federal Department of Environment and Energy (DoEE). This includes:

- Nationally Threatened Species (including koala) and Ecological Communities,
- Listed Migratory Species which may be relevant to this site;
- Declared world heritage sites;
- Ramsar Wetlands;
- Nuclear actions; and
- Actions in a Commonwealth marine area.

The site is not a Declared World Heritage Site, Ramsar Wetland, has no Federal listed Critically Endangered Ecological Community present, and Nuclear Actions/Actions in a Commonwealth marine area are not relevant. There is very limited habitat present for some listed EPBC threatened species, which are only over the proposed wetlands protected area and unaffected by the proposal. Accordingly, the development conforms to the EPBC Act and does not need referring to DoEE.

9.6.3.1.2 Environmental Planning and Assessment Act 1979

Clause 1.7 of the EP&A Act relates to the application of Part 7 of Biodiversity Conservation Act 2016 and Part 7A of Fisheries Management Act 1994.

The EP&A Act is subject to the provisions of Part 7 of the *Biodiversity Conservation Act 2016* (BC Act) and Part 7A of the *Fisheries Management Act 1994* that relate to the operation of this Act in connection with the terrestrial and aquatic environment.

As the BC Act has been addressed within the **Preliminary Biodiversity Assessment**, the relevant biodiversity sections of the EP&A Act 1979 have been addressed also.

9.6.3.1.3 Biodiversity Conservation Act 2016

The BC Act 2016 repeals the *Threatened Species Conservation Act 1995* (NSW), the *Native Vegetation Conservation Act*, *Nature Conservation Trust Act 2001* (NSW) and parts of the *National Parks and Wildlife Act 1974* (NSW).

The BC Act establishes a new regulatory framework for assessing and offsetting biodiversity impacts on proposed developments. Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

Area Clearing Threshold

The area threshold applies to all proposed native vegetation clearing associated with a development proposal. Area clearing thresholds are provided in **Table 39**.

Table 39 Area Clearing Thresholds (BC Act 2016)

Minimum Lot Size	Threshold for Clearing Above Which the BAM and Offsets Scheme Applies
Less than 1 ha	0.25 ha or more
1 ha to less than 40 ha	0.5 ha or more
40 ha to less than 1000 ha	1 ha or more
1000 ha or more	2 ha or more

As no native vegetation clearance is proposed for the development, the BC Act provisions with respect to area clearing thresholds are not triggered.

Biodiversity Values Map

The Biodiversity Values Map identifies land with high biodiversity value, as defined by the OEH Biodiversity Conservation Regulation 2017. The Biodiversity Offsets Scheme applies to all local developments, major projects or the clearing of native vegetation where the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 applies. Any of these will require entry into the Biodiversity Offsets Scheme if they occur on land mapped on the Biodiversity Values Map. Exempt and complying development or private native forestry are not subject to the Biodiversity Offsets Scheme.

The subject site is not mapped on the OEH Biodiversity Values Map, and therefore this proposal does not trigger the BC Act full BDAR assessment under this criteria.

5 Part Test

Under the clause 7.3 of the *Biodiversity Conservation Act 2016*, a 5 Part Test is undertaken to determine whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats.

Under Part 4 of the *Biodiversity Conservation Act 2016* development work requires a 5 Part Test for any clearing of native vegetation, impacts over threatened flora/fauna species and Endangered Ecological Communities.

The “Five Part Test of Significance” was not required in this instance as no impact over any native vegetation, or fauna habitat is proposed.

Local Land Services Amendment Act 2016

The development proposal is subject to development consent under Part 4 of the EP&A Act and therefore the LLS Act does not apply to the proposal.

9.6.3.2 Bushfire

Under the *Environmental Planning and Assessment Act, 1979* (and its regulations), and the *Rural Fires Act 1997* (and its regulations), councils are required to assess and control new developments in bush fire prone areas. This the subject land has been assessed as **not** being part of a Bush Fire Prone Land Area as mapped by Singleton Council. It should be noted that clause 4.14 of the *Environmental Planning and Assessment Act 1979* requires Councils to be satisfied that developments in Bush fire Prone Areas comply with *Planning for Bush Fire Protection 2006* (PBP) guidelines, and relevant standards including the BCA which calls up AS 3959-2009 before granting development consent.

This report aims to address these requirements so consideration may be shown by DPIE to allow development approval.

9.6.4 Methodology

9.6.4.1 Fauna

A threatened species fauna survey was conducted for birds (voice recorded where necessary for identification, and visual by binoculars), amphibians (voice recorded where necessary for identification), mammals (visual, scats, tree scratch marks, burrows, footprints), and reptiles (visual). No trapping, hair sampling, spotlighting, anabat or nocturnal owl call recording occurred due to not being required under BC Act 2016. All scats were analysed. Any hollow bearing habitat trees & other ecological features over the subject site were GPS mapped & inspected where feasible. A full list of fauna species recorded is provided in **Appendix L**.

In addition to the onsite fauna survey and habitat assessment, research using Bionet records and other published sources have been used to determine possible occurrence of threatened species. Where suitable habitat is present and Wildlife Atlas and Bionet records occur, an assumption has been made that potential threatened fauna species as listed in Bionet may be present also (refer **Appendix L**).

As there are no requirements for fauna survey under the BC Act 2016, only records of those fauna recorded during the survey and the habitat assessment described.

9.6.4.2 Flora

Vegetation was assessed by a walking and vehicle meander transect (after Cropper 1993) over the Project area. All transects, and any hollow bearing trees or threatened species were recorded on a Garmin handheld GPS 60CSx unit, generally accurate to within 1- 3m depending on canopy cover. Special attention was paid to any potential threatened species. This has enabled identification and assessment of most species on the site. The survey is limited by non-flowering of cryptic orchid/grass/other species at time of survey as described above making identification impossible/problematic.

To help overcome any limitations, the survey was carried during a known flowering season. Any plants that were not readily identifiable in the field were sampled and analysed in the office. Any potential threatened species are sent to NSW Herbarium for identification /ratification, and Office of Environment and Heritage informed of locations for recording on the NSW Bionet database as per NPWS scientific licence requirements. This was not required in this instance.

9.6.4.3 Bushfire

This assessment (refer **Appendix M**) has been undertaken to address the requirements of clause 4.14 of the EP&A Act 1979.

9.6.4.3.1 Bushfire Prone Land

Bushfire activity is prevalent in landscapes that carry fuel and the two predominant bushfire types are grassland and forest fires. Factors such as topographic characteristics and quantity of fuel loads influence the intensity and spread of fire. The scale of a bushfire hazard is tailored to the characteristics of the hazard, the size and characteristics of the affected population, types of land use exposed to bushfire, predicted development growth pressures and other factors affecting bushfire risk.

The site has been identified in the Singleton Council Bushfire Prone Land Map as not being bushfire prone.

9.6.4.3.2 Vegetation Assessment

Vegetation classification over the site and surrounding area has been carried out as follows:

- Aerial Photograph Interpretation to map the vegetation classification and extent;
- Reference to regional vegetation community mapping; and
- Site Inspection (17 October 2018).

9.6.4.3.3 Slope Assessment

Slope assessment has been undertaken utilising 1m contours and verified during the site inspection. An assessment of the slope over a distance of 100m of the hazard direction from the site boundary was undertaken. The effective slope was then calculated under the classified vegetation. The topography of the site has been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the site.

9.6.5 Impact Assessment

Field survey for fauna, flora, and bushfire was undertaken on the 17 October 2018 and the weather was mild, being around 24°C. The survey was commenced mid-morning and concluded early afternoon and was conducted during clear weather, moderate humidity, and a low wind. Rain had occurred in the preceding week and a thunderstorm occurred later in the afternoon.

9.6.5.1 Fauna

A limited number of birds and other fauna were recorded over or near the subject site, however no threatened species were recorded. The survey covered lands over and around the proposed development footprint. In summary, the following observations were made:

- The site has no native vegetation, and little habitat present for any threatened flora or fauna presence;
- No threatened fauna species were recorded, with only common birds and animals seen;
- No hollow bearing logs, trees, or caves recorded over the site;
- Ephemeral ponds/shallow standing water over smaller depressions occurred over parts of the site from recent rains, which had some local & migratory waterbirds present including ducks over more permanent dams, and waders over small ephemeral ponds such as Red Capped Plover;
- Minimal natural habitat remains over the site, and is limited to these transient waders, waterbirds, and possibly micro bats and scavenging birds such as crows. Introduced mammals such as Fox, rabbit, rats, mice and other opportunistic introduced/feral species are likely to occur around the site; and
- Water quality runoff is likely to be poor coming from the facility. Detention and leachate treatment dams, and wetlands mitigate off site water quality impacts.

9.6.5.2 Flora

In summary, the following observations were made:

- No threatened species or Endangered Ecological Communities were recorded, with the site comprising almost wholly exotic weeds, with only two native species recorded in very low numbers and probably planted over the site;
- No habitat is present for any naturally occurring threatened species or Endangered Ecological Communities over the site due to it being totally filled with mine spoil & fly ash; and
- No native vegetation clearing proposed for the expansion of the development.

9.6.5.3 Bushfire

Significant disturbance of the natural environment within and surrounding the development site has occurred as a result of the long history of mining and power generating activities in the area. The Project area is clear of any remnant or native vegetation due to past land activities.

Access to the facility is provided via an internal unsealed, 4-6m wide two-way all-weather traversable access road off Lemington Road which connects to the New England Highway.

The current and proposed expanded development is not serviced by reticulated water, or mains electricity. A number of dams, with the largest being a mine void dam in excess of 250 megalitres in capacity, is located to the south of the site. The water from the large dam is pumped on site and is available for fire-fighting if necessary. A 300,000 litre steel raw water tank is located centrally on the eastern side of the development.

Land over and within 100m of the site is bare rock & soil, weeds and grasses, which are slashed and managed over the site and assessed as managed land/no hazard. There is insufficient fuel in the slashed grassland to enable a grass fire to develop or spread.

Slope assessment has been carried out under flammable vegetation within 100 metres of the development as specified under the PBP guideline. Slope angles have been measured in the field by an inclinometer, including the slope under the vegetation. In this case as no hazard is present therefore no slopes have been measured.

The subject development site has been cleared, with exotic grasses and weeds occurring over the footprint. An assessment of environmental features was undertaken by Peak Land Management as part of the **Preliminary Biodiversity Assessment** (refer **Appendix L**) which found no environmental features.

An AHIMS search has been undertaken with no sites recorded over the development site. The site is disturbed, slashed, levelled, filled, and cleared.

The legislation as it relates to this site calls for Asset Protection Zones (APZ) to be established around the proposed development, provision of adequate access, design staging and citing of the development and provision of appropriate water supply for bush fire-fighting purposes. Land is to be managed to an APZ standard.

9.6.6 Mitigation and Management

9.6.6.1 Fauna and Flora

The ecological investigations found that there is no suitable habitat present over the site or immediate surrounds to support any Threatened species, Endangered Ecological Community, Critical Habitat, or Endangered Populations by the proposed works.

The following mitigation and management will improve the biodiversity outcomes for the development:

- The north-western area where existing small dams and the proposed artificial wetlands are to be located is encouraged. Use of a variety of water depths, and planting of native wetland species endemic to the Singleton region is encouraged; and
- Environmental weeds present over the disturbed areas of the site should be controlled/eradicated where feasible.

It is considered that itinerant migratory bird, and possibly bat species habitat, may be improved by the proposed retention and improvement of the proposed wetland areas over the north-western part of the site, which may in the long term improve wildlife habitat in this severely degraded area.

9.6.6.2 Bushfire

The development area is not mapped as bush fire prone land, with no bush fire requirements applicable, however the following mitigation and management is recommended:

Access Road - A minimum 4m wide access road with 1m shoulders, passing bays every 200m to allow two-way passing of vehicles, and all-weather trafficable is provided;

Perimeter Road - A minimum 4m wide perimeter road, unsealed all-weather trafficable road around the external perimeter of the compost mounds to prevent potential grass fires encroaching into the compost facility, or a fire from the compost facility spreading into surrounding grassed areas and properties;

Water - water supplies provided to fight any fires (ie. water from local dams on site is adequate, or a 20,000 litre dedicated fire-fighting non-combustible water tank). A diesel or petrol-powered fire-fighting pump, with at least a 40m long hose with steel nozzle, mounted on a mobile fire tanker unit should be provided. It should be able to pump out water and cart water from the water supply tank/dam, and fight any spot fires caused by ember attack, or self-combustion; and

Emergency and Evacuation Plan - including details of the site Fire Warden, local Rural Fire Service contact numbers, emergency muster point, fire-fighting appliances and location, first aid kits, and emergency response procedures in the advent of a bush fire. The Rural Fire Service should also be notified of the development once approved so it can be added to their facility register, and details also provided of access and fire-fighting capacity onsite.

9.6.7 Conclusions

There is not considered to be any significant impact on any threatened species, Endangered Ecological Community, critical habitat, or endangered populations by the proposed works on any state or nationally listed species under the *EPBC Act 1999*, or *BC Act 2016*. Further detail is provided in the full **Preliminary Biodiversity Assessment** attached as **Appendix L**.

As the proposal (including access road) is not over land mapped as Bush Fire Prone Land no further requirements are applicable. This has been verified on site, with no hazard present. The bush fire risk is considered to be adequately managed through the recommendations made above, and in conjunction with any recommendations from the Rural Fire Service/ Council the proposed development should proceed. Further detail is provided in the full **Bushfire Assessment** attached as **Appendix M**.

9.7 Visual

9.7.1 Introduction

Visual impacts have not been identified as a key environmental issue with the expansion of the Project and, as such, SEARs and agency comments have not been provided for assessment against. Notwithstanding this, a basic assessment of visual impacts has been undertaken to satisfy community and regulator expectations.

9.7.2 Existing Environment

9.7.2.1 Visual Amenity

The upper Hunter Valley has a diversity of landforms, vegetation patterns and land uses. The scenic quality of an area is considered to improve with increasing diversity of topographic ruggedness, vegetation patterns, natural and agricultural landscapes and water bodies. However, the scenic quality of an area is typically considered to decrease with views of the built environment (including both urban and industrial development) and areas of extensive earthworks (e.g. mines and quarries).

The visual character of the upper Hunter Valley is characterised by a contrast of landscapes from the native vegetation areas on the slopes bordering the valley, to cleared grazing land, areas of intensive agriculture along the alluvial river flats, rural-residential areas, industrial development (ie. power generation), and coal mining areas.

The dominant land uses in the area surrounding the Project area are mining, power generation, and grazing. A high proportion of this area has extensive views of existing coal mining activities and associated infrastructure such as coal handling facilities. The Liddell and Bayswater power stations are also located to the north of the Project area, further adding to the highly developed nature of the surrounding landscape. The prevailing visual characteristics of the area surrounding the site include former as well as current mining

operations and related activities. Rehabilitated lands and grazing constitute the remainder of the Project area. These general categories are most visible from Lemington Road and the New England Highway from a long distance to the north and north-west.

Vegetative features also influence the level of visual impacts on areas surrounding the Project area. Shielding of the site by vegetation and rehabilitated areas adjacent to roadways provides a barrier between the Project and the surrounding receiver area to the south-east, sections of the New England Highway to the east, and Lemington Road to the south.

The nearest private residences to the Project area are residences located approximately 7 km to the south-east at Camberwell Village.

9.7.2.2 Project Visibility

Project design has considered potential visual impacts on surrounding areas including the distance to potentially affected areas and shielding provided by natural topographic features and the landforms associated with rehabilitated mining areas in the Project area.

The Project does not require any site infrastructure that is elevated in nature, visually intrusive during the day or night, and is not dominant of the landscape. The most visually prominent feature of the Project is the slightly raised location of the site office and staff amenities. The organics processing hardstand is located on a flat recessed area created from the capping of Void 3. Current operations, and proposed operations, will remain visually shield by the surrounding vegetation and topography.

9.7.3 Methodology

9.7.3.1 Viewpoint Analysis

A viewpoint analysis considers the likely impact that a development would have on the existing landscape character and visual amenity by selecting prominent sites or viewpoints. Viewpoints are selected to illustrate a combination of the following:

- Present landscape character types;
- Areas of high landscape or scenic value;
- Visual composition;
- Range of distances;
- Varying aspects;
- Various elevations;
- Various extent of development visibility (full and partial visibility); and
- Sequential along specific routes.

Viewpoints have been carefully selected to be representative of the range of views within the study area. The selection of viewpoints is informed by topography, field observations and other relevant influences such as access, landscape character and the popularity of vantage points.

A total of 7 viewpoints were recorded as part of the field work process. All viewpoints were taken from publicly accessible roads surrounding the site. The viewpoints which have been included represent the areas from where the development would appear most prominent, either based on the degree of exposure or the number of people likely to be affected.

9.7.3.2 Process of Viewpoint Analysis

Once the viewpoint was selected, photographs were taken at eye level from the viewpoints towards the Project site. The visual impact of the viewpoint was then assessed both on site and with the topographic and aerial information to ensure accuracy. Viewpoint locations and photographs taken from these locations looking back towards the Project area are shown on **Figure 21**.

9.7.4 Impact Assessment

Visual impacts are dependent on characteristics of the existing landscape, sensitivity of viewers and the extent to which visual modification will occur as a result of the Project. The visual impact assessment is focused on the most sensitive receivers such as the private residences and the major travel routes.

9.7.4.1 Private Residences

The nearest sensitive receivers to the proposed development are private residences located at Camberwell Village, 7km to the south-east. No views of the operations will be visible from any of the residences due to the blocking effect of a ridgeline located to the north-west of Camberwell.

9.7.4.2 Transport

The New England Highway to the east and north, and Lemington Road to the south, are all screened from the development site by either topography or vegetation along roadway verges and further afield. The low height of infrastructure and equipment at the site also reduce the visual impacts from the development.

Given the screened views available to users of these transport routes, their distance to visible components of the Project and the dominance of other mining and industrial activities in the region, it is considered that the Project will result in minor visual impacts to travellers on these transport routes.



TITLE : FIGURE 21: VIEWPOINT ANALYSIS

LOCATION : RAVENSWORTH

DATUM:GDA 1994

DATE : 4/11/2019

VERSION (PLAN BY): AA3 (Natalie.Wood)

PROJECTION: GDA 1994 MGA Zone 56

PURPOSE: **PLANNING**

J:\JOBS\141K\141357 Ravensworth\10 - Drafting\Arcgis Map Documents\Planning\141357 Figure 21 Photo Location A
PATH: A3L 20190909.mxd

CLIENT: **BETTERGROW**
JOB REF: **PR141357**

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
Unit 2A, 45 Fitzroy Street, Carrington, NSW, Australia, 2294 PO Box 120, Carrington, NSW, 2294
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9.7.4.3 Degree of Change

The visual character of the area surrounding the Project is dominated by existing coal mining activities and associated infrastructure such as powerlines, haul roads and coal handling facilities. The Liddell and Bayswater power stations are located to the north of the Project area and provide significant visual features in the surrounding landscape.

9.7.5 Mitigation and Management

As the development site is already adequately screened from view no additional mitigation measures are proposed. Design and location characteristics of the development provide sufficient mitigation. Retention of existing trees within the site are recommended to maintain the existing level of screening.

9.7.6 Conclusions

With the implementation of the recommended mitigation measures, the proposed development can be undertaken whilst maintaining the core landscape character of the area and have a negligible visual impact on the surrounding visual landscape.

9.8 Aboriginal Heritage

9.8.1 Introduction

An **Aboriginal Cultural Heritage Assessment (ACHA)** of the proposed development has been undertaken by RPS (refer **Appendix N**). The purpose of this assessment was to identify the presence of Aboriginal sites across the Project site, determine the risk of impact to Aboriginal sites, undertake Aboriginal consultation, identify the presence of any significant historic heritage items within the locality of the development site, risk of impact by the development, and to provide mitigation and management measures based on assessment findings. The heritage report has been prepared in accordance with the relevant OEH guidelines including:

The assessment has also been prepared to satisfy the SEARs and agency comments. OEH requested the following be addressed:

Aboriginal Heritage:

- *The Environmental Impact Assessment (EIS) must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in the Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values should be guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and consultation with OEH regional branch officers.*
- *Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.*
- *Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.*

A full summary of the SEARs requirements (including agency responses) are included within **Appendix B**.

9.8.2 Existing Environment

The Project Area is located at Ravensworth No. 2 mine, 74 Lemington Road, Ravensworth, NSW (Lot 10 DP1204457). The site lies approximately 20 km north of the township of Singleton, New South Wales, within

the Singleton Council Local Government Area (LGA) and the Wanaruah Local Aboriginal Land Council (LALC) boundary. It has an approximate overall area of 57ha.

An understanding of the environmental context is crucial for the interpretation of Aboriginal sites. The local environment provided natural resources for past Aboriginal people, such as stone (for manufacturing stone tools), food and medicines, wood and bark (for implements such as shields, spears, canoes, bowls, shelters, amongst others), as well as landforms suitable for camping and other activities. The following sections provide detail on each of the relevant environmental factors.

9.8.2.1 Geology and Soils

The Project Area is situated within the Liddell Soil Landscape (Kovac & Lawrie 1991) characterised by Yellow Soloths on slopes and yellow Solodic Soils on concave slopes. Earthy and Siliceous Sands occur on mid to lower slopes where the parent material is sand. Red Soloths, Red Solodic Soils and Red Podzolic Soils may also occur (Kovac & Lawrie 1991). Soloth soils are acidic soils usually typical of humid regions. Solodic soils have a strong contrast between A and B horizon textures, with A horizons being often acidic and B horizons often alkaline (Agriculture Victoria 2018). Podsol soils are characterised by B horizons dominated by the accumulation of organic compounds, aluminium and/or iron (Agriculture Victoria 2018). Minor to severe sheet erosion and low to moderate flood hazard are common within the Liddell Soil Landscape (Kovac & Lawrie 1991).

9.8.2.2 Topography and Hydrology

Local topography is generally that of undulating low hills and undulating hills (Kovac & Lawrie 1991). Elevation ranges from 140 to 220 m. Slopes are generally between 4 and 7%, with long slope lengths between 1200 and 2000 m. Local relief is 60 to 120 m with drainage lines usually occurring at 300 to 1000 m intervals (Kovac & Lawrie 1991). Distance from water is an important factor affecting the archaeological potential of an area. The Project Area is located approximately 1.19 km west of Bowmans Creek. Lake Liddell is located approximately 5.6 km north-west of the Project Area, though this lake was artificially expanded to accommodate Liddell Power Station's cooling needs sometime after 1970. The Project Area is located approximately 6 km north of the Hunter River. Bayswater Creek originally ran either through or adjacent to the Project Area. In 1987 with the development of the Project Area for coal mining, this creek was diverted.

9.8.2.3 Flora and Fauna

Endemic vegetation communities present within the Project Area prior to European settlement would have included Hunter-Macleay Dry Sclerophyll Forests.

Vegetation communities throughout the Project Area would have provided a habitat for a variety of animals and would have also provided potential food and raw material sources for Aboriginal people. Typical animal species would have included kangaroos, wallabies, possums, sugar gliders, echidnas, birds, a variety of reptiles, as well as rats and mice. The bones of such animals have been recovered from excavations of Aboriginal sites suggesting that they were sources of food, although the hides, bones and teeth of some of the larger mammals may have been used for Aboriginal clothing, ornamentation, or other implements.

9.8.2.4 Synthesis of Environmental Context

The Project Area would have included environments suitable for occupation by past Aboriginal communities. The area is located close to several water sources, flora and fauna species utilised as dietary resources by past Aboriginal people would have been abundant within the Project Area prior to European settlement. However, the underlying geological formation would have provided few suitable raw stone materials for the manufacture of stone artefacts. While it is possible that mudstone could be used in the production of lithic artefacts, it is likely that resources would have also been procured from elsewhere.

9.8.3 Methodology

The following methodology has been applied to the preparation of the **ACHA**.

9.8.3.1 AHIMS Search

A search was undertaken of the AHIMS database on 17 October 2018 which revealed 206 previously recorded Aboriginal objects and their locations within the coordinates (**Table 40**). No Aboriginal sites or objects were identified within the Project Area. Low-density surface artefact sites are the most frequent type occurring within 1.5 kilometres of the Project Area.

Table 40 AHIMS Search Results

Summary of AHIMS sites within the search coordinates		
Type	Frequency	Percent
Artefact site (number unspecified)	156 (99 destroyed, 1 partially destroyed)	75.73%
Isolated find	23 (7 destroyed, 8 partially destroyed)	11.17%
Artefact Scatter	14 (3 destroyed)	7.28%
Artefact Scatter with PAD	5 (3 destroyed)	2.43%
Art (pigment or engraved)	2 (1 destroyed)	0.97%
Grinding groove with artefacts	1	0.49%
Grinding groove, modified tree, artefacts	1	0.49%
Massacre	1	0.49%
PAD	1	0.49%
Restricted	1 (not a site)	0.49%
TOTAL	206 (113 destroyed, 9 partially destroyed, 1 not a site)	100%

Searched co-ordinates Lat, Long from: -32.478046, 151.047558 to -32.46182, 151.06705

9.8.3.2 Literature Review

A review of previous archaeological and cultural heritage work has been undertaken to inform the **ACHA**. These included:

Godwin, L (1987) 'A Preliminary Archaeological Survey of a Proposed Open-cut Coalmine at Ravensworth in the Hunter Valley of NSW.' Report to Croft and Associated Pty Ltd.

In January 1987, Luke Godwin authored a report detailing an archaeological survey undertaken near Ravensworth. A sketch map included within the report identifies the proposal area as being either directly south of the Project Area or south and within the Project Area. The archaeological survey was conducted to inform an Environmental Impact Statement (EIS) for a proposed development of approximately 300 hectares for open-cut mining, also requiring a diversion of Baywater Creek and a re-alignment of Lemington Road.

A survey was undertaken in order to investigate areas that had previously not been surveyed, and to ground-truth previously inspected and recorded sites. Particular interest was paid to eroded areas along watercourses, vehicle tracks and other disturbed areas. During the course of the survey a total of 58 separate exposures of archaeological material were recorded.

Australian Museum Business Services (2002) 'Abbey Green', Mt Thorley Mine, Hunter Valley Archaeological Assessment. Report prepared for Coal & Allied.

In 2002, a report was authored by Australian Museum Business Services (AMBS) for a proposal to extend current open cut mining operations at the Mt Thorley mine, including design concepts for a proposed haul road. The proposal area is located approximately 20 kilometres south of the Project Area.

Within a three-kilometre radius of the proposal area a total of 111 Aboriginal objects had been registered with the National Parks and Wildlife Service. The majority of these sites were open camp sites (109), one set of grinding grooves and one erroneously recorded midden. Two of these sites had been recorded as being located within the proposal area. It was considered likely that open camp sites would be the most common site type likely to be encountered during the works, including stone artefacts and possible hearths.

Insite Heritage (2012) 'Aboriginal Archaeological Report: Proposed Goaf Gas Drainage Project, Ashton Coal Operations Ltd Camberwell, NSW.' Report to Wells Environmental Services on behalf of ACOL.

In 2012, Insite Heritage authored an Aboriginal archaeological report to Wells Environmental Services for a proposed Goaf Gas drainage project. Under the ACOL lease of the area, two Aboriginal Heritage Impact Permits (AHIPs no. 1131017 and 1130976) encompassed the goaf gas drainage proposal area. The report was undertaken in order to identify and assess potential impacts from the proposed works and recommend appropriate management and mitigation strategies under the permits. The proposal area is located approximately five kilometres south-east of the Project Area.

Previous assessments undertaken within the ACOL mine lease area identified 157 sites within the lease as a result of several surveys. The archaeological resource of the area included artefact scatters as the predominant site type, located along the central ridge and on slopes and terraces of Glennies and Bowmans Creeks and the Hunter River. A field survey of the proposal area was undertaken, a portion of which had already been salvaged under the above AHIP. The survey resulted in the identification of 30 previously unrecorded loci containing artefacts, 15 of which were artefact scatters and 15 of which were isolated finds.

9.8.3.3 Aboriginal Consultation

Aboriginal community consultation has been undertaken for this assessment and has followed the Consultation Requirements (DECCW 2010). The Consultation Requirements outline a four stage Aboriginal consultation process and mandate specific timeframes for each stage. The four stages are summarised below.

9.8.3.3.1 Consultation Stages

Stage 1 – Notification of project proposal and registration of interest

Stage 1 requires that Aboriginal people who hold cultural information are identified, notified and invited to register an expression of interest in the assessment. This identification process should draw on reasonable sources of information including: the relevant OEH Environment Protection and Regulation Group (EPRG) regional office, the relevant Local Aboriginal Land Council(s) (LALC), the Register of Aboriginal Owners, the Native Title Tribunal, Native Title Services Corporation, local council(s) and the relevant Local Land Services, as well as placing an advertisement in a local newspaper circulating in the general location of the activity. Aboriginal organisations and/or individuals identified should be notified of the activity and invited to register an expression of interest for Aboriginal consultation.

Stage 2 – Presentation of information about the proposed project

The aim of stage 2 is to provide registered Aboriginal parties identified during stage 1 information about the scope of the proposal and the proposed heritage assessment process.

Stage 3 – Gathering information about cultural significance

Stage 3 provides the opportunity for registered Aboriginal stakeholders to recommend culturally appropriate research methodologies for the cultural heritage assessment. At this stage registered stakeholders are invited to provide input to determine the cultural significance of Aboriginal objects and/or places within the Project Area. In turn they are also given the opportunity to have an input into the development of any cultural heritage management options.

Stage 4 – Review of draft cultural heritage assessment report

The final stage of the Consultation Requirements requires all registered Aboriginal stakeholders to be provided with a copy of the draft ACHAR and given 28 days in which to review the document. This stage

provides Aboriginal stakeholders with an opportunity to review the ACHAR prior to its submission with the AHIP application. Further cultural information may be gathered at this stage and all comments received are then incorporated into the final report.

9.8.3.3.2 Record of Consultation

A full record of all correspondence undertaken for the **ACHA** is included in **Appendix N**.

In accordance with Stage 1, letters requesting the details of any Aboriginal people that may hold cultural knowledge relevant to the Project Area were sent to the following agencies on 10 September 2018:

- National Native Title Tribunal;
- Native Title Services Corporation Limited;
- Registrar of Aboriginal Owners NSW Department of Aboriginal Affairs;
- Singleton Council;
- Office of Environment and Heritage, Hunter Central Coast Region;
- Hunter Local Land Services; and
- Wanaruah Local Aboriginal Land Council.

A notice was also placed in the Singleton Argus on 12 September 2018 (see **Appendix N**) and Aboriginal people or organisations identified were invited to register for the Project.

At the completion of Stage 1 of the Consultation Requirements a total of 23 Aboriginal people or organisations were registered for the project. The list of Registered Aboriginal Parties (RAPs) is provided in **Table 41**. The names and details of all RAPs for the Project were forwarded to Wanaruah LALC and OEH on 15 October 2018.

Table 41 Registered Aboriginal Parties

Aboriginal Stakeholders	
Organisation	Name of representative
A1 Indigenous Services	Carolyn Hickey
Culturally Aware	Tracey Skene
Divine Diggers	Dierdre Perkins
Didge Ngunawal Clan	Paul Boyd & Lilly Carroll
Gidawaa Walang Cultural Consultants	Craig Horne
Gomery	David Horton
Hunter Valley Aboriginal Corporation	Rhonda Griffiths
Jarban + Mugrebea	Les Atkinson
Uncle Barry French	Les Atkinson
JTM Traffic Management	Norman Archibald
Kawul Cultural Services	Vicky Slater / Rod Hickey
Hunter Valley Cultural Surveying	Luke Hickey
Lower Hunter Wonnarua Cultural Services	Tom Miller

REPORT

Aboriginal Stakeholders

Aboriginal Native Title Elders Consultant / Native Title Claimant	Margaret Matthews
Mindaribba LALC	Tara Dever
Stephen Talbott	Stephen Talbott
Tocomwall / Native Title Claimant	Scott Franks
Ungooroo	Allen Paget
Wallangan Cultural Services	Maree Waugh
Wattaka Wonnarua Cultural Consultancy Services	Des Hickey
Widescope	Steven Hickey
Valley ELM Corporation	Iren Adler
Wanaruah Local Aboriginal Land Council	Roz Thomson / Noel Downs

In accordance with Stage 2 and 3, information regarding the proposed heritage assessment methodology and strategy for collecting information on cultural heritage significance, was provided in writing to the Registered Aboriginal Parties on 18 October 2018. 8 groups returned their comments on the methodology. Details of the comments are provided below in **Table 42**.

Table 42 RAPs who Responded to the Methodology

Aboriginal Stakeholder Groups or Individuals

RAP	Response	Date	RPS Response
Margaret Matthews	Supports methodology	18/10/18	-
Tocomwall	<p>I have read the Methodology that you have provided and cannot support most of the elements within it. Firstly, we recommend the following.</p> <ul style="list-style-type: none"> All sites and boundaries of sites need to be recorded with Differential GPS not standard hand-held GPS as it is proven on several other projects that standard off the shelf GPS locations have resulted in sites being impacted on as their accuracy varies from 20 meters to 175 meters Sites card 37-3-1506 may in fact cross over into the proposed development area. This sites card contains cultural protected information, this information will not be shared with registered Aboriginal parties or RPS. The information for that area is extremely sensitive and will need to be recorded for the project. The PCWP Registered Native title party retains its own Anthropologists Dr Neil Draper, this person in conjunction with Tocomwall are authorised to record collect and provide information regarding any cultural information within the registered native title claimed area. <p>Are you able to confirm that you will be engaging other specialist to assess the connection to this</p>	18/10/18	<p>RPS altered the methodology to include use of DGPS to record any sites identified within the Project Area.</p> <p>RPS determined that AHIMS 37-3-1506 currently has the status "Not a Site" in the AHIMS database and therefore considered that no further assessment was needed.</p> <p>RPS has engaged Margaret and John Matthews, who form part of the Native Title Claimant group, to assist in provision of relevant information relating to the Project Area.</p> <p>No meeting has been considered necessary for the completion of this work as all consultation has been undertaken in accordance with the ACHCRs.</p>

Aboriginal Stakeholder Groups or Individuals

	<p>claimed area by Raps, could you please provide me with the process that you will be using to ensure you are complying with section 3 of Aboriginal cultural heritage consultation requirements for proponents 2010, I would also like to advise that the registered native title do not authorise, give permission or acknowledge any person that simply register an interest in this project, we also not except that the WLALC retains any cultural knowledge for the Wonnarua people represented by the registered native title party.</p> <p>Tocomwall on the behalf of the registered native title party needs to develop a process as to how our cultural knowledge can be recorded and managed as such I request a meeting with Bettergrow Pty Ltd and the land owner. Could you please advise suitable dates for this meeting?</p>		
Deidre Perkins	Endorses methodology	22/10/18	-
DNC Paul and Lilly Carroll	Endorses methodology	23/10/18	-
Murra Bidgee Mullangari	Endorses methodology	29/10/18	-
Culturally Aware	Endorses methodology	9/11/18	-
Kawul	Endorses methodology; requests to be involved in the fieldwork	13/11/18	-

Due to the Project specifics, it was deemed appropriate that 2 Registered Aboriginal Parties be offered the opportunity to participate in the fieldworks. Selection of representatives was based on the Registered Aboriginal Parties who responded to the methodology and those who provided their insurances to work. 2 representatives (1 of each Registered Aboriginal Party) where present for the fieldwork. RAPs who attended the fieldwork are detailed in **Table 43**.

Table 43 RAPs who Attended the Fieldwork

Aboriginal Stakeholder Groups or Individuals	
Organisation	Representative
Culturally Aware	Tracey Skene
Aboriginal Native Title Elders Consultants / Native Title Claimant	Margaret Matthews (escorted by John Matthews)

In accordance with Stage 4, a draft copy of this ACHAR was provided to all RAPs on 26/3/2019. All RAPs were provided 28 days to review the document and make comments, request alterations or provide additions to this **ACHA**. **Table 44** provides the details of the comments received which were integrated into the final **ACHA**.

Table 44 RAPs who Provided a Response to the Draft ACHA

Aboriginal Stakeholder Groups or Individuals			
Organisation	Representative	Comment	RPS response
Kawul	Vicky Slater	Vicky indicated that as Kawul had not been involved in the field work, they were not able to provide comment	N/A
Tocomwall	Scott Franks	Scott stated that Tocomwall (and he, as a representative of PCWP) did not believe that adequate consultation with the Native Title Claimant group had been undertaken.	<i>No response was made by RPS to this comment as consultation has been undertaken appropriately in accordance with the ACHCRs.</i>
Wanaruah LALC	Noel Downs	Noel noted that the area did not seem to have been subject to any previous investigations. WLALC recommendations are: 1. There appears to be a large area not yet impacted by mining that we believe should be subject to investigation /walk over before further impacts, and 2. Areas where topsoil from this site has been stored or spread should be investigated for objects.	RPS provided the following response to these comments: “Regarding your point about the previous investigations – I agree that it does appear that way. I believe the reason that this hole in the archaeological record is present, is because this part of the mine was commenced prior to the requirement for comprehensive archaeological and cultural assessment. By the time we were able to get into this area, it was completely altered from its original state. Regarding your comment about the area which does not form part of the original void, refer to Figure 4 of the report and Section 5.2.1 and 5.2.2 which contains the survey unit descriptions (nb: <i>these things were included in the email for convenience</i>). I think Survey Unit 2 is the area to which you refer which was not part of the actual mine void. The survey has covered this portion of the project area and identified a highly eroded landscape which has also been subject to modification as a result of earthworks which have removed parts of the slope. No artefacts were identified while RPS, ANTC and Culturally Aware were out there. As there is no topsoil,

Aboriginal Stakeholder Groups or Individuals

			<p>it was assessed that there was no archaeological potential.</p> <p>I will add your final comment (regarding any topsoil which has been moved from the area previously) into our report."</p>
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9.8.3.4 Field Survey

In accordance with the *Code of Practice*, the aims of an archaeological survey are twofold. The first aim of an archaeological survey is to record all (or a representative sample of all) material traces of Aboriginal land use visible on the ground surface or as landscape features. The second aim is to assess subsurface archaeological potential. The Project Area was initially inspected for the purposes of a due diligence assessment. This was followed by an archaeological survey conducted in accordance with the *Code of Practice*.

The Project Area was inspected on Wednesday 29 January 2019 by RPS Senior Archaeologist Dr Dragomir Garbov with participation by the Registered Aboriginal Parties (RAPs) and Todd Wurth (Bettergrow).

The survey was conducted on foot (pedestrian) and targeted the locations identified in the sampling strategy. The mapping of survey units was undertaken on the basis of GPS recorded data and with reference to aerial and topographic information. The recording of sites was to be undertaken using representative digital photographs and field notes which include observations of soils, ground surface exposure and visibility, vegetation cover, levels of ground surface disturbance, erosion and similar observations.

9.8.4 Results

The Project Area was surveyed as two SUs. SU1 represents a 54 ha of flat disturbed land and SU2 represents a 3 ha disturbed elevation on the eastern verge of SU1. No Aboriginal sites or objects were identified. No potential for subsurface archaeological deposits was identified. No mature native trees were identified. When given the opportunity to comment, the RAPs commented that while the Project Area is culturally significant as part of the wider Aboriginal cultural landscape, when viewed in isolation there are no specific cultural values associated with the Project Area.

The Project Area has nil archaeological significance, nil aesthetic significance, and nil historic significance. The RAPs have identified that while the Project Area is culturally significant as part of the wider Aboriginal cultural landscape, when viewed in isolation there are no specific cultural values associated with the Project Area.

9.8.5 Impact Assessment

No Aboriginal objects have been identified. There was no evidence on the basis of the survey that Aboriginal objects were present in the Project Area and it is unlikely that they will be uncovered as part of the proposed development.

The area has nil archaeological value. RAPs have identified that while the Project Area is culturally significant as part of the wider Aboriginal cultural landscape, when viewed in isolation there are no specific cultural values associated with the Project Area. The Project Area is not archaeologically significant on the basis of research potential, representativeness, rarity or education potential. Impacts to Aboriginal heritage values are considered below.

There is no harm anticipated to tangible Aboriginal heritage in the Project Area as no Aboriginal objects have been identified. The proposed development will have harm on the cultural values of the Project Area, by changing the land surface from disturbed land to nutrient recycling facility, however, given this is a highly modified landscape already and the development is existing, this harm is considered minor.

9.8.6 Mitigation and Management

The following mitigation and management will be applied during the expansion of the development:

- All relevant staff should be made aware of their statutory obligations for heritage under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*. This is to be in the form of a heritage induction on site prior to works;
- In the unlikely event that disturbed Aboriginal objects are identified during the development then they are to be collected and recorded in accordance with OEH guidelines and in consultation with the Registered Aboriginal Parties; and
- In the unlikely event that human skeletal remains are identified, work must cease immediately in the vicinity of the remains and the area cordoned off. The proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of a crime scene or are possible Aboriginal remains. If the remains are thought to be Aboriginal, OEH must be contacted via the Enviroline 131 555. An OEH officer will determine if the remains are Aboriginal or not. If the remains are identified as Aboriginal, a management plan must be developed in consultation with the relevant Aboriginal stakeholders before works recommence.

9.8.7 Conclusions

The **ACHA** considered the environmental and heritage context of the Project Area. It has considered the Aboriginal heritage values of the Project Area and the impact of the proposed activity on Aboriginal heritage values. It has been concluded that:

- No Aboriginal objects were identified;
- There was no evidence on the basis of the survey that Aboriginal objects were present in the Project Area and it is highly unlikely that they will be uncovered as part of the proposed development;
- The Project Area has nil archaeological value and is not archaeologically significant on the basis of research potential, representativeness, rarity or education potential;
- The RAP representatives have identified that the area is culturally important as part of the wider Aboriginal Cultural Landscape yet when viewed in isolation there are no specific cultural values associated with the Project Area; and
- The background information and survey did not identify any impacts to tangible heritage.

The full **Aboriginal Cultural Heritage Assessment** is attached as **Appendix N**.

9.9 Historic Heritage

9.9.1 Introduction

A **Historic Heritage Assessment** has been prepared by RPS for the proposed development. The purpose of the assessment was to identify the presence of any significant historic heritage items (if any) within the locality of the development site, whether any of these items would be impacted upon by the development and provide relevant mitigation and management strategies where appropriate. The **Historic Heritage Assessment** is attached as **Appendix O**.

The assessment was also prepared to satisfy the SEARs and agency comments. OEH requested the following be addressed:

Historic Heritage:

The EIS must provide a heritage assessment including but not limited to an assessment of impacts to State and local heritage including conservation areas, natural heritage areas, places of Aboriginal

heritage value, buildings, works, relics, gardens, landscapes, views, trees should be assessed. Where impacts to State or locally significant heritage items are identified, the assessment shall:

- *outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the NSW Heritage Manual (1996),*
- *be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria),*
- *include a statement of heritage impact for all heritage items (including significance assessment),*
- *consider impacts including, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment (as relevant), and*
- *where potential archaeological impacts have been identified develop an appropriate archaeological assessment methodology, including research design, to guide physical archaeological test excavations (terrestrial and maritime as relevant) and include the results of these test excavations.*

A full summary of the SEARs requirements (including agency responses) are included within **Appendix B**.

9.9.2 Existing Environment

The Project Area was inspected on Wednesday 29 January 2019 by RPS Senior Archaeologist Dr Dragomir Garbov. The inspection was conducted on foot (pedestrian survey) and from a vehicle (reconnaissance survey). The Project Area was found to represent a partially remediated mine open cut and as a result identified as disturbed land. No historic heritage resources were identified. There is nil potential for subsurface archaeological resources to be present within the Project Area.

The Project Area is likely to have been associated with early historic settlement of the Hunter Valley since 1824. It is unlikely that historic settlement of the Upper Hunter Valley is represented in the archaeological record within the Project Area.

As part of Ravensworth estate, the Project Area is closely associated with historic farming in the Upper Hunter since 1824 and appears as farmland on historic parish maps from 1912 and 1920-23. The Project Area remained in use as farmland until it was purchased for mining in 1972. It is unlikely that historic farming in the Upper Hunter is represented in the archaeological record within the Project Area.

9.9.3 Methodology

9.9.3.1 Heritage Register Searches

Due to the low risk of impact to historic heritage items surrounding the locality, a desktop assessment of historic heritage has been undertaken for this Project only. The methodology applied to this assessment involved a search of Local, State, and World heritage registers, and a review of relevant existing studies and historical resources. The sections below detail the registers searched.

9.9.3.1.1 World Heritage List, National Heritage List, and Commonwealth Heritage List

Searches of the World Heritage List, National Heritage List, and the Commonwealth Heritage List were undertaken on 10 January 2019 using the Protected Matters Search Tool. There are no items registered on any of these lists located within the Project Area.

9.9.3.1.2 State Heritage Register

A search of the State Heritage Register was undertaken on 10 January 2019. The search found that one item is listed within 10 km of the Project site which is the Chain of Ponds Inn and Outbuildings (SHR00242) located on the Old New England Highway 2km to the north. This site is not within or near the proposed works.

9.9.3.1.3 Section 170 Heritage Registers

Under Section 170 of the Heritage Act, State Government agencies are required to identify, conserve and manage heritage assets owned, occupied or managed by that agency. Each agency maintains a register of their heritage assets, commonly known as the S.170 Register. A search of S.170 Registers was undertaken for the Project Area and no items were found listed on any S.170 Registers within proximity of the site.

9.9.3.1.4 Singleton Local Environmental Plan 2013

A search of the Singleton LEP was conducted on 10 January 2019 and two heritage items of local significance were identified in Schedule 5 of the LEP within the vicinity of the Project Area (refer **Table 45**). None of these items are within the impact zone of proposed works.

Table 45 Locally Listed Heritage Items

Name	Address	Distance from Project Area
Ravensworth Homestead (I41)	463 Hebden Road, Singleton	3 km north east
Former Public School (I42)	Hebden Road, Singleton	2.5 km south east

9.9.3.2 Historical Context

9.9.3.2.1 Historic Settlement of the Singleton Region

In 1820, 23 years after the Hunter River was discovered by Lieutenant John Shortland, the Hunter Valley was opened for free settlement. In 1821 Henry Dangar was employed to conduct a survey of the valley in order to assess the potential and suitability for farming and cattle grazing. The survey was conducted in two stages and completed in 1826 (Brayshaw 1986). Settlement followed soon after 1820 with settlers reaching the Singleton area by October 1821. The discovery of the overland route to the Hunter Valley in 1823 meant that stock could be brought overland into the area from the Cumberland Plain (Heritage Office and Department of Urban Affairs and Planning 1996). Between 1820 and 1826 over 300,000 acres of land were allotted to settlers. By 1828, 50,000 sheep and 11,000 cattle grazed in the Singleton area. From 1867 the allotments increased to 500,000 acres. Farming of wheat, wool, dairy and cattle were the predominant industries with dairy gradually increasing in economic importance. By 1896 there were 360 registered dairies in the Singleton district (Umwelt 2011).

Coal mining in the Singleton – Muswellbrook region increased in the early 1900s with the establishment of local mining companies such as the Kayuga Coal-Mining Company (1906) and the Muswellbrook Coal Company (1909). By 1944 the first open-cut mines were established in Muswellbrook. Open cut coal mining expanded over the next three decades as an increasing number of farming properties were purchased and converted by mining companies or individuals interested in the development of coal mining.

Coal mining in the Ravensworth area first began in 1972 at the Ravensworth No.2 Open Cut mine to supply coal under contract to Pacific Power (previously known as the Electricity Commission of NSW) (Ravensworth Operations 2008:1). Development to facilitate the open cut mine included an area of approximately 300 hectares being mined for coal using open-cut methods and required both a realignment of Lemington Road and a diversion of Bayswater Creek (Godwin 1987).

9.9.3.2.2 Land Use Context

European settlement of the Hunter Valley commenced in 1820 as the region was pronounced open to free settlement. The earliest land grant in the Ravensworth region was that of Dr James Bowman. By the 1850s European communities in the area were expanding and significant farming estates existed in the region until the 1970s. Coal mining in the Ravensworth area first began in 1972 at the Ravensworth No.2 Open Cut mine to supply coal under contract to Pacific Power (previously known as the Electricity Commission of NSW). Expansion of workings occurred progressively until the late 1990s.

9.9.4 Impact Assessment

The impact of the proposed Project is assessed based on the information provided, the archaeological field observations and the assessment of archaeological potential and significance.

There is nil potential for impact to listed heritage items, historic heritage works or relics and subsurface historic archaeological resources to be incurred by the proposed activity.

9.9.4.1 Assessment of Historical Archaeological Potential

Historical archaeological potential is the potential for an area to contain material evidence related to an earlier phase of European occupation of the area and the associated archaeological resources. The historical archaeological potential has been assessed based on an analysis of documentary and archaeological resources and potential disturbance. The assessment included an inspection of the Project Area.

There are no listed heritage items identified within the Project Area. The documentary resources indicate that from 1824 to 1972 the Project Area has been used as farmland. Since 1972 the Project Area has been used for mining or mining related activities. The inspection of the Project Area revealed that the Project Area consists of disturbed land. There is nil potential for historic heritage resources to be present within the Project Area. There is nil potential for subsurface historic archaeological resources to be present within the Project Area as the entire area is filled with fly-ash and imported capping material.

9.9.4.2 Significance of Assessment

No listed heritage items were identified within the Project Area. There is nil potential for historic heritage works or relics to be located within the Project Area. There is nil potential for subsurface historic archaeological resources to be present within the Project Area.

9.9.5 Mitigation and Management

The following mitigation and management are proposed with regard to historic heritage:

- All relevant staff and contractors must be made aware of their statutory obligations for heritage under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*, which may be implemented as a heritage induction;
- In the unlikely event that unsuspected archaeological resources as defined under the *Heritage Act 1977* (as amended) are uncovered, the proposal within that area must cease. The Heritage Division of the Office of Environment and Heritage must be notified as required under Section 146 of the Act. The archaeological relic must be avoided. If it is not practicable to avoid the archaeological relic, additional approvals would be required under the Act; and
- With regards Aboriginal heritage - if unrecorded Aboriginal sites or object/s are identified in the Project Area during works, then all works in the immediate area must cease and the area cordoned off. OEH must be notified via the Enviroline 131 555 so that the site can be adequately assessed and managed. Refer to the Aboriginal Cultural Heritage Assessment Report (RPS 2019).

9.9.6 Conclusions

The **Historic Heritage Assessment** has reviewed the heritage listings and considered the historic background of the Project Area and a field inspection was undertaken by an RPS archaeologist. It has been concluded that:

- No listed historic heritage items were identified within the Project Area;
- From 1820 to 1972 the Project Area constituted farmland and since 1972 the Project Area was part of mining lease;

- There is nil potential for historic heritage resources to be present within the Project Area;
- There is nil potential for surface or subsurface historic archaeological resources to be present within the Project Area; and
- There are no identified impacts to historic heritage as a result of the proposal.

Further detail is provided in the full **Historic Heritage Assessment** attached as **Appendix O**.

9.10 Socio-Economic

9.10.1 Introduction

This section provides an assessment of the social and economic impacts of the proposed development, including identification of the socio-economic characteristics of the surrounding area and the wider Singleton LGA.

9.10.2 Existing Environment

The proposed development is an expansion of an existing composting and nutrient recycling facility. The site is located approximately 20 km north of the township of Singleton, within the Singleton LGA and 25 km south of the township of Muswellbrook within the Muswellbrook LGA.

The Project Area is located within an area that is dominated by coal mining and heavy industrial activities, including power generation and related activities. As such the development is within a highly altered environment. It is considered that the proposed development is generally compatible with surrounding land uses for the site which include:

- Liddell and Bayswater Power Station, including Lake Liddell to the north-west;
- Liddell Coal Operations to the north-west;
- New England Highway to the east;
- Ravensworth North Open-cut Coal Mine to the west;
- Integra Coal Mine to the south-east; and
- Loop Organics Compost Facility to the south.

Locations of the above operations are shown on **Figure 3**.

The closest sensitive receivers to the proposed development are a number of private rural residential properties at Camberwell Village which is approximately 7km to the south-east. The location of these receivers is shown on **Figure 6**.

Singleton LGA is located in the upper Hunter Valley and is bounded by Muswellbrook, Dungog, and Maitland LGA's. The LGA has a total area of 4,893 square kilometres and includes the township of Singleton, as well as a number of villages including Broke, Milbrodale, Bulga, Jerrys Plains, Putty and rural areas such as Whittingham, Mount Olive, Belford, Kirkton, Camberwell and Elderslie.

According to the Australian Bureau of Statistics (ABS), at the 2016 Census there were 22,987 people in the Singleton LGA, of these 50.9% were male and 49.1% were female. Aboriginal and Torres Strait Islander people made up 5.7% of the population. The median age of people in the LGA was 36 years, compared to 38 years for New South Wales and Australia. Children aged 0 – 14 years made up 21.2% of the population and people aged 65 years and over made up 12.7% of the population. Of people in the area aged 15 years and over, 50.6% were married and 11.3% were either divorced or separated.

The median weekly personal income for people aged 15 years and over in Singleton LGA was \$684 compared to the NSW median of \$664 and the Australian median of \$662.

In 2016 there were 11,531 people who reported being in the labour force in the week before Census night. Of these 59.5% were employed full time, 28.9% were employed part-time and 6.1% were unemployed.

The most common occupations in Singleton LGA included Technicians and Trades Workers 17.8%, Machinery Operators and Drivers 17.3%, Professionals 12.3%, Managers 11.0%, and Community and Personal Service Workers 10.9%.

Key economic characteristics of the Singleton LGA are as follows:

- Gross Regional Product (Nominal) in 2018 was estimated at \$4.387 billion;
- Gross Regional product per capita in 2018 was approximately \$190,850; and
- Mining was the largest industry by employment in 2016, employing 6,626 people. The next largest industry by employment was Public Administration and Safety, employing 1,061 people.

In the 2016 Census, there were 12 people in Ravensworth (State Suburb) of these 42.9% were male and 57.1% were female.

9.10.3 Methodology

To identify potential socio-economic impacts and/or issues as a result of the proposed development, the assessment is supported by background research including information reviews and an analysis of demographic profiles as provided above.

9.10.4 Impact Assessment

9.10.4.1 Construction Impacts

The key potential social impacts that may result from construction of the proposed development include:

- Employment – there is the potential for employment to be generated during construction (temporary); and
- Amenity – construction of the proposed development 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.

There are no community facilities near the site such as schools, churches, childcare centres, open space or recreational facilities. The nearest residential properties are located to the south-east of the site at a distance greater than 7 km thus providing an adequate separation distance between the properties and the site.

The proposed development will have a positive employment impact during construction and is likely to create at least 15 to 20 positions during this period.

The potential for negative amenity impacts during construction will be significantly reduced by the implementation of appropriate environmental management controls guided by a construction environmental management plan as detailed in this EIS.

9.10.4.2 Operation Impacts

The key potential social impacts that may result from operation of the proposed development include:

- Employment – there is the potential for employment to be generated and operation (long term positions); and
- Amenity – operation of the proposed development 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 impact.

The proposed development will have a positive employment impact during operation. Approximately 6 permanent positions are expected to be generated during operation providing jobs for the local community. The estimated capital cost including site upgrades, new hardstand areas and the installation of an aerated composting system is estimated to be \$4.8 million. Collectively the capital expenditure and associated economic spin offs will contribute to and strengthen the local and regional economy.

The proposed development is strategically located within an area that is dominated by coal mining and heavy industrial activities and is therefore away from residential areas. The potential for negative amenity impacts will be significantly reduced by the implementation of appropriate design features and environmental management controls guided by the operational environmental management plan.

The proposed development will increase the quantities of organic materials received and dispatched from the site. It will increase processing capacity for organic waste into recycled materials, thereby reducing the amount of waste going to landfill, and increasing availability of recycled products. Utilisation of recycled materials contributes to the conservation of natural resources and biodiversity and is consistent with the principles of ESD.

Hence the proposed development will further assist the NSW government to achieve its goals to increase the diversion of waste from landfill disposal through the development of strategic recycling infrastructure and processing facilities, thus having a positive impact waste minimisation and resource recovery in the region.

In addition to these social and economic benefits, the facility will service the increasing demand for waste recycling infrastructure in the Hunter region.

9.10.5 Mitigation and Management

Implementation of measures to reduce the potential for amenity impacts during construction and operation, as identified in the relevant chapters of the EIS and Statement of Commitments in Section 9. No further mitigation measures are proposed with regard to socio-economic issues as it is considered that the proposed development will be of net benefit to the community, providing for decreased cost and increased social efficiency associated with composting and nutrient recycling within Singleton LGA and the surrounding area in accordance with legislative requirements. Ongoing engagement will occur with the local community and other key stakeholders during construction and operation.

9.10.6 Conclusions

The construction and operation of the proposed development will be of net benefit to the community. The potential for negative amenity impacts during construction will be significantly reduced by the implementation of appropriate environmental management controls guided by a construction environmental management plan. Emphasis within the design of the proposed development has been applied to the management of potential noise and odour impacts to ensure compliance with relevant assessment criteria.

9.11 Fire and Incident Management

9.11.1 Introduction

The SEARS have requested the following in relation to fire and incident management:

- Identification of aggregate quantities of combustible waste productions to be stockpiled at any one time;

- Technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment and fire (including location of fire hydrants and waterflow rates at the hydrant) management and containment measures;
- Detailed information relating to the proposed structures addressing relevant levels of compliance with Volume One of the National Construction Code (NCC);
- Details of how Clauses E.10 and E2.3 of the NCC would be addressed.

9.11.2 Quantities of Combustible Waste Material

No stockpiles of timber or dry product will be stored onsite. The main risk for waste combustion exists from spontaneous combustion due to the overheating of the composted materials. All materials onsite will be managed in accordance with the requirements of the **Compost Management Plan (CMP)** to ensure spontaneous combustion does not occur. The **CMP** is attached as **Appendix Q**.

9.11.3 Environmental Protection and Management Measures

Bettergrow currently have a Pollution Incident Response Management Plan and Emergency Procedure in place for their existing operations which will be updated to cover the expanded development. Specifically, Emergency Procedure 1 of this document covers Fire Management. The procedure has been developed to ensure that in the event of a fire, all practicable measures are taken to minimise or prevent environmental harm to air, water, and land. Separate to the Fire Management Procedure, Bettergrow have an Accident, Emergency, and Incidents Procedure specific to the composting activities onsite. Both the Fire Management Procedure and the Accident, Emergency, and Incidents Procedure are discussed further below.

9.11.3.1 Fire Management Procedure

9.11.3.1.1 Water Availability

The site currently has access to draw water from Void 4 which is pumped to a 300,000 litre tank in the north-eastern corner of the site. From this tank water trucks are able to be filled and water is supplied to compost rows within the pad area.

As a backup supply for firefighting, water can also be accessed from the leachate dam (when available) and can also be drawn directly from Void 4 should there be a pump failure at the 300,000 litre onsite tank.

Two water tankers are available on site at all times, with a combined capacity of 27,000 litres. Both tankers also double for use in the event of a fire. The tankers are fitted with high pressure sprays and pumping equipment which can be used for firefighting purposes until such time that the Rural Fire Service can attend.

The surface water drainage for the pad area is within a closed system and all water from within this closed system reports to the onsite leachate dam. Any overflow from this leachate dam then reports to Void 4 which does not discharge. As such fire water produced in the event of a fire will be captured in the onsite leachate dam which will have an expanded capacity of 16ML. This leachate dam rarely receives inflow and the storage would always be kept low through re-using the water in the composting process rather than accessing raw water. In the event of a fire, contaminated fire water captured in the leachate dam would be removed off site by a water tanker for treatment and disposal at an EPA licenced facility.

9.11.3.1.2 Fire Management Control Measures

The Fire Management Procedure is designed to ensure that in the event of a fire starting, all reasonable and practicable measures are taken to minimise or prevent environmental harm, including air, water or land pollution. Control measures include:

- Ensuring a strict no smoking policy is enforced on site when in proximity of any combustible materials. Smoking will only be permitted in clearly signposted areas;

- Ensuring all water collection points are checked regularly to ensure their ability to be accessed in an emergency;
- Ensuring that fire extinguishers are positioned at readily accessible points, including on mobile plant, so that their use in an emergency is not restricted;
- Ensuring that all firefighting plant and equipment is regularly serviced in line with the manufacturer's recommendation;
- Ensuring that the temperature of all stockpiles and windrows is monitored in accordance with established workplace procedures. If temperatures throughout the compost exceed 67 degrees C, then sprinkling is to be initiated to dissipate heat;
- Ensuring that all stockpiles and windrows are sufficiently moist. The moisture content of compost windrows must be kept above 40% weight for weight to retard burning;
- In the event of a fire within a windrow or greenwaste stockpile, the affected stockpile/windrow must first be suppressed with either the use of water and/or dirt. The stockpile/windrow must then be pulled apart. However, if weather conditions are such that pulling apart the stockpile/windrow is likely to ignite other stockpile/windrows or spread the fire internally or externally, (eg dry with moderate/strong winds), the stockpile must not be broken up until conditions are suitable;
- In the event that a fire cannot be extinguished using water or soil, the use of fire retardants should be considered (expert advice should be sought from Fire and Rescue NSW before taking action with retardants);
- Once the fire has been extinguished, affected areas should be monitored on a continual basis until materials have cooled;
- Ensuring that all fire water is contained on site;
- Ensuring that staff are trained in the use of onsite firefighting appliances;
- Ensuring that combustible materials are not accumulated in areas close to exhausts or engines.

Figure 22 below shows the site relative to access points, water storage, back up water supplies, booster points, and emergency muster points.

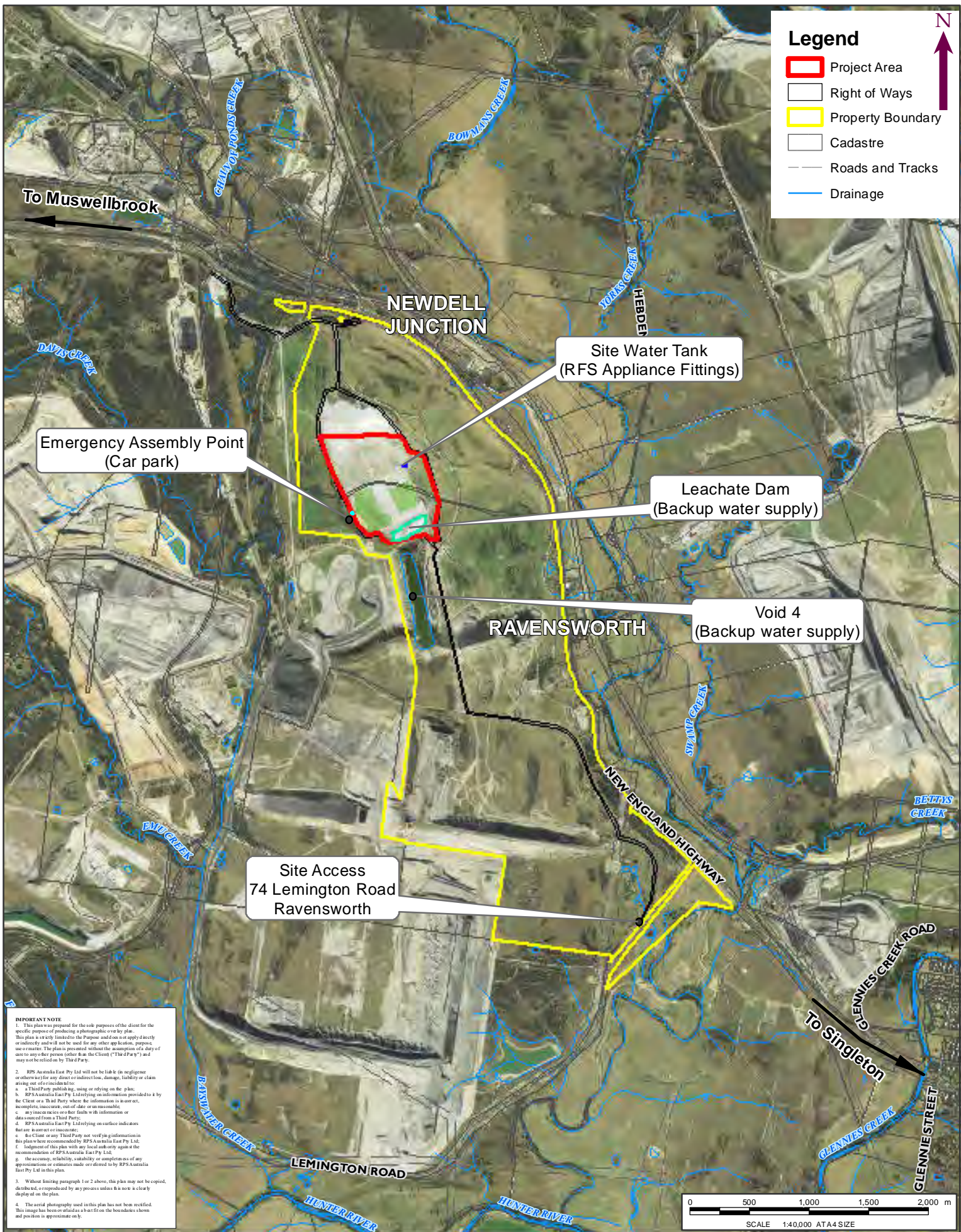


FIGURE 22 : EMERGENCY AND FIRE RESPONSE PLAN

LOCATION:	RAVENSWORTH	DATUM: GDA94
JOB NO.:	PR 141357	PROJECTION: MGA Zone 56
PURPOSE:	PLANNING	Data Sources:
Technician:	Natalie Wood	RPS, Client
Date:	4/11/2019	Land and Property 2017

CLIENT: BETTERGROW

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
Unit 2A, 45 Fitzroy Street, Carrington, NSW, Australia, 2294 PO Box 120, Carrington, NSW, 2294
T: 02 4940 4200 F: 02 4940 4299 www.rpsgroup.com.au



9.11.3.2 Accident, Emergency and Incidents Procedure

9.11.3.2.1 Emergency Preparedness

The following measures would be undertaken to ensure preparedness in the event of an emergency:

- Display emergency procedures and information in the site office or other visible location;
- Conduct or participate in site emergency scenarios as required;
- Regularly identify and check all site fire extinguishers and firefighting equipment;

9.11.3.2.2 Emergency Procedure

In the event of an emergency the following procedures would occur to first protect life and then minimise the impact of the incident on the environment:

- Raise the alarm by calling 000 and advise ambulance or fire brigade and give clear instructions regarding location and nature of the incident;
- Call emergency co-ordinator and advise that 000 have been contacted, then advise nature of the emergency;
- Stop all work immediately, make safe work area and report status to relevant contract administrator;
- Assemble in nominated assembly points until further instruction is received from contract administrator or emergency services personnel;
- Assist anyone on the workplace who may not be familiar with evacuation procedures;
- Assist with first aid or first response if trained to do so;
- Assess the situation, and if it is safe to do so, take action to reduce the spread of the incident.

9.11.4 Information relating to the proposed structures addressing relevant levels of compliance with Volume One of the National Construction Code (NCC)

The National Construction Code contains technical design and construction requirements for all Class 2-9 buildings (multi residential, commercial, industrial and public assembly buildings) and their associated structures. As a performance-based code, it sets the minimum required level for the safety, health, amenity, accessibility and sustainability of certain buildings. It primarily applies to the design and construction of new buildings and plumbing and drainage systems in new and existing buildings. In some cases, it may also apply to structures associated with buildings and new building work or new plumbing and drainage work in existing buildings.

The proposed machinery storage shelter and product receival and blending shelter are Class 7 storage type buildings under the BCA. Part E1 of the BCA relates to deemed to satisfy provisions for fire-fighting equipment. Part E2.3 relates to provisions for special hazards. New structures on the site will comply with the requirements of Parts E1 and E2.3 of the BCA.

9.11.5 Mitigation and Management

New storage structures on the site will be constructed to comply with Part E1 (deemed to satisfy provisions) and Part E2.3 (Special Hazards) of the BCA. In addition, proposed mitigation and management measures with respect to fire and incident management are detailed under **9.11.3.1.2** and **9.11.3.2.1** above.

9.11.6 Conclusions

Bettergrow currently operate a number of recycling facilities across NSW and QLD. Established pollution incident response management plans and emergency procedures and protocols from Bettergrow's existing operations are to be updated for the expanded development. This will ensure that the site has the appropriate checks and balances in place to safeguard the protection of life and the prevention of environmental harm, including air, water or land pollution.

9.12 Hazard and Risk

9.12.1 Introduction

A Preliminary Risk Screening (PRS) under State Environmental Planning Policy No. 33 Hazardous and Offensive Development (SEPP 33) has been undertaken for the development. The assessment has been prepared to satisfy the SEARs, which requested the following be considered:

Hazards – including:

- *A preliminary risk screening prepared in accordance with State Environmental Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is “potentially hazardous” a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011).*

A full summary of the SEARs requirements (including agency responses) are included within **Appendix B**.

The preliminary risk screening involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site with respect to storage depot locations as well as transported to and from the site, and to determine if a more detailed assessment is required.

Where SEPP 33 identifies a development as potentially hazardous and/or offensive, developments are required to undertake a Preliminary Hazard Analysis (PHA) to determine the level of risk to people, property and the environment at the proposed location and in the presence of controls.

If the risk levels exceed the criteria of acceptability and/or if the controls are assessed as inadequate, then the development is classified as ‘hazardous industry’. Where it is unable to prevent offensive impacts on the surrounding land users, the development is classified as ‘offensive industry’ and may not be permissible within most land use zones in NSW. Under SEPP 33 and ‘offensive industry’ is categorised as one which results in a significant level of offence, such as air quality impacts or noise emissions which have been assessed as part of this EIS in **Section 9.1** and **Section 9.5** respectively.

9.12.2 Existing Environment

The development site is located on rehabilitated lands subject of previous coal mining activities and fly ash emplacement at 74 Lemington Road, Ravensworth NSW, within land described as Lot 10 DP1204457.

The development is located within an area that is dominated by coal mining and heavy industrial activities, including power generation and related activities. As such the development is within a highly altered environment and is generally compatible with surrounding land use. The following land uses surround the development site:

- Liddell and Bayswater Power Station, including Lake Liddell to the north-west;
- Liddell Coal Operations to the north-west;
- New England Highway to the east;

- Ravensworth North open-cut coal mine to the west;
- Integra coal mine to the south-east; and
- Loop Organics compost facility to the south.

The above operations are shown on **Figure 3**.

9.12.3 Methodology

The approach to the PRS is to identify the quantity of each dangerous goods class to be stored on site and to compare it to the storage screening threshold in *Table 3 of Applying SEPP 33 (NSW Planning, 2011)*.

The number of generated traffic movements for significant quantities of dangerous goods to and from the site is also considered, with the number of traffic movements compared to the thresholds in *Table 2 of the SEPP 33 guideline*.

The dangerous goods to be stored on the site were grouped into their respective Australian Dangerous Goods (ADG) classes. If more than one packaging group was present in an ADG class, it was assumed that the total amount for that class was the more hazardous packing group.

9.12.4 Impact Assessment

9.12.4.1 Preliminary Risk Screening

Preliminary risk screening is undertaken to determine the requirement for a PHA. The preliminary screening involves identification and assessment of the storage of specific dangerous goods classes that have the potential for significant off-site effects.

Dangerous goods storage on site consists of the bulk storage of diesel fuel in an aboveground storage tank with a capacity up to 5,000 litres. Diesel fuel is not subject to SEPP 33 unless stored with Class 3 flammable liquids. As diesel on site is not stored with Class 3 liquids SEPP 33 screening is not required. No other hazardous materials are kept or stored on site. Diesel fuels onsite are stored in accordance with *AS1940-2004 The storage and handling of flammable and combustible liquids (AS1940)*.

With respect to hazards caused by transport, traffic movements associated with the transport of diesel fuel do not trigger the need for a transport safety study. The existing transport routes to and from the site will remain unchanged.

Preliminary screening concludes that under SEPP 33 the Project is not considered either 'hazardous' or 'offensive'.

9.12.5 Mitigation and Management

While the PRS for the proposed facility has determined that the development is not considered a hazardous or offensive development, the following controls will still be implemented:

- All mobile plant and equipment will be fitted with fire extinguishers;
- An Emergency Response Plan will be prepared and implemented for the facility;
- All staff on site will be appropriately trained in the handling of dangerous goods; and
- Flammable and combustible liquids will be stored in accordance with AS1940.

9.12.6 Conclusions

The SEPP 33 screenings for storage and transportation of dangerous goods indicates that the development is not considered a hazardous or offensive development in accordance with the guidelines. As such a Preliminary Hazard Assessment is not required.

9.13 Waste Management

9.13.1 Introduction

A Waste Management Strategy (WMS) has been prepared to determine the potential waste streams generated from the Project, likely volumes of waste produced during construction and operation, and proposed management measures to reduced wastes. A Waste Management Plan (WMP) has also been prepared as part of this Waste Management Strategy which is provided in **Appendix S**.

The SEARs require the EIS to include the following information in relation to waste management:

- A description of the waste streams that would be accepted at the site including maximum daily, weekly and annual throughputs and the maximum size for stockpiles and any liquid waste storage;
- A description of waste processing operations (including flow diagrams for each waste stream) including a description of the technology to be installed, resource outputs, and the quality control measures that would be implemented including proposed procedures to ensure general solid waste is not contaminated by restricted, hazardous and/or liquid waste;
- Details of how waste would be stored (including maximum daily waste storage of the site) and handled on site and transported to and from the site including details of how the receipt of non-conforming waste, particularly asbestos, would be dealt with;
- Details of the waste tracking system for incoming and outgoing waste;
- Details of the final despatch locations of the waste;
- Details of the waste management strategy for construction and ongoing operational waste generated;
- The measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-2021*.

9.13.2 Description of Waste Streams

All current waste streams as included in the existing approval and EPA licence under the category of general solid waste (non-putrescible) as listed below will continue to be received and processed at the facility, including:

- Paper Crumble;
- Urban wood residues;
- Liquid Waste - Wastewater from Bayswater mine void 4;
- Natural organic fibrous material;
- Power Station Bottom Ash;
- Biosolids (as defined in Schedule 1 of the POEO Act);
- Garden Waste (as defined in Schedule 1 of the POEO Act)

The wastes listed below which come under the category general solid waste (putrescible) – see extract below – will also be received for processing at the facility:

Extract from the POEO Act Schedule 1 – Definitions

“general solid waste (putrescible)” means waste (other than special waste, hazardous waste, restricted solid waste or liquid waste) that includes any of the following:

(a) household waste containing putrescible organics,

(b) waste from litter bins collected by or on behalf of local councils,

1 manure and nightsoil,

(d) disposable nappies, incontinence pads or sanitary napkins,

1 food waste,

(f) animal waste,

(g) grit or screenings from sewage treatment systems that have been dewatered so that the grit or screenings do not contain free liquids,

(h) anything that is classified as general solid waste (putrescible) pursuant to an EPA Gazettal notice,

(i) anything that is classified as general solid waste (putrescible) pursuant to the Waste Classification Guidelines,

(j) a mixture of anything referred to in paragraphs (a)-(i).”

Waste falling within the above definition which would be received include:

- Food waste either directly or included in a kerbside collected Food and Garden Organics Stream;
- Animal Waste;
- Biosolids for reprocessing as defined under the NSW EPA biosolids guidelines;
- Process Water as defined in “The Bettergrow process water compost order 2019 and Exemption”
- Drilling Mud (Soil) as defined in “The Bettergrow separated drilling mud (soil) order 2019 and Exemption”

9.13.3 Maximum Daily, Weekly and Annual Throughputs

A number of the waste streams coming to site are and will be secured under contract from suppliers including Councils and State Government agencies such as Sydney Water. All waste streams included in this application will be subject to supply and demand and availability under contract. As a result, flexibility will be required within the overall approval limit of 200,000 tonnes to allow the facility to optimise resources as they become available.

Table 46 is provided as an example of the potential combination of resource streams that may be received at the site in any given year. As stated above this will vary according to availability.

Table 46 Throughput of Waste Streams

Maximum Incoming Resource Tonnages	Daily	Weekly	Annual
Garden Organics	231	1154	60,000
Biosolids	96	481	25,000
Paper Crumble	38.5	192	10,000
Urban Wood Residue	5.8	29	1,500
Natural Organic Fibrous Material	9.6	48	2,500
Power Station Bottom Ash	46	231	12,000
Liquid Waste ex Void 4	96	481	25,000
Food Waste	19	96	5,000
Food and Garden Organics	115	577	30,000
Animal Wastes	19	96	5,000
Biosolids for Reprocessing	7.7	38.5	2,000
Bettergrow Process Water	77	385	20,000
Bettergrow separated drilling mud	7.7	38.5	2,000
Total	769	3846	200,000

All incoming resources requiring composting will be immediately blended and placed into windrows. Windrow sizes will vary between 700 and 2000 tonne batches depending on their exact location on the composting platform.

Any ingredient such as the bottom ash which may be used as a final blended ingredient rather than as a composting input will be stockpiled in one stockpile which will range in size from 2,000 to 5,000 tonne in storage at any one time.

Liquid waste storage will only be for the Bettergrow Process Water which will be received in tankers and stored in one of the 2 inground 50,000 litre tanks on site. Water will be drawn from these for application to the windrows as required and as an alternative to the Void 4 water source. Also on site is an existing 250,000 litre galvanised water storage tank which is used for the storage of Void 4 water.

At any given time at maximum capacity of 200,000 tonnes per year there potentially could be up to 50,000 tonnes of work in progress stock in windrows and 25,000 tonnes of finished product ready for campaign despatch.

50,000 tonnes in windrows would be 30 rows at 100m long by 5 metres wide and 2 metres high and 15 rows at basically double that volume 100 metres long.

25,000 tonnes of finished stabilised, screened and blended compost in stockpile windrows would be 5 stockpiles of approximately 5000 tonnes each up to 8 metres in height with a surface area of approximately 3000m².

9.13.4 Description of Waste Processing Operations

The waste streams presently received at the facility will continue to be managed in the same way as currently. All incoming wastes are immediately placed in an open windrow and blended. The blending is done either by front end loader or the windrow turner. Active windrows being managed by the windrow turner are approximately 2 metres in height and 5 metres wide in a trapezoidal shape with a flat top. Active windrows managed by excavator and loader can be up to 3 metres in height and potentially 7 metres wide again in a trapezoidal shape.

As each windrow is filled the composting process commences. Temperature and moisture levels are monitored and adjusted to ensure optimum conditions are maintained for efficient composting. As each batch (windrow) reaches maturity, it is tested against the relevant standard prior to being screened and sold.

All incoming food and food and garden organics will be composted as above in an open windrow however the windrow will be formed over an aerated floor such as the MAF system. Controlled forced aerated composting will be used for the composting and management of food and food and garden organics.

Once placed on the aeration pipes, air is forced up through the windrow ensuring optimum air availability to maximise biological breakdown of the materials placed on the floor. Each windrow is treated as a separate batch with temperature and moisture levels being constantly monitored and managed. At the completion of the composting process each windrow/batch is tested prior to being released for sale.

Animal manure received on site will be separately windrowed, composted and tested as above prior to being screened and blended with other finished composted products ready for sale as an ingredient into a finished growing media.

Any biosolids for reprocessing will be immediately placed into a windrow and blended with garden organics and any other ingredients if required to commence the composting process. Any biosolids for reprocessing received at the facility will be managed as a separate batch and monitored to ensure the requirements of the reprocessing are met. Only once the composting is completed and testing has confirmed that the material has met the required standard, it be released for sale.

Figures 23 to 28 below show the processes for each waste activity that feed into composting operations onsite.

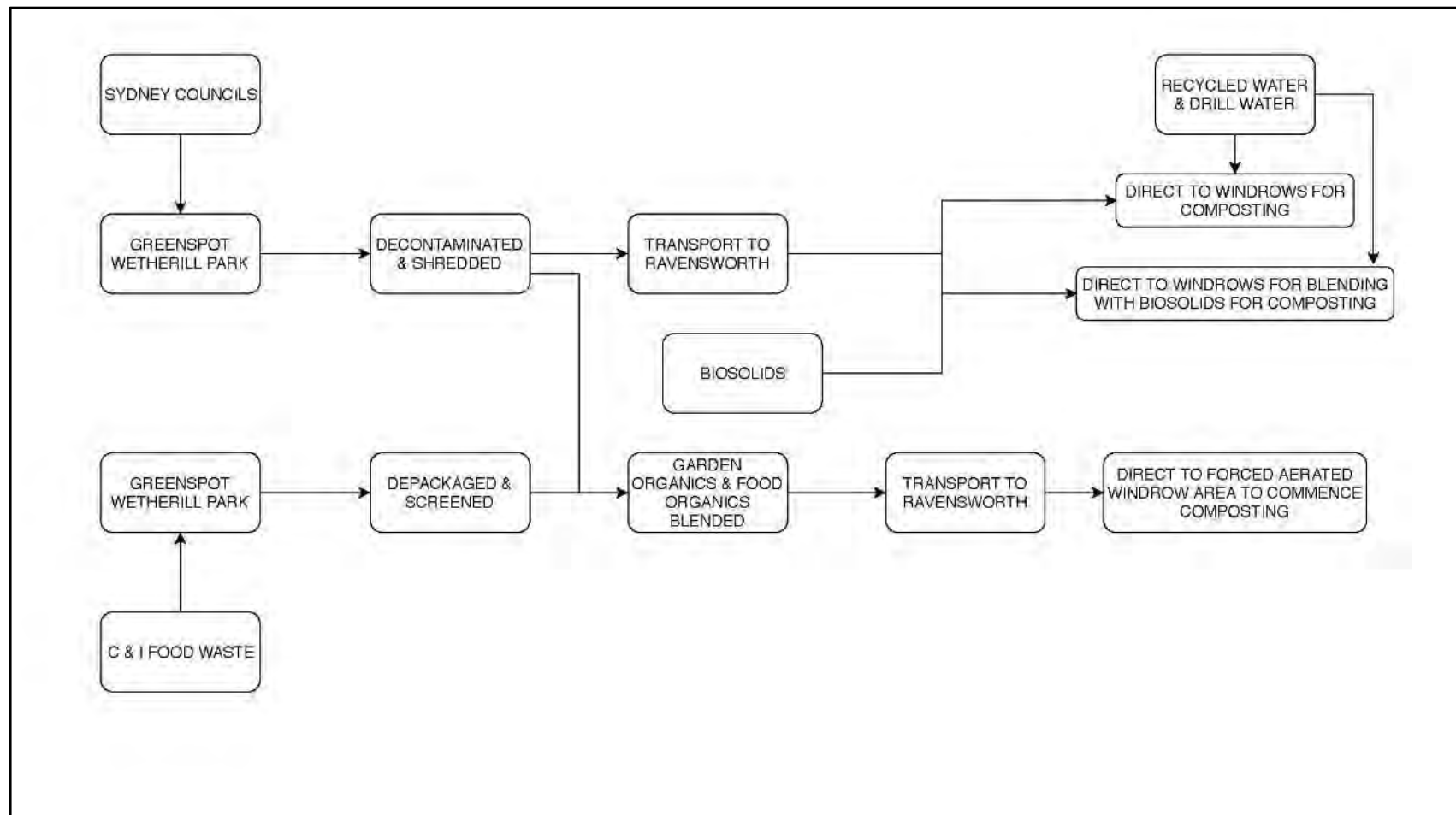


Figure 23 Garden Organics and Food Organics Process

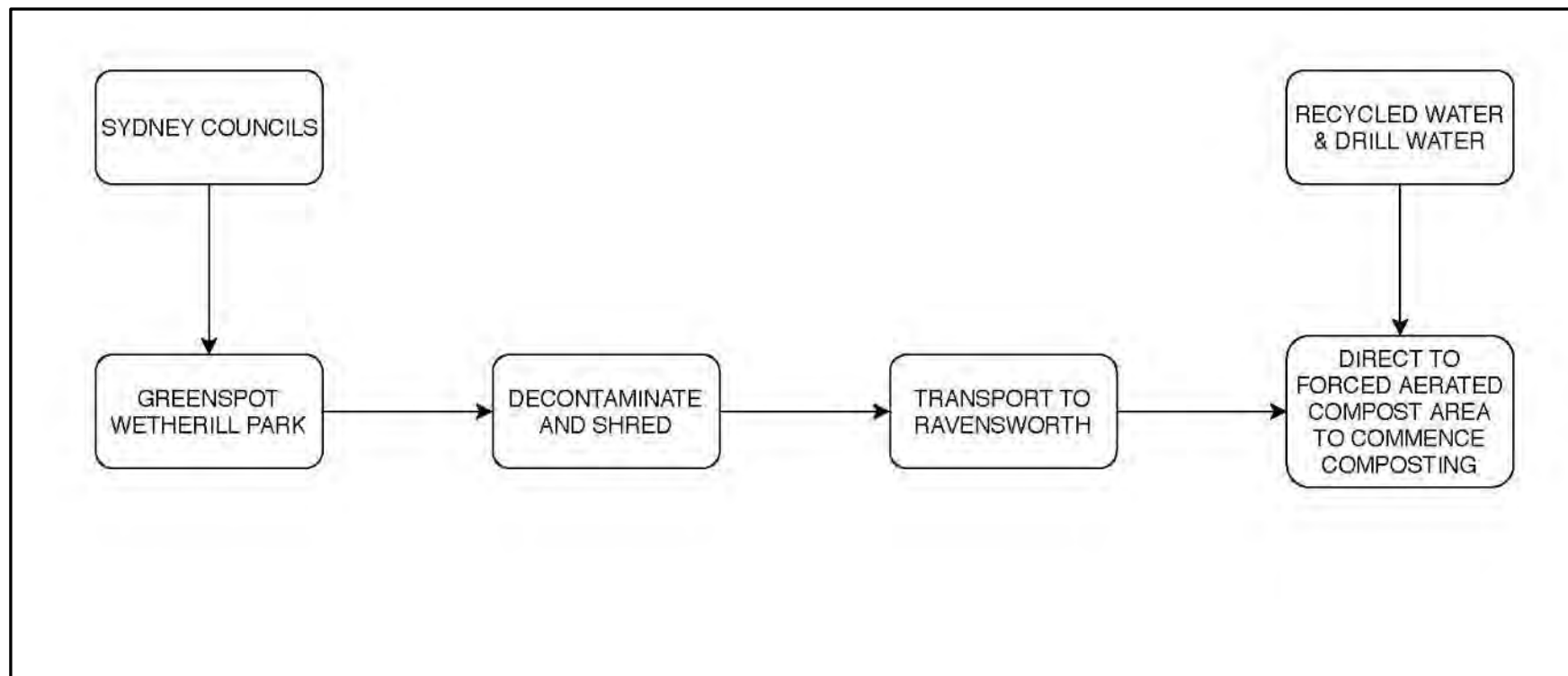


Figure 24 Food and Garden Organics Process

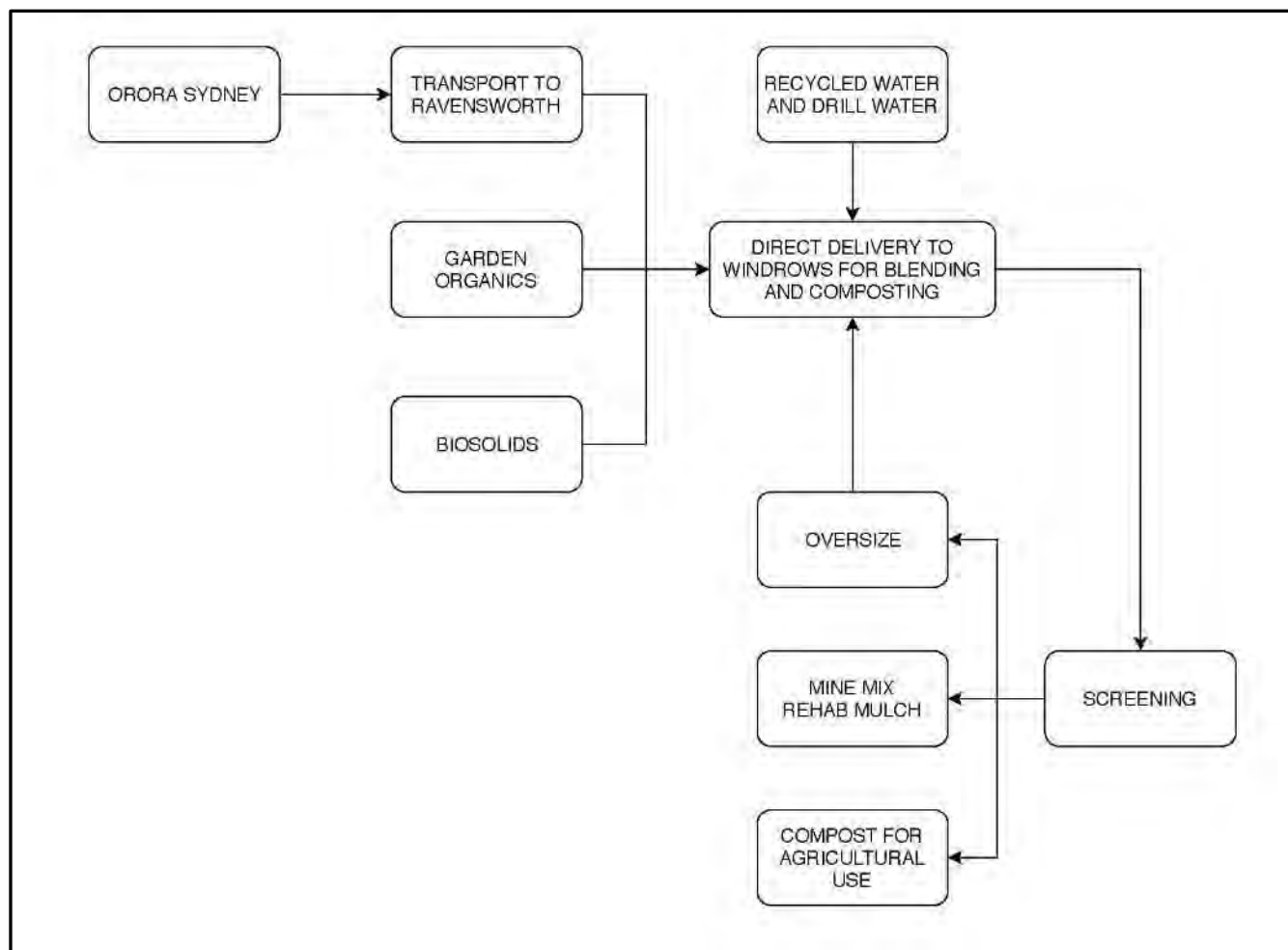


Figure 25 Paper Crumble Process

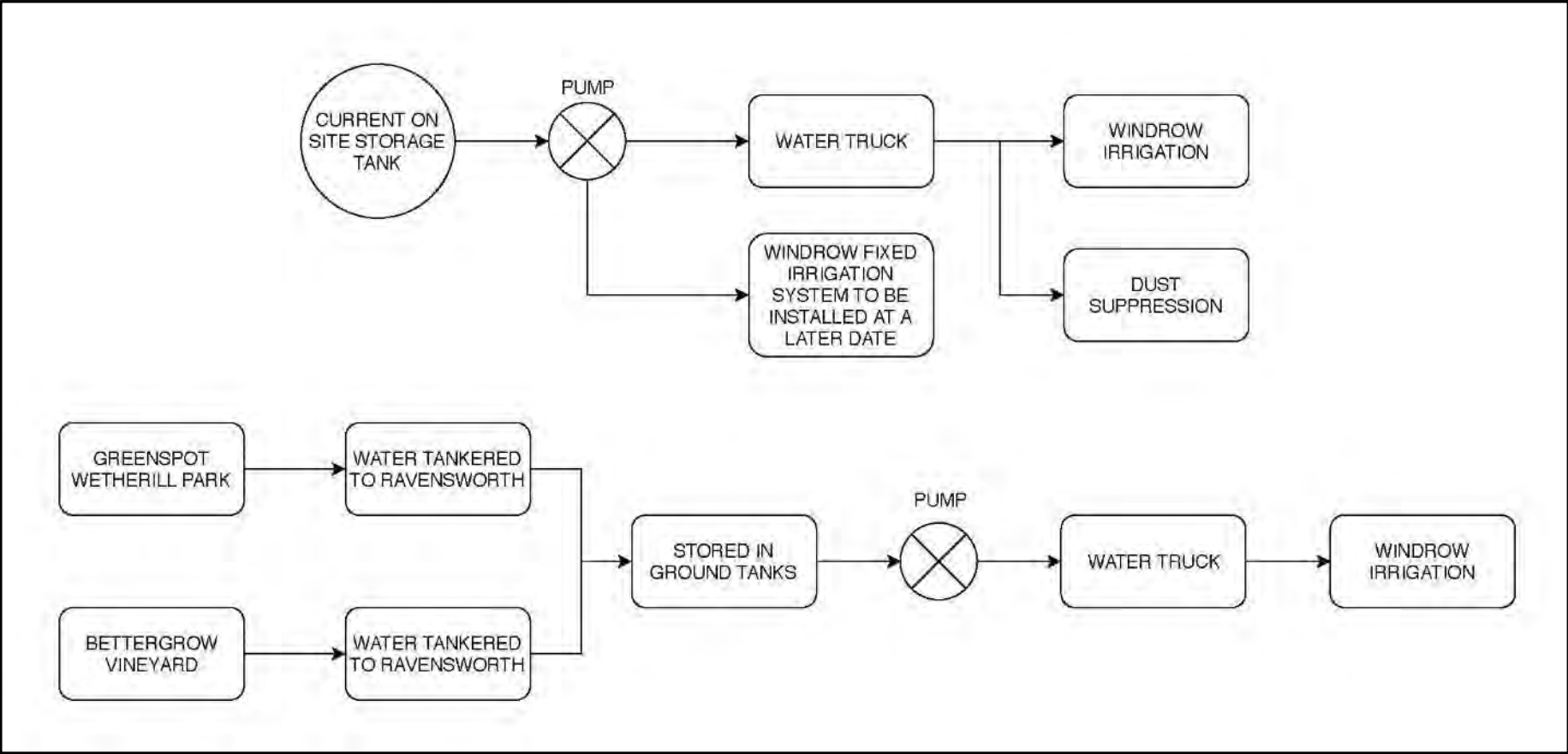


Figure 26 Recycled Water and Drill Water Process

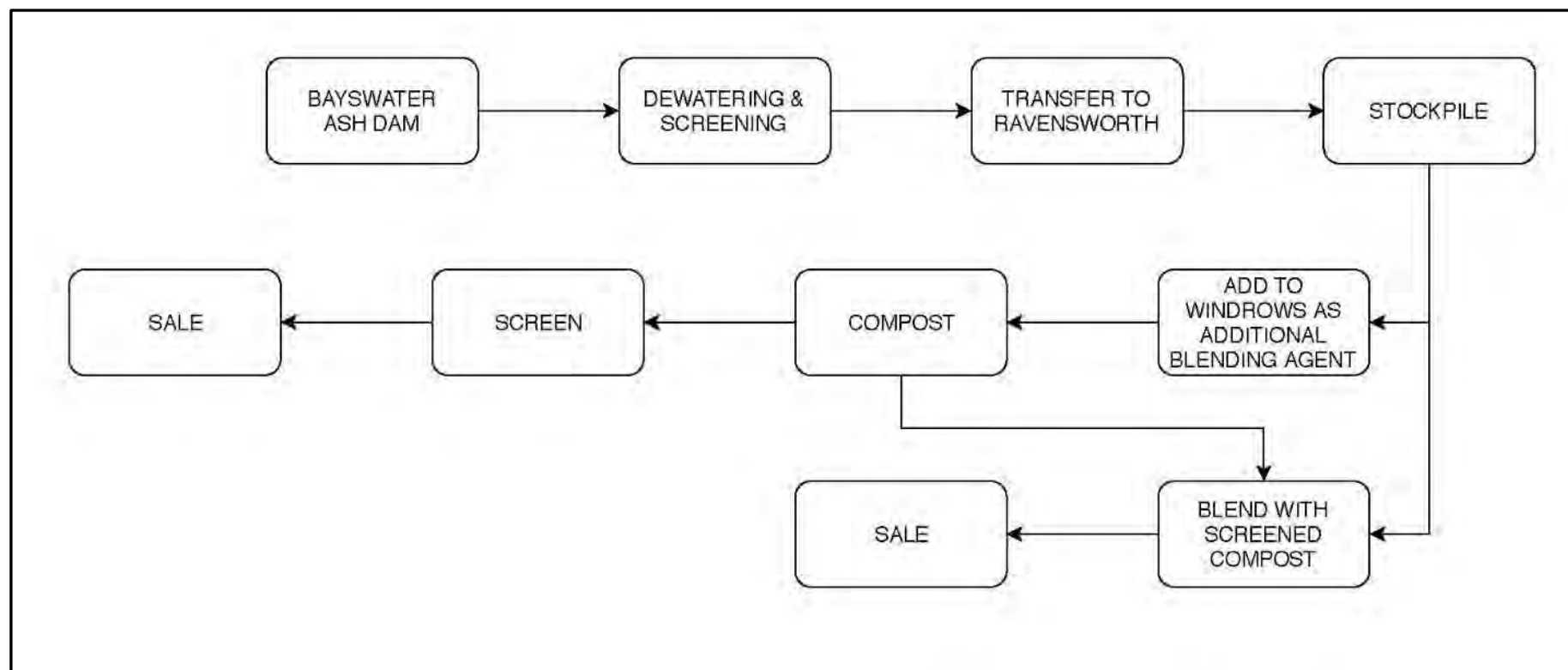


Figure 27 Coal Ash Process

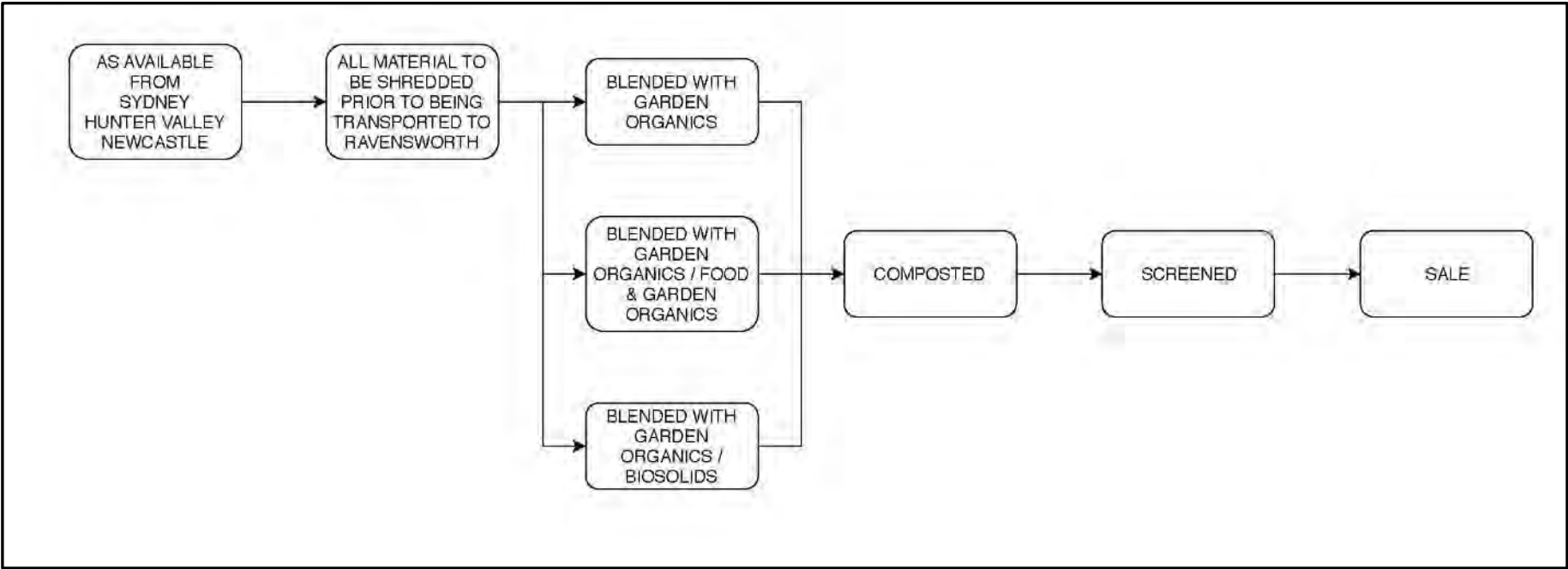


Figure 28 Clean Timber Process

9.13.5 Technology to be installed

The process to be used on site is predominately open windrow composting as per current operations. It is proposed to introduce to the site a system of forced aerated composting such as the Mobile Aerated Floor (MAF) system from Austria. Using a combination of fans and perforated pipes this system enables air to be forced through windrows or blended organic ingredients to provide optimum conditions for aerobic composting, thereby minimising odour generation. The MAF and similar systems are successfully used in this type of application around the world. **Plate 14** below shows a typical MAF arrangement.



Plate 14 Example MAF System

9.13.6 Resource Outputs

All resources received at the facility will be used in the manufacture of a range of Bettergrow trademarked proprietary products for sale and distribution throughout NSW including the following:

- Bio-N-Rich Compost;
- Mine Mix;
- Organic Garden Mix;
- Earth 4 Turf;
- Organic Garden Compost;
- Resoil;
- Bettergrow Fertiliser;
- Naturaliser Liquid Soil Improver.

All finished products are tested prior to release for sale in accordance with the relevant regulatory testing regime. All testing records are retained and are available upon request.

9.13.7 Quality control measures to address contamination

All loads of resources are inspected on discharge. In the event that easily observable levels of contamination are identified as the truck is discharging its load, unloading will be ceased, and if severe, the contaminated material will be reloaded onto the truck and the transporter will be instructed to take the contaminated material to a fully licenced facility that can accept the contamination. Any load leaving the site in this way will be recorded over the weighbridge.

During the blending, composting and process any contamination identified is appropriately removed and isolated in a hook-lift bin. The hook-lift bin when required will be transported to a suitably licenced landfill facility for disposal. Any waste leaving the site will be recorded over the weighbridge at the licenced disposal facility.

Bettergrow has in place special procedures for the management, safe handling and disposal of any hazardous waste including asbestos. All site staff are trained in these procedures including reporting and notification. Ongoing training through toolbox meetings and hazard alerts are part of the staff education process.

9.13.8 Waste storage and handling

All Garden Organics (GO) and Food and Garden Organics (FOGO) arriving at site will be deposited directly at point of processing. The GO will be either placed in windrows on the existing composting pad as per current operations or will be directed into the product receival building. GO will only be directed into the product receival building if it is required for temporary storage in anticipation of the delivery to site of a specific load of food organics requiring blending prior to being placed in the windrow. The food and green windrow size will be approximately 2 to 2.5 metres high and 5 metres at the base in a trapezoidal shape.

GO directed to the composting pad can either be separately windrowed and composted or be blended with biosolids for co-composting.

All biosolids arrive at site in purpose specified truck and dogs or semi-trailers. The biosolids are unloaded adjacent to the allocated windrow where GO already has been stockpiled ready for blending. All biosolids arriving at site are immediately blended with GO and placed into allocated windrows and batches.

Once the GO or FOGO delivery has been tipped and inspected, it will be formed into the appropriate windrow. All arriving loads or organics are recorded and their details allocated to a specific batch. The batch / windrow identification is used throughout the process. All temperature, moisture and processing records are kept for each batch. Each batch is finally tested against the reagent standard and regulatory mechanism at the completion of the composting process. Each batch is only released for sale and distribution once it has passed the relevant testing regime.

All transfer and handling of GO, FOGO and biosolids is by front end loader or high capacity truck and dogs or trailers.

9.13.9 Transport to and from the site

All deliveries from and receipts at Greenspot Ravensworth will be via high capacity enclosed trucks including truck and dogs, B'Double combinations, high capacity trailers, walking floors and liquid tankers. No vehicle or product will be accepted at site without pre-approval and authorisation. In-time camera recognition will be installed at the weighbridge to assist with transport security.

9.13.10 Non-conforming Deliveries

All resources being delivered to site will be from known pre-approved sources which have been inspected prior to being accepted as a potential input to the Greenspot Ravensworth site. All deliveries will be via the onsite weighbridge once installed. Initially all loads being delivered to site will arrive with a weighbridge ticket from a registered public weighbridge.

All loads will be subject to a preliminary camera screening on the weighbridge prior to being released to effect delivery. Any load found to be non-compliant for any reason will not be accepted at site. The company trying to supply contaminated product will be contacted and the truck will be turned away.

All loads of resources are inspected on discharge. In the event that easily observable levels of contamination are identified as the truck is discharging its load, unloading will be ceased and if severe the contaminated material will be reloaded onto the truck and the transporter will be instructed to take the contaminated material to a fully licenced facility that can accept the contamination. Any load leaving the site in this way will be recorded over the weighbridge.

During the blending, composting and process, any contamination identified is appropriately removed and isolated in a hook-lift bin. The hook-lift bin when required will be transported to a suitably licenced landfill facility for disposal. Any waste leaving the site will be recorded over the weighbridge at the licenced disposal facility.

Bettergrow has in place special procedures for the management, safe handling and disposal of any hazardous waste including asbestos. All site staff are trained in these procedures including reporting and notification. Ongoing training through toolbox meetings and hazard alerts are part of the staff education process.

9.13.11 Details of Waste Tracking System

As part of the upgrading of the Greenspot Ravensworth facility, Bettergrow proposes to install a weighbridge on site. A fully integrated weighbridge control and tracking system will be installed including cameras either for rego confirmation or automatic vehicle recognition. A waste tracking form is included as part of the **Waste Management Plan** attached as **Appendix S**.

9.13.11.1 Incoming

The weighbridge will be used to record all incoming wastes and resources by category, customer and place of origin. Deliveries will only be accepted from known generators or transporters.

9.13.11.2 Outgoing

All outgoing loads of soil ameliorants, composts, mulches and any other finished product will be weighed and recorded by category, customer, destination and transporter.

9.13.12 Final Dispatch Locations of Waste

The finished growing media including composts and mulches will be sold and distributed to local and regional customers according to supply and demand.

AGL Macquarie as the landowner has an ongoing requirement for site rehabilitation and planting at both Ravensworth and Liddell. AGL will be the major customer whose annual requirements will be satisfied prior to growing media being offered for sales to others. It is expected that at full capacity the facility will allocate approximately 25% of the finished product to AGL.

Surrounding mine site operators are also expected to have an ongoing requirement for growing media and at least another 25% of the annual production would be anticipated as going to various mining operations for use in their rehabilitation programs. Mining operations include, Yancoal, Muswellbrook Coal, Ashton Coal, Glencore and Hunter Valley Operations.

Bettergrow will also be producing high quality screened composts and compost blends suitable for use in the agricultural market. The Bio-N-Rich compost is a high analysis fertiliser suitable for use in cropping and pasture improvement systems. Bio-N-Rich is an ideal either partial or total replacement to the use of artificial fertilisers in farm nutrient management programs.

In order to optimise transport opportunities some Bio-N-Rich will also be transported back to the Newcastle and Central coast areas as well as Sydney. Bio-N-Rich will be sold either as a direct soil ameliorant or as an

ingredient to be blended with sands and other inputs to produce products suitable for the home garden and landscaping market.

9.13.13 Details of Waste Management Strategy

9.13.13.1 Construction

Major construction on the site will be limited to installation of a single lane weigh bridge approximately 27.5m long, new covered hard stand areas for the receipt and blending of incoming organics including FOGO, dedicated trailer wash bay, two 10,000 litre recycled drill water storage tanks and installation of a machinery shelter that will allow storage of tools and machinery for servicing. Accordingly, construction activities are likely to generate the following types of waste:

- Minimal demolition wastes;
- Excavation material from new building footings;
- General construction wastes (including metals and timber);
- Machinery maintenance waste (including lubricants, greases, filters, and oily rags);
- Packaging waste (including shrink wrap and cardboard);
- Temporary ablutions waste;
- Waste water (pump out from existing sumps/drainage pits); and
- Asphalt and concrete removed from hardstand areas where re-surfacing is required.

Much of this waste can be reused on site or recycled at off-site facilities. As a result it is expected that more than 70% of the predicted construction waste arising from the proposed development can be diverted from landfill.

Waste generated during construction would be separated with the use of dedicated skips for timber, plasterboard, concrete, bricks, steel and general waste. Dedicated stockpiles would be delineated on site and regular transfers to skip bins undertaken for sorting. Stockpiles would be sited to take into account slope and drainage factors to avoid erosion and contamination. The frequency of waste removal would depend on volumes of material being generated. Skips would be checked every day and, if at or reaching capacity, removal would be organised within 24 hours.

9.13.13.2 Operation

The general operation of the facility would generate the following broad waste streams:

- Office wastes;
- Packaging wastes (ie cardboard, paper, plastic / shrink wrap, pallets);
- Amenity wastes; and
- Maintenance wastes.

9.13.14 NSW Waste Avoidance and Resource Recovery Strategy 2014-2021

The NSW Waste Avoidance and Resource Recovery Strategy 2014-2021 is a key component of the Government's vision for the environmental, social and economic future of the state and provides a clear framework for waste management. The Strategy adopts the principles of ecologically sustainable development as defined in Section 6 of the Protection of the Environment Administration Act 1991 and is

also informed and driven by the waste hierarchy which underpins the objectives of the Waste Avoidance and Resource Recovery Act 2001.

At the top of the hierarchy, avoiding and reducing the generation of waste is the most preferred approach. Where avoiding and reducing waste is not possible, the next most preferred option is to reuse the materials without further processing, avoiding the costs of energy and other resources required for recycling.

The next step in the hierarchy is recycling, which involves processing waste materials to make the same or different products. This includes composting, which recycles nutrients back into the soil. Recycling keeps materials in the productive economy and benefits the environment by decreasing the need for new materials and waste absorption. Recycling a product generally requires fewer resources than drawing virgin materials from the environment to create a new one.

Where further recycling is not feasible, it may be possible to recover the energy from the material and feed that back into the economy where this is acceptable to the community. Some materials may be inappropriate to reuse, recycle or recover for energy and instead require treatment to stabilise them and minimise their environmental or health impacts.

Finally, the waste hierarchy recognises that some types of waste, such as hazardous chemicals or asbestos, cannot be safely recycled and direct treatment or disposal is the most appropriate management option.

Construction and ongoing operation of the facility would include the implementation of measures as set out above to ensure that the development is consistent with the aims and objectives of the strategy. Further, the development itself is geared towards nutrient recycling for the purposes of land rehabilitation and soil amelioration.

9.13.15 Mitigation and Management

The following mitigation and management measures will be applied during construction and operation of the facility:

- Plant and equipment will be regularly maintained;
- Ordering will be limited to only the required amount of materials;
- Materials will be segregated to maximise reuse and recycling;
- Routine checks will be undertaken of waste sorting and storage areas for cleanliness, hygiene and OH&S issues, and contaminated waste materials;
- Separate skips and recycling bins will be provided for effective waste segregation and recycling purposes;
- Training and awareness of the requirements of the WMP and specific waste management strategies will be undertaken;
- Contaminated waste will be managed, transported, and disposed of in accordance with licensing requirements;
- Off-site waste disposal will be transported and disposed of in accordance with licensing requirements;
- Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes will be undertaken; and
- Regular monitoring, inspection and reporting will be undertaken and findings implemented.

Further to the above mitigation measures, a WMP has been prepared for the development which is attached in **Appendix S**. The WMP will be implemented throughout the life of the operation and will be updated on a regular basis (e.g. annually) to ensure the document remains relevant and applicable

9.13.16 Conclusion

The waste streams presently received at the facility will continue to be managed in the same way as currently.

Waste generated from construction and operation of the expanded facility would be managed in accordance with the established waste hierarchy which underpins the objectives of the Waste Avoidance and Resource Recovery Act 2001 to ensure that the diversion of waste from landfill is maximised. The WMP attached at **Appendix S** will be implemented to ensure that waste on site is suitably managed. The WMP will be updated when there is an operational or process change.

9.14 Cumulative Impacts

The cumulative assessment considers the potential for the impacts from the development to combine with impacts from potential future developments in the vicinity of the site. This may lead to new or more significant impacts being identified compared to the development specific assessment, and where appropriate, additional mitigation measures should be recommended.

The development is located within an area that is dominated by coal mining and heavy industrial activities, including power generation and related activities. The following land uses surround the development site:

- Liddell and Bayswater Power Station, including Lake Liddell to the north-west;
- Liddell Coal Operations to the north-west;
- New England Highway to the east;
- Ravensworth North Open-cut Coal Mine to the west; and
- Integra Coal Mine to the south-east.

It is additionally noted that Loop Organics have approval from Singleton Council (DA173/2016) for a composting facility on Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW with a capacity of 55,000 tpa. The location of Loop Organics relative to the Project site is depicted in **Figure 3**.

Cumulative impacts of the development with other projects in the vicinity of the site have been considered in technical studies undertaken as part of the EIS, particularly in relation to odour and traffic. The mitigation measures proposed in each of the specialist assessments in **Section 9** have also been designed to ameliorate potential impacts associated with the development in its own right as well as minimising overall cumulative impacts of the development when considered alongside other future developments.

Potential cumulative impacts of the development are considered and summarised in **Table 47** below.

Table 47 Summary of Potential Cumulative Impacts

Issue	Potential Cumulative Impacts	Where Addressed in the EIS
Air Quality	<p>The key potential odour emission sources associated with the activities include material composting in windrows, finished product, leachate water contained in the storage dam and short-term storage of intake streams in the semi-enclosed receival shed.</p> <p>The key dust emission source associated with the facility is the movement of trucks on the unsealed internal haul road.</p> <p>Due to the remoteness of the facility and the nature and extent of the proposed composting activities, no issues were identified in relation to emissions of greenhouses gases, odour or dust.</p> <p>Results of the air quality and odour assessment for the facility suggest that the proposed mitigation measures and management strategies proposed for the operation of the facility will be sufficient to ensure compliance with the regulatory requirements for odour and dust and to manage odour and dust impacts at off- site locations.</p> <p>In terms of greenhouse gases, the total Scope 1 and Scope 2 emissions of greenhouse gases per annum associated with site activities is estimated to be 379.3 tonnes of CO₂-e.</p> <p>By way of comparison, Australia's annual total emissions for the year to September 2017 were estimated to be 557.7 megatonnes (Mt) of CO₂-e (DEE, 2018). A comparison of the Project emissions with those of the waste sector indicates that the Project will contribute an additional 0.003% to this sector and an additional 0.0001% to the annual national total (excluding land use, land use change and forestry).</p>	9.1
Surface Water	<p>While the proposed expansion of the composting facility introduces a risk of additional volumes of leachate (and associated contaminant load) being generated and subsequently entering the surface water drainage environment, the overall risk of harm to the surface water environment is currently low and will continue to be low as it is adequately managed through existing surface water management infrastructure which will be extended.</p> <p>The potential impacts can be mitigated through a range of measures. The facility will continue to be managed in accordance with the requirements of EPL 7654, including surface water monitoring requirements. The Surface and Groundwater Management Plan and other existing environmental management plans are to be updated to include expanded operations.</p> <p>The site is also well elevated at approximately 40m higher than surrounding watercourses. There is no outside flood risk to the site and the area is not shown as flood prone land or within flood planning areas within Singleton LEP 2013 – Flood Planning Maps.</p> <p>In terms of cumulative impacts, the implementation of the mitigation measures described in the existing EPL conditions will ensure that the proposed extension will not result in additional significant adverse impacts to the surface water regime.</p>	9.2
Ground Water	<p>The proposed expansion increases the potential for groundwater pollution impacts associated with leachate infiltration to the groundwater aquifers beneath the site. The potential risk and impact are considered minor however given the negligible volumes of rainfall seepage below the site (3% of total water balance or 9 megalitres per annum), groundwater depth is greater than 40m below the site and groundwater is saline. In addition, groundwater beneath the site flows into Void 4 immediately to the south, providing opportunity to capture and recycle water infiltrated throughout the site.</p>	9.3

Potential impacts to ground water can be mitigated through a range of measures including effective management of surface water. The facility will also continue to be managed in accordance with the requirements of EPL 7654, including surface water monitoring requirements. The Surface and Groundwater Management Plan and other existing environmental management plans are to be updated to include expanded operations.

In terms of cumulative impacts, the implementation of the mitigation measures described in the existing EPL conditions will ensure that the proposed extension will not result in additional significant adverse impacts to the ground water regime.

Traffic and Access	<p>The site is located within an area that is dominated by coal mining and heavy industrial activities. Access to the facility is provided via an internal road off Lemington Road which connects to the New England Highway. The expansion of the facility will result in the quantities of organic materials received and despatched from the site increasing. Accordingly, truck movements to and from the site will also increase. Based on the increased annual production amount of 200 000tpa, the following traffic volumes are anticipated:</p> <ul style="list-style-type: none"> • Peak truck movements maximum of 108 per day; and • Peak light vehicles movements maximum of 38 per day. <p>On the basis that all deliveries and compost transfers will require in-bound and out-bound movements, the worst-case traffic movements generated from the increased operations would be up to 146 movements per day (73 in-bound and 73 out-bound). The actual traffic movements will be less than 146 due to the use of as many inbound trucks as possible to also take out finished product for delivery to sites.</p> <p>Traffic modelling has concluded that the proposed expansion will have minimal impact on the existing performance of the New England Highway/Lemington Road intersection with no deterioration in current levels of service. There are no traffic engineering related matters which would preclude approval of the proposed expansion to 200 00tpa.</p>	9.4
Noise and Vibration	<p>The site is located on a rehabilitated open cut mining pit and is surrounded by five open cut mines. The nearest noise sensitive receivers are located approximately 7.5km away to the south-east in the village of Camberwell.</p> <p>The Noise Impact Assessment prepared in support of the proposed expansion concludes that the noise and vibration generated by the proposal would have minimal to no impact on the nearest residential receivers to the site. The New England Highway and five operating mines surrounding the development already produce considerably more noise than would be emitted from the proposed compost facility expansion. In practical terms, the total measured sound power of all operational mobile and fixed plant on site combined is approximately equivalent to a single 300 tonne rear dump truck typically deployed at an open cut coal mine.</p>	9.5
Biodiversity and Bushfire	<p>The site comprises land located on part of a capped open cut mining void which has been filled with spoil and ash from the Bayswater Power Station. The development footprint is located on a graded hardstand area surrounded by perimeter bunding. The ecological investigations carried out in support of the proposed expansion have found that there is no suitable habitat present over the site or immediate surrounds to support any threatened species, endangered ecological communities, critical habitat or endangered populations.</p> <p>The development area is also not mapped as bush fire prone land. Notwithstanding that, mitigation measures are proposed with respect to ensuring access and emergency evacuation as well as the supply of water.</p>	9.6
Visual Amenity	<p>Project design has considered potential visual impacts on surrounding areas including the distance to potentially affected areas and shielding</p>	9.7

provided by natural topographic features and the landforms associated with rehabilitated mining areas in the project area.

The Project does not require any site infrastructure that is elevated in nature, visually intrusive during the day or night, and which dominates the landscape. The most visually prominent feature is the slightly raised location of the site office and staff amenities. The organics processing hardstand is located on a flat recessed area created from the capping of Void 3. Current operations, and proposed operations, will remain visually shielded by the surrounding vegetation and topography.

Aboriginal Heritage	The site is heavily disturbed, having previously been used as an open cut mine. The Aboriginal Cultural Heritage Assessment prepared in support of the proposed expansion concludes that no Aboriginal objects were identified and there is no evidence on the basis of the survey conducted that Aboriginal objects are present in the project area. It is also highly unlikely that they will be uncovered as part of the proposed development. In addition, the project area has nil archaeological value and is not significant on the basis of research potential, representativeness, rarity or education potential.	9.8
Historic Heritage	The Historic Heritage Assessment prepared in support of the proposed expansion concludes that there are no heritage items identified in the project area. It is not anticipated that the expansion will have any impact on any items of historic heritage due to the highly disturbed nature of the site and the lack of any listed sites in the vicinity.	9.9
Socio-Economic	<p>There are clear socio-economic and community benefits associated with extending the existing nutrient recycling facility. The expansion of this operation will benefit the existing rehabilitation activities across AGL Macquarie lands, and also assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.</p> <p>At the micro level, the proposed expansion will result in employment creation during both the construction and operation phases.</p> <p>Mitigation measures will also ensure that any amenity or environmental impacts associated with the expansion are properly managed.</p>	9.10
Fire and Incident Management	<p>Bettergrow currently operate a number of recycling facilities across NSW and QLD. Established fire management control measures, pollution incident response management plans and emergency procedures and protocols from Bettergrow's existing operations are to be updated for the expanded development. This will ensure that the site has the appropriate checks and balances in place to safeguard the protection of life and the prevention of environmental harm, including air, water or land pollution.</p> <p>Further, new storage structures on the site will also be constructed to comply with Part E1 (deemed to satisfy provisions) and Part E2.3 (Special Hazards) of the BCA.</p>	9.11
Hazard and Risk	A Preliminary Risk Screening (PRS) under State Environmental Planning Policy No. 33 Hazardous and Offensive Development (SEPP 33) has been undertaken for the development. The screening indicates that the development is below the SEPP thresholds and therefore is not considered a hazardous or offensive development in accordance with the guidelines.	9.12
Waste Management	<p>The waste streams presently received at the facility will continue to be managed in the same way as currently.</p> <p>Waste generated from construction and operation of the expanded facility would be managed in accordance with the established waste hierarchy which underpins the objectives of the Waste Avoidance and Resource</p>	9.13

Recovery Act 2001 to ensure that the diversion of waste from landfill is maximised. A WMP has been prepared for the proposed expansion and will be updated and implemented as required

The facility, once operational, will provide critical waste management infrastructure which will be able to service existing and future waste management needs and assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.

10 STATEMENT OF COMMITMENTS

This section summarises the mitigation measures to be implemented at the proposed development to reduce impacts to the surrounding environment.

10.1 Statement of Commitments

The mitigation measures, monitoring activities, and management strategies outlined in **Section 9** above will be implemented for all activities associated with the proposed facility. **Table 48** below details the key commitments proposed in this EIS to effectively mitigate and manage the potential environmental impacts of the development.

Table 48 Draft Statement of Commitments

Summary of Commitments	Where Addressed in the EIS
General	
<ul style="list-style-type: none"> A site-specific Compost Management Plan (CMP) has been developed for the waste facility. The CMP ensures that the commitments made within the EIS are fully implemented and complied with. The CMP is attached as Appendix Q. 	Q
Air Quality (including greenhouse gas, odour and dust)	
<ul style="list-style-type: none"> The potential for odour related impacts to off-site receptors will be managed through the adopted odour reduction measures that form part of the site's Composting Management Plan (CMP) (LZE, 2016). In particular Section 11.1.2 <i>Odour Management</i>, Section 11.2.1 <i>Stormwater Management</i>, Section 11.2.2 <i>Basin Water Health and Management</i>, and Section 12. <i>Management Procedures</i>, of the CMP (LZE, 2016) include references to odour management strategies to be implemented on site as/if required to minimise the potential for off-site odour impacts. The potential for dust related impacts to off-site receptors will be managed through the adopted dust reduction measures that form part of the site's Composting Management Plan (CMP) (LZE, 2016). In particular it is noted that Section 11.1.1 <i>Dust and Particulate Management</i>, Section 12.4.2.4 <i>Hardstand Pads</i> and Section 12. <i>Management Procedures</i>, of the CMP (LZE, 2016) include references to dust management strategies to be implemented on site as/if required to minimise the potential for off-site dust impacts. Use of building materials for walls, floors, roofs, that provide insulation and aid in reduced energy costs; Maximisation of natural ventilation and energy efficient cooling; Use of natural lighting; Use of light sensors to minimise lighting related electricity usage; Use of high efficiency lighting; Whenever practicable, vehicles to leave site with full loads to reduce the number of traffic movements and diesel consumption; and All vehicles/plant and machinery will be turned off when not in use and regularly serviced in accordance with manufacturers specifications to ensure efficient operation. 	9.1

Surface Water and Ground Water

9.2 and 9.3

- Surface and Groundwater Management Plan to be updated to include the expanded facility
- Limit fuels and chemicals stored onsite to a minimum
- All required chemicals and fuels must be located within a bunded enclosure located away from drainage lines and stormwater drains
- Plant and equipment must be regularly inspected and serviced to limit risk of oil loss
- Refuelling of vehicles or machinery is to occur within a containment or hardstand area designed to prevent the escape of spilled substances to the surrounding environment
- Wash down areas must be appropriately constructed to capture and treat all wastewater, with collected solid material disposed off-site to a licensed facility
- All staff to be appropriately trained in the spill response plan for the minimisation and management of unintended spills
- A high standard of site housekeeping is to be maintained to limit risk of gross pollutants entering surface waters (i.e. construction waste, litter)
- All reasonable and practicable measures must be taken to prevent pollution of any existing waterways as a result of silt or untreated leachate run-off, and oil or grease spills from any machinery. Wastewater for cleaning equipment must not be discharged or indirectly to any watercourses or stormwater systems
- Exposed bare earth areas within the composting facility site must be minimised. Unused areas are to be revegetated
- The facility must be designed to prevent surface water from mixing with the organics received and processed at the premises and the final products, process residuals and contaminated materials stored at the premises. This includes:
 - Drains and spillways
 - Bunding
 - Sediment controls during construction
- Clean stormwater must be diverted around waste and leachate catchments through the installation of clean water catch drains and diversion bunds
- Maintain surface gradient of the hardstand pad and orientation/geometry of windrows to minimise leachate generation and to ensure that leachate flows directly to the primary detention basin without mixing with compost organics
- Maintain all water related infrastructure, during construction and operation of expanded infrastructure, and operation, designed to maximise runoff and reduce infiltration including:
 - Low permeability base in the composting processing areas
 - Lining of the leachate dams
 - Bunding and arrangement of windrows
 - Perimeter bunding and diversion drains
- Procedures for testing, treatment and discharge of leachate to be established and implemented, including monitoring anaerobic conditions

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- Undertake aeration of the leachate dam (increase oxygen) if required (i.e. if hydrogen sulphide, dissolved oxygen or pH levels are outside limits)
- Monitor water levels of the detention basin to ensure that the water levels do not drop below the anticipated use of water for composting and evaporation.
- Maintain integrity of hardstand pad by repairs to areas damaged by plant and machinery movements
- Ensure drains and surface water gradients are free of excess vegetation and debris so that the flow of stormwater or leachate is not impeded, and the moisture / compaction levels achieved in embankment construction are maintained
- Regular inspections of onsite infrastructure and structural integrity of drains, hardstand and leachate dam
- Repair and maintain any cracks observed in the base and side walls of the dam using clay, preferably bentonite or bentonite clay mixture
- Waste to be accepted at the facility is to be in accordance with the EPA licence. Waste must be effectively vetted so prohibited wastes are not accepted at the facility
- Waste is only to be received, stored or processed in areas where the leachate barrier has been installed
- Monitoring of pollutants must be undertaken as per EPL 7654
- Leachate collection and storage facilities must be maintained to collect and impound all leachate in accordance with the design storm event
- Leachate is not to be used for dust suppression on haul roads
- Leachate is to be recycled through moisture conditioning of compost, to drawdown on basin volumes and ensure the design capacity of the basin is maintained for future storm events
- Management of windrows and gradients to ensure no ponding or pooling occurs. Depressions must be filled promptly by using screened or sieved overburden
- All water that has entered processing and storage areas and water that has been contaminated by leachate must be handled and treated in the same manner as leachate
- Leachate must be collected and stored in a lined basin capable of capturing the 1% AEP, 24-hour runoff event. The hardstand pad and basin liner shall be constructed recompacted overburden/clay with an in-situ permeability (K) of less than 1×10^{-9} m/s in accordance with Aurecon (2017)
- The leachate dam must be designed in accordance with AS 3798-2007 - Guidelines on Earthworks for Commercial and Residential Developments
- Leachate basin is to be regularly desilted in order to maintain design storage capacity, without compromising basin liner integrity

Traffic and Access

As there would be no impact on the performance of the local road network, road upgrades are not required. While the traffic assessment concludes that the additional traffic generated by the facility will not adversely impact on road capacity. Bettergrow will, where possible, schedule its heavy vehicle movements to avoid the busy morning and afternoon peak hours. The performance capacity of the local road network and intersections is being further enhanced with a number of road upgrades in the vicinity of the proposed development.

9.4

Noise and Vibration

REPORT

As there would be no construction and operational noise impacts as a result of the development, no specific noise mitigation measures or monitoring is required. This reflects the location of the development and the background noise already present from the NEH and five surrounding mining operations.

9.5

Biodiversity and Bushfire

- The location of artificial wetlands in the north-western area where small dams exist is encouraged. Use of a variety of water depths, and planting of native wetland species endemic to the Singleton region is encouraged. 9.6
- Weeds present over the disturbed areas of the site should be controlled/eradicated where feasible.
- **Access Road** - A minimum 4m wide access road with 1m shoulders, passing bays every 200m to allow two-way passing of vehicles, and all-weather trafficable is to be provided;
- **Perimeter Road** - A minimum 4m wide unsealed all-weather trafficable road around the external perimeter of the compost mounds should be provided to prevent potential grass fires encroaching into the compost facility, or a fire from the compost facility spreading into surrounding grassed areas and properties;
- **Water** - A diesel or petrol-powered fire-fighting pump, with at least a 40m long hose with steel nozzle, mounted on a mobile fire tanker unit should be provided. It should be able to pump out water and cart water from the water supply tank/dam, and fight any spot fires caused by ember attack, or self-combustion;
- **An Emergency and Evacuation Plan** should be prepared - including details of the site Fire Warden, local Rural Fire Service contact numbers, emergency muster point, fire-fighting appliances and location, first aid kits, and emergency response procedures in the advent of a bush fire. The Rural Fire Service should also be notified of the development once approved so it can be added to their facility register, and details also provided of access and fire-fighting capacity onsite.

Visual Amenity

As the development site is already adequately screened from view no additional mitigation measures are proposed. Design and location characteristics of the development provide sufficient mitigation. Retention of existing trees within the site are recommended to maintain the existing level of screening.

9.7

Aboriginal Heritage

- All relevant staff should be made aware of their statutory obligations for heritage under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*. This is to be in the form of a heritage induction on site prior to works; 9.8
- In the unlikely event that disturbed Aboriginal objects are identified during the development then they are to be collected and recorded in accordance with OEH guidelines and in consultation with the Registered Aboriginal Parties; and
- In the unlikely event that human skeletal remains are identified, work must cease immediately in the vicinity of the remains and the area cordoned off. The proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of a crime scene or are possible Aboriginal remains. If the remains are thought to be Aboriginal, OEH must be contacted via the Enviroline 131 555. An OEH officer will determine if the remains are Aboriginal or not. If the remains are identified as Aboriginal, a management plan must be developed in consultation with the relevant Aboriginal stakeholders before works recommence.

Historic Heritage

- All relevant staff should be made aware of their statutory obligations for heritage under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*. This is to be in the form of a heritage induction on site prior to works; 9.9

REPORT

- In the unlikely event that disturbed Aboriginal objects are identified during the development then they are to be collected and recorded in accordance with OEH guidelines and in consultation with the Registered Aboriginal Parties; and
- In the unlikely event that human skeletal remains are identified, work must cease immediately in the vicinity of the remains and the area cordoned off. The proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of a crime scene or are possible Aboriginal remains. If the remains are thought to be Aboriginal, OEH must be contacted via the Enviroline 131 555. An OEH officer will determine if the remains are Aboriginal or not. If the remains are identified as Aboriginal, a management plan must be developed in consultation with the relevant Aboriginal stakeholders before works recommence.

Socio-Economic

Implementation of measures to reduce the potential for amenity impacts during construction and operation are identified in the relevant chapters of the EIS and Statement of Commitments. No further mitigation measures are proposed with regard to socio-economic issues as it is considered that the proposed development will be of net benefit to the community, providing for decreased cost and increased social efficiency associated with composting and nutrient recycling within Singleton LGA and the surrounding area in accordance with legislative requirements. Ongoing engagement will occur with the local community and other key stakeholders during construction and operation.

9.10

Fire and Incident Management

- New storage structures on the site should be constructed to comply with Part E1 (deemed to satisfy provisions) and Part E2.3 (Special Hazards) of the BCA.
- A strict no smoking policy should be enforced on site when in proximity of any combustible materials. Smoking will only be permitted in clearly signposted areas;
- All water collection points should be checked regularly to ensure their ability to be accessed in an emergency;
- Fire extinguishers should be positioned at readily accessible points, including on mobile plant, so that their use in an emergency is not restricted;
- All firefighting plant and equipment should be regularly serviced in line with the manufacturer's recommendation;
- The temperature of all stockpiles and windrows should be monitored in accordance with established workplace procedures. If temperatures throughout the compost exceed 67 degrees C, then sprinkling is to be initiated to dissipate heat;
- All stockpiles and windrows should be sufficiently moist. The moisture content of compost windrows must be kept above 40% weight for weight to retard burning;
- In the event of a fire within a windrow or greenwaste stockpile, the affected stockpile/windrow must first be suppressed with either the use of water and/or dirt. The stockpile/windrow must then be pulled apart. However, if weather conditions are such that pulling apart the stockpile/windrow is likely to ignite other stockpile/windrows or spread the fire internally or externally, (eg dry with moderate/strong winds), the stockpile must not be broken up until conditions are suitable;
- In the event that a fire cannot be extinguished using water or soil, the use of fire retardants should be considered (expert advice should be sought from Fire and Rescue NSW before taking action with retardants);
- Once the fire has been extinguished, affected areas should be monitored on a continual basis until materials have cooled;
- All fire water should be contained on site;
- All staff should be trained in the use of onsite firefighting appliances;

9.11

REPORT

- Combustible materials should not be accumulated in areas close to exhausts or engines.
- Display emergency procedures and information in the site office or other visible location;
- Conduct or participate in site emergency scenarios as required;
- Regularly identify and check all site fire extinguishers and firefighting equipment.

Hazard and Risk

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|---|-------------|
| <ul style="list-style-type: none">• All mobile plant and equipment should be fitted with fire extinguishers; | 9.12 |
| <ul style="list-style-type: none">• An Emergency Response Plan should be prepared and implemented for the facility; | |
| <ul style="list-style-type: none">• All staff on site should be appropriately trained in the handling of dangerous goods; and | |
| <ul style="list-style-type: none">• Flammable and combustible liquids will be stored in accordance with <i>AS 1940-2004: The Storage and Handling of Flammable and Combustible Liquids</i>. | |

Waste Management

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|--|-------------|
| <p>The following mitigation and management measures will be applied during construction and operation of the facility:</p> | 9.13 |
| <ul style="list-style-type: none">• Plant and equipment should be regularly maintained; | |
| <ul style="list-style-type: none">• Ordering should be limited to only the required amount of materials; | |
| <ul style="list-style-type: none">• Materials should be segregated to maximise reuse and recycling; | |
| <ul style="list-style-type: none">• Routine checks should be undertaken of waste sorting and storage areas for cleanliness, hygiene and OH&S issues, and contaminated waste materials; | |
| <ul style="list-style-type: none">• Separate skips and recycling bins should be provided for effective waste segregation and recycling purposes; | |
| <ul style="list-style-type: none">• Training and awareness of the requirements of the WMP and specific waste management strategies will be undertaken; | |
| <ul style="list-style-type: none">• Contaminated waste will be managed, transported, and disposed of in accordance with licensing requirements; | |
| <ul style="list-style-type: none">• Off-site waste disposal should be transported and disposed of in accordance with licensing requirements; | |
| <ul style="list-style-type: none">• Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes should be undertaken; and | |
| <ul style="list-style-type: none">• Regular monitoring, inspection and reporting requirements should be undertaken, and findings implemented. | |
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11 JUSTIFICATION AND CONCLUSIONS

11.1 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) is a primary objective of environmental protection in NSW. The objectives of the EP&A Act include the encouragement of the principles of ESD. Supplementary to the EP&A Act objectives, section 7 (1(f)) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 requires a proponent to include in an EIS the reasons justifying the development, including the principles of ESD. Section 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 defines the principles of ESD as follows:

- (a) *The **precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*
 - (i) *Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
 - (ii) *An assessment of the risk-weighted consequences of various options.*
- (b) ***Inter-generational equity**, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*
- (c) ***Conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.*
- (d) ***Improved valuation, pricing and incentive mechanisms**, namely, that environmental factors should be included in the valuation of assets and services, such as:*
 - (i) *Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
 - (ii) *The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
 - (iii) *Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

11.1.1 Precautionary Principle

The Precautionary Principle states that if there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The Development has been assessed for impacts relating to air quality and odour, noise, traffic and transport, visual amenity, water resources, flora and fauna, Aboriginal heritage, and non-indigenous heritage. This EIS, combined with the consultation undertaken with relevant government agencies, and local stakeholders, has provided an understanding of the potential implications of the development and subsequently confirm the mitigation measures required.

Through the adoption of an anticipatory approach, each potential issue arising from the Project has been identified, evaluated and mitigated through a series of design or management solutions.

11.1.2 Intergenerational Equity

Intergenerational Equity is centred on the concept that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. There is a moral obligation to ensure that today's economic progress, which would benefit current and future generations, is not offset by environmental deterioration.

Throughout the assessment, the type and extent of potential impacts caused by the Project have been analysed and mitigated. The assessment methodologies have adopted a risk-based and worst-case scenario approach to ensure improved environmental, social and economic protection for current and future generations. The environmental management and mitigation measures have been developed to minimise the impact of the Project on the environment for future generations.

The management and mitigation measures proposed in **Section 9** above would assist in ensuring that the development does not pose any significant impact or risk to the surrounding environment and safeguards the environment for future generations.

11.1.3 Conservation of Biological Diversity and Ecological Integrity

The principle of Conservation of Biological Diversity and Ecological Integrity holds that the conservation of biological diversity and ecological integrity should be a fundamental consideration for development proposals.

The site comprises lands located on part of a capped open cut mining void which has been filled with mine spoil and ash from the Bayswater Power Station. The development footprint, including the existing approved composting facility, is located on a graded hardstand area, surrounded by perimeter bunding. An ecological assessment has been undertaken by a qualified specialist to identify the extent of biological diversity on site and the surrounding area. There is not considered to be any significant impact on any threatened species, Endangered Ecological Community, critical habitat, or endangered populations by the proposed works on any state or nationally listed species under the *EPBC Act 1999*, or *BC Act 2016*.

11.1.4 Improved Valuation, Pricing, and Incentive Mechanisms

The principle of Improved Valuation, Pricing and Incentive Mechanisms deems that environmental factors should be included in the valuation of assets and services. The cost associated with using or impacting upon an environmental resource is seen as a cost incurred to protect that resource.

Given that the development is not proposing to clear any vegetation, and would not have any impacts to waterways, environmental resources should not be significantly impacted.

The Project optimises the valuation and pricing of natural resources by encouraging diversion away from landfilling and encouraging recycling. Further justification in this regard is provided in Section 4.1 and below.

11.2 Project Need

AGL currently have over 700 ha of land that require progressive rehabilitation and further areas are likely to become available in the future as mine voids are filled with fly ash from their coal fired power generators. Previous open cut mining operations across AGLs lands have resulted in the removal and disturbance of the topsoil, and the remaining sub-soils have limited value as a plant growth medium due to their poor structure, low nutrient levels, low organic matter, and high sodicity and salinity. Previous rehabilitation activities have been unsuccessful in re-establishing robust and diverse vegetation communities. Long term successful rehabilitation at the site is dependent on creating a biologically active soil with a sustainable carbon and nutrient cycle.

The Project will continue to provide the biologically active organic material required to ameliorate the soils across AGLs lands which will facilitate successful rehabilitation at the Ravensworth No. 2 and Ravensworth South Mines. Organic material would be used to improve the soil across existing rehabilitated areas and new rehabilitation areas. The Project will also expedite the rehabilitation of AGLs disturbed areas through

supplying organic materials produced onsite and provide a sustainable and cost-effective option for soil improvement.

The development of the facility up to 200,000 tpa will also provide the additional capacity to process an increased source of organic materials and also service the demand for composted organics in the broader supply market.

In order to reach State waste diversion targets, the NSW government has identified that additional waste infrastructure is required to receive, process, and convert organics for beneficial use. The decision by the NSW EPA to cease approval of the application Mixed Waste Organics to land will further increase the need for infrastructure capable of processing FOGO from council kerbside collections as well as GO and FO.

Bettergrow's proposal for Greenspot Hunter Valley will complement its other operations across NSW, including Greenspot Wetherill Park (SSD 7401), which are key pieces of waste infrastructure assisting the State government to meet its diversion of waste from landfill objectives. Greenspot Wetherill Park has existing approvals in place permitting the receipt and processing of GO, mixed FOGO and FO from Sydney councils and C&I food waste collectors.

The increased capacity of 200,000 tpa at Greenspot Hunter Valley will allow the facility to continue to produce high quality composts suitable for land application in both farming and rehabilitation, and further enhance the availability of waste infrastructure in the local regional.

11.3 Conclusion

This Environmental Impact Statement (EIS) has been prepared to support a State Significant Development Application by Bettergrow trading as 'Greenspot Hunter Valley' to expand an existing nutrient recycling facility on Lot 10 DP1204457 at 74 Lemington Road, Ravensworth. Bettergrow Pty Ltd are contracted by AGL Macquarie (the Landowner) to supply manufactured soil ameliorant and rehabilitation products for use, in part, for approved rehabilitation works at the Ravensworth No. 2 mine and Ravensworth South mine.

Current composting operations at the site are approved by DA140/2016 to receive up to 76,000 tonnes per annum (tpa) of biosolids and garden organics. The subject application seeks to authorise the receipt of up to 200,000tpa of organic materials, including new feed sources of food waste, to facilitate the sale of a portion of the composted material to third parties.

The expanded facility will provide critical waste management infrastructure which will be able to service existing and future waste management needs in the Hunter Valley region and surrounds and assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.

The proposed development has been shown to be consistent with the relevant local, State and Commonwealth government planning instruments.

A range of environmental issues were identified and assessed with appropriate mitigation and management measures proposed to be carried through to the construction and operational phase. The Traffic Impact Assessment prepared in support of the proposed expansion concludes that the additional traffic generated by the facility will not adversely impact on existing road capacity, and that as there would be no impact on the performance of the local road network, road upgrades are not required.

The flooding and surface water assessment concludes that the site is also well elevated at approximately 40m higher than surrounding watercourses, and that there is no outside flood risk to the site. The risk of harm to the surface water environment is currently low and will continue to be low as part of the proposed expansion.

The proposal provides enhanced social and economic benefits by increasing the processing capacity for organic and commercial waste into recycled materials, thereby reducing the amount of waste going to landfill, and increasing availability of recycled products. Utilisation of recycled materials contributes to the conservation of natural resources and biodiversity and is consistent with the principles of ESD.

REPORT

It has been demonstrated throughout this EIS that any minor impacts associated with the proposed expansion can be addressed through the implementation of appropriate management and mitigation strategies. Overall, the expansion of the facility in the form proposed is a logical extension of the existing operations and has significant environmental, sustainability and public interest benefits. On this basis, we respectfully submit that the proposed expansion should be approved.

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