Prepared for:

Civil Lake on behalf of Lake Macquarie City Council

Environmental Assessment

Sustainable Resources Centre - Teralba

Volume 1 - Report

August 2010

Environmental Assessment

Teralba Sustainable Resource Centre

Prepared for

CiviLake on Behalf of Lake Macquarie Council

Prepared by

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Certification

Submission of an Environmental Assessment prepared under the *Environmental Planning and Assessment Act 1979* Section 75F

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Project		
Project application	MP 08_0079	
Applicant name	Lake Macquarie City Council trading as CiviLake	
Applicant address	Works Depot, Creek Reserve Road, Boolaroo, NSW, 2284	
Land to be developed	Lots 42, 43, 53 and 54 in Deposited Plan 16062	
Proposed project	Crushing grinding and separating operation for construction and green waste materials including concrete, asphalt, recycled asphalt pavement, road base, green waste, bricks, tiles and soil.	
Environmental Assessment	The attached Environmental Assessment has been prepared in accordance with the Director General's Environmental Assessment Requirements issued under Part 3A of the *Environmental Planning and Assessment Act 1979.*	
Certification	I certify that I have prepared the contents of this Environmental Assessment and to the best of my knowledge it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.	
	Signature: Name: Natasha Ridler Date:	Signature: Name: Catherine Brady Date:

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List of Abbreviations

AADT	Average Annual Daily Traffic
ABPP	Australian Bushfire Protection Planners
ACM	Asbestos Containing Materials
AHIMS	Aboriginal Heritage Information Management System
ANL	Acceptance Noise Level
ANZECC	Australian and New Zealand Environment Conservation Council
APZ	Asset Protection Zone
ASS	Acid Sulphate Soils
ATS	Australasian Traffic Surveys
BAR	Basic Right Turn
BGS	Below Ground Surface
BOM	The Bureau of Meteorology
CAMBA	China Australia Migratory Bird Agreement
CCL	Consolidated Coal Leases
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
CPRS	Carbon Pollution Reduction Scheme
DCP	Development Control Plan
DECCW	NSW Department of Environment, Climate Change and Water
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts
DGRs	Director General's Requirements
DIP	Design Information Package
DoP	NSW Department of Planning
DoS	Degree of Saturation
DP	Deposited Plan
DII	Department of Industries and Investment
EA	Environmental Assessment
EEC	Endangered Ecological Community
ENM	Excavated Natural Material
EP&A	NSW Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPBC	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EPI	Environmental Planning Instruments
EPL	Environmental Protection Licence
ESD	Ecologically Sustainable Development
ETS	Emissions Trading Scheme
GCL	Geosynthetic Clay Liner
GHG	Greenhouse Gases
WARR	NSW Waste and Resource Recovery Strategy 2007
INP	Industrial Noise Policy
IPCC	Intergovernmental Panel on Climate Change
JAMBA	Japan Australia Migratory Bird Agreement
KLALC	Koompathoo Local Aboriginal Land Council
LES	Local Environmental Study
LGA	Local Government Area

LHCCNREMS	Lower Hunter and Central Coast Regional Environmental Management Strategy
LHRS	Lower Hunter Regional Strategy
LMCC	Lake Macquarie City Council
LMLEP	Lake Macquarie Local Environmental Plan 2004
LoS	Level of Service
LV	Low Voltage
ML	Mining Leases
MSB	Mine Subsidence Board
NES	National Environmental Significance
NGER	Commonwealth National Greenhouse and Energy Reporting Act 2007
NPW	NSW National Parks and Wildlife Act 1974
NV	NSW Native Vegetation Act 2003
OEMP	Operational Environmental Management Plan
PASS	Potential Acid Sulfate Soils
PB	Parsons Brinckerhoff Australia Pty Limited
PEA	Preliminary Environmental Assessment
PEL	Petroleum Lease
PHA	Preliminary Hazard Assessment
POEO	Protection of the Environment Operations Act 1997
RAP	Remedial Action Plan
RBL	Rating Background Level
REP	Regional Environmental Plans
RNE	Register of National Estate
ROTAP	Rare or Threatened Australian Plants
RTA	Roads and Traffic Authority
SEPP	State Environmental Planning Policy
SHI	NSW Heritage Office State Heritage Inventory
SHR	NSW Heritage Office State Heritage Register
SOC	Statement of Commitments
SSFCF	Sclerophyll Forest on Coastal Floodplain
TAPM	The Air Pollution Model
TJ	Terrajoules
TN	Total Nitrogen
TPH	Total Petroleum Hydrocarbons
TSC	NSW Threatened Species Conservation Act 1995
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
VENM	Virgin Extracted Natural Material
VIA	Visual Impact Assessment
WARR	NSW Waste and Resource Recovery Strategy 2007
WCPS	Western Corridor Planning Strategy
WSUD	Water Sensitive Urban Design

Executive Summary

Introduction

This Environmental Assessment Report (EA) has been prepared by AECOM for CiviLake, a business unit of Lake Macquarie City Council (LMCC) under the provisions of Part 3A of the *Environmental Planning and Assessment Act 1979 (EP&A Act)* and in accordance with the Director General's Requirements (DGRs) issued by the Director General of the Department of Planning (DoP) on 6 May 2009 for Major Project Application MP 08_0079.

This EA seeks the approval of the Minister for Planning for a Sustainable Resource Centre (referred to as the proposed Facility) on the subject site at The Weir Road, Teralba, known as Lots 42, 43, 53 and 54 in Deposited Plan (DP) 16062, located within the Lake Macquarie Council Local Government Area (LGA) (see **Figure 1-1**).

The proposed Facility would be a crushing, grinding and separating operation for construction and green waste materials including concrete, asphalt, recycled asphalt pavement, road base, green waste, bricks, tiles and soil.

As stipulated by the *EP&A Act*, *State Environmental Planning Policy (SEPP) (Major Development) 2005*, and as per advice in correspondence received from the DoP dated 23 January 2007, the proposed Facility is a 'Major Development' requiring the Ministers approval to proceed.

In March 2008, Lake Macquarie City Council, on behalf of CiviLake provided a Preliminary Environmental Assessment (PEA) to the DoP. The PEA was submitted for the purpose of informing the DoP of the general details of the proposal and to obtain the DGRs. The DoP subsequently issued the DGRs in a letter dated 6 May 2008. The DGRs are at **Appendix A** to this EA.

Need for the Project

Waste produced from Lake Macquarie Council's civil and maintenance works is handled by CiviLake. As a result of market and legislative forces, this waste has been subject to rapidly increasing disposal costs. Recent advances in materials recovery and improved end market options now mean that this waste is more readily recycled and reused. As CiviLake is in the position of being both the waste generator and the recycled material user, it has identified that the most cost effective means of reprocessing construction and green waste material is to establish a Council operated crushing and recycling plant.

CiviLake currently generates over 110,000 tonnes of hard material from its own operations. Less than 17% of this material is value added or on sold, while a large percentage of the material is disposed of at significant cost. The nearest recycling facilities with the capacity to store and process CiviLake generated material into new products exist outside the LGA. These factors coupled with the increases in the Section 88 Waste levy under the *Protection of the Environment Operations Act 1997* (POEO Act), have created a sound business case for the development of a Council owned and operated recycling facility.

Council and other recycling/ waste managers in the Lake Macquarie LGA currently process the CiviLake generated materials to various specifications at a number of different locations. The proposed Facility would consolidate much of the processing to the one site, creating plant and transport efficiencies and economy of scale. These efficiencies represent triple bottom line improvements for CiviLake operations.

Section 20.0 of this EA provides a detailed justification and associated benefits of the proposed Facility, and considers potential environmental, social and economic impacts locally and on the State.

Site Description

Lake Macquarie is geographically unique in that the City surrounds the Lake. The City of Newcastle borders the north and eastern edge of Lake Macquarie. The proposed Facility is approximately 20km from Newcastle's CBD and approximately 140km from the Sydney CBD.

The subject site is approximately 7 hectares and is located approximately 2km north of the village of Teralba on a floodplain to the south and west of Cockle Creek. The closest point of the creek is approximately 200m from the proposed Facility. The subject site is elevated approximately 1m relative to the adjoining land, due to the previous land use of sanitary disposal involving the deposit of biosolids and fill over the site.

The site is currently used for light agriculture (agistment). An electricity transmission easement dissects the site running east west with 132kV power lines.

The Weir Road adjoins the southern edge of the subject site. Access to the site via the Weir Road is from two directions, Barnsley to the west and Teralba to the southeast.

Project Description

Project approval is sought for the proposed Facility which would accept up to 200,000 tpa of construction and green waste material for reuse within CiviLake operations and resale to the construction industry.

Materials that would be stored, sorted, reprocessed and stockpiled on the site include concrete, asphalt, Recycled Asphalt Pavement, road base, green waste, bricks, tiles and soil. After reprocessing, materials would be stored on-site, tested to any necessary Department of Environment, Climate Change and Water (DECCW) requirements then sold.

The proposed Facility has been planned and designed in order to enable the practical requirements of the proposed Facility's operation. Current operations at CiviLake's existing facilities at the Teralba Metromix Quarry and Boolaroo Transfer Station have informed the site layout and design of the proposed Facility.

An Environmental Protection Licence (EPL) for operations would be obtained from the DECCW which would be adhered to throughout operations.

The site has been designed in order to minimise the potential impacts of the proposal on the surrounding environment.

A description of the site preparation and construction and operational processes of the proposed Facility are detailed in **Section 2** of this EA.

Statutory Planning

Commonwealth Legislation

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* requires the approval of the Commonwealth Minister for the Environment, Water, Heritage and the Arts for actions that may have a significant impact on matters of National Environmental Significance (NES). Approval from the Commonwealth is in addition to any approvals under NSW legislation.

A search of the Department of the Environment, Water, Heritage and the Arts (DEWHA) EPBC Protected Matters database has revealed that the subject site is not located within a World Heritage area, a Commonwealth marine environment, nor does the proposed Facility involve nuclear activities. However, the preliminary review of the database has revealed that threatened ecological communities, threatened species, migratory species and listed marine species may occur on or near subject site.

As a result, a flora and fauna assessment has been undertaken by Ecotone Ecological Consultants and is included in **Appendix H** of this EA. This assessment has found that the proposed Facility does not pose a threat to the EPBC listed species, and therefore a referral to the Commonwealth Minister for the Environemnt is not required.

Environmental Planning and Assessment Act 1979

The proposed Facility has been declared as a Major Development under Clause 75(b) of the *EP&A Act*. This has been confirmed by DoP in a letter dated 23 January 2007, which states that the proposed Facility is classified as a 'Major Development to which Part 3A of the *EP&A Act* applies.

Part 3A of the *EP&A Act* provides processes for the assessment of development which is considered to be a "Major Project" as declared by a SEPP, or by order of the Minister in the Government Gazette.

Pursuant to Section 75U of the *EP&A Act*, Part 3A has removed the application of integrated development provisions for Major Projects and therefore with the exception of the *POEO Act*, there are no concurrent licensing provisions that apply to Part 3A development, and therefore the Proposal.

There are however several Acts that, save the provisions of Part 3A, would be relevant to the Proposal. While compliance with the provisions of these Acts is not mandatory, their consideration in the design and incorporation into the project ensures that the proposed Facility would have a negligible environmental impact and would contribute positively to the environmental and socio-economic position of the Teralba locality. Relevant Acts include the *Threatened Species Conservation Act 1995 (TSC Act)*, the *National Parks and Wildlife Act 1974 (NPW Act)* and the *Native Vegetation Act 2003 (NV Act)*.

Environmental Planning Instruments

A range of Environmental Planning Instruments (EPI), created under the *EP&A Act*, provide further detailed guidance and regulation for development at a State, regional and local level.

In accordance with Clauses 75J and 75O of the *EP&A Act*, in deciding whether or not to approve a Concept Plan or the carrying out of a Project, the Minister may (but is not required to) take into account the provisions of any EPI that would not apply if the Project were approved. As this is a discretionary matter for the Minister, a range of EPIs have been considered in relation to the Project, including:

- *State Environmental Planning Policy (Major Development) 2005*
- *State Environmental Planning Policy (Infrastructure) 2007*
- *State Environmental Planning Policy 14 – Coastal Wetlands*
- *State Environmental Planning Policy 33 – Hazardous and Offensive Development*
- *State Environmental Planning Policy 44 – Koala Habitat*
- *State Environmental Planning Policy 55 – Remediation of Land*
- *State Environmental Planning Policy No 71 – Coastal Protection*
- *Hunter Regional Environmental Plan 1989*
- *Lake Macquarie Local Environmental Plan 2004 (LMLEP 2004)*
- *Lake Macquarie Development Control Plan 2006*

Pursuant to LMLEP 2004, the majority of the subject land is zone 9 Natural Resources, with a portion to the south-east and south-west corner zones 7(1) Conservation (Primary).

Consultation

This EA has been prepared in accordance with Part 3A of the *EP&A Act* and its Regulation. Part 3A of the *EP&A Act* ensures that the potential environmental effects of a proposal are properly assessed and considered in the decision making process.

In preparing this EA, the DGRs have been addressed as required by Clause 75F of the *EP&A Act*. The key matters raised by the Director General for consideration in the EA are outlined in Table 4.1 of this EA, together with the relevant section of the EA which addresses that matter. A full copy of the DGRs is provided in **Appendix A**.

The proponent has undertaken consultation with key local and State Government agencies as specified in the DGRs during the preliminary design phase and preparation of this EA. The purpose of this consultation has been to provide an overview of the project and to seek input into matters agencies would like to see addressed in the EA. All formal responses provided as a result of agency consultation are included in **Appendix R** of this EA.

Issues Identification and Prioritisation

A preliminary assessment of environmental issues associated with the project was undertaken for the PEA prepared in respect of the proposed Facility. Key environmental issues identified in the PEA included:

- Acid Sulphate Soils (ASS);
- surface and ground water contamination;
- flooding;
- flora and fauna;
- noise generation;
- dust generation;
- traffic impact;
- greenhouse gas emissions;
- contaminated land; and
- location of electrical transmission easement.

An issues prioritisation matrix was used to identify priorities. Each issue was given a ranking between one and three for the severity of effects and the perceived consequences of those effects if left unmanaged. These two numbers were added together to provide a numerical ranking for the issue that was used to categorise each issue into high, medium or low priority.

The table below identifies the prioritisation of environmental issues, and therefore the focus of assessment for the proposed project was as follows:

Issues Prioritisation

Low	Medium	High
Water Quality (consumption of potable water) Air Quality (construction impacts) Visual Noise and Vibration (construction) Ecology Social and Economic Heritage Land Use	Hazard and Risk Geology and Soils Waste Management Noise and Vibration (operation) Traffic and Transportation Air Quality (greenhouse gases (GHG))	Air Quality (atmospheric emissions) Water Quality (contamination and degradation)

Geotechnical and Contamination

Investigations ot determine the contamination and geotechnical suitability of the site for the proposed Facility were carried out by Parsons Brinckerhoff Australia Pty Limited (PB) in 2008. The investigation was designed to establish the baseline conditions for the site and address the following issues:

- Soil and groundwater contamination;
- Earthworks for proposed filling;
- Likely settlements associated with the filling of the site and stockpiling of materials;
- Foundation conditions and footing design parameters for proposed structures;
- Pavement design for the bulk haulage access road;
- Sedimentation and erosion impacts on the receiving environment;
- Geotechnical aspects of the proposed stormwater retention ponds; and
- ASS.

Assessments were undertaken identifying the site characteristics including topography, geology and soils, groundwater, and the nature, source and extent of subsurface contamination. Construction and operational impacts on the site were considered and appropriate environmental safeguards, in addition to those outlined in the Remedial Action Plan (RAP) (**see Appendix D),** were detailed. These safeguards include details regarding:

- The design and placement requirements for the capping layer,
- The Environmental Management Plans;
- Groundwater and methane monitoring requirements;
- The preparation of a site validation report.

It is anticipated that with the implementation of the management strategies detailed in the PB RAP, the potential impacts relating to contamination from past land uses can be effectively mitigated.

Stormwater Management

AECOM was commissioned to prepare a Water *Cycle Management Plan* for the proposed Facility. The following analyses were used to support the design of the water cycle management strategy:

- Site Conditions and Constraints;
- Flood Study; and
- Water Balance Model.

The recommended water cycle management strategy for the proposed Facility was determined to include measures to meet dopted water conservation, flow (quantity) and water quality (pollution control) management targets and objectives. These objectives reflect best practice guidelines for stormwater management and are in accordance with relevant State and Local policies and planning documents.

These measures include:

- **Water Conservation and Reuse**
  - Rainwater harvesting and reuse.
  - Stormwater treatment and reuse.
- **Water Quantity**
  - Perimeter bunding to prevent flood waters entering the site.
  - Provision of a freeboard storage volume to attenuate surface runoff from the development site for events up to the 1 in 100 year ARI, 24 hour rainfall event.
  - Discharge controlled to maintain pre-development peak discharge flows from the development site.
- **Water Quality**
  - Stormwater from the site is treated to manage sediment, nutrients and other pollutants to meet best practice targets.
  - Buffer strips used around stockpiles to reduce sediment load generated from stockpile areas
  - Silt fences installed to capture coarse sediments and gross pollutants.
  - Site graded to drain stormwater via a sedimentation swale to a ‘Dirty’ Water Pond.

- Dirty Water Pond used to capture and remove gross pollutants and coarse sediment, from runoff on the site.
- Treatment of water drained from Dirty Water Pond in a bioretention pond.
- Overflow and treated flow from the bioretention system collected in a Main Storage Pond for use as process and dust suppression water during operations.
- Water quality testing would be carried out on treated water to confirm the performance of the treatment system.

The full *Water Cycle Management Plan* is included as Appendix F of this EA.

Flora and Fauna

Ecotone Ecological Consultants was engaged to prepare an *Ecological Assessment* for the proposed Facility in order to assess the potential ecological impacts. The aims of the assessment included:

- describe the existing biological environment of the study area in relation to flora and fauna;
- discuss the potential impacts of the proposal on any threatened species that occur or could be likely to occur in the subject site; and
- provide discussion on measures to mitigate impacts.

The methodology followed for flora and fauna assessment involved three stages of environmental investigations. These stages include:

a) A review of available literature pertaining to the site and surrounding locality and preliminary habitat assessment of the study area.
b) Field surveys and habitat assessments for threatened species regarded as potential subject species, and surveys to investigate the inherent biological attributes of the study area.
c) Assessment of the impacts of the proposal on flora and fauna in accordance with the relevant NSW and Commonwealth legislation and planning instruments.

It was determined that overall flora species diversity within the study area was low but considerably higher in the surrounding 30 m buffer. A total of 92 flora species from 37 families were identified. Detailed flora species lists are provided in **Appendix H** of this EA.

The impacts on threatened fauna (as well as non-threatened species) were determined to be minimal for the following reasons:

- there are no identified hollow bearing habitat trees being removed;
- the subject site is primarily devoid of natural habitats;
- vegetated corridors for terrestrial and arboreal species would still remain in their current state;
- most of the species assessed are highly mobile and either have a large home range or are nomadic; and
- large areas of better quality habitat occur on adjoining land.

Impacts from increased noise, traffic movements, dust and lighting have the potential to displace fauna from the buffer zone, however this is not considered likely to result in the local extinction of any of the species assessed.

The *Ecological Assessment* also concluded under the Commonwealth EPBC Act that a significant impact would not occur on listed endangered, vulnerable or migratory species and therefore referral to the Federal Minister of the Environment is not required.

The *Ecology Assessment* is included as **Appendix H** of this EA.

Heritage

The aim of the *Heritage Assessment* was to identify the Aboriginal and European heritage values of the project land, identify potential development impacts on those values and provide suitable management recommendations.

The *Heritage Assessment* adopted a two-stage process in accordance with DECCW's *Part 3A EP&A Act Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DECC 2007). The Stage One investigation consisted of a preliminary (desktop) assessment to identify whether any Aboriginal and/or historic heritage values are associated with the study area and consultation with relevant Aboriginal stakeholders. The results of this Stage One assessment indicated there were unlikely to be any constraints to development on heritage grounds. Therefore, a more detailed assessment under Stage 2, which would involve field survey, was not considered warranted.

The *Heritage Assessment* concluded that whilst it is acknowledged that evidence of Aboriginal activity may be found in any part of the landscape, the environmental conditions of the site indicates that significant deposits of archaeological material are unlikely to be present in the natural ground soils of the site below the current fill layer. These deposits, if present, are likely to be general 'background scatter'. It is unlikely that any historic archaeological material would be encountered within the site.

Consequently, it was determined that there is no requirement for further *Heritage Assessment* of the site. However should archaeological materials be identified during construction, in particular human skeletal material, works should cease and the appropriate authorities (DECCW and Koompathoo Local Aboriginal Land Council) be notified immediately.

The *Heritage Assessment* is included as **Appendix I** of this EA.

Traffic Assessment

AECOM was commissioned to undertake a *Traffic Assessment* for the proposed Facility. The *Traffic Assessment* included a review of existing traffic conditions, an evaluation of the potential impacts from a future development scenario, and the development of criteria for future development and potential mitigation measures to be adopted. The *Traffic Assessment* was prepared in accordance with the Roads and Traffic Authority's (RTA's) Guide to Traffic Generating Developments.

It is expected that the proposed Facility would generate a total of approximately 26 heavy vehicle movements and 5 car movements during the AM peak hour. The *Traffic Assessment* has shown that the surrounding road network would operate with an acceptable level of service and with spare capacity with the additional traffic.

It was also determined that the proposed access intersection would provide safe passage for both vehicles ingressing / egressing the porposed Facility and for through traffic on The Weir Road.

The *Traffic Assessment* is included as **Appendix J** of this EA.

Extractive and Mineral Resources

The *Local Environmental Study for Land North of Teralba* (LES) (CH_2MHILL 2008) assessed the suitability of land to support the development of a recreational sporting complex as well as the proposed crushing and recycling plant. The LES examined the extractive and mineral resources within a study area which extends beyond the boundaries of the subject site but encompasses the entirety of the site.

The LES found that although there are a number of leases for extracting resources over the site, the coal seams have been mined out and there is little potential for the mining of methane gas. The proposed Facility is also unlikely to impact upon the extraction of sand and aggregate at the nearby Teralba Quarry. As the subject site lies within a mine subsidence area, the Mine Subsidence Board (MSB) would be consulted before permanent structures are constructed.

Bushfire Threat Assessment

Australian Bushfire Protection Planners (ABPP) was engaged to prepare a bushfire protection assessment to provide advice on the bushfire protection measures required for the construction of the proposed Facility.

It was determined that implementation of the strategies provided in the ABPP report would provide the level of protection required to the proposed Facility and would ensure compliance with legislative requirements in respect to the provision of defendable spaces between the Bushfire Prone Vegetation and the proposed buildings; access for fire-fighting operations and recommendations on the provision of water supplies for fire protection of the buildings and the resources stored within the proposed Facility.

The assessment of the bushfire protection requirements and potential levels of bushfire attack on the proposed Facility indicates that the development of the subject site can be undertaken in a manner that balances development opportunities and the protection of life, property and the environment.

The full ABPP report is included as **Appendix K** of this EA.

Hazard and Risk Assessment

The proposed Facility has a number of potentially hazardous operations including fuelling of plant and equipment, potentially contaminated run-off and equipment fires. These operations have the potential to impact offsite or cause bushfire at the adjacent properties. A Preliminary Hazard Assessment (PHA) has been prepared for the proposed Facility and is included as **Appendix L** of this EA.

The methodology selected for the PHA was that prescribed in Hazardous Industry Planning Advisory Paper No.6, Hazard Analysis Guidelines.

The PHA identified the following potential hazards:

- dangerous goods stored and handled at the proposed Facility;
- storage shed – minor storage;
- contaminated run-off;
- refuelling of vehicles and plant; and
- contaminated material deliveries.

The PHA concluded that the subject site does not exceed the risk criteria published in Hazardous Industry Planning Advisory Paper No.4. *Risk Criteria for Land Use Safety Planning*. Hence, it is concluded that the proposed Facility may be classified only as a potentially hazardous facility and therefore is permissible in the proposed location with adoption of recommended safeguard measures.

Amenity and Visual Impact

A *Visual Impact Assessment* was prepared to consider the visual impact of the proposed Facility on surrounding land users and make recommendations for mitigation measures that may be required to reduce potential visual and amenity impacts arising from the proposed Facility.

It was determined that the subject site is not readily viewed from any sensitive observer locations. Where it is viewed, the development is likely to be of low visual prominence due to:

- viewing distance;
- restricted height of observer locations, i.e. the viewing angle is very low and only affords low slanted views into the site;
- low numbers of viewers from these observer locations; and
- substantial screening from surrounding remnant vegetation.

The application of the recommended landscape remediation measures or environmental safeguards outlined would further reduce the visual prominence of the proposed Facility from the surrounding areas.

The full *Visual Impact Assessment* is included as **Appendix M** of this EA.

Air Quality Impact Assessment

AECOM has prepared a quantitative air quality assessment using estimates of feed materials, together with publicly available meteorological and ambient air quality data to assess potential impacts. The full Air Quality Impact Assessment is included as **Appendix N** of this EA.

As part of the operation of the proposed Facility, raw materials would be delivered to the site and processed to form a number of usable end products. Processing works would include screening, crushing, blending and mulching. The materials, processing operations and products have the potential to generate dust emissions, with odour emissions also possible from the green waste storage.

The *Air Quality Impact Assessment* found that provided the recommended management and mitigation measures included n the CEMP and OEMP for the proposed Facility are implemented, dust and odour emissions are not expected to significantly affect the health or amenity of Residents in the locality.

Noise Impact Assessment

The *Acoustic Assessmen* prepared by Hunter Acoustics was conducted in accordance with the Industrial Noise Policy (INP) released by the DECC in December 1999.

The assessment showed that the proposed Facility would comply with the requirements of the NSW INP and is not likely to become a source of offensive or intrusive noise. In this regard, the proposed Facility would meet the noise criteria for both daytime and night time operations and would not cause an excessive increase in traffic noise along access roads.

The full report is included as **Appendix O** of this EA.

Utilities and Public Infrastructure

Water supply would be required for dust control, for the site amenities and for the pugmill, concrete crushing and batching plant operations. This supply would mainly be from a number of stormwater ponds on site and reticulated water supply would be required as a back-up in dry periods when there is insufficient water in the ponds. CiviLake would obtain Hunter Water approval prior to installation of the new water service.

LMCC has advised that as there are no buildings greater than 500m^2 in area specific fire fighting water supply is not required. However, based on recommendations from the *Bushfire Assessment*, as a precautionary measure a total of 50,000L of static water storage would be provided specifically for fire fighting purposes in two above ground storage tanks.

Waste water on the site would be generated from toilets, showers and water basins. Given the lack of reticulated sewer in the vicinity of the site and the relatively small quantity of wastewater that the proposed Facility is expected to generate, it is proposed to manage wastewater on the site though installation of a small, low maintenance package sewerage treatment system. The required capacity of the systems would be further assessed during the detailed design phase and a monitoring program established. It is considered that installation of an onsite treatment system is a sustainable solution for sewage management on the site and would not pose a significant risk to the environment.

The proposed Facility would be provided with a low voltage 415V 3-phase 50Hz electricity supply to service the asphalt recycler, pug mill, concrete batching plant, two water pumps , office building, two storage sheds, amenities and lighting around the buildings and site entrance. The low voltage cables would be located in shared trenches with other services such as communications and water where appropriate.

Renewable energy would be generated on the site using solar panels and potentially a wind turbine and would be fed back to the grid reducing the facilities net energy usage.

A power easement for a 132kV overhead power lines transects the site from east to west and a lattice tower for the power lines (TowerIU-50817) is present within the easement close to the eastern boundary of the site. Energy Australia in 20 October, 2009 advised of requirements with regard to the transmission line easement. These requirements have been taken into account in the development of the concept plan for the Facility.

LMCC presently operates a radio microwave communications network from a commercial tower on Sugarloaf Range. The intention is to use this existing communications platform to connect the proposed Facility to the LMCC Administration Building. Both phone and data services would be supported across this radio. A small tower would be erected on either the site office building or one of the storage sheds. The Combined Services Drawing shows the proposed approximate location of the radio receiver and internal communication conduits

Sustainability and Energy

Although recycling facilities are inherently sustainable as they displace the demand for virgin finite resources, the performance of the proposed Facility would further be enhanced through a number of renewable energy, remediation and resource balance strategies.

As part of the sustainability assessment, an assessment was made as to the feasibility of various renewable energy options (including wind turbines, photovoltaic arrays and solar hot water), the extent of emissions that would be produced by the proposed Facility and the implications of the evolving Carbon Pollution Reduction Scheme (CPRS) for the proposed Facility. The findings of these assessments are discussed in **Section 18** of this EA.

It was determined that there is no requirement for the proposed Facility to report under the National Greenhouse and Energy Reporting Act 2007NGER or CPRS as the proposed Facility would produce GHG emissions, which are well under the threshold for triggering reporting obligations. However, it is recommended that a GHG emissions inventory and/or energy audit be carried out if operations increase or change, or if the legislation is altered.

Waste Avoidance and Recovery

A management approach would be implemented to minimise the potential impacts to the community and environment as a result of waste generated from the construction and operation of the proposed Facility. Where possible, waste materials would be reused or recycled onsite. Contaminated waste material would be transported and disposed off-site by licensed contractors.

Cumulative Impacts

The potential cumulative impacts associated with the various elements of the proposed Facility are considered to be acceptable and manageable based upon the control measures described within this document and/or to be determined in the preparation of subsequent Environmental Management Plans required by the project approval.

Cumulative impacts were also taken into account with regard to other major projects planned in the local area.

The detailed technical assessments contained in this EA report address the potential cumulative impacts of the proposed Facility. In summary the cumulative impacts are considered to be acceptable and manageable based on the environmental safeguards and mitigation measures proposed.

Project Justification

The Director General's EA requirements issued for the proposed Facility require justification for the project to be provided, having regard to environmental, social and economic considerations together with the principles of Ecologically Sustainable Development (ESD).

It is concluded that the proposed Facility provides an opportunity to consolidate a number of existing operations into one facility which is consistent with other industrial activities in the area, and has the potential to contribute positively to the local and regional economies. The proposed Facility, if operated in accordance the Statement of Commitments (SOC), is considered to be in accordance with the principles of ESD as the proposed Facility would:

- protect natural resources by providing sustainable recycled materials for use within the public and private construction sectors;
- provide an improvement to the operating environmental performance of CiviLake's existing operations; and
- provide additional employment prospects and subsequent economic benefits to the local economy.

Statement of Commitments

In accordance with the EA requirements under part 3A of the *EP&A Act*, a SoC for the proposed Facility is included in **Section 21** of this EA. The SoC sets out CiviLake's environmental commitments and details on the environmental management and monitoring of the proposed Facility during its construction and operational activities.

The Proponent is committed to ensuring the preparation and implementation of the environmental management and monitoring plans, further investigations and studies and environmental mitigation measures detailed in the SoC for the proposed Project approval.

Conclusion

The proposed Facility, incorporating the mitigation measures recommended in this EA is considered to provide significant economic and environmental benefits and would contribute towards the achievement of the objectives of local and State government waste policy.

1.0 Introduction

This section introduces the proposal and provides the background information, including the Director General's Requirements and geographical setting.

1.1 Scope of Part 3A Application and Director General's Requirements

This Environmental Assessment Report (EA) has been prepared by AECOM for CiviLake, a business unit of Lake Macquarie City Council (LMCC) under the provisions of Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and in accordance with the Director General's Requirements (DGRs) issued by the Director General of the Department of Planning (DoP) on 6 May 2009 for Major Project Application MP 08_0079.

This EA seeks the approval of the Minister for Planning for a Sustainable Resource Centre (referred to as the proposed Facility) on the subject site at The Weir Road, Teralba, known as Lots 42, 43, 53 and 54 in Deposited Plan (DP) 16062, located within the Lake Macquarie Council Local Government Area (LGA) (see **Figure 1-1**).

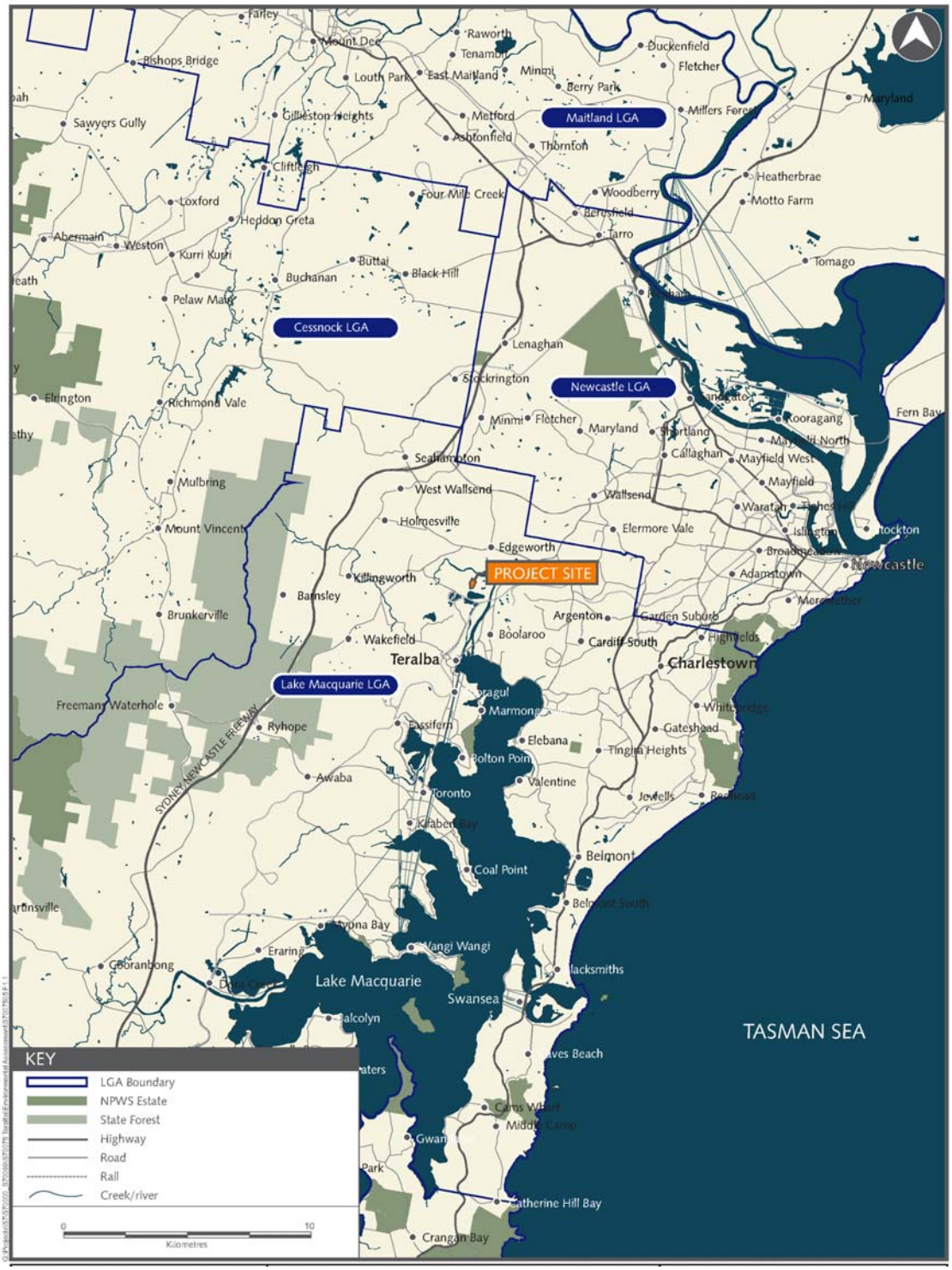
The proposed Facility would be a crushing grinding and separating operation for construction and green waste materials including concrete, asphalt, recycled asphalt pavement, road base, green waste, bricks, tiles and soil. The proposed Facility would process up to 110,000 tonnes of material per annum (tpa) and may in the future subject to market demand, receive and process waste volumes up to 200,000 tonnes of material per annum.

To accommodate the proposed Facility, the site would be raised in the order of around 2m to 3m above existing levels. This would ensure that the proposed Facility is clear of the 100 year flood level, and provide sufficient freeboard volume to minimise uncontrolled stormwater discharge from the site. An estimated 200,000 tonnes of fill is required to raise the site to its proposed level. The filling of the site also provides a remediation function as it would cap the land and contain contaminated materials associated with historical uses of the land (see **Section 6.0).**

As stipulated by the EP&A Act, *State Environmental Planning Policy* (SEPP) *(Major Development) 2005*, and as per advice in correspondence received from the DoP dated 23 January 2007, the proposed Facility is a 'Major Development' requiring the Ministers approval to proceed.

In March 2008, LMCC, on behalf of Civilake provided a Preliminary Environmental Assessment (PEA) to the DoP. The PEA was submitted for the purpose of informing DoP of the general details of the proposal and to obtain the DGRs. The DoP subsequently issued the DGRs in a letter dated 6 May 2008. The DGRs are at **Appendix A** to this report.

Figure 1-1: Regional Context



Source: AECOM 2010

1.2 Proponent

LMCC is the owner of the subject site and proponent for this application. CiviLake is a business unit of Council that would operate the proposed Facility. CiviLake carries out road and drainage maintenance and construction, building and demolition as well as parks and gardens maintenance.

1.3 Need for the Project

The Lake Macquarie, Newcastle and Central Coast regions are three of the fastest growing areas in NSW, with a current population of about 480,000 residents (CH_2MHILL 2008). The environmental attributes, proximity to Sydney and Newcastle and relatively affordable housing all suggest the region will experience strong population growth in the future. This growth will strengthen the construction industry within the region, which will have a flow on effect for the infrastructure services CiviLake provides within the Lake Macquarie LGA.

Waste produced from Council's civil and maintenance works is handled by CiviLake. As a result of market and legislative forces, this waste has been subject to rapidly increasing disposal costs. Recent advances in materials recovery and improved end market options now mean that this waste is more readily recycled and reused. As CiviLake is in the position of being both the waste generator and the recycled material user, it has identified that the most cost effective means of reprocessing construction and green waste material, is to establish a Council operated crushing and recycling plant.

CiviLake currently generates over 110,000 tonnes of hard material from its own operations. Less than 17% of this material is value added or on sold, while a large percentage of the material is disposed of at significant cost. The nearest recycling facilities with the capacity to store and process CiviLake generated material into new products exist outside the LGA. These factors coupled with the increases in the Section 88 Waste levy under the *Protection of the Environment Operations Act 1997 (POEO Act)*, have created a sound business case for the development of a Council owned and operated recycling facility.

Council and other recycling/ waste managers in the Lake Macquarie LGA currently process the CiviLake generated materials listed in Table 1-1 to various specifications at a number of different locations. **Figure 1-2** illustrates the locations of existing processing/disposal operations. The proposed Facility would consolidate much of the processing to the one site, creating plant and transport efficiencies and economies of scale. These economies represent triple bottom line improvements for CiviLake operations.

Table 1-1: Current Materials Destination and Processing

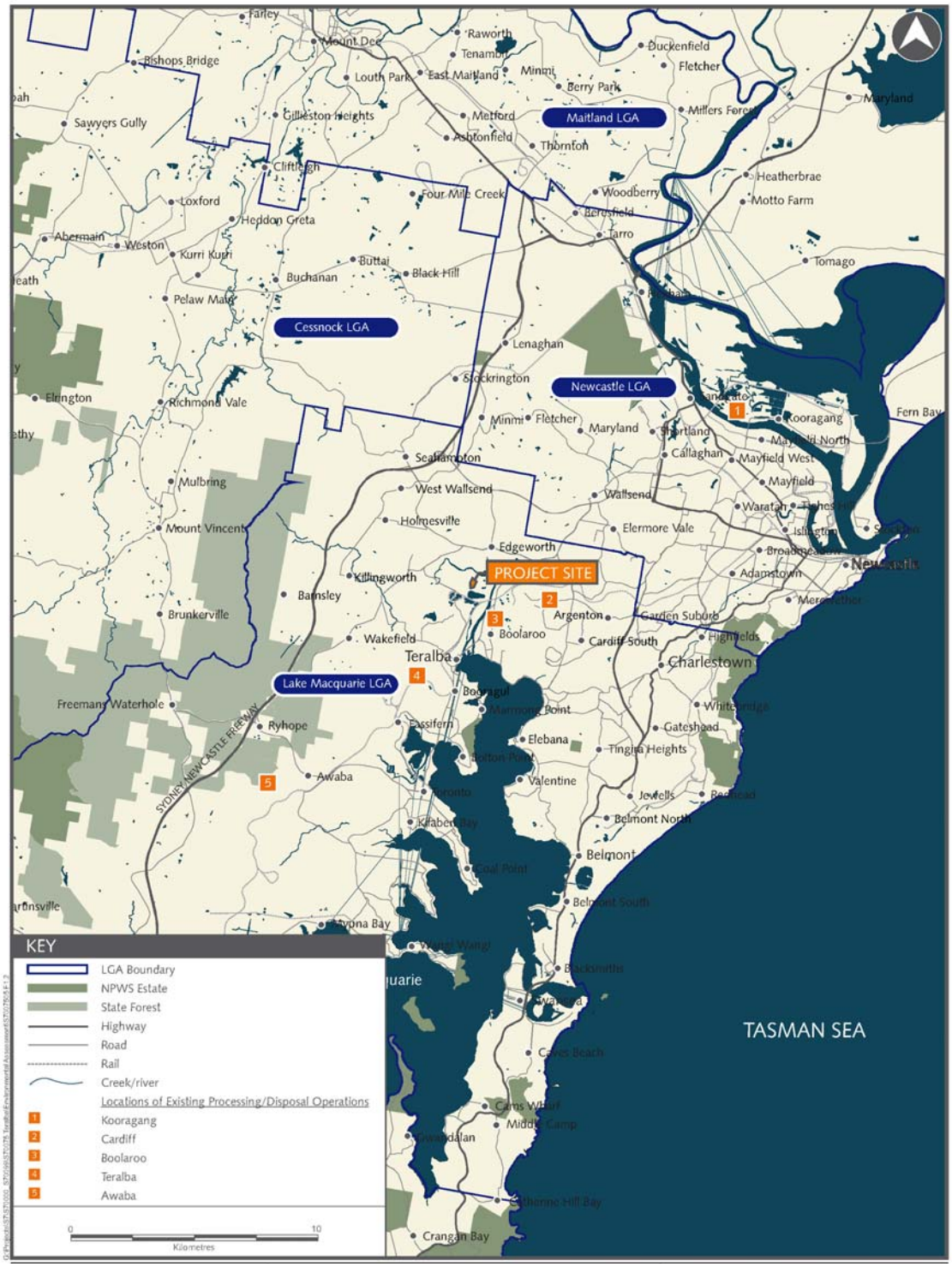
Source	Indicative Volumes (tonnes/annum)	Composition	Current Destination	Current Processing
Mixed reclaimed asphalt pavement	7,500	40 minus aggregate*	Metromix Teralba (6500t) Boolaroo Transfer Station (1000t)	Reuse
Road excavation	5,000	Asphalt, aggregate, road base, Virgin Extracted Natural Material (VENM)	Boral Recycling Kooragang	Reuse by Boral
Parks and gardens (green waste)	3,000	Weeds, hardwood	Awaba Tip	Woodchip
Road excavations (non-bituminous inert material)	65,000	Road base, VENM	Vales Point (ash dam construction)	Fill
Concrete	6,000	Concrete	Metromix Teralba	Road base
Roads, drainage, kerb and gutter, maintenance, cycleways etc.	15,000	Concrete, green waste, asphalt, road base, other	Awaba Tip	Landfill
Foreshore maintenance	2,000	Dredge waste sea grass	Awaba Tip	Landfill
Street sweeper	1,000	Leaf litter, aggregate and litter	Awaba Tip	Landfill
Clean fill (VENM)	5,000	Soil**	McDonalds Quarry, Cardiff	Reuse
Recycled sealing aggregate	500	Aggregate	Boolaroo Transfer Station	Reuse
TOTAL	**110,000**			

** Material with a maximum stone size of 40mm reducing down to fine.*

*** Soil would come from the construction of concrete footpaths, kerb and gutter and playgrounds, etc. All recycled materials that require Department of the Environment andCclimate Change (DECCW) exemptions would be tested prior to on selling.*

Note: not all material generated by CiviLake's operations would be suitable for recycling at some time and would be taken to licensed premises.

Figure 1-2: Locations of Existing Processing/Disposal Operations



Source: AECOM 2010

1.4 Local and Regional Context

Lake Macquarie LGA is geographically unique in that the City surrounds the Lake. A City CBD does not exist, rather a number of commercial centres which service the different areas of the City. However, development of greenfield sites and redevelopment of existing structures is largely concentrated around the northern rim of the lake as identified in the *Lower Hunter Regional Strategy* (DoP 2006). As such, Council regards the centre of CiviLake's operations as the suburb of Glendale. Glendale is approximately 8km by road to the subject site. Therefore, Lake Macquarie's development trends present significant transport efficiencies for feedstock to and products from the proposed Facility.

The city of Newcastle borders the north and eastern edge of Lake Macquarie. Newcastle CBD is approximately 20km from the proposed Facility. Proposed green field developments in Newcastle's western suburbs are closer to the proposed Facility also offering accessible markets. The proposed Facility is approximately 140km from the Sydney CBD.

1.5 Site Location and Description

The subject site in **Figure 1-3** comprises Lots 42, 43, 53 and 54 in DP 16062, The Weir Road, Teralba and has a total area of approximately 7 hectares.

The property is located approximately 2km north of the village of Teralba on a floodplain to the south and west of Cockle Creek and is used for light agriculture (agistment). The closest point of the creek is approximately 200m from the proposed Facility. The land is elevated approximately 1m relative to the adjoining land, due to the previous land use of sanitary disposal involving the deposit of biosolids and fill over the site.

An electricity easement dissects the site running east west with 132kV power lines.

The Weir Road adjoins the southern edge of the subject site. Access to the property via the Weir Road is from two directions, Barnsley to the west and Teralba to the southeast (see Plates 1-1 and 1-2).

Plate 1-1: View east along The Weir Road from subject site

Plate 1-2: View west along the Weir Road from subject site

1.5.1 Site History and Previous Use

The site was previously used for biosolid disposal. Sanitary Waste Depot operators previously adjoining the site deposited biosolids in trenches covering the entire site.

The proposed Facility would be developed in accordance with the *Remedial Action Plan (RAP) The Weir Road, Teralba, NSW* prepared by Parsons Brinckerhoff (PB) in November 2008. Soil contamination issues are addressed further in **Section 6.0** of this EA.

1.5.2 Surrounding Land Uses

Bushland buffers the subject site to the north, south, east and west as shown in **Figure 1-3**. The nearest building is the Council owned and operated Teralba Worm Farm Waste Education Centre, which is approximately 300m to the east of the subject site. The Worm Farm receives approximately 1000 tonnes/annum of organic waste for processing and 3000-4000 people visit the property annually.

The Lake Macquarie Miniature Aircraft Club, located approximately 400m to the northeast of the subject site currently holds a Council issued licence to operate on approximately 1ha of cleared land at 4 Griffen Road. The licence commenced on 15 June 1999 for an initial 12 month period and is currently operating under 'hold-over' conditions.

The nearest residential property is approximately 500m to the north of the subject site on Martin Place in Edgeworth. Riparian vegetation covers the entire strip between Edgeworth and the subject site. The Edgeworth Sewage Treatment Works is approx 400m to the north of the site.

1.5.3 Planning History

Until recently, pursuant to *Lake Macquarie Local Environment Plan 2004* (LMLEP 2004), the majority of the subject site was zoned 7(2) Conservation (Secondary), with a small portion in the southeast corner zoned 7(1) Conservation (Primary). Recycling facilities were prohibited within the 7(1) and 7(2) Conservation zones.

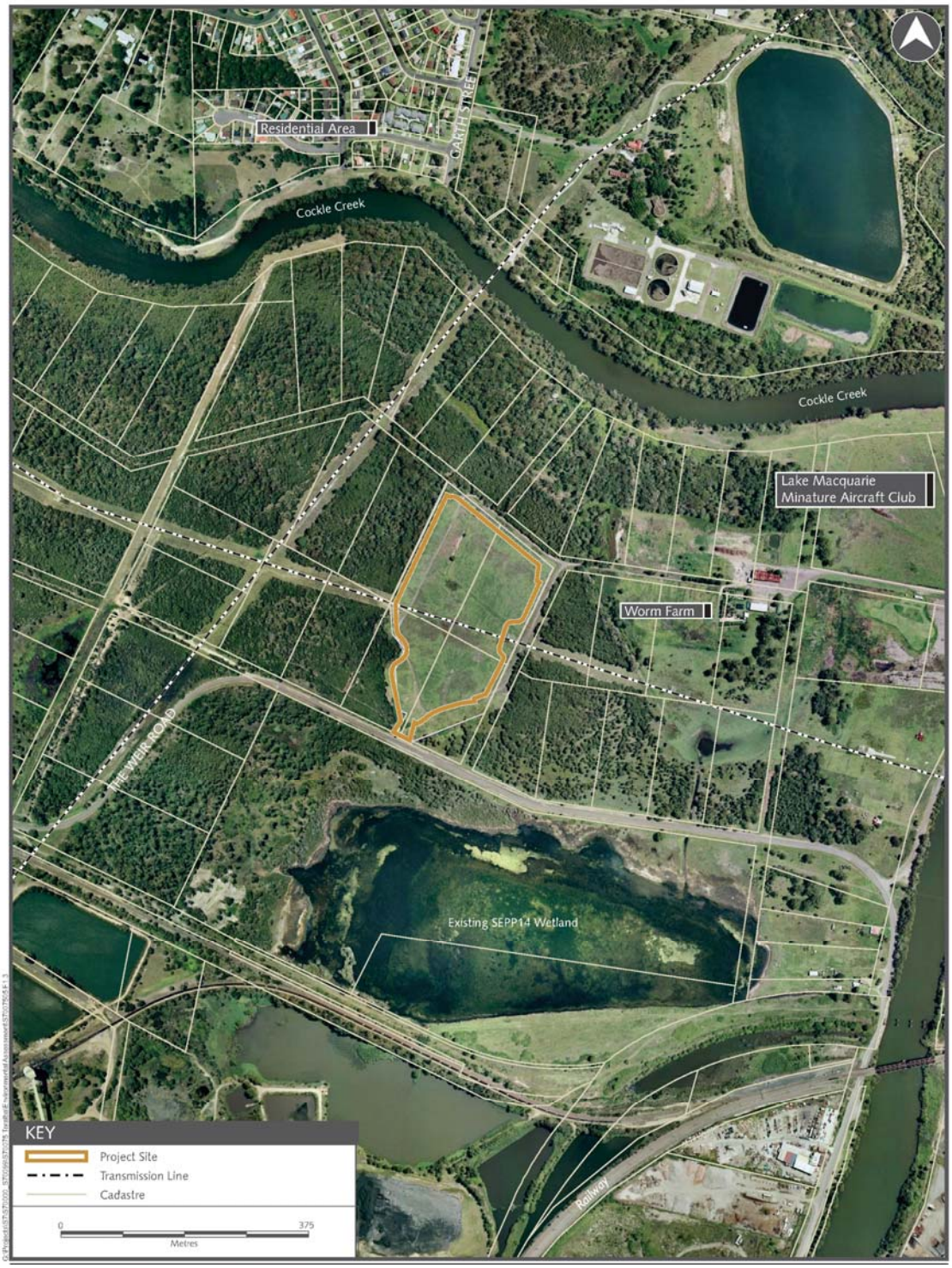
Pursuant to Section 55 of the *EP&A Act 1979* a report submitted to Council in August 2007, recommended a draft amendment to *LMLEP 2004*. The report recommended the subject site be rezoned from 7(2) Conservation (Secondary) to 9 Natural Resources or 4(1) Industrial Core. Both zones permit the development and operation of a recycling facility.

In April 2008, Council engaged consultants CH_2MHILL to conduct a *Local Environment Study (LES*) to support the proposed rezoning and to determine the suitability of the subject site to support a crushing, grinding and separating facility. The study also addressed land adjoining the site, to assess its suitability for a sporting and recreational development.

The rezoning application was subsequently approved and the LEP amendment gazetted. As illustrated in Figure 1-4 the majority of the subject site is now zoned 9 Natural Resources, with a portion in the southeast corner and southwest corner zoned 7(1) Conservation (Primary).

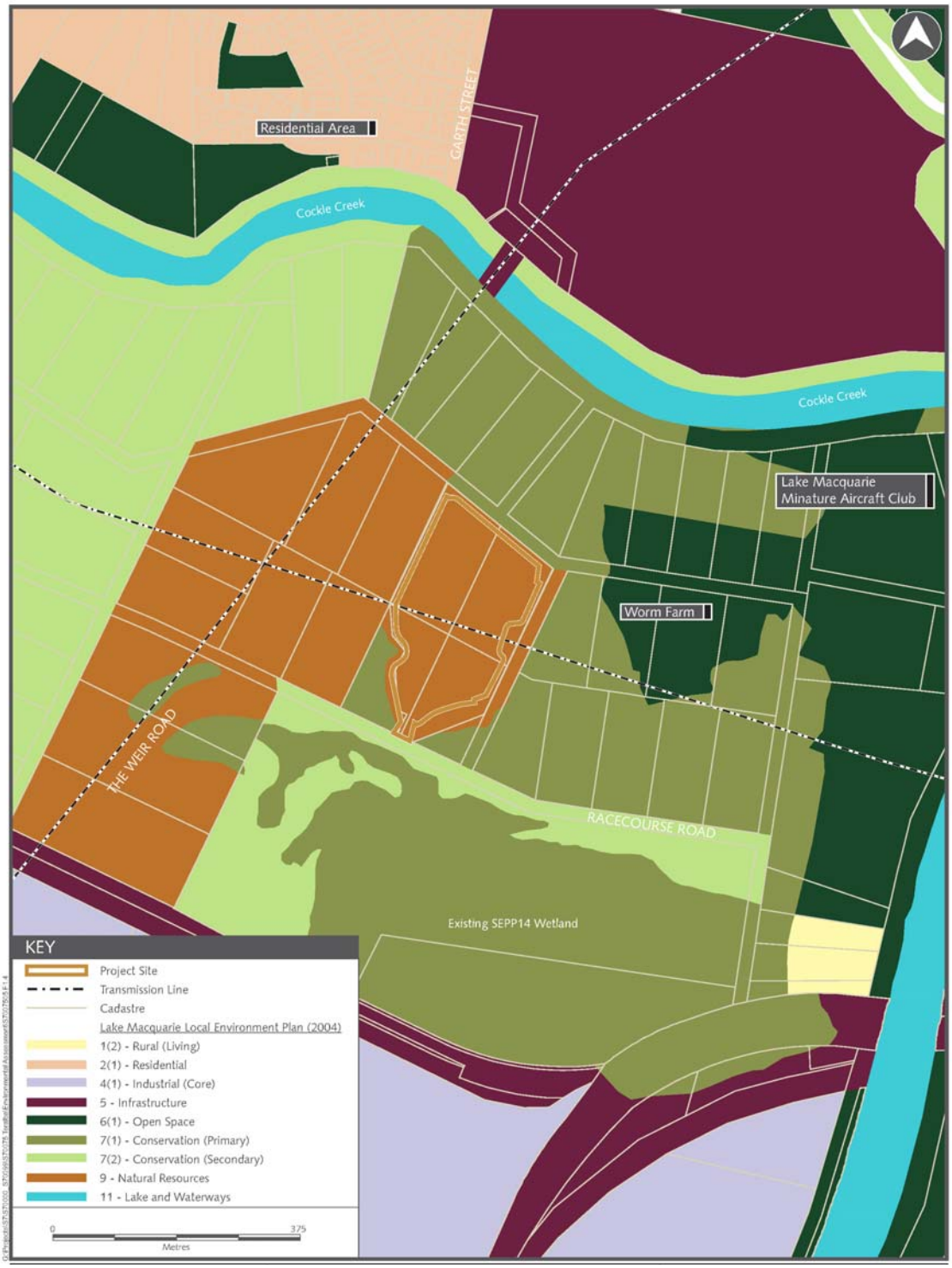
Along with the subject site, land extending to Cockle Creek to the north east of the subject site was also rezoned to 6(1) Open Space.

Figure 1-3: Subject Site Aerial Photograph



Source: AECOM 2010

Figure 1-4: Site Zoning



Source: AECOM 2010

1.5.4 Topography and Hydrology

Topographically, the site is located in an alluvial back swamp approximately 200m south of Cockle Creek. Wetlands are located immediately to the south of The Weir Road. Small hills are located at distance to the south and south east of the site.

Locally the site is gently undulating, and the ground surface is hummocky and irregular due to the presence of fill on the site. The ground surface contains troughs approximately 1m in depth. Generally the site slopes at <5° to the south.

Previous investigations indicate that the site has been filled. Fill depths of greater than 2.9 m have been recorded. Filling of the site also includes construction of an unsealed gravel road around the perimeter of the site. One metre deep, unlined drainage channels have been cut into the fill, which flow east through an existing drainage pathway (man-made channels) and eventually into the wetland to the south of the site. A small construction waste stockpile consisting of steel sheeting and other construction waste material is located on the western area of the site in Lot 53. Surface soils consist of loose sand and clayey sand fill.

Plate 1-3 to **Plate 1-6** provides views across the site from a variety of angles.

Plate 1-3: View east across site, along electricity easement

Plate 1-4: Mid-eastern edge of the site, looking west

Plate 1-5: View south from inside site boundary, towards The Weir Road

Plate 1-6: View north-east into the site from The Weir Road

1.5.5 Groundwater

Six groundwater bores are present on the site. Five of the wells are located around the site boundaries and 1 well is located in the centre of the site. The groundwater levels measured range from around 0.5m RL in dry periods and 1.5-1.8m RL measured following high rainfall) (see **Section 6.0** of this EA for more information in relation to groundwater).

1.5.6 Vegetation

The subject site consists almost entirely of cleared, open and weedy pasture. However, threatened and significant ecological communities and flora species surround the subject site up to its boundary.

A *SEPP 14* Wetland exists 200m to the south of the subject site and a number of vegetation communities adjoin the site to the north, west and east, including Ball Honeymyrtle Swamp Forest, Scribbly Gum/Swamp Mahinay / Paper transitional Forest and Red Mahogany / Swamp Mahogany / Paperbark Swam, which qualified as the endangered ecological community (EEC) *Swamp Sclerophyll Forest on Coastal Floodplains* according to the soil type, habitat and species assemblage (Ecotone Ecological Consultants 2009). Flora and fauna issues are addressed further under **Section 8** of this EA.

2.0 Project Description

This Section outlines the details of the key design, construction and operational components of the proposal.

2.1 Overview

The proposed Facility would accept up to 200,000 tpa of construction and green waste material for reuse within CiviLake operations and resale to the construction industry.

Materials that would be stored, sorted, reprocessed and stockpiled on the site include concrete, asphalt, recycled asphalt pavement, road base, green waste, bricks, tiles and soil. After reprocessing, materials would be stored on-site, tested to any necessary DECCW requirements then sold.

The proposed Facility has been planned and designed in order to enable the practical requirements of the proposed Facility's operation. Current operations at CiviLake's existing facilities at the Teralba Metromix Quarry and Boolaroo Transfer Station have informed the site layout and design of the proposed Facility.

An environmental protection licence (EPL) for operations would be obtained from the DECCW which would be adhered to throughout operations.

A description of the design process is provided in **Section 2.2** below and a description of the Facility operations in **Section 2.9.** The proposed site layout is shown in **Figure 2-1** and the design drawing package in Appendix B**.**

2.2 Project Design

The Facility has been designed in order to minimise the potential impacts of the proposal on the surrounding environment. This has been achieved through the following design objectives:

- *Provide sufficient site levels and freeboard volume to protect assets against flood events and minimise uncontrolled discharge off-site.*
- *Incorporate an appropriate stormwater treatment system that would treat water to acceptable levels for controlled discharge off-site to the environment.*
- *Provide sufficient water storage for a reliable supply for reprocessing operations, dust suppression and fire fighting.*
- *Provide safe and efficient access and circulation routes to, from and within the site.*
- *Minimise impact on local endemic vegetation.*
- *Provide for sufficient buffering and setbacks to ensure bushfire risk is minimised.*

The site would be filled over a period of in the order of three years, as fill becomes available from CiviLake works or third party suppliers on a campaign basis. It is expected that the majority of fill would be obtained from spoil generated from construction projects. The reuse of construction spoil has a number of environmental benefits, including reducing the need to quarry virgin material for fill, and finding a suitable reuse for construction spoil, which would ordinarily be sent to landfill. All fill used in the construction of the facility would be tested to DECCW requirements.

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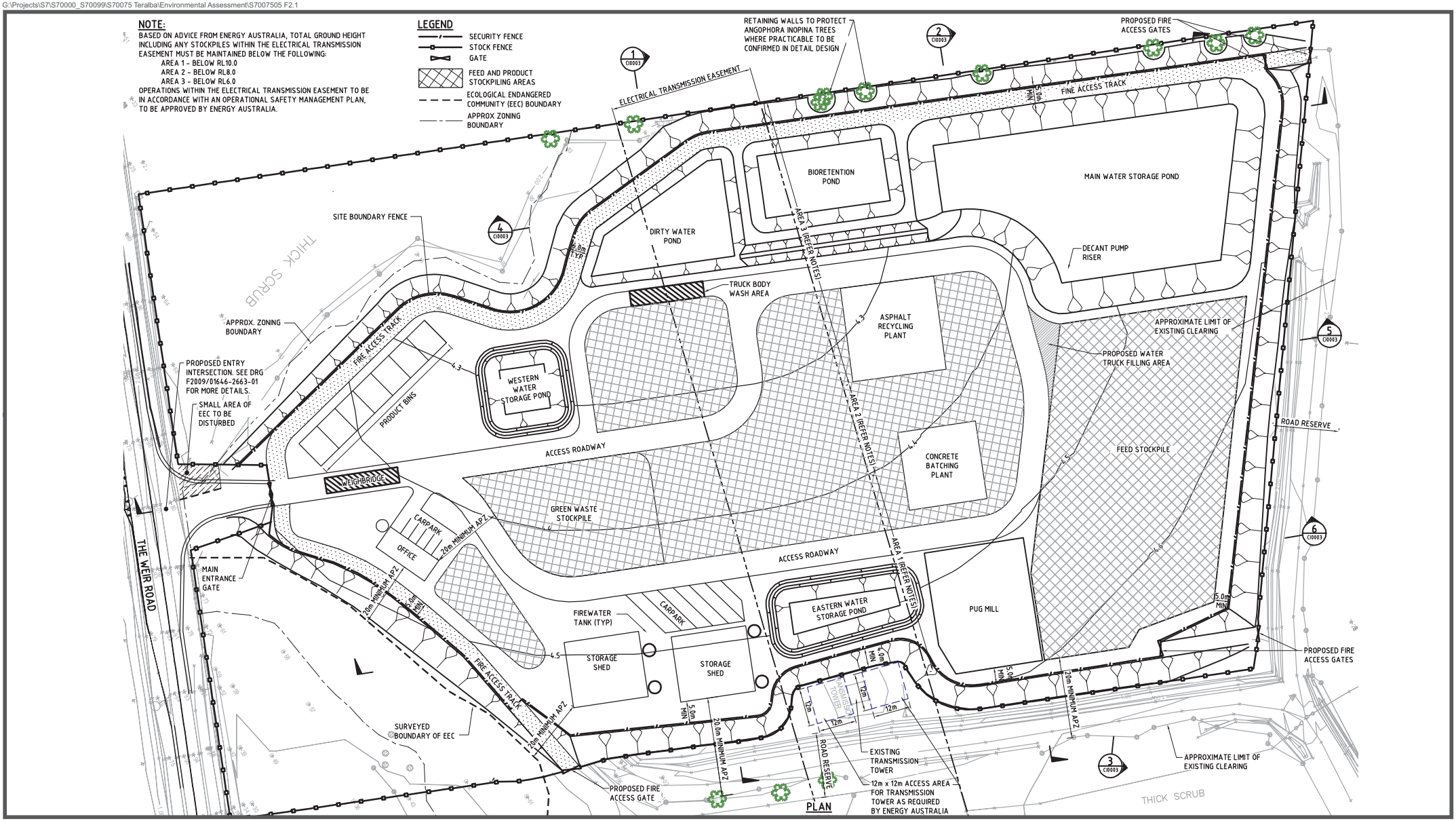

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Proposed Site Layout

Lake Macquarie City Council
Environmental Assessment
Teralba Sustainable Resource Centre
Teralba

Figure
2.1

2.3 Site Preparation and Construction

2.3.1 Capping and Fill

The site would be raised in the order of around 2m to 3m above existing levels, in order to ensure that the proposed Facility is clear of the 100 year flood level, and provide sufficient freeboard volume to minimise uncontrolled stormwater discharge from the site. An estimated 200,000 tonnes of fill is required to raise the site to its proposed level.

The filling of the site also provides a remediation function, being a cap and contain strategy, although the entire 2m to 3m may not be required for this purpose. The gradual filling of the site ensures that any impacted soils onsite as a result of previous uses are managed on-site so as to minimise potential risk to the environment or human health. Impacted soils would be capped by the placement of capping layer materials to prevent exposure to site occupiers or workers. The base of the 'capping layer material' would be clearly marked with a layer of non woven geotextile such as Bidam or similar, to indicate that below this depth workers could potentially be exposed to contamination, which would then trigger additional health, safety and environmental controls.

2.3.2 Specification of Capping and Fill Material

The majority of fill materials are expected to be sourced directly from CiviLake road works or drainage works undertaken within the Lake Macquarie LGA. The permeability requirements of the fill would be determined and specified during detailed design of the Facility along with the exact specification of the capping.

CiviLake would prepare and implement an *Imported Fill Quality Plan* which would be included within the *Construction Environmental Management Plan* (CEMP). All material used for site filling and capping would be either VENM or excavated natural material (ENM) as defined in DECCW guidelines.

Fill material imported to the site would meet an appropriate resource recovery exemption, and procedures for validation of the imported fill material would be included in the Imported Fill Quality Plan. Key features are discussed below.

1) All material used for filling on the site would be classified as either VENM or ENM prior to being imported to the subject site.
2) There would be two different types of validation programmes implemented for imported fill depending on the volume of fill available from a source site as described below:

For the majority of source sites the following procedure would apply:

- A preliminary assessment would be made by CiviLake as to whether it believes the source site is likely to generate ENM / VENM suitable for importation to the Teralba site. This would be based on its knowledge of the source site area and visual inspections for evidence of potentially contaminating activities.
- Once CiviLake believes a source site is suitable, it would engage a qualified environmental consultant to collect in-situ samples from the subject material. The overall testing rate would be in accordance with the testing requirements specified in the ENM exemption (i.e. minimum 10 composite samples per 4000 tonnes). DECCW would be consulted regarding appropriate sampling rates for individual source sites from which less than 4,000 tonnes of material would be sourced. While sampling, the consultant would also observe the soil condition to visually assess the material meets the requirements of ENM or VENM and would also observe the nearby area for potential contamination sources (such as service stations).
- If the testing results comply with the ENM criteria and visual observations indicate the material is consistent with VENM / ENM, then the consultant would prepare a brief letter report documenting the results and confirming the VENM or ENM classification.
- Depending on the results or observations (e.g. one or more results failing the criteria, observations of non-VENM / ENM material, observations of potential contamination sources etc), the consultant could potentially also: recommend further investigation; confirm that only certain portions of the soil classify as VENM or ENM (clearly defining these areas); or advise the site is unsuitable as a source site.
- Once the consultant has confirmed the material at a source site classifies as VENM or ENM, the material would be excavated (after stripping any non complying overburden such as asphalt or asphaltic sub-base) and transported directly to the Teralba site. During the excavation and loading, a nominated site representative (e.g. foreman, plant operator etc) would observe material to ensure it is consistent with the approved material and there is no evidence of non VENM / ENM material. Should any evidence of non VENM / ENM material be observed, excavations in that part of the site would temporarily cease and the consultant would be contacted to reassess the situation.

For source sites from which small volumes of material would be generated rendering in-situ validation impractical the following procedure would apply:

- A preliminary assessment would be made by CiviLake as to whether the source site is likely to generate ENM / VENM suitable for importation to the Teralba site. This would be based on its knowledge of the source site area and visual inspections for evidence of potentially contaminating activities.
- Once CiviLake believes a source site is suitable, it would engage a suitably qualified environmental consultant to collect a limited number of in-situ samples from the subject material (typically around 3 samples). While sampling the consultant would also observe the soil condition to visually assess the material meets the requirements of ENM or VENM and would also observe the nearby area for potential contamination sources (such as service stations).
- If the testing results comply with the ENM criteria and visual observations indicate the material is likely to be consistent with VENM / ENM, the consultant would prepare a brief letter report documenting the results and providing a conclusion that the material is likely to classify as VENM or ENM subject to additional testing to comply with the ENM exemption.
- Once the consultant has confirmed the material at a source site is likely to classify as VENM or ENM subject to additional testing, the material would be excavated (after stripping any non complying overburden such as asphalt or asphaltic sub-base) and transported to a LMCC owned site licensed for temporary stockpiling of soil. During the excavation and loading, a nominated site representative (e.g. foreman, plant operator etc) would observe material to ensure it is consistent with the approved material and there is no evidence of non VENM / ENM material. Should any evidence of non VENM / ENM material be observed, excavations in that part of the site would temporarily cease and the consultant would be contacted to reassess the situation.
- At the temporary stockpiling site, the material would be consolidated into a stockpile of similarly approved materials sourced from other small sites. Once the stockpile has reached a reasonable size (no larger than 2,500 tonne), an environmental consultant would be engaged to collect samples from the stockpiled material. The testing rate would be in accordance with the testing requirements specified in the ENM exemption for 4,000 tonne.
- If the testing results comply with the ENM criteria and visual observations indicate the material is consistent with VENM / ENM, the consultant would prepare a brief letter report documenting the results and confirming the VENM or ENM classification. The material would then be loaded onto trucks for transportation to the Teralba site.
- As a contingency, if the results fail the ENM criteria then the consultant would advice CiviLake and one or more of the following actions would be taken: The entire stockpile would be rejected and disposed of to a suitably licensed landfill or the consultant would undertake more detailed assessment of the stockpile to identify if non-VENM / ENM material can be delineated from VENM / ENM material. Note that it is anticipated that in-situ sampling and visual observations of material being excavated and unloaded as described above, would significantly reduce the likelihood of non ENM / VENM material being placed in the stockpiles and hence samples failing the criteria.
- At the temporary stockpiling site the following would apply:
  - Each load would be inspected as it enters the site and then as it is tipped, to confirm it is consistent with the approved material and there is no evidence of non VENM / ENM material.
  - Should any non complying material be observed in the inspections, that load would immediately be removed from site to an appropriately licensed landfill. Importation from that source site would then be temporarily halted while the reason for the non-conformance is investigated.
  - Stockpile management and tracking procedures would be implemented

3) The following would apply at the subject site:
   - Only material pre-validated as VENM or ENM in accordance with the above procedures would be permitted on the subject site.
   - Each load would be inspected as it enters the site and then as it is tipped to confirm consistency with the approved material, and confirm that there is no evidence of non VENM / ENM material. This would complete the validation process for individual loads and no further tracking of material would be undertaken after it passes these inspections.
   - Should any non complying material be observed in the inspections, that load would immediately be removed from the subject site to an appropriately licensed landfill. Importation from that source site would then be temporarily halted while the reason for the non-conformance is investigated.
   - The site would be securely fenced to prevent illegal tipping.

4) A materials tracking program would be implemented in order to track material from the excavations to any temporary stockpiling areas to the subject site. Truck dockets would also be required for all movements of soil.
5) CiviLake would develop and implement an auditing program for the fill importation procedures which would include review of documentation and procedures, random inspections etc. The procedure would be updated in response to any recommendations from these audits.
6) CiviLake would prepare regular (approximately monthly) reports confirming compliance with the plan which would then be consolidated into an imported fill validation report at completion of the fill importation.

The above would be incorporated into a detailed *Imported Fill Quality Plan* which would be included within the CEMP. The above process may be refined as the filling progresses, based on advice from a suitably qualified consultant.

2.3.3 Fill Placement and Monitoring

The capping layer would be measured and monitored, particularly while capping is occurring in terms of height and tonnages.

With respect to height / thickness of capping,the current site survey (supplemented by additional spot levels if considered necessary) would be used to represent pre-capping conditions. Following completion of capping, the surface of the capping layer would be surveyed and compared to the initial survey to confirm the thickness. Regular survey would also be undertaken during the filling process to track levels as the fill is placed.

Initially the volume of fill material imported to the site would be estimated based on the carrying capacity of trucks entering the site. This information would be recorded on daily record sheets that would also be used to record inspections of the quality of each load as described below. Once the southern part of the site has been filled to the design level and power supply to the site has been commissioned, the weighbridge would be installed. After this time all loads would be measured on the weighbridge.

2.3.4 Fill Delivery

Currently, CiviLake's operations yield an average of 60,000 tonnes of fill per annum as a result of Council construction works. Based on this yield, the estimated construction period for sourcing and transfer of the required fill is in the order of three years. It is expected that some materials would need to be obtained from sources outside of CiviLake's works. Where possible, Council intends to obtain this fill primarily from construction activities both internal and external to CiviLake, which would be tested and certified to DECCW requirements, minimising the need for quarry material.

Fill materials would be delivered to the site by rigid truck and dog trailer combinations. It is estimated that approximately 60 percent of the fill material would be transported from the south via Teralba and Racecourse Road and the remaining 40 percent of the fill material would come from the west via Barnsley and The Weir Road.

2.3.5 Site Validation

Following completion of capping and filling activities, a site validation report would be prepared by a suitably qualified consultant in accordance with the relevant sections of the NSW Environment Protection Authority (EPA) (1997) *Guidelines for Consultants Reporting on Contaminated Sites.*

The validation report would provide a conclusion that the site is suitable with respect to human health, for the proposed land-use.

For areas where capping is required, the validation report would also summarise the findings of a construction quality assurance program including 'as constructed drawings' (to be based on survey), photographs during cap installation and density test results.

2.4 Earthworks

The earthworks component of the proposal would comprise construction of an embankment, filling of the site and water management measures.

2.4.1 Embankment

An embankment would be constructed which runs around the perimeter of the proposed Facility to raise the site level above the 100 ARI flood level. The embankment would vary in height from 1m to 1.9m and have batter slopes typically of 3:1 and would be vegetated with appropriate native species for stabilisation and amenity.

Typical earthwork sections are shown in **Figure 2.2.**

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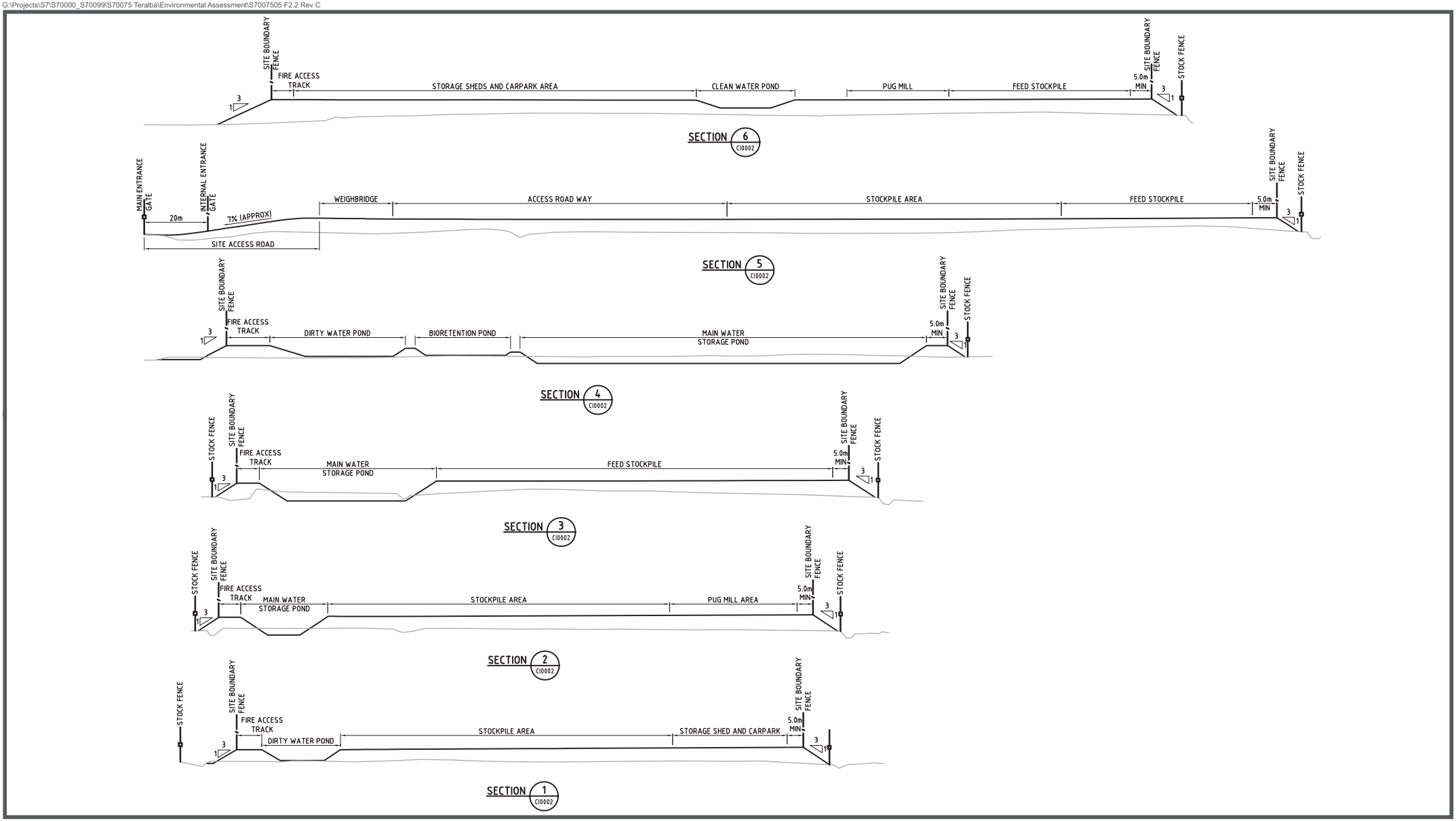

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Earthwork Sections

Lake Macquarie City Council
Environmental Assessment
Teralba Sustainable Resource Centre
Teralba

Figure
2.2

2.4.2 Water Management Measures

A proposed Water Cycle Management Strategy incorporating Water Sensitive Urban Design (WSUD) techniques is to be adopted for the site that would mitigate the effects of stormwater discharges on receiving waters, provide a reliable source of water for operational demands of the Facility, provide adequate flood mitigation and potential spill containment storage for events up to the 1 in 100 year ARI storm event, and prevent external flood water entering the site

The proposed Water Cycle Management Strategy includes the following elements.

- buffer strips around stockpiles,
- drainage swale flow path to sedimentation pond,
- sedimentation pond,
- bioretention system,
- bypass swale,
- main storage pond,
- on-site water reuse,
- rainwater tanks and
- additional smaller water storage ponds

The location of the proposed stormwater controls are shown in **Figure 7-3.**

The storage and treatment ponds / systems would be installed in conjunction with site earthworks for the facility.

The Water Cycle Management Strategy is discussed in more detail in **Section 7** of this report.

2.5 Access and Circulation

All access for construction and operation of the proposed Facility would be via a single entry / exit point located at the centre of the site along The Weir Road. In order to facilitate this access, a new two lane – two way road is proposed to intersect The Weir Road in a Basic Right Turn (BAR) arrangement. This treatment would provide sufficient trafficable width for heavy vehicles to pass on the left of a single unit stationary vehicle. The new access road leading into the site would be sealed for the length from The Weir Road to the weighbridge and 20m beyond.

Internal access and circulation is provided via an access road in the order of 6m wide. This access road has been designed to accommodate all weather haul access and would be managed as a one-way system, in order to avoid internal traffic conflicts during operation. A number of manoeuvring areas have been provided along the access road and around the designated truck parking area located near the south eastern corner of the site, to provide ready access for trucks to all areas of the proposed Facility and to ensure that all trucks can leave the site in a forward direction.

An existing Council road reserve is located outside of the site boundary, immediately to the north and east of the site. This reserve is to be utilised as a fire access track for bushfire fighting purposes. A 4m wide access track plus 1m verges would be provided along the south eastern, south western and western boundaries of the proposed Facility for bushfire fighting purposes.

The proposed Facility would be enclosed with a security fence that travels around the perimeter of the site boundary, with the exception of the south western and south eastern corners. In these areas, the boundary fence follows the extent of the embankment and travels into the centre of the site, towards the entrance gate, in order to avoid unnecessary disturbance of existing vegetation in these areas.

In addition to the entrance gate, three other access gates provide entry to and from the site in the north west, north east and south east corners. These access gates are provided for bushfire fighting purposes, and would be fitted with fire trail locks.

2.6 Landscaping

Three primary treatment types are proposed for the landscape treatment of the site; bush regeneration, entry treatment and perimeter planting as discussed in Section 14.0. A specialised planting palette is also proposed for water treatment elements.

2.6.1 Bush Regeneration/Restoration

This treatment is proposed for the southern end of the site, external to the proposed embankment that surrounds the built elements of the proposed Facility. A Swamp Mahogany / Paperbark / Woollybutt Swamp Forest vegetation community inhabits this area, which is prone to periodic waterlogging. An elevated fill area within the south-west corner of the site falls outside of the proposed embankment. This fill is proposed to be removed to bring the area back to pre-development levels and hydrologic regime. This area would be planted out to a diverse planting suite from the species present in the adjoining Swamp Mahogany / Paperbark / Woollybutt Swamp Forest.

2.6.2 Entry Treatment

A simplified palette of species chosen from the Scribbly Gum/Red Bloodwood/Smooth-barked Apple Open Forest community is proposed for the entry treatment, as the entry area would be raised above the surrounding low lying area, and therefore relatively less subject to periodic inundation and waterlogging than the adjacent remnant patches of Swamp Mahogany/Paperbark/Woollybutt Swamp Forest. The planting palette would include some dry-tolerant species of the Swamp Mahogany/Paperbark/Woollybutt Swamp Forest community and would visually tie in the entry area with the adjoining retained landscape setting.

2.6.3 Perimeter Embankment Planting

The perimeter/embankment planting would comprise of a dense cover of native grasses with strategically located small stands of trees. The planting approach facilitates the embankment perimeter planting being managed as an Asset Protection Zone (APZ) with the grasses required to be slashed at approximately three monthly intervals during the hotter period of the year, to maintain reduced ground fuel loads.

A highly simplified plant palette chosen from the Scribbly Gum/Red Bloodwood/Smooth-barked Apple Open Forest vegetation community would suit the drier soils on the embankment and batters surrounding the proposed Facility.

2.6.4 Water Treatment Elements

A number of specialised planting palettes are proposed for the various water treatment elements on site. The Bioretention System utilises a palette of plants selected from the Scribbly Gum / Red Bloodwood / Smooth-barked Apple Open Forest and Swamp Mahogany / Paperbark / Woollybutt Swamp Forest communities. The proposed sedimentation ponds would utilise plants from the surrounding freshwater wetland communities.

2.7 Security

A security fence would be erected on top of the perimeter embankment and surround the proposed Facility.

Low impact fencing (stock fencing) would run around the perimeter of the site boundary, sufficient to preclude stock from the proposed landscape restoration areas. Where this fencing passes through EEC's, it is to be very low impact, in that no trees would be removed in order to erect the fence, and the fence would deviate from the boundary line as required to achieve protection of EEC's.

Site identification signage would be incorporated at the entrance and directional signage would be placed at appropriate locations along the internal access road and car parking areas.

Adequate lighting for night delivery operations and security purposes would be erected within the proposed Facility.

2.8 Staging of Construction

The anticipated staging of the Facility's construction including the main tasks to be undertaken in each stage is summarised below:

- Stage 1 (in the order of 3 years)
  - Construction of site access
  - Filling the site to design levels
  - Completing site remediation including installing the capping layer
  - Installing water treatment ponds
  - Landscaping

  - Fencing
  - Installation of weighbridge (as soon as sufficient fill has been placed in the weighbridge area)
  - Installation of at least one of the storage sheds (so construction vehicles can be securely stored)
  - Installation of power, water and telecommunications supply to site
  - Installation of product bins
- Stage 2 (to be completed shortly after Stage 1)
  - Installation of remaining buildings including additional storage shed and office building
  - Connection of services to buildings
- Stage 3 (greater than 5 years)
  - Relocation of pug mill, asphalt recycler and concrete batch plant to the site

The cap would be fully installed prior to any waste processing taking place. CiviLake may however, commence importation of feedstock prior to completion of the filling, provided the water management system and weighbridge have been installed, and after a portion of the site adequate to stockpile feedstock has been filled to final design levels and subject to DECCW providing a licence to commence such activities.

2.9 Project Operation

2.9.1 Site Infrastructure and Plant

The siting and location of plant and equipment and buildings has been designed according to operational requirements. Permanent plant has also been located outside of the transmission line easement, which dissects the site in an east west direction. **Figure 2-1** illustrates the indicative site layout of the proposed Facility.

Plant, equipment and buildings required for the operation of the proposed Facility are described below.

2.9.2 Gatehouse and Weighbridge

A double storey gatehouse (6 m in height) and 60 tonne weighbridge would be situated at the entry to the site, approximately 70m from The Weir Road to allow for truck queuing. The function of the gatehouse, which would consist of a demountable style building on top of a 9m shipping container, would be to allow for visual screening of incoming loads. The gatehouse would also be equipped with receipting and cash facilities in order to support the sale and purchase of materials.

2.9.3 Administration Office

Located along the south-eastern boundary of the proposed Facility, the administration office would contain a reception area, manager's office, staff workstations, meeting room, lunchroom and amenities. The function of the administration office is to provide access to site visitors and the general public requiring business at the proposed Facility. This demountable style building would be some three metres in height and designed with windows located to view operations.

Staff and visitor car parking is located immediately to the northwest of the administration office between the office and the internal road. A total of six car parking spaces would be provided. Access to the car park would be made via a separate driveway, to the northeast of the weighbridge.

2.9.4 Product Bins

A series of 7m x 10m x 2m product storage bins would be located along the south western boundary of the proposed Facility. These bins, which would be constructed of large concrete blocks, have been situated away from processing areas to avoid operational risks. The bins would store a variety of materials including new and recovered sealing aggregate and reclaimed asphalt pavement. Any bins in which combustible materials such as mulch are proposed to be stored are required to have an APZ of a minimum of 20m to bushfire prone vegetation. **Plate 2.1** and **Plate 2.2** show examples of similar product bins currently existing at the Boolaroo Transfer Station.

2.9.5 Storage Sheds

Two storage sheds measuring 24m x 18m x 6m would be located north east of the administration office along the eastern boundary of the proposed Facility. Building A would be used to store mobile plant and machinery. Building B would be used to store miscellaneous recyclables such as signs, barrier board, formwork, and steel hardware products. A lunch room and amenities would also be contained in Building B.

These industrial style sheds would be fabricated of steel and trim deck colour wall sheeting and constructed over slab on ground.

2.9.6 Stockpiles

Materials are separated into two types of stockpiles – feed stockpiles, which consist of materials waiting to be processed, and end product stockpiles, which consist of materials that have been processed and are waiting to be reused in CiviLake's operations or sold.

The primary location of both feed and end product stockpiles would be within the area surrounded by the internal access road, with the exception of the main concrete feed stockpile. The main concrete feed stockpile would be located along the northern Facility boundary.

Feed stockpiles would be up to 8m in height, with end product stockpiles ranging from 5 to 6 metres, with the exception of stockpiles located within the transmission line easement (discussed later in this section).

An example of feed and end product stockpiles is provided in **Plate 2.3** and **Plate 2.4** respectively.

The approximate proposed locations of stockpiles are shown on **Figure 2-1**, although it is important to note that this layout is indicative only.

At this stage approximate anticipated maximum sizes of stockpiles are as follows:

- Concrete feed stockpile – up to 75m x 40m x 8m high.
- Various end product stockpiles- up to 45m x 20m x 6m high.
- Green waste stockpile– up to 30m x 20m x 4m high

Some key features of stockpile management include:

- A comprehensive materials tracking planwould be designed and implemented
- Each stockpile would be given a unique identifier and would be indentified by signage adjacent to the stockpile.
- A daily plan would be completed which would show the locations, contents and status of each of the stockpiles on site.
- Trucks bringing feedstock onto the site would be directed from the weighbridge area to the appropriate stockpile area and once at the stockpile area instructed where to tip.
- Each type of feedstock and processed product material would be stockpiled separately.
- The processed product stockpiles would have three designations as follows which would be clearly indicated by signage on the site and on the daily stockpile plans:
    - Open Designation – Product may be added to the stockpile. No material may be taken from the stockpile.
    - Validation Designation – Indicates that the stockpile is in the process of being validated and that no material may be added or taken from the stockpile
    - Export Designation – Indicates that product has been validated and that material may be taken from the stockpile for export to be used in accordance with the conditions of the appropriate resource recovery exemption. No material may be added to the stockpile.
- As each processed product stockpile is closed for validation and then for export, a new stockpile would be initiated to take the next batches of processed product. The maximum quantity of processed material placed in each product stockpile would be governed by the validation requirements of the appropriate resource recovery exemption and quality specification (e.g. 4000 tonnes for material to be covered by the Recovered Aggregate General Exemption).
- Appropriate environmental controls would be placed around the stockpiles (such as downgradient silt fences) to minimise erosion and sediment generation from the stockpiles.
- Appropriate dust control measures would be implemented to control dust from the stockpiles.
- Safe work method statements would be prepared for stockpile operations
- Any stockpiles containing combustible material (i.e. the green waste stockpile) would be located outside the transmission easement and at least 20m away from buildings and bushfire prone vegetation.
- Regular measurements of stockpiles heights and size and estimates of stockpile volumes would be made using a laser distance measurer or similar.
- Process stockpiles would be designated as open or closed and indicated on daily plans and signage.

The details of the stockpile management would be documented in the *Operational Environmental Management Plan* (OEMP) for the proposed Facility.

Energy Australia in correspondence dated 20 October, 2009 advised of the following requirements with regard to stockpiles and the transmission line easement:

- The total height of land build-up and stockpiles should not exceed:
  - RL of 10m for 65m from the centre of Tower number IU-50817 (which equates to a stockpile height of up to approximately 5m high).
  - RL of 8m for the following 30m (which equates to a stockpile height of approximately 3m high).
  - RL of 6m for the following 130m (which equates to a stockpile height of approximately 1.5m high).

The transmission easement is shown on **Figure 2-1**.

Energy Australia permits stockpiling of non-combustible materials within the transmission easement. The green waste stockpile (which is potentially combustible) would therefore be located outside the easement.

Measures to address safety in respect to the transmission easement would be developed in consultation with Energy Australia and be included in both the CEMP and OEMP for the proposed Facility (as requested by Energy Australia). The transmission easement is further discussed in **Section 17.0**

2.9.7 Asphalt Recycler

An asphalt recycler would be some 8m in height and would be located within the northern part of the loop created by the access road. The asphalt recycler reheats 100% asphalt (reclaimed asphalt pavement) for reuse as road base. The asphalt recycler proposed for the proposed Facility would be relocated from CiviLake's existing recycling operation at the Teralba Metromix Quarry (**Plate 2.5**).

2.9.8 Pug Mill

An ARAN Modumix 11 model pug mill would be located near the eastern boundary of the proposed Facility. The 17m high pug mill has a capacity of 400 tonne per hour, and is utilised in the concrete and asphalt mixing processes and adds binders to mix materials together.

The pug mill is expected to operate between the hours of 7 am to 6 pm (although operations would typically be expected to cease by mid afternoon). Moist stockpiled material would be mixed with a small volume of powder stored in the pug mill silo (approximately 1 % powder to gravel ratio) and water to form a moist (not wet) product that is loaded onto trucks via a conveyor. No dust emissions are generated during the loading process due to the moisture content of the material. The pug mill processing operations are also essentially dust free – the gravel placed in the pug mill should contain sufficient moisture to prevent dust generation, and the pug mill is enclosed and serviced by two dust extractors with filters that are replaced regularly. All water required for the operation of the pug mill would be utilised from onsite storage ponds.

The pug mill is also proposed to be relocated from CiviLake's current operation at the Teralba Metromix Quarry (**Plate 2.5 and Plate 2.6**).The pug mill is not known to generate any dust emissions from its current operation at the Metromix Quarry.

2.9.9 Batching Plant

A concrete batching plant would occasionally be operated on site to produce low-strength concrete products suitable for applications such as foot path construction. Small batches (6 – 7 tonnes) are expected to be produced utilising concrete crushed on site. The batch process would be expected to take less than one hour. The plant and silo located within the northern part of the loop created by the access road would be around 10m in height and would produce a volume of approximately 5,000 tpa of concrete. All water required for the operation of the batching plant would be utilised from onsite storage ponds.

2.9.10 Mobile Plant

Three large loaders would move up to 400 tonnes of material per hour around the proposed Facility depending on length of travel. Two crushing and screening plants with a combined processing capacity up to 300 tonnes per hour would also be utilised on an as required basis. A tub grinder would be used for around two campaigns per year (around 3 days per campaign) to shred and mulch green waste, primarily that collected after storm events.

2.9.11 Dust Suppression Plant

A truck wash bay with rumble bar would be located north of the gatehouse to facilitate the washing of vehicles prior to trucks exiting the site. A 10,000L capacity mobile water cart would also be utilised as part of the proposed Facility's dust suppression management practices. This water cart would wet down the internal access road and

areas around stockpiles and plant at least on a daily basis. A water truck loading facility and pump out well would be located adjacent to the main storage pond to enable the filling of the cart.

Plate 2-1: Product bins, currently located at the Boolaroo Transfer Station

Plate 2-2: Product bins, Boolaroo Transfer Station

Plate 2-3: Pug mill and material stockpile, Metromix Quarry

Plate 2-4: Material stockpile, current located at Metromix Quarry

Plate 2-5: Asphalt recycler, currently located at the Metromix Quarry

Plate 2-6: Pug mill, Metromix Quarry

2.10 Materials, Sources and Delivery

The proposed Facility would reprocess up to 200,000tpa of construction and green waste material for reuse within CiviLake operations and for general resale. Materials that would be stored, sorted, reprocessed and stockpiled on the site include concrete, asphalt, reclaimed asphalt pavement, road base, green waste, bricks, tiles and soil. While green waste would be processed and stored on site, no composting is proposed as part of the Facility's operations.

CiviLake currently generates over 110,000 tonnes of hard material from its own operations (see Table 1-1). These materials would make up the primary source of feed for the proposed Facility.

Materials would be delivered to the Facility typically between the hours of 7am and 4pm and from the Facility between 6am and 3pm. Volumes of materials delivered to and transported from the Facility are in **Tables 10.6** and **10.7** respectively.

2.10.1 Sorting, Stockpiling and Reprocessing

On entering the site, trucks would be received via the double storey gatehouse and weighbridge. Here the product would be weighed and visually screened and assessed for any contaminants, such as asbestos. Loads containing contaminants would not be received into the proposed Facility.

Differential pricing would encourage source separation. Based on load materials, trucks would be directed to an appropriate sorting stockpile area to unload and be sorted into respective feed stockpiles to await reprocessing. The locations of stockpiles areas is outlined in **Figure 2-1** however, it is noted that these locations are indicative and subject to detailed design.

Processing would vary for different feedstock, outputs and market availability. **Table 2-1** outlines general material processing pathways that would occur within the proposed Facility.

Table 2-1 Material Processing Pathways

Feedstock	Processing	Processing Plant	Product
Concrete, bricks, tiles	Crushing / screening	Crushing and screening plant	Various aggregates
	Blending	Pug mill	Crusher dust
			Road base (N.G.B.20 and N.G.S.20) and applicable recycled concrete specs
Asphalt / road base	Crushing / screening	Crushing and screening plant	Recycled road base
			Gravel products
	Asphalt recycler	Asphalt recycler	Asphalt
Green waste	Shredding, mulching	Tub grinder as required ie 10 weeks per annum	Woodchip
	Blending	Loader	Soil blends
Soil	Screening / blending	Loader and screening plant	Soil blends

N.G.B.20 – a natural gravel basecourse 20mm minus.
N.G.S.20 – a natural gravel subbase course 20mm minus.

Some of the green waste material would come to the site already processed by mobile units. Woody materials processed within the proposed Facility would be stockpiled and processed through a tub grinder when enough material has been accumulated on site. Soil conditioning would be carried out on some of the processing green waste through blending of soil and seagrasses.

2.11 End Product Storage and Use

In addition to the large end product stockpiles, materials would also be stored on site in product bins which would be recovered from Boolaroo Transfer Station.

A series of 7m x 10m product storage bins would be located along the south western boundary. These bins, which would be constructed of large concrete blocks would store new and recovered sealing aggregate, recycled asphalt pavement and mulch as follows:

- Annual sales of approximately 7,000 - 8,000 tonnes of new and recovered sealing aggregate would be realised per year, with around 600 to 700 tonnes of new sealing aggregate being stored at any one time. Quantities of recovered aggregate would be less, at approximately 500 tpa;
- An estimated 15,000 tonnes of recycled asphalt pavement would be stored in the bins per year, with not more than 5,000 tonne at any one time;
- Approximately 5,000m^3 of mulch, which is a blend of hardwood and leaf would be stored. In order to prevent combustion and associated bushfire risk, mulch stockpiles would be turned regularly. Mulch stockpiles are depleted and replenished on a weekly basis, with older material used first. The mulch bins would have a 20m APZ to bushfire prone vegetation.

In addition to end product stored on the site which has been reprocessed in the proposed Facility, CiviLake also proposes to store a range of materials that do not require reprocessing. This material is purchased from external organisations for a number of operational purposes. This material would also be stored in the product bins. Specific examples and quantities of these materials purchased by CiviLake include:

- 2,000 tpa of packing sand and crusher dust;
- 1,500 tpa of topsoil; and
- 1,500 tpa of backfill/drainage aggregate.

The pack sand and crusher dust, topsoil and backfill/drainage aggregate would be purchased in bulk, stored at the proposed Facility and distributed in smaller loads to various CiviLake construction sites. The cover material would be generated from CiviLake construction sites and does not generally require processing, however processing would be undertaken if required.

Dry green waste would also be received and stored for short periods at the site, primarily consisting of materials that have been mulched or chipped at the pick-up locations and seaweed harvested from around the lake area. Mulch material would be blended with soil and stockpiled for immediate sale (no further processing required), with turnaround times of less than three weeks anticipated. No composting of green waste would occur. No grass clippings or putrescible wastes would be received at the site.

Products generated from the proposed Facility would be sold internally for Council operations and externally to suitable markets in the building and civil engineering industries in the Lower Hunter.

2.12 Incoming Waste Quality Plan

CiviLake would design and implement an *Incoming Waste Quality Plan* which would be included within the OEMP.

One of the main concerns for incoming waste and in particular recycled concrete is the potential for asbestos to be present. WorkCover are in the process of publishing a document entitled '*Guide for Preventing Asbestos in Demolition and Construction Waste*' which is specifically aimed at preventing asbestos being included in waste delivered to facilities such as the proposed Teralba facility. The procedures for checking for asbestos on the Teralba site would be in accordance with these guidelines as follows.

1) Setting up the site with appropriate controls such as advising suppliers that asbestos containing materials (ACM) would not be accepted, incorporating a 'no asbestos' clause in supplier contracts, installing appropriate warning signage and ensuring workers receiving and inspecting wastes are appropriately trained.
2) Visual inspections of each load as the material enters the site and then as it is tipped. Operational staff would also undergo asbestos awareness training.
3) Implementing appropriate controls and contingency measures should potential asbestos containing material be identified.

4) Implementing a regular program of review of the site's systems and operations and random asbestos testing program.

The procedures implemented for checking for asbestos would also be suitable to check for the majority of other unsuitable material.

In addition to the above, persons bringing loads to the site would be required to complete a questionnaire about the source of the material and sign confirming the material is free from contamination (and in particular asbestos).

Any suspect loads would either be rejected outright or investigated further.

The OEMP would contain procedures for checking material, as it enters the site. Once concrete or recycled asphalt pavement is processed (or prior to it being exported from the site for material that is not being processed), it would be tested in accordance with the requirements of the relevant resource recovery exemption. Note that the testing would be undertaken after processing due to the impracticability of sampling concrete and asphalt pieces.

For wastes such as tiles or bricks no testing is proposed due to the small quantities and low likelihood of contaminants unless a resource recovery exemption is introduced which requires testing. No testing is proposed of green waste due to the low potential for contamination.

A detailed procedure for testing would be documented in the OEMP.

2.13 Workforce and Hours of Operation

2.13.1 Construction

As outlined in **Section 2.3.1,** the site is required to be filled, which is expected to take in the order of three years. During the filling stage, at least one full-time employee would be on site at all times to ensure that all fill complies with DECCW requirements. Trucks would deliver and stockpile fill material on the site, as fill is progressively won from CiviLake construction activities in the area with details of each delivery being recorded.

Once the site has been filled to the required freeboard level, plant and equipment would be delivered to the site using specialised vehicles to enable construction of the proposed Facility. Construction vehicles and equipment would be stored on site for the duration of site preparation and construction works. Buildings would be prefabricated and would require minimal construction. The construction workforce is estimated to comprise of 3 to 5 people.

Construction works would be conducted during the following hours:

- Monday to Friday, 7am to 6pm;
- Saturday, 8am to 1pm (or 7am to 1pm if inaudible at residential premises); and
- No construction on Sundays or public holidays.

Construction works would be undertaken in accordance with a CEMP for the proposed Facility.

2.13.2 Operation

It is anticipated that the onsite workforce would be a total of five full-time staff.

Hours of operation for the proposed Facility are divided into crushing and processing operations, and pickup/delivery operations.

The proposed Facility is proposed to operate crushing and processing works Monday to Friday between 7:00am and 6:00pm and on Saturdays between 7:00am and 1:00pm.

No processing of incoming material would be conducted at night or on Sundays or public holidays.

However the proposed Facility would be required to cater for after hour's deliveries of materials resulting from CiviLake site works. After hours deliveries are necessary to the operation of the proposed Facility, as much of CiviLake's site works are carried out at night, where construction and maintenance work times is defined by the Roads and Traffic Authority (RTA). Receipt of deliveries at night are proposed up to 50 nights per year.

Receipt of materials on Sundays and public holidays is proposed between 8:00 and 5:00pm due to CiviLake's commitment to minimising disruptions associated with work on community projects e.g. schools and commercials areas.

Operations would be carried out in accordance with an OEMP. The objective of the OEMP would be to ensure that a high level of environmental performance is maintained throughout the life of the Facility. The OEMP would be updated annually to promote continued best practice environmental management and to reflect changes in the Facility operations.

2.14 Service Infrastructure

Infrastructural requirements for the site including water supply, waste water management, power supply and communications are discussed in **Section 17.0**. There is no gas supply required for the site.

3.0 Statutory Planning

3.1 Introduction

This section explains the approvals framework for the proposed Facility, identifying how the proposed Facility meets statutory planning and environmental criteria and discusses any licensing requirements for the development.

3.2 Commonwealth Legislation

3.2.1 Environment Protection and Biodiversity Conservation Act 1999

Part 3 of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* provides that an action which "has, will have or is likely to have a significant impact on a matter of national environmental significance" may not be undertaken without prior approval from the Commonwealth Minister for the Environment and Heritage, as provided for under the provisions of Part 9 of the *EPBC Act 1999*. The *EPBC Act 1999* lists the following as matters of national environment significance (NES) for which Ministerial approval is required:

- World Heritage properties;
- Wetlands of International Significance (Including Ramsar wetlands);
- Listed threatened species and communities;
- Listed Migratory Species protected under international agreements (CAMBA and JAMBA);
- Protection of the Environmental from Nuclear Actions; and
- Marine Environment.

The Administrative Guidelines for the *EPBC Act 1999* set out criteria intended to assist in determining whether an action requires approval. In particular, the Guidelines contain criteria for determining whether a proposed action is likely to have a significant impact on a matter of NES.

A search of the Department of the Environment, Water, Heritage and the Arts (DEWHA) *EPBC Protected Matters database* has revealed that the subject site is not located within a World Heritage area, a Commonwealth marine environment, nor does the proposed Facility involve nuclear activities. However, the preliminary review of the database has revealed that threatened ecological communities, threatened species, migratory species and listed marine species may occur on or near subject site.

A flora and fauna assessment has been undertaken by Ecotone Ecological Consultants and is appended at **Appendix H** of this EA. This assessment has found that the proposed Facility does not pose a threat to the *EPBC* listed species, and therefore a referral to the Minister is not required.

3.3 State Legislation

3.3.1 Environmental Planning and Assessment Act 1979

The *EP&A Act 1979* and its supporting Regulation, the *Environmental Planning and Assessment Regulation 2000 (EP&A Regulation)*, provide the framework for the assessment and approval of development proposals within NSW. Assessment provisions are provided in three parts of the *EP&A Act*, namely Part 3A, Part 4 and Part 5.

The Proposal for the approval of a recycling Facility on the site falls under the provisions of Part 3A of the Act. Part 3A of the *EP&A Act* provides processes for the assessment of development which is considered to be a "Major Project" as declared by a *SEPP*, or by order of the Minister in the Government Gazette.

The proposed Facility has been declared as a Major Development under Clause 75(b) of the *EP&A Act*. This has been confirmed by DoP in a letter dated 23 January 2007, which states that the proposed Facility is classified as a '*Major Development to which Part 3A of the EP&A Act applies'*.

The objectives of the *EP&A Act* are listed under Section 5 of the Act. When determining applications, the Minister is required to have regard to these objectives. This Project Application is in line with the objectives of the *EP&A Act,* as demonstrated in **Table 3-1**.

Table 3-1 Objectives of the EP&A Act

EP&A Act Objectives	Compliance
(a) to encourage:	
(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,	The proposed Facility would take place on land zoned for recycling facilities and as detailed in this EA, would not result in any significant adverse environmental impacts on the natural environment. The social and economic welfare of the community is best served by development which is permissible under the relevant planning regime and in accordance with the prevailing planning controls, as is the case with the proposed Facility. As detailed in **Section 22**, there would be positive social and economic impacts resulting from the proposed Facility.
(ii) the promotion and co-ordination of the orderly and economic use and development of land,	The orderly and economic use of land is best served by development which is permissible under the relevant planning regime and in accordance with the prevailing planning controls. The proposed Facility is a permissible use on the subject site. As detailed in this EA, the proposed Facility would not result in any significant adverse environmental impacts.
(iii) the protection, provision and co-ordination of communication and utility services,	As outlined in **Section 17**, the proposed Facility provides for the provision and co-ordination of communication and utility services on the subject site.
(iv) the provision of land for public purposes,	N/A
(v) the provision and co-ordination of community services and facilities, and	N/A
(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and	A portion of the site is zoned for conservation, and would be rehabilitated as part of the proposed Facility.
(vii) ecologically sustainable development, and	The proposed Facility is consistent with Ecologically Sustainable Development (ESD) principles as detailed in **Section 22** of this EA.
(viii) the provision and maintenance of affordable housing, and	N/A
(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and	The Proposal is subject to the provisions of Part 3A of the *EP&A Act*, where the Minister is the consent authority.
(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.	Any relevant public representations would need to be considered by the DoP during the processing of the Part 3A application.

While the *EP&A Act* provides the framework for the planning and development approvals system within NSW, there are several other Acts and Regulations which contribute to the environmental and planning system.

Pursuant to Section 75U of the *EP&A Act*, Part 3A has removed the application of integrated development provisions for Major Projects and therefore with the exception of the *POEO Act*, there are no concurrent licensing provisions that apply to Part 3A development, and therefore the Proposal.

There are however several Acts that, save the provisions of Part 3A, would be relevant to the Proposal. While compliance with the provisions of these Acts is not mandatory, their consideration in the design and incorporation into the project ensures that the proposed Facility would have a negligible environmental impact and would contribute positively to the environmental and socio-economic position of the Teralba locality. Relevant Acts include the *Threatened Species Conservation Act 1995* (TSC Act), the *National Parks and Wildlife Act 1974* (NPW Act) *and the Native Vegetation Act 2003* (NV Act).

3.3.2 Protection of the Environment Operations Act 1997

The *POEO Act 1997* provides an integrated system of licensing for polluting industries. Schedule 1 of the *POEO Act* identifies types of development that require an EPL. Schedule 1 Clause 16 of the *POEO Act* identifies licensing requirements for the following relevant activity:

Crushing, grinding or separating

> *(1) This clause applies to* ***crushing, grinding or separating****, meaning the processing of materials (including sand, gravel, rock or minerals, but not including waste of any description) by crushing, grinding or separating them into different sizes.*
>
> *(2) The activity to which this clause applies is declared to be a scheduled activity if it has a capacity to process more than 150 tonnes of materials per day or 30,000 tonnes of materials per year.*

The proposed Facility would be a crushing grinding and separating operation for hard waste/ construction and demolition materials including concrete, bricks, gravel and crushed rock road base, asphalt, soils, green waste and tiles. The operation would process up to 200,000 tonnes of material per annum. An EPL would be sought from DECCW prior to the commencement of operations.

3.3.3 Threatened Species Conservation Act 1995

The *TSC Act 1995* provides for the conservation of threatened species, populations and ecological communities of animals and plants. It provides a framework for the assessment of any action that may impact on threatened species.

The Ecological assessment undertaken as part of this EA has assessed the potential impacts on threatened species and provides a suite of suitable impact mitigation and environmental management measures for threatened species, where required.

3.3.4 National Parks and Wildlife Act 1974

The NPW Ac) aims to protect native flora and fauna and the integrity of any Aboriginal heritage items in NSW. It also provides for the protection of National Parks, Historic Sites, Nature Reserves, State Recreation Areas, Regional Parks, Designated Wilderness, Karst Conservation Sites and State Game Reserves.

Under the NPW Act, protected species, threatened biota and any Aboriginal artefacts or sites cannot be harmed, picked, removed or disturbed without a license, permit or other authority from the NSW DECCW.

3.3.5 Native Vegetation Act 2003

The NV Act regulates the clearing of native vegetation on all land in NSW except for land listed in Schedule 1 of the Act. Excluded land under Schedule 1 of the Act includes National Parks and other conservation areas, state forests and reserves, and urban areas. Specifically, urban areas, which are excluded, include areas zoned residential (but not rural residential), village, township, industrial or business.

The proposed facility does not require the clearing of native vegetation.

3.3.6 State Environmental Planning Policies

SEPPs are planning instruments under the *EP&A Act* that address more specific planning matters, where it is not considered appropriate for the Act to provide the detail, and are required to be considered by Part 3A Applications and assessment.

The following SEPPs are relevant to the proposed Facility.

State Environmental Planning Policy (Major Development) 2005

SEPP 2005 (Major Development) provides details of specific sites, types of developments and State significant sites which are subject to assessment and determination under Part 3A of the *EP&A Act*.

Schedule 1 of the *SEPP 2005* outlines classes of development for Part 3A Major Projects. Clause 27 of Schedule 1 includes the following:

Resource recovery or waste facilities

> *(3) Development for the purpose of resource recovery or recycling facilities that handle more than 75,000 tonnes per year of waste or have a capital investment value of more than $30 million.*

The proposed Facility would process more than 75,000 tonnes of waste per year and is therefore classified as 'Major Development' eligible for assessment under Part 3A.

CiviLake received formal notification on 23 Januray 2007 from the Director General of the DoP, that the proposed Sustainable Resource Centre is a project to which Part 3A of the *EP&A Act* applies. Accordingly CiviLake is seeking Major Project Approval for the proposed works.

A PEA was prepared for the proposal by LMCC in March 2008, outlining to the DoP and other relevant agencies/ stakeholders, key elements of the project so that project specific DGRs could be formulated. The DGRs for the proposal were subsequently issued on 6 May 2008 and are in Appendix A and addressed in **Table 4-1** of this EA.

State Environmental Planning Policy (Infrastructure) 2007

Schedule 3 of this SEPP provides the RTA with the opportunity to provide feedback on certain traffic-generating developments before a consent authority makes a determination about a development application.

Schedule 3 lists types of development to which this policy applies, including "recycling facilities" of any size or capacity.

Consultation has occurred with the RTA during the preparation of this EA. A Traffic Impact Study has been undertaken in accordance with RTA requirements in **Table 4-1** and is detailed in **Section 10**.

State Environmental Planning Policy 14 – Coastal Wetlands

The SEPP applies to many wetlands on the coast of NSW and is designed to protect wetlands from ad hoc clearing, draining, filling and levee construction.

A wetland listed under *SEPP 14* occurs to the south east of the proposed Facility (Wetland No. 852). The boundary of the subject site has been located to completely avoid the *SEPP 14* wetland, including a 20m buffer. The wetland would be protected from untreated runoff from the site by the landscaped embankment surrounding the works area. The *Water Cycle Management Plan* (as discussed in Section 7 of this EA) is designed to manage the quantity and quality of stormwater discharged from the site to mitigate impacts on the downstream freshwater and SEPP14 wetland communities, maintaining the hydrology and water quality variation to within the range experienced by these communities.

State Environmental Planning Policy 33 – Hazardous and Offensive Development

SEPP 33 was designed to ensure that sufficient information is provided to consent authorities to determine whether a development is hazardous or offensive. Conditions can then be imposed on the development to reduce or minimise adverse impacts. Any development application for a potentially hazardous development must be supported by a Preliminary Hazard Analysis (PHA). The results of the PHA are discussed in **Section 13** and the detailed report is available in **Appendix L.**

State Environmental Planning Policy 44 – Koala Habitat

The aim of *SEPP 44* is to encourage the conservation and management of areas which provide habitat for koalas with a direction of establishing a permanent population over their present range and reverse the current trend of decline. Lake Macquarie LGA is listed on Schedule 1 of the SEPP, and as such *SEPP 44* applies to the Site.

The subject site itself consists primarily of grassland and as such does not represent koala habitat. Much of the forest/woodland surrounding the subject site has been identified as 'potential koala habitat' based on the presence of food tree species listed in *SEPP 44* (Ecotone 2008). Three food tree species, *Eucalyptus tereticornis*, *E. haemastoma* and *E. robusta*, listed on Schedule 2 of *SEPP 44* occur in the buffer surrounding the subject site,

mainly within the north-western parts. Ball honeymyrtle swamp forest is dominant in much of the remaining buffer and although melaleuca species are not listed in *SEPP 44* some species are known to be important koala habitat in other areas (e.g. *Melaleuca quinquenervia* in Port Stephens LGA). Therefore at least the scribbly gum/swamp mahogany/paperbark swamp forest in the north-western part of the study area represents 'potential koala habitat'. However the lack of evidence of koala presence through scat searches and the fact that no records occur near the subject site, indicates that the study area does not represent 'core koala habitat' as defined in *SEPP 44* and therefore further assessment under *SEPP 44* is not required.

State Environmental Planning Policy 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. *SEPP 55* specifies when development approval is required for remediation works and also details the range of considerations that are relevant in determining a development application.

With respect to *SEPP 55* the remedial works to be undertaken are considered to be "Category 2 remediation work: work not needing consent" as defined in Clause 14 of *SEPP 55* for the following reasons:

- the works do not constitute a designated development;
- the remediation works are considered to be minor;
- the remediation works to occur would have minimal interference to native flora and fauna;

Clause 16(2)(a) of *SEPP 55* requires that 30 days notice be given to the relevant council before the commencement of Category 2 Remediation work. Clause 17(3) requires that notice be given to Council of completion of work within 30 days.

State Environmental Planning Policy No 71 – Coastal Protection

The proposed Facility is located within the coastal zone as defined by *SEPP 71* which details provisions regarding protection of coastal attributes, protection of natural and cultural heritage elements, coastal environmental protection, and the retention of foreshore public access. Part 8 of the SEPP provides matters for consideration to be taken into account by a consent authority when determining an application to carry out development:

It is considered that the proposal complies with *SEPP 71* as:

- There is no direct foreshore access from the site and the development does not impede upon any foreshore access;
- There would be no significant detrimental impact on views to and from the foreshore;
- There is very limited vegetation cover on the site with minimal identified habitat value. Environmental impacts to the site and surrounding waters would be minimal and controlled through site management plans;
- Existing coastal processes would not be impeded by the proposal, nor is it considered that those processes would impact on the site development;
- The proposed Facility is not expected to impact upon existing water borne activities;
- It is unlikely that there would be any disturbance to relics, heritage items or places of cultural significance.There are no known heritage items on the site;
- Water quality impacts would be minimised through the proposed site drainage design and the implementation of a *Water Cycle Management Plan*;
- The cumulative effects of the development and surrounding industrial activities have been considered and are considered to be minimal; and
- Energy and water efficiency measures are proposed for the development.

3.4 Regional Context

As of 1 July 2009, regional environmental plans, referred to generally as REPs, are no longer part of the hierarchy of environmental planning instruments in NSW. This process is described through SEPP *(Repeal of REP Provisions) 2009 (SEPP)*, also see DoP, Planning Circular PS 09-014. As a result the existing REP described in the following section is deemed to be a SEPP under the new Division 2, Part 3 of the *EP&A Act.*

3.4.1 Hunter Regional Environmental Plan 1989

The aims of the Hunter REP 1989 are:

(a) to promote the balanced development of the region, the improvement of its urban and rural environments and the orderly and economic development and optimum use of its land and other resources, consistent with conservation of natural and man made features and so as to meet the needs and aspirations of the community,

(b) to co-ordinate activities related to development in the region so there is optimum social and economic benefit to the community, and

(c) to continue a regional planning process that will serve as a framework for identifying priorities for further investigations to be carried out by the Department and other agencies.

The proposed Facility is consistent with the aims of the *Hunter REP* in that it would:

- result in the productive use of the subject site which would otherwise be largely unusable due to previous uses;
- improve the environmental quality of portions of the site as a result of proposed landscape rehabilitation; and
- provide an economic and resource protection benefit through the recycling and reuse of waste materials.

3.4.2 Lower Hunter Regional Strategy 2006 – 2031

The *Lower Hunter Regional Strategy (LHRS)* provides a strategic planning guide for the Lower Hunter for the period 2006 to 2031. The Lower Hunter is the sixth largest urban area in Australia and one of the State's major centres of economic activity. It is expected to continue to grow as people are attracted by its lifestyle and opportunities.

The LHRS:

- Provides for 115,000 new homes to cater for a projected population growth of 160,000 people;
- Plans for up to 66,000 new jobs and ensures an adequate supply of employment land;
- Promotes growth in centres — a greater choice of housing and jobs in Newcastle's CBD and specified major centres;
- Creates important green corridors of land with high environmental value, which would be managed for conservation purposes. These corridors align with existing public reserves, some of which would be expanded;
- Protects high quality agricultural land, and natural resources such as water aquifers and extractive materials.

The subject site lies within the LHRS area and would provide a valuable service to the Lower Hunter Community, contributing to future waste management and recycling requirements.

3.4.3 Draft Newcastle-Lake Macquarie Western Corridor Planning Strategy

The *Draft Newcastle-Lake Macquarie Western Corridor Planning Strategy (WCPS)* relates to land to the west of Newcastle and Lake Macquarie identified under the LHRS as proposed urban and employment lands, known as the Western Corridor. The Western Corridor includes land from the New England Highway at Beresfield in the north to Killingworth in the south.

The Draft Strategy establishes a broad, strategic land use framework for the future development of the area for employment lands, residential and environmental conservation areas. The strategy identifies planning principles, development criteria and infrastructure requirements for the development of these lands.

The Western Corridor area is anticipated to accommodate some 8000 dwellings and 1500 hectares of employment lands along with a green corridor running between Black Hill and Minmi, including Hexham Swamp wetlands.

The subject site lies to the south of the Western Corridor area and would provide a valuable service to this future community, contributing to the waste management requirements of this growing urban area.

3.5 Local Planning Instruments and Controls

3.5.1 Lake Macquarie Local Environmental Plan 2004

The *LMLEP 2004* provides a legal basis for development control, protection of agricultural land and environmentally sensitive areas, and management of urban areas within the Lake Macquarie LGA.

Clause 15 – Land Zoning

Pursuant to *LMLEP 2004*, the majority of the subject site is zoned 9 Natural Resources, with a portion in the south east and south west corner zoned 7(1) Conservation (Primary).

LMLEP 2004 defines the proposed Facility as a ***recycling facility***, which refers to *a building or place used for the collection, storage, abandonment, sorting and/or sale of waste materials and/or the preparation of those recycled materials for further use.* Recycling facilities are permissible within the 9 Natural Resources zone subject to development consent. Recycling facilities are prohibited within the 7(1) Conservation (Primary) zone. As such, the proposed Facility has been designed so that no works would be undertaken over the portion of the Site that is zoned for conservation.

The relevant objectives of the 9 Natural Resources zone as applied to the proposed Facility are to:

a) provide land that has dual values as an economic natural resource and for environmental protection, and

b) recognise the dual values of the land and integrate economic use of the land with ecological sustainability, and

c) acknowledge the long term value of the land for the management and maintenance of biodiversity, threatened species habitat, and corridors by minimising the adverse impacts of resource development, and

d) rehabilitate disturbed land to a natural state, reflective of its long term value, and

e) minimise earthworks while enabling productive use of the land, and

f) provide for sustainable water cycle management.

The proposed Facility demonstrates consistency with these objectives by:

- utilising degraded areas of the site for the proposed Facility, while protecting and enhancing the conservation area within the site through bush regeneration;
- realising the economic value of natural resources through the recycling and reuse of up to 200,000tpa of construction and green waste materials;
- providing for the rehabilitation of degraded conservation areas within the site, that would ensure self sustaining ecosystems; and
- providing for an integrated water management strategy which limits the impact of the proposed Facility on the surrounding environment and receiving waters.

Other provisions of the LEP may also have an impact on the development of the site as outlined below.

Clause 16 – Development Consent – Matters for Consideration

Consent must not be granted for development unless the consent authority has had regard to the vision, values and aims of the *Lifestyle 2020 Strategy* expressed in Part 2 of *LMLEP 2004,* and is satisfied that development proposed to be carried out within a zone, is consistent with the relevant objectives for the zone. As outlined above, the proposed Facility is consistent with the objectives of the zone. The proposed Facility is also consistent with the relevant aims of the *Lifestyle 2020 Strategy*, as it would:

- *provide local employment opportunities for residents and promote economic development consistent with the City's natural, locational and community resources; and*
- *manage the City's natural environment so that its ecological functions and biological diversity are conserved and enhanced, and contribute to the City's overall well being; and*
- *manage the City's heritage and economic resources in a way that protects the value of these resources and enhances the City's character; and*
- *integrate land use with the efficient provision of public and private movement systems*.

Clause 17 - Provision of Essential Infrastructure

The consent authority must be satisfied that there are adequate arrangements for the provision of infrastructure that is essential for the proposed Facility, including water supply, energy and management of sewage. As outlined in **Section 2.14** of this report, adequate service infrastructure would be provided to the site.

Clause 29 – Building Heights

In considering an application for consent to the erection of a building the whole or part of which exceeds 8m, the consent authority must take into consideration whether that height is compatible with the heights of other buildings in the immediate vicinity or locality and is compatible with the site attributes, and existing or proposed uses of the land to which the application relates, and the provisions of any relevant development control plan. The proposed Facility would have some structures that are in excess of 8m. As outlined in **Section 14** of this EA, a visual impact assessment has been undertaken and mitigation measures recommended in order to reduce potential visual impacts from the proposed Facility.

Clause 30 – Control of Pollution

Consent must not be granted to development unless the consent authority is satisfied that all reasonable and practicable control measures would be implemented to minimise pollution likely to arise from carrying out that development. A number of environmental safeguards would be implemented for the proposed Facility ensuring that air, noise and water pollution are managed as part of the construction and operational phases of the proposed Facility.

Clause 31 - Erosion and Sediment Control

Consent shall not be granted to development that may give rise to the exposure of the soil surface to the action of wind or water, unless all reasonable control measures would be implemented to minimise erosion. A detailed CEMP would be developed prior to the commencement of any works onsite, which would include the management of soil and prevention of erosion.

Clause 32 - Flood Prone Land

The site is flood prone, and as such, no works, including the erection of any structures is to be carried out without consent. Further, the consent authority must be satisfied that any development is consistent with flood hazard and levels of risk that are acceptable to the community. As outlined in **Section 7** of this report, a detailed Water Cycle Management Strategy has been development for the site in order to reduce potential impacts from the proposed Facility to the surrounding environment and receiving waters.

Clause 33 - Bush Fire Considerations

The site is classified as bush fire prone and the consent authority must have regard to the relevant provisions of *Planning for Bush Fire Protection 2006.* An assessment of the proposed Facility with regard *Planning for Bush Fire Protection 2006* has been undertaken, and can be viewed in **Section 12** of this EA.

Clause 35 - Acid Sulphate Soils

The subject site is located on Class 2 and 3 acid sulfate soils (ASS) pursuant to LEP mapping. An *Acid Sulfate Soils Management Plan* has been prepared for the proposed Facility, details of which are provided in **Section 6.0** and **Appendix E** of this EA. The objective of the management plan is to reduce the likelihood of impact associated with excavation of potential acid sulfate soils (PASS) on the environment during construction of the proposed Facility.

Clause 60 - Development on Land Adjoining Zones 5, 7 (1), 7 (4) and 8

Consent must not be granted to development on land adjoining or adjacent to land within Zone 7 (1) unless the consent authority is satisfied that the proposed Facility is consistent with the effective conservation of the land within Zone 7 (1) and its protection from adverse impacts, including stormwater run-off, erosion and sedimentation, pollution, weed infestation, feral or domestic animals, chemicals, nutrients and the like. As outlined in this EA, the proposed Facility would not result in any significant adverse environmental impacts.

3.5.2 Lake Macquarie Development Control Plan 2006

A number of sections under the *Lake Macquarie Development Control Plan (DCP) 2006* are relevant to the proposed Facility. Table 3-2 provides an outline of the proposed Facility's consistency with relevant DCP performance criteria and acceptable solutions.

Table 3-2: DCP Performance Criteria Consistency

Performance Criteria	Acceptable Solutions	Consistency
2.1 Environmental Responsibility and Land Capability		
2.1.1 Ecological Values		
P1. Impacts of the proposal on native flora and fauna is avoided or minimised.	**A1.** Development is located and designed to avoid or minimise impacts on native vegetation. Where a development is proposed to impact on an area of native vegetation: • It is demonstrated that no reasonable alternative is available; and • Suitable ameliorative measures are proposed.	The proposed Facility is to be located on a site that is clear of significant vegetation. Where potential impacts on native vegetation have been identified, appropriate management and mitigation measures have been recommended in order to minimise impacts (see **Section 8.0**).
P2. Native Flora and Fauna Assessments are conducted with sufficient detail.	**A2.1** Flora and Fauna Assessments are prepared and lodged in accordance with Council's *Flora and Fauna Guidelines* (2001) establishing the significance of the site and shall: • Identify the total impact of the development on native flora, fauna and significant habitat, • Address legislative requirements, and Identify the location of significant habitat on the site and where necessary, on surrounding lands.	An Ecological Assessment for the proposed Facility has been prepared to assess the potential ecological impacts. The assessment included the following: • a description of the existing biological environment of the study area in relation to flora and fauna; • assessment of legislative requirements; • impacts of the proposal on any threatened species that occur or could be likely to occur in the subject site; • recommendation of mitigation measures to mitigate impacts.
	A2.2 When native vegetation or fauna habitat is to be affected either directly or indirectly the Flora and Fauna Assessment must address section 5A Environmental Planning and Assessment Act 1979 (ie. contains "the Significance Test" (see Ecological Values – Additional Information)). **A2.3** The Flora and Fauna Assessment and "the Significance Test" is sufficient to determine whether there is likely to be a significant affect on threatened species, populations or ecological communities or their habitats as well as impacts on significant habitat/s. **A2.4** If the proposal is likely to have a significant effect on threatened species, populations or ecological communities or their habitats, a Species Impact Statement is prepared and lodged. **A2.5** Additional flora and fauna survey work may have to be undertaken to demonstrate that the performance criteria can be met.	As outlined in **Section 8.7**, the assessment found that the proposed Facility would be suitable on the site, subject to the imposition of recommended mitigation strategies.

Performance Criteria	Acceptable Solutions	Consistency
	A2.6 Any relevant research, recovery plans, threat abatement plan, guidelines and Management Plans are appropriately addressed in the flora and fauna assessment.	
P3. Significant Habitat, being areas and habitat elements important for significant flora and fauna species, populations, vegetation communities and/or ecological communities, is protected and enhanced on and/or adjoining the site	**A3.1** Development is located and designed to avoid impacts on significant habitat. Note – Significant habitat includes marine, estuarine and aquatic environments **A3.2** Where a development is proposed to impact on an area of ecological value: • it is demonstrated that no reasonable alternative is available, and • suitable ameliorative measures are proposed.	The Facility would remove or modify a small rectangular patch of habitat that qualifies as the EEC Swamp Sclerophyll Forest on Coastal Floodplains. This occurs at the southern end of the subject site on the western edge of the site entrance at The Weir Road. The total area to be removed or modified amounts to approximately 80m^2. The 80m^2 area of EEC proposed to be removed has been assessed as poor and degraded. Further, the loss or modification of this small area of habitat would be offset within the site by weed control/ management of retained patches of the EEC in the south-western and south-eastern corners of the property which are both outside the subject site. The available offset area consists of 0.83 ha of existing habitat for the EEC which would be retained and managed, representing an offset ratio of 104:1.
	A3.3 Additional flora and fauna survey work may have to be undertaken to demonstrate that the performance criteria can be met. **A3.4** Measures are put in place during construction to protect native vegetation or fauna habitat. This should be detailed in a Construction Management Plan (refer to page 11). **A3.5** A management plan for retention of significant habitats, is prepared and/or covered in the other management plans. **A3.6** Degraded or areas affected by the development are rehabilitated with indigenous native species to establish a self maintaining ecosystem as close as possible to the natural state.	Following detailed survey of the subject site, a total of seven *Angophora inopina*, a threatened flora species, were found to occur within the project site or on its boundary. These trees are proposed to be retained as part of the Facility, and provision has been made to provide retaining walls to protect tree trunks from the earth bund wall within a radius from the trunk equal to the dripline of the tree canopies. Additionally, a total of 52 individuals of *Angophora inopina* were recorded within the 30m buffer zone surrounding the subject site, none of which would be affected by the proposal. Given the protective measures proposed to be applied to the seven *Angophora inopina* located on or within the subject site boundary, it is not expected that the lifecycle of the species in the local population would be significantly affected.

Performance Criteria	Acceptable Solutions	Consistency
P5. Development in the following zones: • 6 – Open space • 7 – Conservation and Environmental, • 9 – Natural Resources, and • 10 – Investigation, • is designed and constructed to avoid and minimise impacts on the ecological values of the land, does not further fragment land and maintains minimum viable habitat areas for significant species.	**A5.2** Development results in a positive conservation outcome for significant habitat and/or corridors through enhancement, protection and/or long term security.	Vegetation within the Conservation Zones is proposed to be rehabilitated, resulting in the enhancement of native vegetation which is currently unmanaged and degraded.
P7. Significant Habitat in and around the site is protected from external influences.	**A7.1** The development is designed to respect and address the areas to be maintained in their natural condition. **A7.2** A suitable buffer and/or barrier is established between development and areas of significant habit to ensure that they will be maintained in their natural condition. The width of the buffer or form of the barrier will vary, depending on the function/s of the habitat, the natural environment and the type of development proposed.	The subject site is primarily devoid of natural habitats. Impacts from increased noise, traffic movements, dust and lighting (if operating after dark and/or security lights) have the potential to displace fauna from the buffer zone, however this is not considered likely to result in the local extinction of any of the species assessed.
2.1.2 Ecological Corridors		
P1. Ecological Corridors are identified, protected and enhanced on and adjoining the site.	**A1.1** Assessment is undertaken to determine the extent to which the site contributes to an ecological corridor, whether or not the site contains all of, part of, or is adjoining an ecological corridor.	While the subject site is largely devoid of significant vegetation, the area surrounding the site is part of a wider corridor that provides connectivity both for movement of fauna.
	A1.2 Where a development is proposed to impact upon an ecological corridor: • it is demonstrated that no reasonable alternative is available; and • suitable ameliorative measures are proposed.	As noted above, impacts from increased noise, traffic movements, dust and lighting have the potential to displace fauna from the buffer zone however this is not considered likely to result in the local extinction of any of the species assessed.
	A1.3 Development is designed to protect ecological corridor/s within and adjoining the site for their ecological values and natural water system qualities.	The Ecological Assessment prepared for the proposed Facility provided a range of mitigation measures to protect ecological corridors. In addition the Water Cycle Management Strategy has been designed to minimise any impact on natural water systems including the adjoining wetlands and the wider receiving environment.

Performance Criteria	Acceptable Solutions	Consistency
2.1.3 Scenic Values		
P1.1 Development is designed to complement, rather than detract from the landscape, whether it is locating in an urban, rural or environmental setting.	**A1.1** In Zones A and B a Visual Impact Statement is prepared and lodged in accordance with the *Lake Macquarie Scenic Quality Guidelines* (2004) that assesses the impact of development and illustrates how any impact will be ameliorated.	The site is located in Zone A under Council's DCP. A visual impact assessment (VIA) has been prepared to assess potential impacts of the proposed Facility. While the VIA was not undertaken with specific reference to the *Lake Macquarie Scenic Quality Guidelines* (2004), the VIA employs a method that ensures all potential visual impacts from observer locations are assessed, and mitigated where appropriate. As detailed in **Section 14.6**, the proposed Facility is not readily viewed from any sensitive observer locations. Where it is viewed, the development is likely to be of low visual prominence.
2.1.4 Tree Preservation and Management		
P1. Development maintains or enhances: • The natural bushland character of the City through the protection of trees and bushland, • Trees or groups of trees that have natural heritage significance and/or aesthetic values for the community,	**A1.1** An Arborist Report is prepared and lodged: • In support of an application to prune or remove a tree listed on Council's Significant Tree Register, and/or • When requested by Council's Tree Preservation Officer.	See comment under 2.1.1 Ecological Values and 2.2.1 Ecological Corridors above.
• Streetscape values where trees form an essential element of the streetscape, • The integrity and quality of riparian vegetation and the littoral vegetation. • Ecological Corridors • Ecological Habitat • Significant Species and Communities	**A1.2** Methods for protecting native vegetation or significant trees from development impacts, are specified. **A1.3** Habitat trees are examined by a suitably qualified flora and fauna specialist **A1.4** Where it is not possible to avoid the clearing of a habitat tree, measures are to be taken to avoid injury or death of animals likely to inhabit the tree **A1.5** Where appropriate, alternative habitat is provided eg nest boxes etc	The Ecological Assessment carried out as part of this EA examined the potential impact of the proposed Facility and recommended a range of mitigation measures, to where possible mitigate any impacts.
	A1.6 The retention of trees that are threatened species, population or part of an endangered ecological community or threatened species habitat. **A1.7** The retention of the trees that are not part of an ecological corridor. **A1.8** Where a tree has a diameter greater than 200mm and is located within 300mm of a boundary fence, the fence is constructed around the tree.	See comment under 2.1.1 Ecological Values and 2.2.1 Ecological Corridors above.

Performance Criteria	Acceptable Solutions	Consistency
2.1.5 Bushfire Risk		
P1. No Performance Requirement, as per Acceptable Solutions.	**A1.2** Commercial and Industrial development must address the aims and objectives of *Planning for Bushfire Protection.*	A bushfire protection assessment has been undertaken, and provides advice on the bushfire protection measures required for the construction of the proposed Facility. As outlined in **Section 12.2**, a number of mitigation measures have been incorporated within the design of the proposed Facility to ensure compliance with the aims and objectives of *Planning for Bushfire Protection.*
P2. Bushfire risk is managed in connection with the preservation of the ecological values of the site and adjoining lands.	**A2.1** Ecological and environmental values of the land are protected and maintained. **A2.2** APZ's on slopes greater than 1 in 5, and along ridgelines shall not be allowed as the environmental consequences of clearing such slopes and ridgelines is not acceptable. **A2.3** Clearing for the purpose of bushfire risk management must be consistent with the *Lake Macquarie Bushfire Management Plan.* **A2.4** As a general rule APZ's within environmental protection or conservation zones will not be accepted by Council.	All APZ's required for the proposed Facility have been provided within the site, which is cleared of significant vegetation. APZ's proposed do not require significant clearing of vegetation and are not located within environmental protection or conservation zones.
P3. Landscaping for developments in bushfire prone land must satisfy Appendix 5 of *Planning for Bushfire Protection.*	**A3.1** Use of locally indigenous fire retardant species.	Landscaped areas have been designed in consultation with a bushfire risk assessment consultant. As outlined in **Section 12.5**, a specific environmental safeguard has been recommended relating to the management of landscaped areas during the operation of the site.

Performance Criteria	Acceptable Solutions	Consistency
2.1.6 Water bodies, Waterways and Wetlands		
P1.1 The water cleaning, hydraulic and ecological functions and habitats of water bodies, waterways and wetlands, and associated landforms and vegetation (such as riparian, floodplain, stream terrace, littoral and dune areas) are preserved. P1.2 Changes to the water regime including: • alterations to flood frequency, • water temperature, • streamflow, • water quality, among other things that could affect the ecological values of a water body, waterway or wetland are avoided or minimised. **P1.3** Developments are designed to ensure: • watercourses and their associated vegetation and landforms are protected. • the pre-development water quality of receiving waters is maintained or improved. • impacts of construction (except for major flood events) are minimised and • provision is made for ongoing maintenance of any works or landscaping associated with development.	**A1.1** Avoid actions such as clearing, filling, redirecting or otherwise modifying waterbodies, waterways and wetlands and associated landforms and vegetation. If such actions cannot be avoided, proposals demonstrate that any alteration to hydrological conditions will not adversely affect the current or future natural value, safety or use of any land or the quality of receiving waters. Where impacts are identified, proposals demonstrate, in detail, how those impacts will be ameliorated. **A1.2** Proposals demonstrate that alterations in water regime will not affect habitat in terms of vegetation communities (aquatic, littoral and terrestrial) and fauna and/or fish communities including microinvertebrates. Where appropriate, proposal includes measures to facilitate movement of aquatic species up and down stream. **A1.3** The development protects natural watercourses and riparian corridors by avoiding disturbance, redirection, reshaping or modification of natural systems. If modifications are required, suitable environmental offsets should be considered to ensure a net environmental gain.	A Water Cycle Management Plan has been prepared for the proposed Facility that provides water quality and quantity management in order to mitigate potential impacts on the downstream environment (freshwater and SEPP14 wetlands).
P3. Riparian, littoral areas, water bodies, waterways and wetlands are adequately buffered from development.	**A3**. In the Conservation, Environmental or Rural Zones a minimum buffer, 50 metres between any development and the outer limit of a wetland or 40 metres between any development and the deed high watermark of a water body or waterway, is provided. The buffer: • Where appropriate, may incorporate facilities such as public open space, • Will retain and enhance predevelopment vegetation and hydrology characteristics,	The subject site is surrounded by a substantial buffer area of bushland. The site is located approximately 250m from Cockle Creek to the north and lies upstream of the SEPP 14 wetland to the south east. The potential impacts on water quality and quantity are mitigated for the protection of the downstream environment including the wetland system as discussed in **Section 7**.

Performance Criteria	Acceptable Solutions	Consistency
	• Is not subject to use of fertilisers, herbicides, pesticides or other contaminants, • Excludes all buildings and structures or infrastructure, • Excludes domestic animals (particularly livestock.).	
2.1.7 Flood Management		
P1. The proposal satisfies relevant criteria contained in an adopted Local Flood Study, Floodplain Management Study or Plan that applies to the land.	**A1**. No Acceptable Solutions prescribed, as per Performance Criteria.	A specific *Flood Assessment Study* was undertaken by Council in 2009 to analyse and predict any changes to flood levels that may result following construction of the proposed Facility. As outlined in **Section 7.2.2**, the study concluded that the proposed Facility has negligible effect to the flooding regime of Cockle Creek and would not adversely affect upstream or downstream properties.
P2. Adequate risk mitigation measures are applied so that the hydraulic hazard conditions present at the site do not pose an unacceptable level of risk.	**A2.1** Development is consistent with the principles contained in the *NSW Floodplain Development Manual* (2005) and any relevant Local Flood Study, Floodplain Management Study or Plan.	See above comment.
	A2.2 Development will not result in adverse impacts on adjoining flood plains and land.	
P3. The development does not result in unacceptable risks due to impacts on flooding behaviour at other locations.	**A3**. The proposal is the subject of a Local Flood Study, Floodplain Management Study or Plan that considers cumulative impact issues, and the study demonstrates that impacts on other lands will be negligible.	See above comment.
P5. New development, buildings and structures on flood prone land (not located in a floodway) are located and designed to meet an acceptable level of risk of flood damage.	**A5.1** For all development – • Buildings and other structures, including fences, are located to avoid impeding on floodway areas and natural water flow. Perimeter drainage may be required to convey and/or redirect natural water flow. • All development uses suitable building materials. • Proposed flood mitigation works are compatible with a Floodplain Management Plan. • Run-off from development is maintained at pre-development or 'natural' levels within the site, so as not to concentrate run-off across a property boundary.	The proposed Facility includes filling and perimeter bunding to prevent flood waters entering the site.

Performance Criteria	Acceptable Solutions	Consistency
2.1.10 Acid Sulphate Soils		
P1. Disturbance of acid sulfate soils is minimised so that: • Water quality is acceptable at receiving waters, • Areas of environmental value are protected, Property is not detrimentally affected.	**A1.1** Development is located so as to avoid disturbance of Potential Acid Sulphate Soils. Where there is no alternative but to disturb Potential Acid Sulphate Soils: • design and construction methods are employed to minimise exposure to these soils. • a Preliminary Acid Sulfate Soil (ASS) Assessment Report is prepared and lodged in accordance with the NSW Acid Sulfate Soils Planning Manual (1998). If the findings of the preliminary assessment identify impacts associated with the proposed works, a more detailed assessment is conducted and where appropriate a Management Plan is prepared in accordance with the *Acid Sulphate Soil Manual.*	The subject site is located on Class 2 and 3 ASS pursuant to LEP mapping. An *Acid Sulfate Soils Management Plan* has been prepared for the proposed Facility, details of which are provided in **Section 6.0.** The objective of the management plan is to reduce the likelihood of impact associated with excavation of PASS on the environment during construction of the proposed Facility.
2.1.11 Erosion Prevention and Sediment Control		
P1.1 The design, construction and operation of development minimise the exposure of the soil surface to the action of stormwater or wind. **P1.2** Measures are taken to limit sediment laden stormwater discharges and restrict stormwater flows over exposed areas during construction.	**A1.1** Development is designed to reduce impacts of erosion by minimising disturbance, retaining vegetation and reducing the need for earthworks. **A1.2** For proposals where the area of disturbance will be: <u>Category 3 - Greater than 2500m2</u> • Erosion prevention and sediment control measures are incorporated as a component of a Soil and Water Management Plan, in accordance with the above publication. The use of a number of integrated solutions in the form of a treatment train approach, is implemented for the control and treatment of erosion and sediment.	A CEMP would be prepared for the proposed Facility, which would describe appropriate environmental measures required to be implemented for the proposed excavation work, including erosion and sediment control during construction.
2.1.12 Mine Subsidence		
P1. Concurrence from the Mine Subsidence Board has been obtained for the development.	**A1.** No Acceptable Solutions prescribed, as per the Performance Criteria.	Details of the proposed Facility were referred to the Mine Subsidence Board (MSB). The MSB did not raise any objection to the proposal Facility (see **Section 4.2**).

Performance Criteria	Acceptable Solutions	Consistency
2.1.13 Contaminated Land		
P1.1 The level of contamination is clearly identified and addressed. The proposal demonstrates that the use for which the land is proposed is suitable in the site's contaminated state, or will be suitable, after remediation. **P1.2** The site is remediated and the works are reviewed and validated before the land is used for its proposed purpose. **P1.3** The proposal demonstrates how contaminants that are proposed to remain on the site will be monitored.	**A1.1** A Preliminary Site Investigation Report is prepared and lodged, consistent with *Managing Land Contamination: Planning Guidelines,* SEPP 55 - Remediation of Land (1998). Where contaminants are found within the site, a Detailed Investigation Report is prepared and lodged, consistent with the above publication. Where the Detailed Investigation Report determines that contaminants will have an impact on a proposed development, or if the land requires remediation, a Remedial Action Plan is prepared and lodged, consistent with the above publication. **A1.2** Following remediation, the site is validated by a site auditor accredited under the *NSW Contaminated Land Management Act,* 1997.	The previous use of the site was for biosolid disposal. Sanitary Waste Depot operators previously adjoining the site deposited biosolids in trenches covering the entire site. The proposed Facility would be developed in accordance with the *RAP The Weir Road, Teralba, NSW* prepared by Parsons Brinckerhoff in November 2008. The RAP contains mitigation measures for the handling of contaminated soils and groundwater, however additional measures are recommended to be implemented in conjunction with the RAP (see **Section 6.4**).
	A1.3 Where full remediation is not feasible and on-site control of contamination is acceptable, a Contamination Monitoring Program is prepared and lodged, consistent with the above publication.	It is considered that the management strategies noted in **Section 6.5** should be effective in dealing with the contamination issues associated with the proposed development.
2.1.15 Noise and Vibration		
P1. Development is carried out so that no intrusive or offensive impacts from noise are caused to the surrounding population now or in the future.	**A1.** The noise(s) to be generated are not offensive or greater than the amenity and intrusive criteria in the NSW EPA Industrial Noise Policy at the property boundary of the noise source or the receiver; and the noise(s) to be generated have been acoustically modified at source or receiver so as not to be offensive or greater than the appropriate noise level stipulated in the NSW EPA Environmental Noise Control Manual.	An acoustic assessment has been prepared which makes appropriate recommendations for noise control measures to ensure that the proposed Facility does not become a source of offensive or intrusive noise during construction or operation.
		The assessment has shown that the proposed Facility would comply with the requirements of the *NSW Industrial Noise Policy* and is not likely to become a source of offensive or intrusive noise. In this regard, the proposed Facility would meet the noise criteria for both daytime and night time operations and would not cause an excessive increase in traffic noise along the access roads.

Performance Criteria	Acceptable Solutions	Consistency
P2. The construction of development is carried out so that no intrusive or offensive impacts from noise are caused to the surrounding population, now or in the future.	**A2.** The operating noise level of machinery, plant and equipment complies with NSW EPA Environmental Noise Control Manual or equivalent; and a Noise Management Plan has been prepared and lodged for construction periods in excess of 26 weeks duration and includes specifications for stringent hours of operation.	See above comment.
P3. The operation of development is carried out so that no intrusive or offensive impacts from noise are caused to the surrounding population, now or in the future.	**A3.** The operating noise generated is not offensive or greater than the amenity and intrusive criteria in the NSW Industrial Noise Policy or the appropriate noise level stipulated in the NSW EPA Environmental Noise Control Manual at the property boundary of the noise source or the receiver; and the operating noise level of the premises complies with any other noise abatement requirements stipulated in NSW regulation or policy.	See above comment.
P5. For road(s); Noise generated by vehicles either on the road system or within a development site is not of an intrusive or offensive impact upon the surrounding population.	**A5**. Vehicle noise generated on the road complies with the NSW EPA publication "Environmental Criteria for Road Traffic Noise"; and/or Vehicle noise generated within a development site complies with the amenity and intrusive criteria in the NSW EPA "Industrial Noise Policy".	See above comment.
2.1.16 Air Quality		
P1. Development illustrates that, when in operation and when all measures proposed to minimise its impact have been employed, no negative emissions will result that would diminish the amenity of adjacent properties, the surrounding area or water bodies, waterways and wetlands.	**A1.1** Where the development will negatively affect air quality or where it will be affected by air pollution, a Statement of Air Quality is prepared and lodged. **A1.2** Where the Statement of Air Quality requires further supporting information, an Air Quality Report is prepared and lodged. **A1.3** Where a monitoring program is required, it is carried out and reported on in accordance with the requirements of the relevant Australian Standards, such as *AS3580.4-1 Methods of sampling and analysis of ambient air – Determination of sulfur dioxide – Direct reading instrument method* (1993).	The materials, processing operations and products have the potential to generate dust emissions, with odour emissions also possible from the green waste activities. An air quality assessment has been prepared for the proposed Facility to asses potential air quality impacts. As outlined in **Section 15.0**, with the implementation of appropriate management practices, the dust emissions from the proposed Facility are not expected to significantly affect the health or amenity of local businesses or residences.

Performance Criteria	Acceptable Solutions	Consistency
P6. Development minimises odour nuisance.	**A6**. Development is designed to conform with the Environment Protection Authority's Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW (January 2001).	The abovementioned air quality assessment also assessed potential odour impacts. As outlined in **Section 15.4.2**, the proposed Facility is not expected to generate offensive odours that would be detected at any off site receptor locations.
2.5 Stormwater Management, Infrastructure, and On-Site Services		
2.5.1 Essential Infrastructure		
P1.1 Essential infrastructure is efficiently provided to all development, including the delivery of: • A satisfactory supply of water, • Electricity, • Communications, including data cabling, • The sustainable management of sewage, • Reticulated natural gas.	**A1.1** Where the site is located within 100m of a reticulated sewer system, the development connects to this system. Where reticulated sewer is unavailable, the proposal must be able to demonstrate that site and soil conditions allow for the on-site disposal of sewerage and provides a similar or better service, while minimising environmental impacts.	The proposed Facility will be supplied with water, electricity and communications provision from nearby existing connections (see **Section 17.0**).
P2. The location and design of essential infrastructure minimises adverse environmental impacts in the short and long term.	A2.1 The location of infrastructure avoids areas of ecological or scenic value, and/or water bodies, waterways or wetlands, and minimises its impact on areas of native vegetation.	Water and electricity connections have been located along the central access way of the proposed Facility off The Weir Road, in order to avoid disruptions to areas of vegetation located along the front of the site.
P3. There is a water supply adequate for the intended use and for fire fighting purposes.	A3.1 Where the site is not connected to a reticulated water service, it has a minimum water supply of 10,000 litres available for fire fighting purposes. A3.2 When the water supply is provided in above ground tanks, the tank is supported by a fire-proof structure and is fitted with the necessary equipment to allow fire hose connection. A3.3 Where the site is connected to a reticulated water supply, but is located more than 90 metres from a fire hydrant point, it has a minimum water supply of 5,000 litres available for fire fighting purposes.	A reticulated water supply for potable water supply is only proposed for the site. Fire-fighting water supply would be supplied from onsite storage tanks (50kL) (See Section 7.3.1). The water storage tanks would feed a pump which supplies fire hose reels fitted to the exterior of the Office and Storage Shed buildings. The number of hose reels would be determined so that all points of the exterior of the buildings are covered by a 30m hose line length and the water stream from the end of the hose.

Performance Criteria	Acceptable Solutions	Consistency
2.5.3 Stormwater Management		
P1.1 The stormwater drainage system is planned and designed to ensure that natural watercourses and associated vegetation are maintained. **P1.2** Stormwater planning, including site layout and building design is undertaken to ensure: • The design of the drainage system takes full account of the existing downstream systems. • A variety of controls are incorporated into the design of the system that minimise the impacts on water quality and quantity of stormwater run-off from the site. • The system is accessible and easily maintained. • Maintenance access is available to those parts of the system located on private land. • The selection of materials and methods are based on their suitability, durability and cost-effectiveness, including maintenance costs.	**A1.1** The design of drainage systems protects natural watercourses and riparian corridors by avoiding disturbance, redirection, reshaping or modification of natural systems. This design complies with Volume 2 Engineering Guidelines – *Design and Construction Specifications* (LMCC 2003). **A1.2** A Stormwater Management Plan is prepared and lodged that demonstrates the development's ability to meet the principles of water cycle management in the design of the system and incorporates a variety of suitable source controls, conveyance controls and discharge controls.	As outlined in **Section 7.0**, a proposed stormwater "treatment train" incorporating WSUD techniques is to be adopted for the site (in accordance with *LMCC DCP No.1 2006*) that would mitigate the effects of stormwater discharges on receiving environments.
P2.1 Stormwater discharge to surface and underground receiving waters during pre and post construction does not degrade the quality of receiving waters. **P2.2** The stormwater management system optimises the interception, retention and removal of water borne pollutants before their discharge to receiving waters. **P2.3** Point sources of pollution in the catchment are identified and their impacts minimised until they	**A2.1** Development complies with the provisions outlined in *Managing Urban Stormwater – Soils and Construction* (EPA 1998). **A2.2** No Acceptable Solution prescribed. **A2.3** No Acceptable Solution prescribed. **A2.4** Water pollution control ponds, wetlands, or other water quality improvement devices are provided for the treatment of stormwater run-off before discharge from the site and are located to minimise negative impacts on the natural environment. The design and construction of water pollution minimisation systems complies with Volume 2 Engineering Guidelines - *Stormwater Treatment Framework and*	The proposed treatment train would include the following controls: • buffer strips around stockpiles, • drainage swale flow path to sedimentation pond, • sedimentation pond, • bioretention system, • bypass swale, • main storage pond, • on-site water reuse, • rainwater tanks and • additional smaller water storage ponds As outlined in **Section 7.0**, the proposed water treatment system and expected pollutant removal is considered adequate to ensure the water quality discharged from

Performance Criteria	Acceptable Solutions	Consistency
can be eliminated. **P2.4** The stormwater management system minimises the environmental impact of urban run-off on the quality of surface or ground receiving waters and on other aspects of the environment, such as ecologically valuable areas, ecological corridors and water bodies, waterways and wetlands.	*Stormwater Quality Improvement Device* (LMCC 2004) and *Managing Urban Stormwater: Treatment Techniques* (EPA, 1997).	the site does not result in significant impacts on the downstream ecological communities.
P2.5 The first flush is diverted from sensitive areas or treatment systems are installed to minimise polluted run-off entering receiving waters.	**A2.5** Water quality protection measures, such as: • Bunding and/or roofing of storage and process areas to contain possible leaks and/or spills in all potential conflict areas. • 'First flush' systems. • Silt and/or oil traps and rubbish collectors. • Establishing formal Trade Waste Agreements with Hunter Water. are incorporated into the development to control and direct polluted run-off.	As above.
P3.1 Natural water bodies, waterways and vegetation are retained and protected from increased stormwater flows.	**A3.1** A variety of suitable source, conveyance and discharge controls are provided and utilised to minimise the increase in stormwater flows both for smaller (frequent) and larger (less frequent) rainfall events.	See above comment.
2.6 Transport, Parking, Access and Servicing		
2.6.2 Traffic Generating Development		
P1. Development with high traffic generating potential adequately considers transport/land use issues.	**A1.2** A Traffic Impact Statement for development identified in Schedule 1 and 2 of SEPP 11 – Traffic Generating Developments is prepared and lodged.	A Traffic Impact Assessment has been prepared for the proposed Facility. As outlined in **Section 10.0**, the assessment found that the surrounding road network would operate with an acceptable level of service as a result of the proposed Facility.
2.6.6 Vehicle Parking Provisions		
P1. Development achieves adequate provision of on-site vehicle parking that is clearly defined, safe and easily accessible.	**A1.** The provision of on-site vehicle parking complies with Table 4 – Vehicle Parking Provision. Industry - 1 space per 100m2 GFA, plus 1 space per 50m2 ancillary office space.	A total of six car parking spaces are proposed for the Facility, which is considered acceptable for the anticipated onsite workforce of five full-time staff.
2.6.8 Vehicular Access		
P1. Site access is suitably located and designed to optimise public safety and	**A1.3** When determining the location of an access driveway, the following design constraints are taken into consideration:	All access for construction and operation of the proposed Facility would be via a single entry / exit point located at the centre of the site along The Weir Road. A new two lane –

Performance Criteria	Acceptable Solutions	Consistency
convenience.	• Characteristics of frontage road, such as road type, traffic volumes and vertical and horizontal geometry, • Sight distance requirements, • Location of intersections, median openings and other driveways, • Queue and turn lane lengths, • Location of existing utilities, power poles and street lighting, • Location of existing bus stops, taxi ranks, traffic control devices and significant trees, • Pedestrian and cyclist requirements, • Requirements of the Roads and Traffic Authority (RTA). • Requirements of the NSW Fire Brigades, • Requirements of the NSW Rural Fire Service.	two way road is proposed to intersect The Weir Road in a Basic Right Turn (BAR) arrangement to facilitate this access. This treatment would provide sufficient trafficable width for heavy vehicles to pass on the left of a single unit stationary vehicle. The new access road leading into the site would be sealed for the length from The Weir Road to the weighbridge and 20m beyond. A network of perimeter fire trails [proposed and existing] has been included within the design of the Facility to provide fire-fighting access between the buildings and storage facilities within the site and the adjacent bushfire prone vegetation.

4.0 Consultation

4.1 NSW Formal Procedures

This EA has been prepared in accordance with Part 3A of the *EP&A Act* and its Regulation. Part 3A of the *EP&A Act* ensures that the potential environmental effects of a proposal are properly assessed and considered in the decision making process.

In preparing this EA, the DGRs have been addressed as required by Clause 75F of the *EP&A Act*. The key matters raised by the Director General for consideration in the EA are outlined in Table 4-1 below, together with the relevant section of the EA which addresses that matter. A full copy of the DGRs project is provided in **Appendix A**.

Table 4-1 Director General's Requirements

Director General EAR	Reference in EA
General Requirements	
• An executive summary.	**Page xiii**
• A detailed description of the project, including the: - need for the project; - alternatives considered; - engineering and/or architectural plans for the proposed building works; and - various components and stages of the project.	**Sections 1 and 2 and Appendix B.**
• Consideration of the project against any relevant statutory provisions, including whether it is consistent with the objects of the *Environmental Planning and Assessment Act 1979.*	**Section 4.0**
• A general overview of all the environmental impacts of the project identifying the key issues for further assessment.	**Section 5.0**
• A detailed assessment of the key issues specified below, and any other significant issues identified in the general overview of environmental impacts of the project (see above), which includes: - a description of the existing environment; - an assessment of the potential impacts of the project, including any cumulative impacts; - a description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage, and/or monitor the impacts of the project.	**Sections 6.0 – 20.0**
• A Statement of Commitments, outlining the proposed environmental management, mitigation, and monitoring measures for the project.	**Section 21.0**
• A conclusion justifying the project, taking into consideration the cost and benefits of the project and the suitability of the site.	**Section 21.0**
• A signed statement from the author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading.	**See cover page**
Key Issues	
• **Development Controls** – demonstrate that the proposal is generally consistent with the *Lake Macquarie Development Control Plan*; and justify any inconsistencies between the project and the DCP.	**Section 3.5.2**

Director General EAR	Reference in EA
• **Waste Management** – describe what measures would be implemented to control the inputs and outputs of the proposed Facility; and demonstrate that all reasonable and feasible measures would be implemented to maximise resource recovery from the waste stream.	**Section 2.0 and 19.0**
• **Soil and Water** – including: - the proposed erosion and sediment controls during construction; - the proposed stormwater management system, including the capacity of the onsite detention systems, and management to treat, reuse or dispose of water; and - consideration of the potential acid sulfate soils, salinity, soil contamination and flooding impacts of the proposal.	**Sections 2.4.2, 6.0 and 7.0** **Appendix E, F and G**
• **Flora and Fauna** – including any threatened species, populations and ecological communities; the aquatic ecosystems, especially in the surrounding wetlands; and any native vegetation.	**Section 8.0** **Appendix H**
• **Odour and Air Quality**	**Section 15.0** **Appendix N**
• **Noise** – including construction, operational and traffic noise.	**Section 16.0** **Appendix O**
• **Traffic and Transport** – including: - a detailed traffic impact study of the project on the safety and performance of the surrounding road network, and a description of the measures that would be implemented to upgrade and/or maintain this network over time; - an assessment of the potential parking demand of the project; and - detailed plans of the proposed layout of the internal road network and parking on site in accordance with the relevant Australian standards.	**Section 2.5 and Section 10.0** **Appendix J**
• **Greenhouse Gas and Energy** – calculate the scope 1 and 2 emissions of the project, and describe what measures would be implemented to ensure the operations on site are energy efficient.	**Section 18.0** **Appendices P and Q**
• **Hazards and Risk** – including a PHA of the project, and an assessment of the potential bushfire risks of the project.	**Section 13** **Appendix L**
• **Visual Impacts** – including landscaping, the design and articulation of any buildings (scale, height and bulk), lighting, any signage; impacts of views and any measures to mitigate impacts.	**Sections 2.6 and 14.0** **Appendix M**
• **Heritage**	**Section 9.0** **Appendix I**

Director General EAR	Reference in EA
Consultation	
During the preparation of the Environmental Assessment, you should consult with the relevant local, State or Commonwealth government authorities, service providers, community groups or affected landowners. In particular you must consult with the: • Department of Environment and Climate Change • Department of Water and Energy • Roads and Traffic Authority • Rural Fire Service The consultation process and the issues raised must be described in the Environmental Assessment.	**Section 4.2**

4.2 Consultation with Stakeholders and Other Relevant Authorities

The proponent has undertaken consultation with key local and state Government agencies as specified in the DGRs during the preliminary design phase and preparation of this EA. The purpose of this consultation has been to provide an overview of the project and to seek input into matters agencies would like to see addressed in the EA. **Table 4-2** below summarises the responses received together with the relevant section of the EA which addresses the matter. All formal responses provided as a result of agency consultation are included in **Appendix R** of this EA.

Table 4-2 Agency Responses

Agency	Agency	Reference in EA
DECCW	**Construction** Details are required of the proposed capping material, including how the Proponent will ensure material meets relevant conditions of DECCW Resource Recovery Exemptions, how the capping layer will be marked and how the depth of the capping layer will be measured. Clarification as to whether the site will be fully capped prior to waste being accepted. Details on site validation report. **Waste** Details requested with regard to whether composting is proposed. Information regarding management of stockpiles. **Water Management and Leachate** Details required with regard to the construction of water detention ponds and potential impacts of water discharge on the surrounding environment. **Air Assessment** Submission of a quantitative modeling assessment of all proposed odour sources. Assessment to quantify potential dust emissions and nominate specific dust control strategies. **Threatened Species and Biodiversity Conservation** Clarification on whether the development footprint will remain within the cleared/disturbed land. Details of any proposed offset/compensatory habitat to compensate for impacts of the Facility. Details relating to the specific bush regeneration and weed management proposed within the exiting vegetation remnants.	**Section 2.3** **Section 2.4 and Section 19.0** **Section 7.0** **Section 15.0** **Section 8.0 and Section 14.0**

Agency	Agency	Reference in EA
RTA	**Traffic** A Traffic Impact Study should be undertaken in accordance with the RTA's Guide to Traffic Generating Developments and include the following: • current traffic counts and 10 year traffic growth projections • with and without development scenarios considered • 95th percentile back of queue lengths • delays and level of service on all legs for the relevant interactions • use of SIDRA or similar traffic model • electronic data for RTA review The cumulative traffic impacts of the proposal and other major developments in the area should be included in the above network and intersection analysis.	**Section 10.0 and Appendix J**
Lake Macquarie City Council	No comments received.	N/A
DoP Hunter Region	No comments raised.	N/A
DoP Heritage Branch	**Heritage** Assessment of the heritage significance of the site and any impacts the development may have upon this significance. Assessment should include natural areas and places of Aboriginal, historic or archaeological significance and include a consideration of wider heritage impacts in the area surrounding the site. Consult heritage lists from: • State Heritage Inventory • Lists maintained by the National Trust of Australia • Heritage listed under the Australian Government's Environment Protection and Biodiversity Conservation Act 1999 • Lake Macquarie City Council . Non-Aboriginal heritage items within the area affected by the proposal should be identified by field survey. Assessment of items should be undertaken in accordance with the guidelines in the *NSW Heritage Manual*. The proposal should have regard to any impacts on places, items or relics of significance to Aboriginal people. The relics provisions in the *Heritage Act* require an excavation permit to be obtained from the Heritage Council, or an exception to be endorsed by the Heritage Council, prior to commencement of works if disturbance to a site with known or potential archaeological relics is proposed. If approval is required under the Heritage Act the Heritage Council's approval must be sought prior to an approval being issued by the consent authority under the *Environmental Planning and Assessment Act 1979*.	**Section 9.0 and Appendix I**
Hunter - Central Rivers Catchment Management Authority (CMA)	No comments received.	N/A

Agency	Agency	Reference in EA
Industry and Investment - Fisheries	No comments raised.	N/A
Industry and Investment - Mining	**Compliance** Compliance with appropriate Mine Subsidence Board guidelines.	**Section 11.0**
NSW Office of Water	**Water Management** Size, capacity and depth of excavation for the stormwater retention ponds and if the ponds are to have impermeable liners. Details for water supply, use of recycled water, sewage services and/or treatment of effluent (if applicable) **Groundwater** Licence details and the location of the then (10) ground water bores.	**Sections 2.4.2, 6.0, 7.0 and 17.0 and Appendix F.** The only known 7 groundwater monitoring wells at the site are discussed in **Section 6.2.3**
NSW Rural Fire Service (RFS)	**Hazard and Risk** Afford occupants of any building adequate protection from exposure to a bush fire. Provide appropriate separation between the bush fire hazard and buildings to prevent flame contact and material ignition. Ensure that safe operational access and egress for emergency service personnel and occupants is available. Provide for the ongoing management of asset protection zones. Ensure that utility services are adequate to meet the needs of fire fighters and others assisting in bush fire fighting.	**Sections 2.0** and **12.0 and Appendix K.**
Energy Australia	No comments raised.	N/A
Mine Subsidence Board (MSB)	**Geotechnical** If any of the proposed structures are likely to be sensitive to, or damaged by, future mine subsidence, some geotechnical investigations of the abandoned mine workings may be required.	**Section 11.0**
Hunter Water	No comments raised.	N/A

The Aboriginal Heritage Assessment undertaken as part of this EA also involved consultation with the Koompathoo Local Aboriginal Land Council (KLALC). Results of this consultation are summarised in the Aboriginal Cultural Heritage Assessment discussed in **Section 9.0** of this EA and included within **Appendix I.**

5.0 Issues Prioritisation

5.1 Issue Identification

A preliminary assessment of environmental issues associated with the project was undertaken for the PEA prepared in respect of the proposed Facility. Key environmental issues identified in the PEA included:

- ASS;
- surface and ground water contamination;
- flooding;
- flora and fauna;
- noise generation;
- dust generation;
- traffic impact;
- greenhouse gas emissions;
- contaminated land; and
- location of power easement.

5.2 Prioritisation of Issues

5.2.1 Approach

The prioritisation of issues for the proposed Facility was based on the need to recognise that a higher degree of assessment is required for the issues with the highest severity and greatest consequences. **Table 5-1** shows the issues prioritisation matrix used to identify priorities. Each issue was given a ranking between one and three for the severity of effects and the perceived consequences of those effects if left unmanaged. These two numbers were added together to provide a numerical ranking for the issue that was used to categorise each issue into high, medium and low priorities.

Table 5-1 Issues Prioritisation Matrix

Severity Of Effects	Consequence of Unmanaged Effects		
	3 High	2 Medium	1 Low
1 Low	4 (Medium)	3 (Low)	2 (Low)
2 Medium	5 (High)	4 (Medium)	3 (Low)
3 High	6 (High)	5 (High)	4 (Medium)

5.2.2 Assessment

The prioritisation of environmental issues in the PEA as they related to the proposed Facility is shown in **Table 5-2**.

The allocation of risk is based upon the following considerations:

Severity of Risk

Low: localised implications; imperceptible or short term cumulative impacts.

Medium: regional implications; modest or medium term cumulation of impacts.

High: inter-regional implications: serious or long term cumulation of impacts.

Consequences of Unmanaged Effects

Low: minor environmental change; offsets readily available.

Medium: moderate adverse environmental change; offsets available.

High: important adverse environmental change, offsets not readily available.

Table 5-2: Prioritisation of Environmental Issues

Issue	Severity	Consequence	Priority
Aspect: Hazard and Risk			
Exposure of surrounding land uses/population to risks and hazards	2	2	**4 (Medium)**
Exposure of employees to risks and hazards	2	2	**4 (Medium)**
Aspect: Water Quality			
Degradation of surface water quality during construction	2	2	**5 (High)**
Contamination of surface water resulting from operation	2	2	**5 (High)**
Consumption of potable water resources during construction	1	1	**2 (Low)**
Consumption of potable water resources during operation	1	1	**2 (Low)**
Aspect: Geology and Soils			
Erosion and sedimentation during construction	2	2	**4 (Medium)**
Spread of contaminants off-site during construction/operation	2	2	**4 (Medium)**
Aspect: Waste Management			
Potential contamination of land and water as a result of inappropriate handling of waste	2	2	**4 (Medium)**
Aspect: Air Quality			
Construction related impacts on air quality	1	2	**3 (Low)**
Emissions to the atmosphere with the potential to result in degradation of air quality in the local area (including dust)	2	3	**5 (High)**
Emissions of greenhouse gases (GHG) due to the proposed Facility	2	2	**4 (Medium)**
Aspect: Visual			
Impacts of development on visual landscape	2	1	**3 (Low)**
Visual impact on nearby residents	2	1	**3 (Low)**
Aspect: Noise and Vibration			
Temporary noise nuisance to surrounding area during construction	1	2	**3 (Low)**
Noise nuisance to surrounding area during operation	2	2	**4 (Medium)**
Aspect: Ecology			
Loss of habitat due to clearing	1	1	**2 (Low)**
Reduction in biodiversity due to loss of habitat for native species	1	1	**2 (Low)**

Issue	Severity	Consequence	Priority
Impact upon EEC's	1	2	**3 (Low)**
Impact upon SEPP 14 wetland	1	2	**3 (Low)**
Aspect: Traffic and Transportation			
Increase in traffic on local road network during construction	2	2	**4 (Medium)**
Increase in traffic on local road network during operation	2	2	**4 (Medium)**
Aspect: Social and Economic			
Impacts upon amenity such as noise, visual, etc	1	2	**3 (Low)**
Job creation during construction	1	1	**2 (Low)**
Job creation during operation	1	1	**2 (Low)**
Aspect: Heritage			
Damage or removal of Aboriginal artefacts or places	1	2	**3 (Low)**
Detrimental impact upon items of non-indigenous heritage significance	1	1	**2 (Low)**
Aspect: Land Use			
Inappropriate use of land	1	2	**3 (Low)**
Incompatibility of land use with surrounding environment	1	2	**3 (Low)**

Table 5-3 identifies that the prioritisation of environmental issues, and therefore the PEA identified that the focus of assessment for the proposed Facility in the EA should be as follows.

Table 5-3 Prioritisation of Issues

Low	Medium	High
Water Quality (consumption of potable water) Air Quality (construction impacts) Visual Noise and Vibration (construction) Ecology Social and Economic Heritage Land Use	Hazard and Risk Geology and Soils Waste Management Noise and Vibration (operation) Traffic and Transportation Air Quality (greenhouse gases)	Air Quality (atmospheric emissions) Water Quality (contamination and degradation)

6.0 Geotechnical and Contamination

6.1 Introduction

Investigations to determine the environmental and geotechnical suitability of the site for a proposed Recycling Facility were carried out by PB in 2008. The investigation was designed to establish the baseline conditions for the site and address the following issues:

- Soil and groundwater contamination;
- Earthworks for proposed filling;
- Likely settlements associated with the filling of the site and stockpiling of materials;
- Foundation conditions and footing design parameters for proposed structures;
- Pavement design for the bulk haulage access road;
- Sedimentation and erosion impacts on the receiving environment;
- Geotechnical aspects of the proposed stormwater retention ponds; and
- ASS.

Investigation results were presented in the following environmental reports (provided in **Appendix C**):

- PPK (2002) *Site Assessment and Remediation Full Report - Former Sanitary Waste Depot, Racecourse Road,* Teralba, NSW; and
- PB (2008) *Geotechnical and Environmental Site Assessment at Lots 42-43 and 53-54 DP16062, The Weir Road Teralba,* August 2008 (Geotechnical Report).

In addition to the above listed reports, PB prepared the following documents to address contamination and ASS identified at the site during the assessment:

- PB (2008) *Remedial Action Plan, The Weir Road, Teralba,* NSW, November 2008 (RAP); and
- *Acid Sulphate Soil Management Plan for the Proposed Recycling Facility at Teralba*, January 2009 (ASSMP)

It should be noted that the proposed Facility is located in the western section of a larger portion of land referred to as the Former Sanitary Waste Depot and which was denoted as Area A by PB during the 2002 investigation. Contamination issues related to other parts of the Former Sanitary Waste Depot, denoted as Area B and Area C, are not assessed given that these areas are located outside the boundary of the proposed Facility.

Additional sampling was carried out by PB at the site in 2008 to supplement the findings obtained from the 2002 investigation. This combined data set forms the baseline environmental conditions for the proposed development and is outlined in the section below, along with the potential impacts that current site conditions may have on the proposed development.

6.2 Site Characteristics

6.2.1 Topography

PB (2008) reported that the subject site is gently undulating, and the ground surface is hummocky and irregular due to the presence of fill with troughs up to approximately 1 m in depth. Generally, the site slopes at $<5^0$ to the south.

6.2.2 Geology and Soils

The Newcastle Coalfield Geology Map indicates that the subject site is underlain by Quaternary gravel, sand, silt and clay, which was confirmed by PB during the 2008 field investigation.

PB (2008) reported that the site typically comprised uncontrolled fill consisting of soft to stiff clay and very loose to medium dense sand, silt, gravel and clay, to depths greater than 2.9m. Topsoil was noted in five test pits, mainly located in the eastern portion of the site.

Fill materials were underlain by firm to stiff alluvial sandy clay, and loose to medium dense silty sand and clayey sand to depths greater than 3.5m. The alluvial sand and clay extended to depths of 16.5 to 19 m followed by highly weathered, medium strength sandstone.

6.2.3 Groundwater

There are currently seven groundwater monitoring wells at the site. In addition, eight monitoring wells were also installed by PB in 2002 in the other parts of the Former Sanitary Depot. PB (2008) encountered groundwater between 0.6m to 2.8m during the subsurface investigation predominantly within the fill materials. PB reported that the groundwater gradient was relatively flat with a slight slope to the northeast towards Cockle Creek, which is located 200 m from the site. Measured groundwater quality parameters indicate that the groundwater environment is slightly acidic and fresh to slightly saline.

The groundwater levels are relatively close to the surface with records of groundwater level of 0.5m RL in dry periods and 1.5-1.8m RL in recent monitoring following high rainfall.

6.2.4 Nature, Source and Extent of Subsurface Contamination

Reported site history indicated that the land had been used for agricultural purposes prior to the early 1960s and has since then been used as a night soil dumping site and for sewage treatment. It is noted that the Former Pasminco Cockle Creek Lead Smelter is located some 500m northeast of the site and fall out emissions from the smelter and use of smelter slag material as fill, has resulted in metal impacted surface soils across the region.

The central portion of the Former Sanitary Depot was cleared for toilet pan disposal in 1961. Sludge disposal was also undertaken at the site. The operation expanded throughout the 1970s with additional clearing and trenching in the northern and southern parts of the Depot. The toilet pan disposal area was later cleared and covered by coal chitter from an unknown source.

The dumping of Pasminco smelter slag on-site is also known to have occurred. An additional evaporation pond was constructed in the 1980s and an aeration system was established in the central section of the Former Depot in the 1990s. Soil analytical results indicated that elevated concentrations of total petroleum hydrocarbons (TPH) and some heavy metals (including arsenic, copper, lead, manganese and zinc) were reported above the *National Environment Protection Measures Health Investigation Level (NEPM HIL) 'F' – Commercial / Industrial Guideline* (1999) or the NSW EPA *Service Station Guideline* (1994) for sensitive land use in the northern, western and southern portions of the site (denoted as TP11, TP16 and TP19, respectively).

PB assessed that the depth of the contamination was restricted to the surface fill material at a depth of approximately 0.1m below ground surface (bgs). The lateral extent of the impact was evaluated at each location and the following volumes of impact were estimated by PB:

- TP11 – 84 m^3;
- TP16 - 108 m^3; and
- TP19 - 8 m^3.

PB attributed the contamination to the placement of smelter slag from the former Pasminco Cockle Creek Lead Smelter and not past activities associated with the Former Sanitary Waste Depot.

A review of the soil analytical results obtained in the 2002 investigation indicated that concentrations for all potential contaminants of concern were reported below the above guideline adopted.

Elevated concentrations of heavy metals, total nitrogen and ammonia were reported above the *Australian and New Zealand Environment Conservation Council and Agricultural Resource Management Council of Australia and New Zealand 2000 Australian and New Zealand Guidelines for Fresh and Marine Water Quality* Freshwater Guidelines (ANZECC 2000) in the groundwater samples collected from the 2008 field investigation. The impacted groundwater was attributed to the leaching of chemicals from the fill material and/or sanitary waste historically disposed of at the site. PB (2002) reported that groundwater contamination was also identified in other parts of the Former Sanitary depot.

A review of the vapour monitoring results obtained in 2002 (PB, 2002) indicated that elevated concentrations of methane were noted in one of the monitoring points located within the site. It was also noted that methane gas has been detected in the former pan disposal area, to the east of the proposed Facility (denoted as Area B in 2002). Vapour monitoring was not carried out as part of the investigation in 2008.

The presence of ASS was confirmed during the two investigations. It is noted that ASS would be managed in accordance with the *Acid Sulphate Soil Management Plan* (PB, 2008) during construction works.

Based on the findings of the investigations, PB (2008) recommended that the construction of a capping layer over the contaminated areas would be the most suitable remedial option for the site. PB recommended that the

capping layer be constructed using clean imported fill materials, potentially sourced from other ongoing developments within the Lake Macquarie area.

Additionally, PB recommended that additional groundwater monitoring be conducted prior to the commencement of construction works, in order to monitor the trend of groundwater quality beneath the site, as well as the potential for off-site migration of identified groundwater contamination.

6.3 Assessment of Impacts

6.3.1 Construction Impacts

The potential construction impacts associated with the development of the site are detailed below:

Soils

Given a capping layer is proposed to be constructed, it is anticipated that excavation works would be limited in the early stage of the construction works and that further excavation works would be restricted to the construction of foundations for the heavily loaded structures with limited disturbance.

Some excavation works would be carried out during site preparation and construction activities. Soils may also be disturbed as a result of construction vehicle traffic movements around the site.

Should surplus materials be generated during construction and/or development works, the materials would be temporarily stockpiled on-site and then transported off-site to a licensed landfill facility. If off-site disposal is required, characterisation sampling should be carried out in accordance with regulatory standards and guideline practices.

Surface runoff including sediment loads would also require management to protect the environmental quality of nearby wetlands and Cockle Creek. Soil and erosion mitigation measures to be included in the CEMP are considered to be sufficient to mitigate potential impacts.

Excavation of ASS would need to be carefully managed and appropriate measures would be implemented in accordance with the *Acid Sulphate Soil Management Plan* (PB, 2008) (refer to **Appendix E)**.

Contaminated Materials

The main potential impact associated with the construction phase of the development relates to the mobilisation and/or migration of the contaminated soils and groundwater to off-site locations, and in the case of soils, via vertical migration as a result of leaching during foundation construction.

Although the majority of the existing fill material would remain on-site, minor disturbance of the fill material may occur during the construction of the capping layer and appropriate environmental measures must be implemented to prevent off-site migration of the fill materials. Erosion and sedimentation control measures would be implemented during construction works.

There is a potential however for construction activities to cause minor contamination of soils, resulting from oil and/or fuel leaks from operating construction equipment. Impacts could also occur during operating equipment refuelling and minor maintenance activities. Management of such incidents would be described in the CEMP.

Elevated concentrations of methane gas were detected in one of the groundwater monitoring wells located on the site in 2002. While higher concentrations were reported in the adjacent former pan disposal area, given the presence of the uncompacted fill materials across the site, methane gas migration may occur under certain conditions. Methane monitoring would be carried out during and post construction to address potential human health risks and generation of potential explosive environments which may be hazardous during operation of the proposed facility.

If methane monitoring suggests that methane is being generated at significant concentrations at the site, appropriate mitigation measures would be included in the CEMP prior to construction occurring.

6.3.2 Operational Impacts

Cap and contain is the most reliable remediation strategy to mitigate the risk to human health, via exposure to contaminated fill materials and possibly improve the quality of groundwater beneath the site, by mitigating rainfall infiltration through the subsurface profile. The cap would provide a physical barrier preventing future site users from accessing contaminated soils and minimising future potential impacts to the surrounding environment.

The construction of the capping layer would generally be undertaken in accordance with the strategies detailed in the RAP (refer to **Appendix D**). All materials imported onto the site to form the capping layer are to be sourced from LMCC works and more importantly this material must be certified as VENM or ENM as discussed in Section 2.3.1 of this EA. In addition the material would need to be geotechnically suitable for the proposed development.

The OEMP for site operations would address residual contamination remaining at the Site. The OEMP would describe guidance and control measures required to manage potential risks to human health and the environment associated with exposure to residual contaminated materials at the site. For instance, if excavation is required as part of future site maintenance works, to extend beyond the limit of the capping layer, then these earthworks would be conducted in accordance with health and safety and environmental measures described in the OEMP.

An ongoing groundwater monitoring programme would be detailed in the OEMP based on the recommendations provided in the RAP, to assess for groundwater impacts associated with the on-site soil impacts and the potential for off-site migration of associated contaminants in the groundwater. Groundwater monitoring would be carried out to establish the trend of groundwater flow, migration pathways, contamination fate and monitored natural attenuation.

6.4 Environmental Safeguards

The site is currently vacant and based on the findings of the field investigation it is not suitable for use for the proposed Facility in its current condition.

Construction and operational impacts would be addressed though the implementation of appropriate management and mitigation measures as described in the RAP, *Acid Sulphate Soil Management Plan*, CEMP and OEMP. The current RAP contains mitigation measures for the handling of contaminated soils and groundwater, however additional measures are recommended to be implemented in conjunction with the RAP as follows.

- **Design and placement requirements for the capping layer**
  - A detailed design specifying the construction/composition requirements for the capping layer should be developed. The design should consider mitigation of rainfall infiltration and migration of methane vapours.
  - Fill material imported onto the site must be certified as clean and geotechnically suitable.
- **Environmental Management Plans (Construction and Operational)**
  - The site CEMP would describe appropriate environmental measures required to be implemented for the proposed excavation work.
  - The OEMP would describe measures which would mitigate the risk that site conditions, such as contaminated fill materials and groundwater and methane vapours may pose to human health and the environment.
- **Erosion and Sediment Control**
  - Erosion and sedimentation control measures would be included in the CEMP and OEMP as mentioned above and would include specific measures such as silt fencing and bunding where required.
- **Groundwater monitoring**
  - AECOM concur with PB that additional groundwater monitoring should be conducted to establish, with a greater level of confidence, groundwater flow direction, hydraulic conductivity and whether identified contaminated groundwater is migrating off-site.
  - It is recommended that an additional round of monitoring be conducted during pile construction, so that groundwater levels can be monitored to evaluate the significance of draw down of the groundwater table.
  - It is also recommended that a contingency plan be considered in the event that groundwater quality does not improve following the placement of the cap and/or contaminated groundwater is migrating off-site.
- **Methane monitoring**
  - Methane was identified as an issue during the PB 2002 investigation. This matter should be investigated further and the potential hazards that vapour generation poses to both the construction and future site workers should be evaluated.
- **Site Validation Report**
  - It is recommended that a Site Validation Report is prepared following placement of the capping layer and the additional groundwater, surface water, sediment and methane monitoring, to certify that the site is suitable for operation of the recycling facility.

6.5 Conclusion

With the implementation of the above management strategies as part of the CEMP and OEMP, the potential impacts relating to contamination from past land uses can be effectively mitigated.

7.0 Stormwater Management

7.1 Introduction

AECOM was commissioned to prepare a *Water Cycle Management Plan* for the proposed Facility. This section provides an overview of the *Water Cycle Management Plan*. The full plan is included as **Appendix F** of this EA.

7.1.1 Water Management Objectives

The objectives of the *Water Cycle Management Plan* for the proposed Facility are to:

- *Provide sufficient water storage on site to provide a sustainable and reliable water supply for operational demands of the facility such as for dust suppression and mill/crushing plant demands;*
- *Reduce the demand on potable town water supplies;*
- *Minimise changes in the hydrology of surface runoff from the site to mitigate potential impacts on the downstream receiving environment (freshwater wetlands and SEPP14 wetland downstream of the site);*
- *Remove stormwater pollutants from runoff to mitigate potential impacts on the downstream receiving environment.*
- *Ensure peak discharge from the developed site does not exceed the predevelopment peak discharge (for events up to the 1 in 2 year ARI storm event) in order to mitigate the risk of erosion along the flow paths towards the receiving environment and the SEPP 14 wetland;*
- *Provide adequate peak flow attenuation flood mitigation and potential spill containment storage for events up to the 1 in 100 year ARI storm event;*
- *Prevent external flood waters entering the site by raising the site level and providing perimeter earth bunding.*

7.1.2 Water Quality Objectives and Targets

Based on the proposed facility usage and operations, the expected pollutants that may be produced and could potentially contaminate stormwater runoff within the site would include the following:

- gross pollutants (debris, vegetation litter);
- oils and greases (from vehicles and operational plant);
- coarse sediments (from rock/soil/aggregate stockpiles);
- suspended (fine) solids (from soil stockpiles);
- nutrients – nitrogen and phosphorus (from green waste stockpiles); and
- heavy metals (which could potentially be present in feedstock).

For the proposed Facility, an integrated water cycle management approach is to be adopted that would include both qualitative and quantitative performance objectives and targets. It is important that these targets can be, and are met, to ensure successful mitigation of development impacts upon the receiving environment.

7.1.3 Statutory Requirements and Guidelines

There are various State and local planning documents and development guidelines that address development requirements associated with Water Cycle Management Strategies. The main relevant documents that have been reviewed in preparation of the *Water Cycle Management Plan* are as follows:

- *Lake Macquarie City Council DCP No.1 "Stormwater Management, Infrastructure and On-Site Services*" (Rev 3), dated February 2009.
- *Australian Runoff Quality (Draft*) – Institute of Engineers, Australian National Committee on Water Engineering, June 2003.
- *Managing Urban Stormwater: Environmental Targets*, Department of Environment and Climate Change, Consultation Draft, October 2007.
- *ANZECC Water Quality Guidelines (2000).*

7.1.4 Adopted Water Quality Targets

Based on the above review of various State and local planning documents and previous development guidelines that address water cycle management, **Table 7-1** provides water management targets and objectives that have been adopted for the proposed Facility.

Table 7-1 Adopted Water Management Targets

Objective	Performance Measure and Target
Water Quality	90% reduction in the average annual gross pollutant (size > 5mm) load*
	85% reduction in the average annual total suspended solids (TSS) load*
	65% reduction in the average annual total phosphorus (TP) load*
	45% reduction in the average annual total nitrogen (TN) load*
Flow Management	Post-development storm discharge to match pre-development storm discharges for the 1.5 year and up to the 100 year ARI peak flows

** Based on comparison with typical urban loads from a site of comparable impervious area*

7.2 Methodology

The following analyses were used to support the design of the water cycle management strategy.

7.2.1 Site Conditions and Constraints

The constraints considered in the preparation of the water cycle management strategy for the proposed Facility include:

- The site ground surface ranges from about RL 0.6m AHD in the south to approx RL 3.0m AHD in the north of the site. Therefore perimeter bunding would be required to prevent flood waters entering the site (RL 2.9m AHD for 100 year ARI flood event including climate change effects).
- The groundwater levels are relatively close to the surface which limits the depth of stormwater management ponds (records of groundwater level of 0.5m RL in dry periods and 1.5-1.8m RL in recent monitoring following high rainfall).
- Compacted fill material would be used to raise the site levels. The post development infiltration to groundwater would be limited, resulting in more runoff and representing a change from the predevelopment infiltration processes. Also water management strategies that rely on infiltration that slowly seep water into natural ground (ie. infiltration basins, porous pavements, irrigation) are therefore not considered appropriate for this site.
- The receiving environment includes sensitive ecological communities as outlined in the *Ecological Study* (Ecotone, 2008) in Appendix H to the EA. The vegetation communities include Ball Honeymyrtle Swamp Forest, Freshwater wetland, Swamp Mahogany / Paperbark / Woollybutt Swamp Forest and an area mapped as a SEPP 14 wetland.
- The downstream drainage line is a man made channel that passes through the communities mentioned above.
- Ecotone (2008) noted that the freshwater wetland is ephemeral.
- Ecotone (2008) also noted that the Ball Honey Myrtle Swamp forest would technically be classified as an EEC Sclerophyll Forest on Coastal Floodplain (SSFCF) but is dominated by Melaleuca nodosa which is not a characteristic species of that EEC.
- The discharge along the drainage flow path through the vegetation communities downstream would need to be managed to prevent any potential erosion points and ensure hydrologic conditions along this flow path are appropriate for these ecosystems.

The opportunities to be considered in the preparation of the water management strategy for the proposed Facility include:

- Surface slopes on the development site would generally be less than 1% therefore soil erosion of surface soils would be limited.

- The compacted fill material used to fill the site would minimise mobilisation of contaminants that have been identified on the site from historic land uses.
- The proposed Facility would have a relatively large non-potable water demand requirement for mill and crushing plants processes and for dust suppression, presenting the opportunity for stormwater reuse and recycling on site.

7.2.2 Flood Study

The site is within the floodplain of Cockle Creek which discharges into Lake Macquarie at its north western extent. The catchment for Cockle Creek is approximately 106km² and includes urban development to the north and east and vast undeveloped areas to the west.

In order to protect the proposed Facility from flooding inundation, it is proposed to fill the site to such a level and such a gradient as to be above any flood level and to grade surface water to the retention ponds. These works have the potential to then affect flooding levels in the vicinity. As a result, a *Flood Assessment Study* was undertaken by Lake Macquarie Council in 2009 to analyse and predict any changes to flood levels that may result following construction of the proposed Facility. The assessment included flood modelling of Cockle Creek in the vicinity of the site.

The results of the flood study are provided in the Council Report titled *"Analysis on the Impact of Flooding in Cockle Creek for proposed Construction of Recycling Waste Facility*, dated November 2009 and are included as **Appendix G.** A summary of the conclusions from the report are presented below:

- Modelling has shown that the proposed Facility has an insignificant impact on the existing flooding regime in Cockle Creek which is governed by a backwater phenomenon created at the confluence of Cockle Creek, Cocked Hat Creek and Brush Creek;
- An increase in flood level of 0.01m occurs at the upstream boundary of the site as a result of the proposed filling required for the Facility. This increase is negligible, given the vast extent of flooding in the area and is probably within the accuracy of the model;
- Due consideration has been given to the effect of climate change by conservatively increasing flows and downstream tail water controls. Modelling indicates that an increase in flood level, as a result of climate change, would be approximately 0.2m from RL2.7m AHD to RL 2.9m AHD at the site. It was also found that filling to the site in this scenario also resulted in a negligible increase of 0.01m at the upstream boundary of the site in comparison to pre-developed flood levels at that location; and
- It was concluded that the proposed Facility has negligible effect to the flooding regime of Cockle Creek and would not adversely affect upstream or downstream properties.

7.2.3 Water Balance Model

A water balance model was developed for the proposed Facility to understand the following:

- predicted daily stormwater runoff volumes and frequencies and impacts on hydrology;
- estimated pollutant loads and treatment train effectiveness in water quality improvement; and
- predicted storage volume fluctuations and water supply reliability

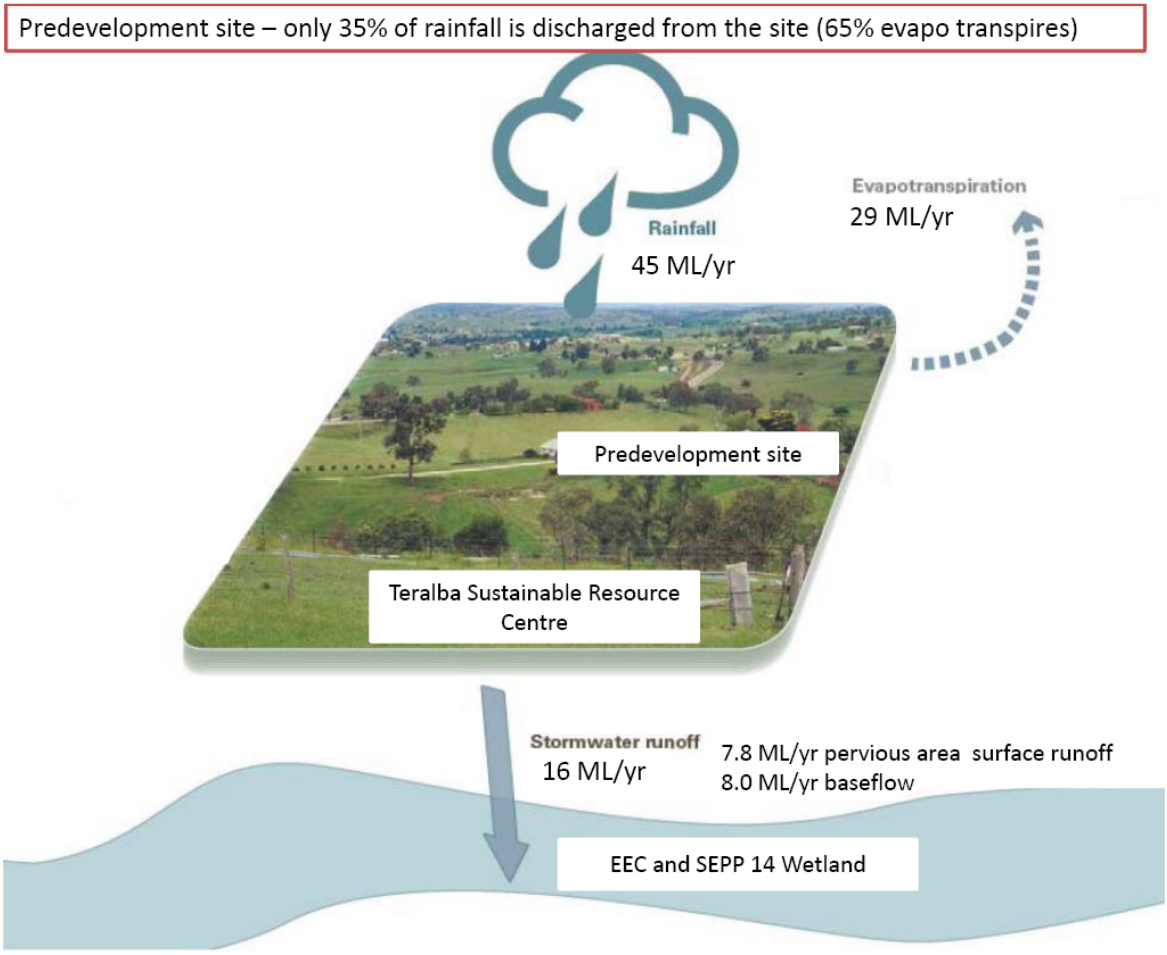
CiviLake has provided indicative daily usage requirements during operation of the proposed Facility as follows:

- pug mill requiring approximately 50kL of water per day (this is allowing for minimal moisture in the feed stockpiles);
- dust suppression (watering) requiring approximately 30kL of water per day; and
- concrete crushing requiring approximately 20KL of water per day for an estimated average one week/month operation during the year.

Based on the above, a maximum average daily usage of approximately 72kL/day is adopted as an estimate of operational water demands. Note that demands are likely to increase gradually as operations on the site increase over a number of years.

A preliminary water balance has been established for the site – in the pre-development (existing) condition and for the site once developed and operational (**Figure 7.1 and 7.2** below). The pre-development water balance illustrates the typical quantities of rain that fall on the site in an average year and the proportion that is lost via evapotranspiration and through runoff as surface and subsurface flow (groundwater). Approximately 8 ML/yr is discharged from the site as surface flow.

Figure 7-1: Pre-development Water Balance

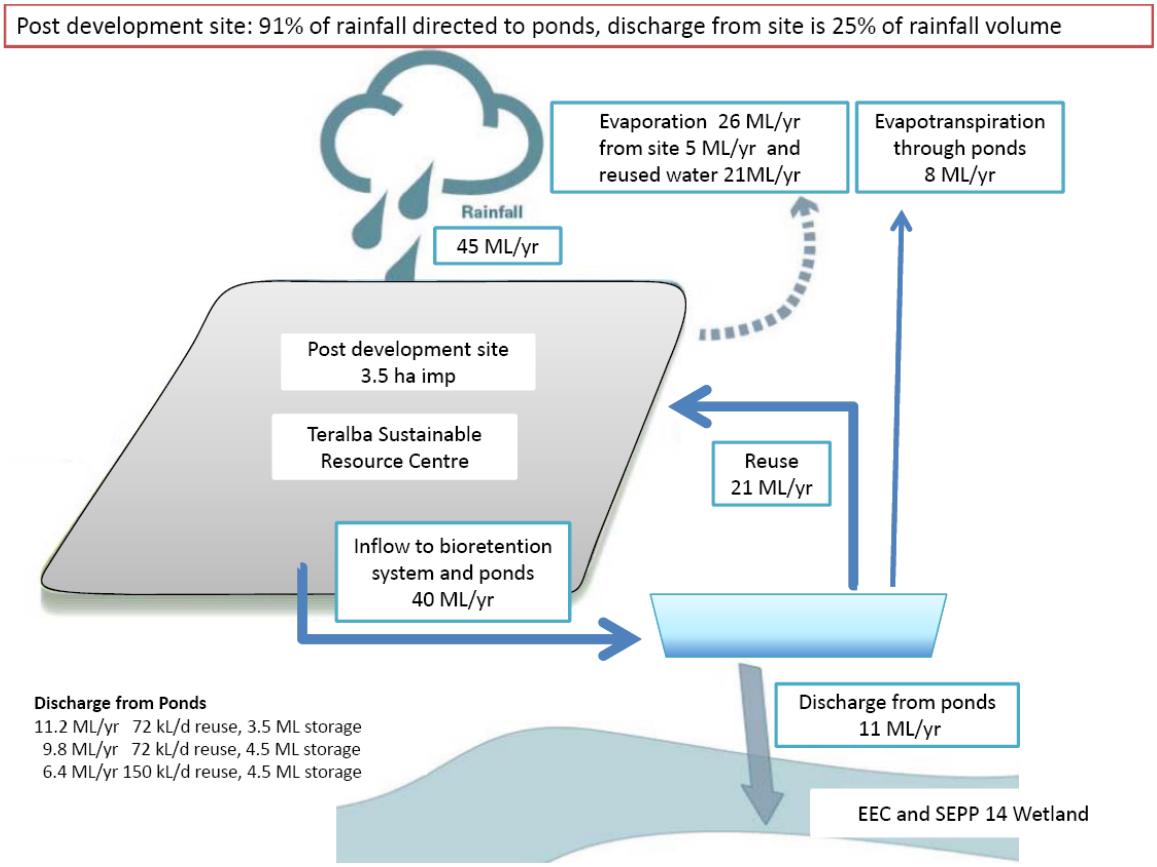


In the post development case, the site would comprise largely compacted earth (for stockpiling areas), buildings, vehicle parking and roadway areas. The internal site area that drains to the water quality treatment area has conservatively been assumed to be entirely impervious. Modelling indicates that almost all rainfall is directed to the water treatment ponds (90% of rainfall), with the remainder initially wetting the site and being lost to evaporation.

Key water balance components of the water directed to the ponds post developement, in an average year are summarised as follows:

- Evaporation - approximately 8 ML would evaporate,
- Reused / recycled within the site - 21 ML (80% of the estimated 26ML/yr demand)
- Discharged off-site - approximately 11 ML would exceed the storage capacity of the site and would be discharged off-site as surface runoff.

Figure 7-2: Post-development Water Balance



The water balance has indicated:

- *Changes in hydrology* - The development of the site would result in a small increase in estimated discharge of surface runoff from the site from 8 to 11 ML. Modelling of the site hydrology indicates that in the predevelopment case, runoff occurs on average 7 times a year (from approximately 100 days of rainfall each year). In the post development case, this is increased to 23 times per year. This indicates that reuse of water within the site would ensure that for the majority of events, discharge does not occur
- *Water reuse* - Surface water runoff from the site is to be collected and reused on the site for activities including dust suppression and the operation of the mill. The modelled reuse is estimated at approximately 21ML/yr (80% of the 26ML/yr demand) with periods where the storages would be dry and unable to meet the assumed uniform water demands of the site.
- *Operational control of water reuse to minimise changes in hydrology* - Reuse of stormwater is important in maintaining the existing hydrology to the downstream environment and therefore it is important that operations at the Facility maintain expected water reuse including when the site in not operational or operating at reduced capacity. It may be possible to increase the dust / irrigation usage (to nearly double that assumed in the modelling) to draw down the water storage capacity so as to reduce the volume of water discharged. Refining the design and operational procedures for the proposed water treatment system would enable the predevelopment mean annual surface runoff volume to be more closely matched. The adaptive operational management of water usage may also enable an even greater proportion of the expected demand to be met as the water usage can be reduced to the essential demands when storage levels are low and increased when pond storage levels are high. The reuse strategy would be developed as part of the OEMP for the site to manage expected discharge from the site and to ensure high supply reliability in meeting the reuse demands for water on the site.
- *Mitigating impacts from change in hydrology* - These changes in hydrology are not expected to have a significant impact on the receiving environment. Most wetland vegetation and ecological communities respond to variations in hydrology through wet and dry years. The changes expected from the development of the site are likely to be within the tolerance limits of the communities.

7.3 Water Management Strategy

7.3.1 Stormwater Treatment Elements

A proposed stormwater "treatment train" incorporating WSUD techniques is to be adopted for the site (in accordance with *LMCC DCP No.1 2006*) that would mitigate the effects of stormwater discharges on receiving waters. The proposed treatment train would include the following controls:

- buffer strips around stockpiles,
- drainage swale flow path to sedimentation pond,
- sedimentation pond,
- bioretention system,
- bypass swale,
- main storage pond,
- on-site water reuse,
- rainwater tanks and
- additional smaller water storage ponds

The location of the proposed stormwater controls are shown in **Figure 7-3** and are further described below.

The key proposed stormwater treatment system elements have been sized using the stormwater quality modelling software MUSIC, with conservative (i.e. high) assumptions relating to the potentially higher TSS load in stormwater runoff from stockpile areas compared with typical urban environments. The mean TSS concentration for storm flow modelling has been increased by an order of magnitude (from 150 mg/L, which represents the mean TSS concentration observed in urban stormwater, to 1500 mg/L) and thus reflects TSS loads equivalent to construction sites with exposed soil and stockpile surfaces. The modelling results indicate that the treatment train is able to reduce the load of suspended solids discharged from the site to the same load that would be generated by an equivalent urban impervious area.

Multiple elements used in a 'treatment train' to provide effective sediment removal for the full range of particle sizes, together with the harvesting and reuse of a substantial proportion of stormwater runoff, represent contingency in design. The system would be subject to monitoring and maintenance of each of these elements to ensure effective operation. These requirements would be clearly outlined in the OEMP – including checklists of weekly monitoring, record keeping and reporting, the mechanisms for corrective action and review. The effective operation of each of the elements of the treatment train then provides confidence that the system would operate as designed – reflecting the extensive scientific research that underpins the design and modelling of these systems.

The water management strategy requires discharge from the site for the following reasons:

- The quantity of water that is expected to be reused on the site is substantially less than the expected rainfall on the site.
- A bioretention system is proposed to remove pollutants in stormwater runoff generated within the site. It requires a free draining outlet in order for flow to move through the filter media and sets the maximum operational level of the main storage pond, and thus sets the maximum storage volume available.
- Discharge from the site is required to minimise the changes to the existing catchment hydrology that sustains the vegetation of the downstream wetlands. Altering excessively (either increasing or decreasing) the existing discharge from the site may impact on the receiving environment (including the Freshwater Wetland community and the SEPP 14 wetland).

Alternative strategies that aim to store and reuse as much water as possible, with minimal discharge from the site could be adopted however it is considered an inferior approach for the following reasons:

- Within the available site area, allocating the majority of available space to storage would reduce the area available for treatment. The ability to treat water within the site is therefore compromised by the requirement to maximise the available storage volume. As a result, when discharge does occur, the water discharged from the site would be largely untreated.
- During lengthy wet periods the ability to reuse water (for dust suppression, mill/crushing operations) is limited and thus quantities of untreated water discharged would be significant.

- The hydrological nature of the site would be altered from predevelopment with potentially detrimental impacts on the receiving environment (including the Freshwater Wetland community and the SEPP 14 wetland).

Discharge from the site would occur regardless of which strategy is adopted owing to the mean annual demand for water reuse being less that the mean annual runoff from the site. The proposed strategy is to treat, reuse and discharge the residual water, aiming to minimise changes to the hydrology of the receiving environment and ensure best practice reduction in pollutant loads in stormwater that would be discharged.

A description of the key elements is provided below and are shown in **Figures 7-3 and 7-4**.

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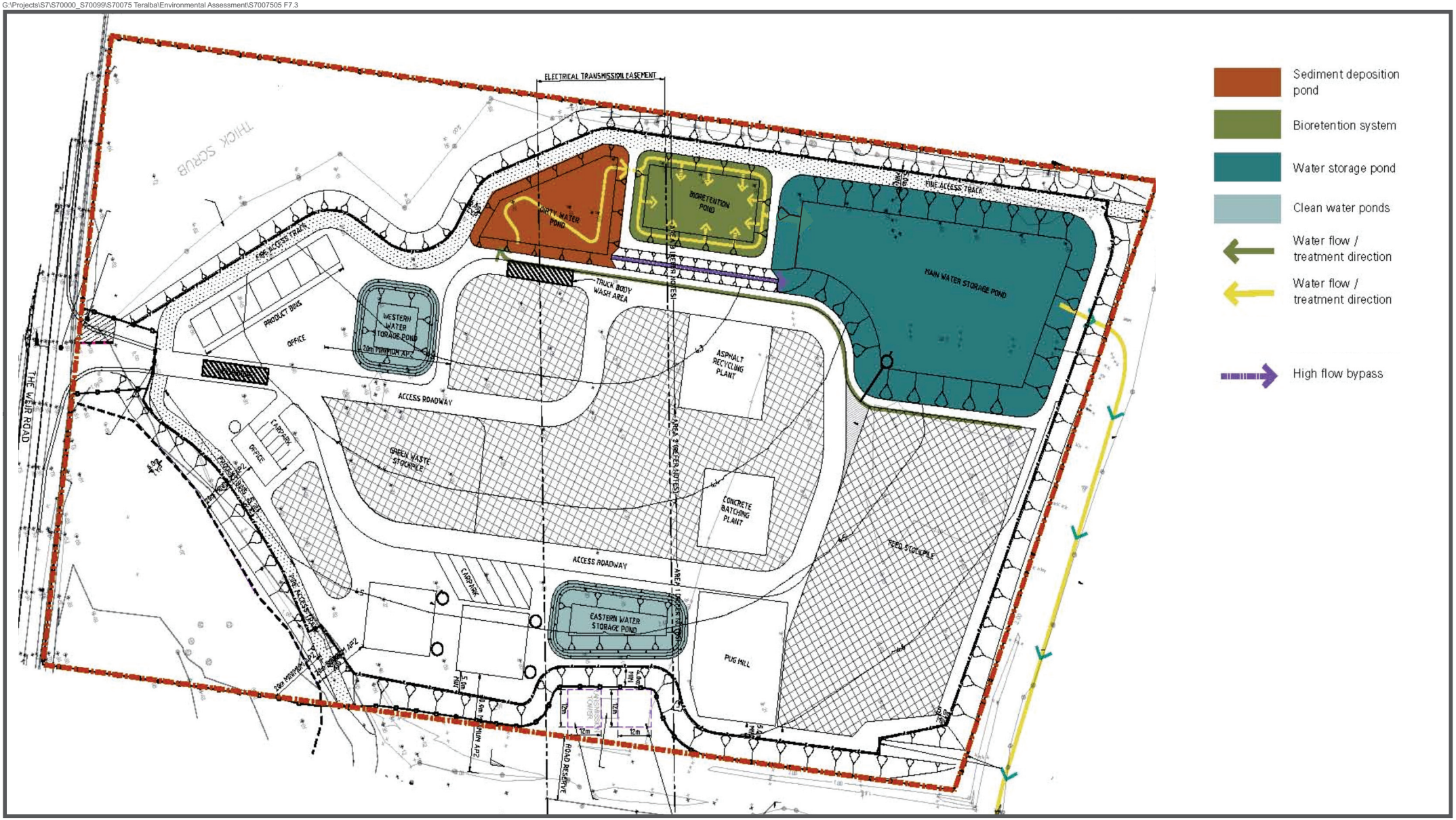

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Plan Showing Stormwater Management Features

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Figure 7.3

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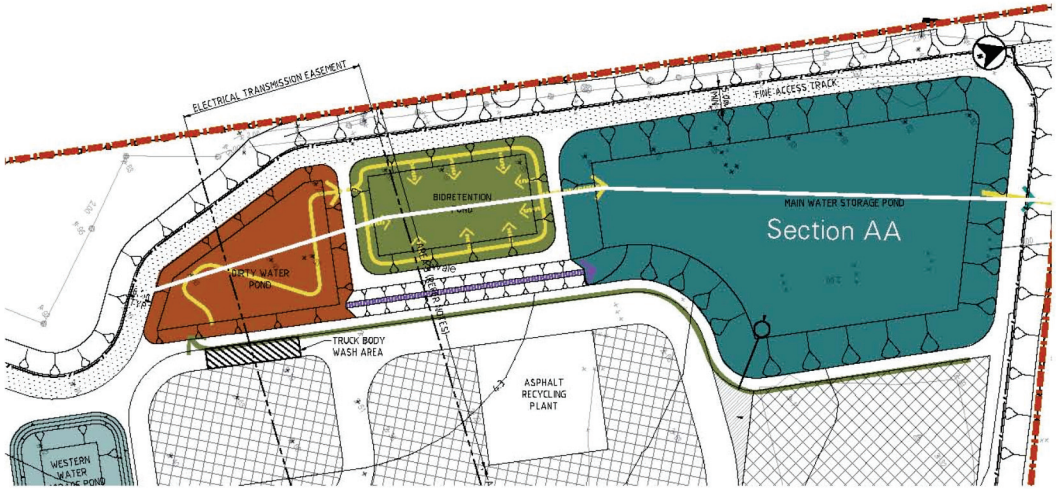


Legend

- Sediment deposition pond
- Bioretention system
- Water storage pond
- Water flow / treatment direction
- Swale
- High flow bypass

Design Parameters

Dirty Water Pond

- 3.5m RL bypass swale
- 3.25m RL overflow weir
- 2.81m RL outlet pipe invert in overflow pit
- 1.8m RL base of pond

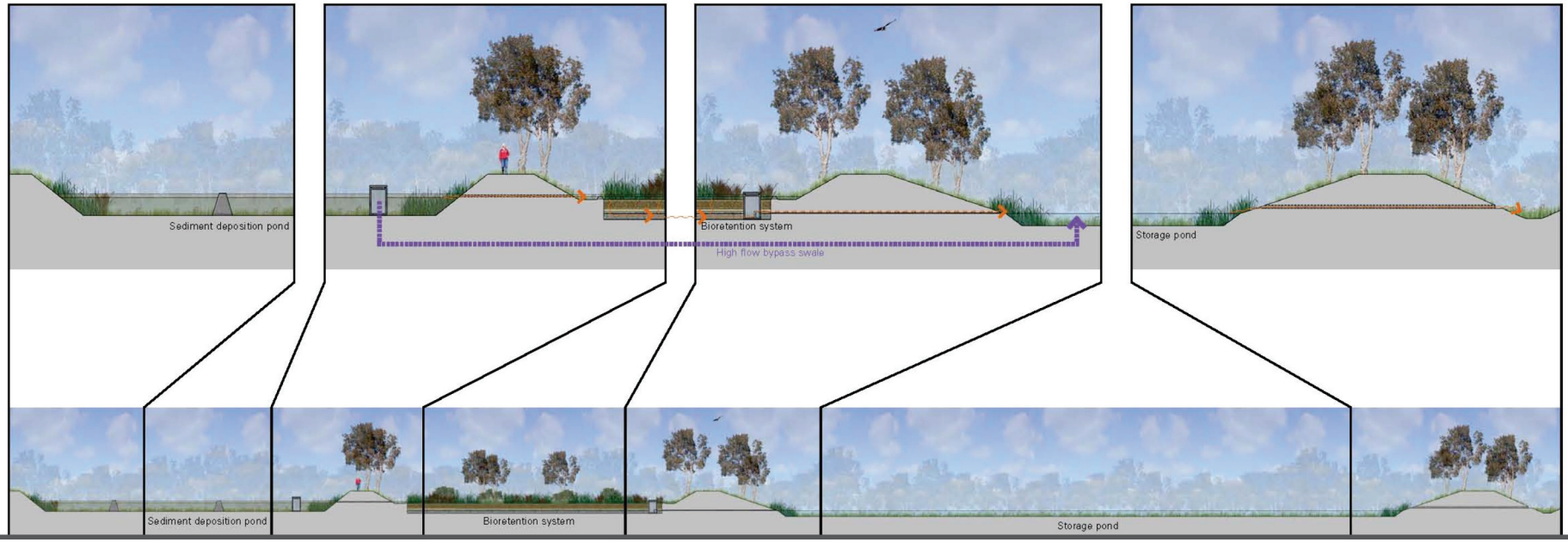
Water Storage Pond

- 4.1m RL spillway
- 2.1m RL outlet pipe invert
- 1.1m RL base of pond

Bioretention System

- 3.0m RL top of extended detention
- 2.7m RL bioretention surface
- 2.15m RL bioretention (SZ) outlet invert

Section AA through Water Treatment Train



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Section Through Stormwater Treatment System

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Figure 7.4

All water ponds would have a suitable base liner comprising either a clay layer or a Geosynthetic Clay Liner (GCL) with the details to be confirmed through the detailed design of the system.

The water detention basins would be installed prior to waste processing operations occurring at the Facility.

Preliminary Sedimentation Controls

Buffer strips are to be installed around stockpiles to capture coarse sediments and gross pollutants from stormwater runoff from stockpile surfaces. Vegetated swales would be used along the drainage pathways to the Dirty Water pond in order to reduce the sediment load that must be managed within the pond system. CiviLake has extensive experience with sedimentation controls and is able to use techniques to effectively manage sediment within the site and ensure the treatment system operates as effectively as possible for the stormwater runoff from the operational part of the site.

Surface grading of the site (0.25% nominal fall) is to be towards the west with collection of all surface runoff from the operational areas within the site (i.e. stockpiles, roads, pug mill, and vehicle parking areas) within the Dirty Water Pond.

Dirty Water (Sedimentation) Pond

The Dirty Water (Sedimentation) Pond would have an effective storage capacity to contain the “first flush” runoff volume from the development catchment area. The pond would target the efficient capture and removal of gross pollutants and coarse sediment, and reduce the sediment load that enters the bioretention system that is effective in removing finer particulate material. The Dirty Water (Sedimentation) Pond also provides storage for spill containment.

The process of sedimentation removes the heavier sediments, where velocities are appropriate to allow adequate detention time for a significant proportion of the suspended particles to settle. The design would ensure that the clean out frequency for the system is appropriate and that access is provided to ensure that maintenance requirements and clean out can be done easily.

The pond would have a total depth of approximately 1m with the bottom 0.5m allocated to sediment storage and the top 0.5m dedicated for sedimentation. An outlet weir controlling flow to the bioretention system would be configured to ensure that a significant proportion of flows are treated. Once the capacity within the pond is reached, the pond would discharge into the main storage pond via a bypass swale. Mobile pumps would be used as required to dewater the sediment storage zone so as to provide additional capacity and prior to periodic sediment removal for maintenance purposes.

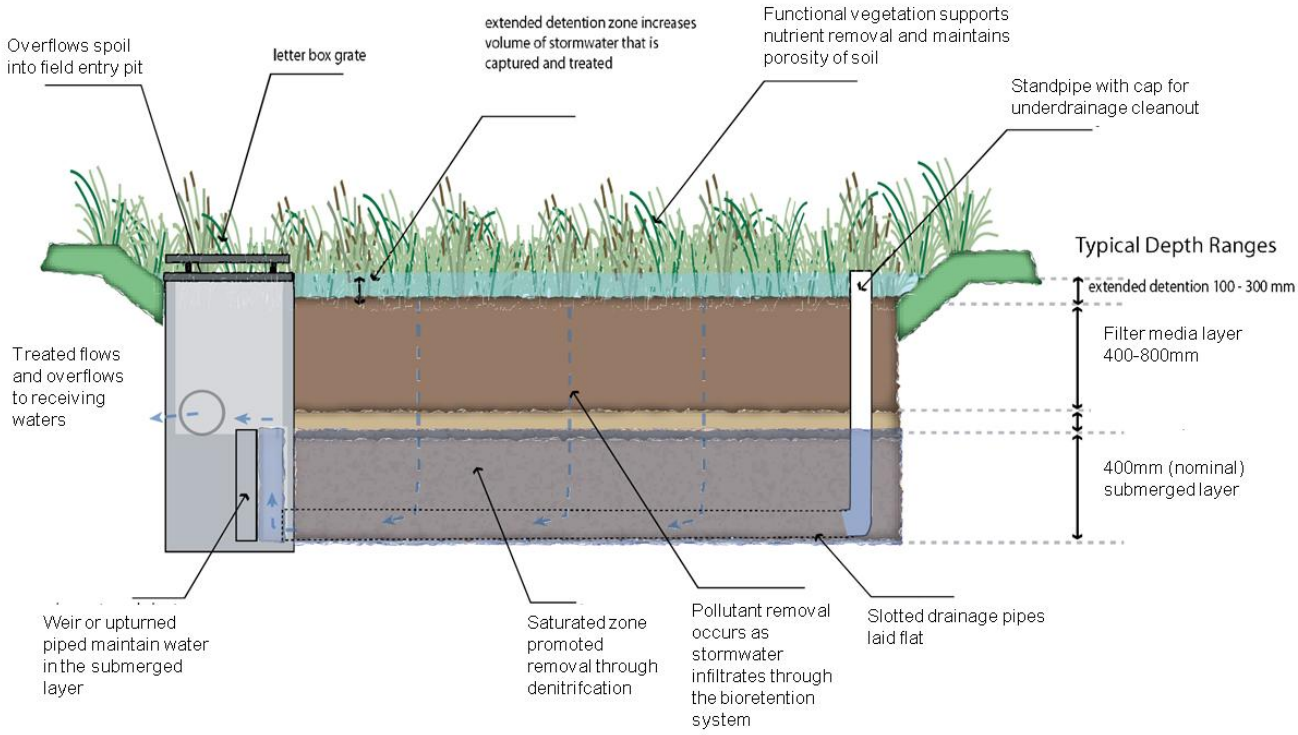
The Dirty Water (Sedimentation) Pond floor base would be at RL 2.5mAHD with a spillway at RL 3.5m AHD providing a total storage capacity of approx 2ML. The pond base would be lined using a suitable clay or plastic geomembrane liner to prevent infiltration to and from the underlying groundwater system.

Bioretention System

The bioretention system receives flow from the Dirty Water (Sedimentation) Pond and effectively removes fine suspended sediments, dissolved nutrients and heavy metals.

Bioretention systems are typically vegetated filtration systems, where runoff is encouraged to pond above a loamy sand filter media and percolate down at a rate favouring nitrogen uptake by plants and organisms within the media and root mass. Temporary ponding above the vegetated soil media provides additional filtration/biological treatment processes. Treated run-off is then collected through a series of subsoil perforated pipes and discharged to downstream waterways or storage facilities for reuse. The filtration rate through the soil filter media is typically in the order of 100 to 180mm/hr ensuring the capture storage is drained within several hours.

Figure 7-5: Saturated Zone Bioretention System



In summary, the bioretention system would include the following:

- A total bioretention water surface area of approximately 750m$^{2;}$
- Filter medium comprising sandy loam with a permeability coefficient of between 100 and 180mm/hr;
- Filter medium depth of 0.4m minimum depth, with a saturated zone beneath the media for enhanced nitrogen removal and plant survival through dry periods;
- A maximum depth of ponding within the pond area limited to approximately 0.3m (to provide detention and allow plant growth); and
- Bioretention system surface at RL 2.7mAHD with a spillway at RL 3.0mAHD to the main storage pond. The pond base would be lined using a suitable clay or plastic geomembrane liner to prevent infiltration to and from the underlying groundwater system.

Main Storage Pond

Overflow and treated flow from the bioretention system would be collected in the main storage pond. The pond would include a low level (valved) outlet pipe at approximately RL 2.1mAHD and have an average pond floor level of approx RL 1.1mAHD. This would allow a nominal 1 m deep clean water storage (resulting in approx 3.5ML capacity) for process and dust suppression water during operations. The pond base would also be lined using a suitable clay or plastic geomembrane liner to prevent infiltration to and from the underlying groundwater system.

Given the receiving environment includes sensitive ecological communities and a SEPP14 wetland, it is desirable to provide an adequate freeboard volume to attenuate storm flows and to contain spills. A freeboard up to the 100 year ARI, 24 hour rainfall event prior to discharge occurring has been provided in the pond area. This event would produce a total rainfall depth in the order of 247mm which would result in a total runoff volume of approximately 11ML from the 4.7ha site. To achieve this freeboard volume, a high spillway at RL 4.0mAHD is to be provided from the main storage pond. The spillway, in the very rare occasions, would allow spill to occur from the pond (i.e., following rainfall events greater than the 100 year ARI, 24 hour storm). The freeboard volume would extend above the Dirty Water (Sedimentation) Pond and bioretention system but would be confined within the pond surface areas (i.e. flood waters would not extend to the road and stockpile areas within the site). This freeboard also provides for stormwater detention to mitigate any increases in peak discharge from the development catchment leaving the site.

The Dirty Water (Sedimentation) Pond would be managed to maintain maximum storage capacity within this storage prior to spill to the Main Storage Pond via a bypass channel. This would reduce the liklihood for potentially contaminated runoff entering the Main Storage Pond when a spill occurs. In the event that the stored water within the Main Storage Pond becomes contaminated due to uncontrolled spill, then the contingency measures would include pump-out back to the Dirty Water (Sedimentation) Pond for temporary storage and subsequent treatment via the bioretention system, in conjunction with disposal by onsite operational use.

Rainwater and Stormwater Reuse

Rainwater harvesting and reuse would be achieved through the use of above ground rainwater storage tanks for fire-fighting and toilet flushing for office and storage shed facilities. High groundwater levels would likely preclude the use of buried tanks.

A total minimum fire fighting supply of approximately 50kL is required for the site. This is to be provided by way of two dedicated tanks designated for fire fighting purposes only. Additional tanks providing a total capacity of around 60kL would also be provided on site. The tanks would be topped up from the stormwater storage ponds located within the site or if insufficient water was present in the ponds, from mains potable water supply. Booster pumps and hose reels are to be located adjacent to the tanks for fire-fighting purposes.

Based on the above, there is provision for a total storage capacity of approx 4.5ML on site from the Main Storage Pond and the two smaller ponds. This storage volume can provide an average reliability of supply for process and dust suppression water during site operations of approximately 80%. Therefore, on average, 80% of the volume required for process and dust suppression water would be sourced from on-site stormwater ponds with substantial reduction in potable (mains) supply. An average reliability of 80% was considered acceptable by CiviLake.

7.4 Mitigation of Potential Impacts of Stormwater Discharge to the Receiving Environment

Potential impacts on the receiving environment associated with discharge of surface runoff from the site can be caused by;

- altered hydrology
- erosion
- sedimentation
- changes to water quality

This section outlines the mitigation of these causal factors that have the potential to impact on habitat, flora and fauna.

Hydrology - average annual flows

The changes to hydrology reflected in the pre and post development water balances suggest that substantial reuse of water on the site mitigates the risks associated with altered surface flow hydrology on the receiving environments. The OEMP would outline operational strategies to further refine the management of water reuse and discharge to minimise changes from the existing hydrology. The modelled changes in hydrology are expected to be within the tolerance limits of the receiving environment.

Hydrology – geomorphic impacts associated with peak flows

Surface water runoff currently drains through existing man-made channels located along the perimeter of the site toward the north-eastern corner. The flow path then heads in a south easterly direction and continues through minor culverts and drainage ditches and into a broad floodplain area without an identifiable channel. This area includes ecological communities; Ball Honeymyrtle Swamp Forest, Freshwater wetland, Swamp Mahogany / Paperbark / Woollybutt Swamp Forest and an area mapped as a SEPP 14 wetland.

The drainage flow paths would be designed to disperse flow within the floodplain area to mimic existing conditions that support the communities present. Any localised erosion along the drainage flow paths would be rehabilitated and modified to prevent further concentration of flow and mobilisation of sediment. Maintaining the stability of the drainage flow paths under the expected flow conditions would ensure geomorphic protection. This requirement would be reflected in the OEMP.

The peak discharge from the developed site would be attenuated using the capacity of the Main Storage Pond. This would ensure post development peak flows do not exceed the predevelopment peak discharge (for events up to the 1 in 2 year ARI storm event). This mitigates the risk of erosion along the flow paths of the receiving environment.

Erosion

Erosion risks are associated with discharge of high flows and velocities that mobilise sediment exposing the soil profile. This is of particular concern for defined waterway channels that must be sufficiently wide to convey flow without increasing the flow velocities and associated shear stress that results in erosion. The Main Storage Pond would reduce the frequency and volume of water discharged from the site for a significant majority of storm events. The drainage lines surrounding the site would be configured to safely convey flows without the risk of mobilising sediment. This may include the use of small rocks (if required) and dense planting for stabilisation. Energy dissipation would be provided at the discharge point from the site.

Flow from the development into the adjoining sites to the east is initially within a man made drainage line but would relatively quickly disperse across a broad flood plain area with significantly reduced potential for erosion.

Sediment

Suspended solids are considered the highest risk pollutant for this site as they have the highest potential to impact on the sensitive downstream environment and also are an effective surrogate measure for the adequacy in removal of heavy metals. A treatment train approach is proposed to provide multiple elements to reduce TSS concentrations in stormwater runoff. As discussed above, sediment loads have been managed through a treatment train that enables 98% of TSS loads to be removed. This represents a very high level of protection for the mitigation of impacts on the receiving environments.

Water quality

Stormwater quality has been addressed through the stormwater treatment train that gives modelled mean annual load reductions of 98% for TSS, 91% for TP and 84% for TN – equivalent to the best practice TSS load reduction for an equivalent residential area. TSS discharge concentrations modelled exceed the urban guideline value reported in Table 2.5 of Australian Runoff Quality of <25 mg/L less than 1% of the time that flow is observed.

It is noted that other pollutants such as heavy metals would also be captured by the treatment train proposed. Heavy metals and hydrocarbons are mostly particulate-bound in that the majority of these pollutants are bound to suspended solids. Thus TSS concentrations are an appropriate surrogate measure of the effectiveness in the removal of many stormwater pollutants. Stormwater treatment systems effective in TSS removal can therefore be expected to be also effective in removal of many of the particulate-bound pollutants. Bioretention systems are also very effective at removing dissolved pollutants such as dissolved metals, nutrients and organic chemicals.

The treatment train proposed for the site is considered adequate to ensure the water quality discharged from the site would have minimal impact on the downstream ecological communities. The impacts are mitigated as the water quality delivered to the receiving environment and hydrology that supports these communities would be within the range commonly experienced by these ecosystems.

Habitat, flora and fauna

The water management strategy for the site has been designed to mitigate the impacts associated with changes in hydrology, geomorphology and water quality. These factors support the habitat and food requirements for flora and fauna. As these have been addressed, it is not expected that there would be any significant impacts on habitat, flora and fauna. The Koala habitat area identified in the Ecology Assessment Report in Appendix H would not be adversely impacted upon by any of these causal factors associated with the discharge point for water from the site.

7.5 Contingency in Design and Operation

The multiple elements of the treatment train and stormwater harvesting provide effective sediment removal for the full range of particle sizes and represent many levels of protection and contingency in design. The effective operation of the system requires adequate monitoring and maintenance of each of these elements. These requirements would be clearly outlined in the OEMP – including checklists of weekly monitoring, record keeping and reporting and the mechanisms for corrective action and review. The effective operation of each of the elements of the treatment train ensures that the system would operate as designed – reflecting the extensive scientific research that underpins the design and modelling of these systems.

Valves would enable the discharge pipe from the Main Storage Pond and the inflow point to the bioretention system to be closed if a spill occurs or concerns arise with the quality of the water in the pond (e.g. turbidity readings of concern, presence of weeds that could affect the downstream environment, contaminants suspected). The water storage pond has been designed to allow for flood storage in the Main Storage Pond (approximately 11 ML volume equivalent to runoff volume in a 1 in 100 year ARI flood, 24 hour storm duration). When the pond discharge pipe valve is closed, appropriate remediation activities would be immediately undertaken. These would be outlined in the OEMP for a range of scenarios that would require the closure of the system. Where appropriate the water may be treated with a flocculent to reduce suspended solids and suitable water reused on site for additional dust suppression / irrigation within the bunded areas. If these measures are ineffective the final backup contingency plan would involve trucking contaminated water off site. This would only happen as a last resort where all other options have been unsuccessful.

If it is found that stored water is not of a quality fit for discharge (e.g. turbidity levels are high), operational procedures could assist in preventing discharge through additional reuse (e.g. additional dust suppression across the site, irrigation of the vegetation on the internal bund batter, and intermittent transfer to pass the water through the treatment train again).

In the unlikely event that the system does not operate as expected, additional on site sediment management options could be introduced and additional wetland treatment areas can be built on Council land to the north of the site.

7.6 Erosion and Sediment Controls during Construction

Erosion and sediment controls would be used to minimise the exposure of the soil surfaces to the actions of stormwater, limit discharge of sediment laden stormwater and to restrict stormwater flows over exposed areas during construction.

The construction erosion and control measures would be in accordance with the Landcom (2004) *Managing Urban Stormwater: Soils and Construction* and would include:

- A stabilised access to the site from Weir Road with a facility for removing sediment from truck wheels at the site entrance;
- Provision of silt fencing around the site perimeter;
- Provision of silt fences downstream of stockpiles;
- Provision of temporary sediment basins which are likely to be located at the proposed location of the permanent ponds in the north-western corner of the site – that is the temporary basins would eventually be converted into the permanent basins. Water in the ponds would be used for dust suppression on the site and construction water. Excess water would be tested, treated if necessary through flocculation or similar and then discharged into the drainage channels adjacent to the site;
- As the site is filled, upstream water would be diverted around the site;
- Avoiding disturbance to adjoining areas which are predominantly vegetated;
- Regular monitoring and maintenance of the sediment and erosion control measures

Given the sensitive nature of the downstream environment a Type F sedimentation basin as defined in Table 6.1 of Landcom (2004) is proposed. This is applicable to sites with fine soils and allows longer settling times. The size of the required sedimentation basin was calculated in accordance with Table 6.1 of Landcom (2004) to require a volume of around 7,100m^3 which allows complete storage of the 95th percentile 5 day rainfall. The basin is required to have length: width ratio of >3:1. This would equate to approximate dimensions of 170m length by 55m wide by approximately 1m depth with 1:2 batters.

At this stage it is assumed that as the filling of the site progresses, it would be graded to drain all runoff into the basin in the north-western corner of the site. If the staging of the filling results in portions of the site temporarily grading in a different direction, then additional temporary basins may be required which would be sized and located at the time.

Figure 7-6 presents a sediment erosion control plan showing the main sediment and erosion control features. Note these are indicative and would be refined during the construction process.

The sediment and erosion measures to be implemented during construction would be further developed within the CEMP. These measures would ensure temporary sediment controls are provided to mitigate potential impacts on the downstream environment.

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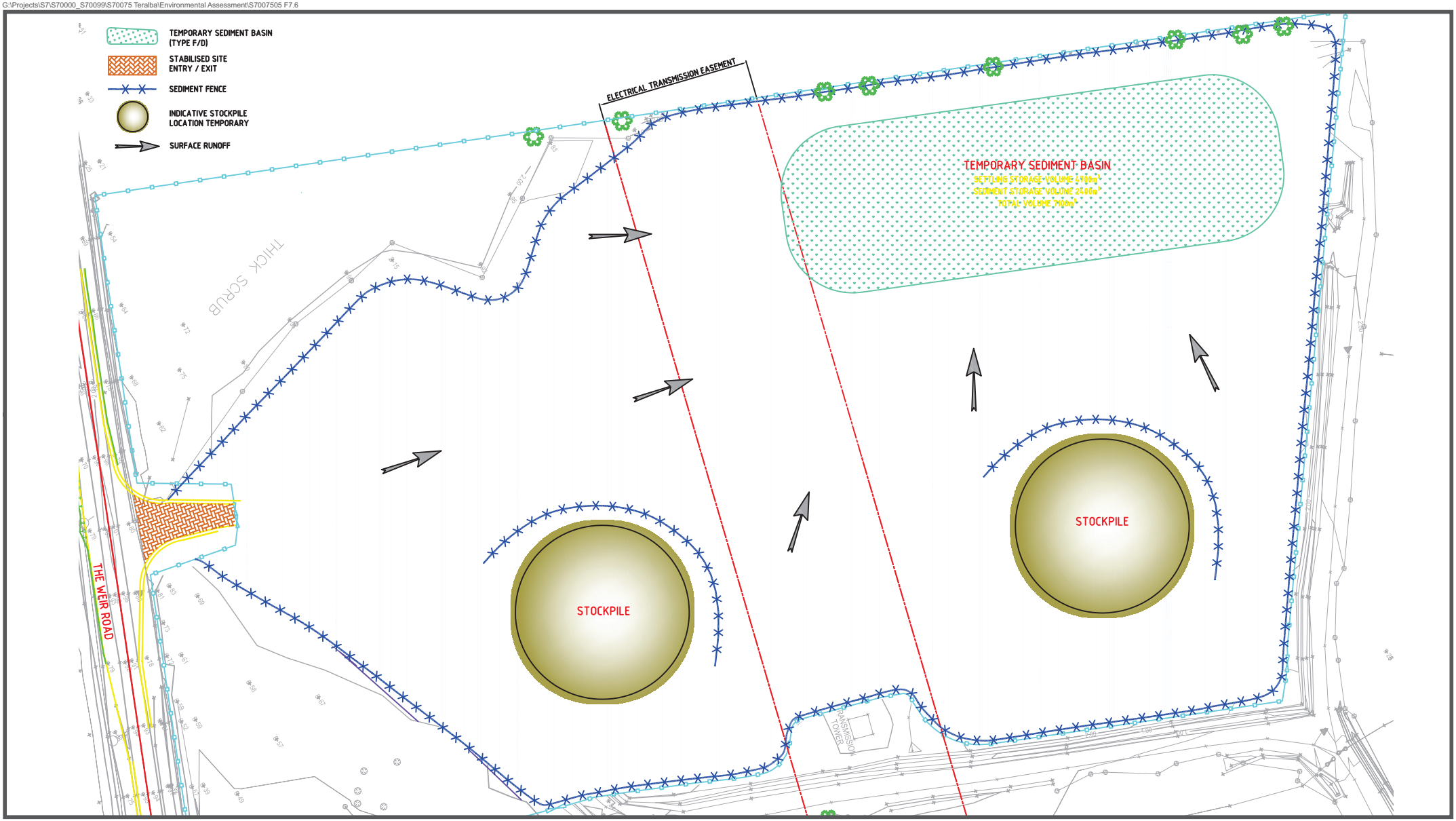

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Construction Sediment and Erosion Control Plan

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Figure
7.6

7.7 Environmental Safeguards

The proposed Facility requires water cycle management measures to meet adopted water conservation, flow (quantity) and water quality (pollution control) management targets and objectives. These objectives reflect best practice guidelines for stormwater management and relevant State and local policies and planning documents

The recommended water cycle management strategy for the Teralba Sustainable Resource Centre is summarised below.

Water Conservation and Reuse

- Stormwater from the stockpile areas on site would be treated and stored in the Main Storage Pond for reuse during operations with an estimated resultant 80% of operational water sourced from onsite water ponds.
- Rainwater harvesting from roofs would be achieved through the use of above ground rainwater storage tanks and reused for fire-fighting and toilet flushing for office and storage shed facilities.

Water Quantity

- Perimeter bunding would be provided to prevent flood waters entering the site from the 100 year ARI flood event of Cockle Creek.
- Provision of a freeboard storage volume (approx 11ML) in the Main Storage Pond would attenuate surface runoff from the development site for events up to the 1 in 100 year ARI, 24 hour rainfall event. Discharge would be controlled to maintain pre-development peak discharge flows from the development site.
- Following storm events, water would be attenuated in the Main Storage Pond. Discharge can occur from an outlet pipe when the pond water level rises and via a spillway when the pond capacity is exceeded. Water discharged from the Main Storage Pond would follow an existing drainage pathway (man-made channels) through the downstream swamp forest and freshwater wetland communities.

Water Quality

- Stormwater from the site would be treated to manage sediment, nutrients and other pollutants to meet best practice targets.
- Buffer strips would be used around stockpiles to reduce sediment load generated from stockpile areas.
- Silt fences would be to be installed along the downstream toe of stockpiles to capture coarse sediments and gross pollutants from stormwater runoff from stockpile surfaces.
- The site would be graded to drain stormwater via a sedimentation swale to the Dirty Water (Sedimentation) Pond.
- The Dirty Water (Sedimentation) Pond would capture and remove gross pollutants and coarse sediment. Outlet controls enable the basin to also provide storage for spill containment. Discharge from the Dirty Water (Sedimentation)Pond would drain by gravity to a bioretention system for effective treatment of fine suspended sediments, dissolved nutrients and heavy metals and hydrocarbons. The design would ensure adequate energy dissipation and flow distribution.
- Overflow and treated flow from the bioretention system would be collected in the Main Storage Pond for use as process and dust suppression water during operations.
- Water quality testing would be carried out on treated water as detailed in Section 9 of the *Water Cycle Management Plan* in Appendix F to confirm the performance of the treatment system.

The CEMP would contain mitigation measures including temporary sediment controls to mitigate potential impacts on the downstream wetland areas.

An OEMP would be developed that further refines the water management procedures for the protection of the downstream environment, providing protocols to balance the need to store water to meet operations demands onsite with the need to minimise changes in hydrology for the protection of the receiving environment. The OEMP would also provide details on emergency response measures and maintenance requirements.

Adoption of the above measures would provide an integrated, sustainable approach to water cycle management for the proposed Facility.

7.8 Conclusions and Recommendations

The proposed Facility includes water cycle management measures to meet adopted water conservation, flow (quantity) and water quality (pollution control) management targets and objectives. These measures would provide an integrated, sustainable approach to water cycle management of the proposed Facility.

8.0 Flora and Fauna

8.1 Introduction

Ecotone Ecological Consultants was engaged to prepare an *Ecology Assessment*for the proposed Facility in order to assess the potential ecological impacts. The aims of the assessment included:

- *describe the existing biological environment of the study area in relation to flora and fauna;*
- *discuss the potential impacts of the proposal on any threatened species that occur or could be likely to occur in the subject site; and*
- *provide discussion on measures to mitigate impacts.*

This section provides an overview of the assessment which is included as **Appendix H** of this EA.

8.2 Methodology

By way of definition, the Ecology Assessment considered:

- the *subject site* as the land area potentially directly affected by the proposed Facility (the site);
- the *study area* consists of the subject site plus a 30m buffer zone beyond the defined boundary of the subject site; and
- the *study locality* is the area of land within a ten (10) kilometre radius of the centre of the subject site.

The methodology followed for the assessment involved three stages of environmental investigations as discussed below.

8.2.1 Literature Review

A review of available literature pertaining to the site and surrounding locality and preliminary habitat assessment of the study area was carried out as follows.

- A review of the documented records of the locations of threatened flora and fauna species within the study locality was undertaken. Results from previous Ecotone Ecological surveys of the study area were used.
- Threatened species records were accessed from the *DECCW Atlas of NSW Wildlife Database* for the Newcastle (9232) and Lake Macquarie (9231) 1: 100 000 map sheets (updated to July 2009).
- The *EPBC Act Protected Matters Search Tool* was accessed on 30th August 2009 to identify the Protected Matters under the Commonwealth *EPBC Act* 1999 that occur or may occur within the study locality.
- The information compiled in relation to the flora and fauna habitats of the study area was used in the determination of a list of threatened flora and fauna species that may be regarded as potential inhabitants of the site (i.e. potential subject species).
- An assessment of the relative likelihood of the threatened flora and fauna species within a 10 km radius of the study area was undertaken.

8.2.2 Field Surveys and Habitat Assessment

Field surveys and habitat assessments for threatened species regarded as potential subject species, and surveys to investigate the inherent biological attributes of the study area were carried out and summarised below.

- **Flora:**
  - A site specific survey was undertaken on the 19th August 2009 to document flora and vegetation communities within the study area. The survey methodology complied with current best practice flora survey guidelines for a full impact assessment. It involved three components:
    - Traverses on foot involving a random meander throughout the study area to assess the range of floristic variation, vegetation structure (strata, heights and cover), extent of modification, disturbance, weed invasion and condition of the vegetation generally. All vascular flora species encountered were recorded and the vegetation communities were mapped.
    - Three 20 x 20 m flora quadrats covering different community types within the naturally vegetated areas in the 30 m buffer zone from the proposal boundary. Physical and vegetation structural data recorded within the quadrats included vegetation structure (strata, heights and cover), soil type,

topography, extent of modification, disturbance, signs of fire, weed invasion and condition of the vegetation generally. All vascular flora species were listed within each quadrat and its location was recorded using a hand-held GPS to an accuracy of 10 m.

- A targeted survey for any threatened flora species considered to have potential to occur in the study area. It was already known and confirmed from the earlier flora surveys for the *Environmental Study for Land North of Teralba* (CH2MHILL 2008) , as outlined in *Ecological Assessment for a Local Environment Study* (Ecotone Ecological Consultants 2008) that the vulnerable species Angophora inopina occurred within the buffer zone. The locations of all trees of this species within the buffer zone were recorded with a GPS. Small samples of any other plant species that could not be identified in the field were obtained for further examination and identification.
- A supplementary survey was carried out by Ecotone and LMCC surveyors on 30th March 2010 to accurately plot the locations of Angophora inopina trees in the vicinity of the site boundary, and the boundary of the swamp community at the southern end of the site.

- **Fauna:**
  - A site specific field survey was undertaken on the 19th August 2009 to document the fauna within the study area.
  - The fauna field survey methodologies, used in the 2007 and 2009 surveys, were in general accordance with the *Lower Hunter and Central Coast Regional Environmental Management Strategy* (LHCCREMS) flora and fauna survey guidelines and included:
    - tree trapping;
    - spotlight survey;
    - koala scat survey;
    - stag watch;
    - ground trapping;
    - ultrasonic bat call detection;
    - diurnal bird survey;
    - diurnal reptile survey;
    - nocturnal call playback;
    - harp trapping for insectivorous bats;
    - opportunistic observations; and
    - habitat assessment.
  - The habitat assessment also conducted on 19th August 2009 investigated the type and condition of potential habitats for fauna species across the subject site. The habitat features investigated on the site included:
    - topographic features;
    - dominant vegetation community composition, structure and condition at all strata levels (i.e. from ground level to canopy);
    - ground cover type and percentage cover;
    - form, quality and location of water sources;
    - location, type and size of tree hollows;
    - the presence, number and condition of unique habitat features (such as caves, crevices, loose tree bark, rocks on rock and mistletoe); and
    - the level of disturbance.

    All opportunistic observations of fauna or faunal activity were recorded during the habitat assessment. Further detail regarding survey methodologies and results can be found in Appendix H.

8.2.3 Assessment of Impacts

Assessment of the impacts of the proposal on flora and fauna was carried out in accordance with the relevant NSW and Commonwealth legislation and planning instruments.

Relevant legislation included the Commonwealth *EPBC Act, NSW TSC Act, NP&W Act, EP&A Act*; and subsequent amendments to these. Specific consideration was also given to Part 3A of the *EP&A Act* and the guidelines provided for threatened species assessment (former NSW Department of Environment and Conservation (DEC).

8.3 Flora Impact Assessment

As a result of a review of literature, an *EPBC Act Protected Matters Search*, field survey results and habitat assessments of the study area, the following flora, fauna and other potentially relevant matters under the EPBC Act required consideration.

A total of 16 rare or threatened flora species have previously been recorded within the study locality:

- *Angophora inopina* (Charmhaven apple/ scrub apple);
- Callistemon linearifolius (netted bottle brush);
- *Cynanchum elegans* (white-flowered wax plant);
- *Diuris praecox* (rough doubletail);
- Epacris purpurascens var. purpurascens;
- *Eucalyptus camfieldii* (heart-leaved stringybark);
- *Grevillea parviflora* subsp. *parviflora* (small-flower grevillea);
- *Melaleuca biconvexa* (biconvex paperbark);
- Rutidosis heterogama (heath wrinklewort);
- *Syzygium paniculatum* (magenta lilly pilly);
- *Tetratheca juncea* (black-eyed Susan);
- Zannichellia palustris;
- Arthrochilus prolixus (Rare or Threatened Australian Plants ROTAP);
- Eucalyptus fergusonii subsp. dorsiventralis (ROTAP);
- Eucalyptus fergusonii subsp. fergusonii (ROTAP);
- Macrozamia flexuosa (ROTAP).

Of these 16 species, 10 are listed as Vulnerable species by the *NSW TSC Act*, of which all but two (*Callistemon linearifolius* and *Epacris purpurascens* var. *purpurascens*) are also listed as vulnerable in the Commonwealth *EPBC Act*. Four additional species are not protected under State or Commonwealth legislation but are listed under the national database known as ROTAP (Briggs & Leigh 1996).

The statutory-listed species and ecological communities (EEC) that were either confirmed to occur in the study area or considered to have at least a moderate likelihood of occurrence were considered to be potential subject species in this assessment. These species include:

- *Angophora inopina* – slaty red gum (Vulnerable – *TSC and EPBC* Acts);
- Callistemon linearifolius – netted bottlebrush (Vulnerable – TSC and EPBC Acts);
- *Melaleuca biconvexa* – biconvex paperbark (Vulnerable – *TSC and EPBC* Acts) *;*
- *Tetratheca juncea* – black-eyed Susan (Vulnerable – *TSC and EPBC* Acts) (EEC);
- Swamp Sclerophyll Forest on Coastal Floodplains (EEC).

Four broad vegetation community types occur within the study area, the first three of which are natural communities and are restricted to the 30m buffer zone:

- Ball Honeymyrtle Swamp Forest;
- Red Mahogany / Swamp Mahogany / Paperbark Swamp;
- Scribbly Gum / Swamp Mahogany / Paperbark Transitional Forest; and
- Cleared open pasture, with occasional isolated trees. This community is largely restricted to the subject site.

Overall flora species diversity within the study area was low but considerably higher in the surrounding 30 m buffer. A total of 92 flora species from 37 families were identified. Detailed flora species lists are provided in **Appendix H.**

The vegetation within the subject site is almost completely cleared and highly disturbed, in poor floristic condition with patches of noxious and environmental weeds. The vegetation within the buffer zone around the subject site is in moderate to good condition with many weeds present. Professional control of these weed species would be desirable.

The Swamp Sclerophyll Forest on Coastal Floodplains (EEC) that was confirmed to occur within the buffer zone of the study area is in moderately good condition. A narrow strip at the edge of the EEC overlaps with the subject site in the south-eastern corner. This species comprises part of a mapped SEPP 14 wetland (along the south eastern boundary).

No EECs listed under the Commonwealth *EPBC Act 1999* are considered to occur on the subject site.

The ecological functions of the buffer vegetation include:

- habitat for threatened flora species;
- providing part of a wider corridor that provides connectivity both for movement of fauna and for exchange of genetic material between native flora species locally; and
- providing a refuge for flora and fauna which would reduce the risk of local populations becoming locally extinct.

Most of the vegetation within the cleared subject site has little significance for flora or flora populations.

8.3.1 Impacts on Threatened Flora Species and EECs

The potential impacts of the proposed Facility on threatened flora species, populations, EEC and critical habitats are summarised in **Table 8-1**.

Table 8-1: Flora Impact Assessment

Impact	Assessment
Impact on the lifecycle of a threatened species and/or population	One listed threatened flora species, *Angophora inopina* (Vulnerable - TSC Act) was confirmed to occur within the study area. Numerous individuals of the species were recorded within the 30m buffer zone around the edge of the subject site. A number of individuals were found to occur at the edge of or near the boundary of the project site, particularly along the western boundary. Following accurate surveying of their locations, it was found that seven of these trees occurred slightly within the project site or on its boundary. It would not be necessary to remove these trees as provision has been made to provide retaining walls to protect the tree trunks from the earth bund wall within a radius from the trunk equal to the dripline of the tree canopies. Further to the above, a total of 52 individuals of *Angophora inopina* were recorded within the 30m buffer zone surrounding the subject site, none of which are proposed to be affected by the proposal. Additionally, results from earlier flora surveys for the LES (Ecotone Ecological Consultants 2008) show that the species occurs beyond the limits of the current study area, and the population was noted to be dense and abundant to the west of the study area, particularly beyond the north-western corner. Given the protective measures that would be applied to the few trees of *Angophora inopina* that are on or within the site boundary, it is not expected that the lifecycle of the species in the local population would be significantly affected. No endangered flora populations were recorded within the study area, therefore the proposed Facility would have no affect on the lifecycle of any currently listed endangered populations of flora.

Impact	Assessment
Impact on the habitat of a threatened species, population or ecological community	The habitat for *Angophora inopina* within the 30m buffer zone surrounding the subject site would not be directly or indirectly affected by the proposed Facility. Further, the development of a landscape management plan, which is proposed as part of the project would ensure that weed invasion into the buffer zone would be prevented and managed. No endangered flora populations were recorded within the study area, therefore the proposed Facility would have no affect on the habitat of any currently listed endangered populations of flora.
	The proposed Facility would remove or modify a small rectangular patch of habitat that qualifies as the EEC *Swamp Sclerophyll Forest on Coastal Floodplains.* This occurs at the southern end of the subject site on the western edge of the site entrance at The Weir Road. The total area to be removed or modified amounts to approximately 80m^2 and is in a poor and degraded condition. The loss or modification of this small area of habitat would be offset within the site by weed control/ management of retained patches of the EEC in the south-western and south-eastern corners of the property. The available offset area consists of 0.83 ha of existing habitat for the EEC which would be retained and managed, representing an offset ratio of 104:1. The habitat for the EEC within the 30m buffer zone surrounding the subject site and beyond would not be directly or indirectly affected by the proposal due to the treatment and appropriate discharge of stormwater runoff from the site. Therefore, the retained areas of habitat for the EEC are unlikely to be affected by edge effects or hydrological changes. The Landscape Management Plan would ensure that weed invasion into the surrounding retained areas of habitat would be prevented and managed. Weeds and habitat would be managed professionally within the retained areas of bushland in the south-western and south-eastern corners of the site, which consist entirely of habitat for the EEC. Therefore, in these areas of the site the quality of the habitat is likely to improve. Given the extensive area of this EEC that was documented in the surveys for the LES (Ecotone Ecological Consultants 2008), together with the offsetting and management of habitat for the EEC within the study area, Ecotone concluded that the removal or modification of a small area of habitat would have an insignificant effect on the extent and continued health of the EEC in the wider area.
Impact on any threatened species or populations that are at the limit of its known distribution	The proposed Facility would not affect any listed threatened flora species or populations at the limit of their known distributions.
Impact on current disturbance regimes	The entire subject site is currently highly disturbed and modified by past land clearing and filling for grazing, dumping of rubbish and timber stockpiles, creation of drainage channels and invasion of weeds. Due to the landscaped embankment and water management strategy proposed as part of the Facility, no indirect additional disturbances would occur to the natural vegetation surrounding the site. Further the proposed landscape rehabilitation would offset the small area of habitat lost and reverse the effects of disturbances due to past and current land management practices, including invasions of weeds.
Impact on habitat connectivity	The proposed Facility would be almost entirely confined to cleared, open and weedy pasture and would only involve incremental losses of transitional habitat at edges of natural vegetation. Consequently, habitat connectivity would be virtually unaffected by the proposed Facility.
Impact on critical habitat	No areas of critical habitat occur in the vicinity of the study area, therefore critical habitat would not be affected by the proposed Facility.

Source: Ecotone 2009

8.4 Fauna Impact Assessment

A total of 54 threatened terrestrial fauna species (including 4 preliminary determinations) have previously been recorded within the study locality (listed on the *Atlas of NSW Wildlife*), comprising 36 bird, 14 mammal, one reptile and three frog species. Of these, five species (black-necked stork, swift parrot, regent honeyeater, wandering albatross and green and golden bell frog) are currently listed as endangered on Schedule 1, Part 1 of the *TSC Act* and the remainder as vulnerable on Schedule 2 of the Act.

Ten species are also listed in the Commonwealth *EPBC Act*, four as endangered (swift parrot, regent honeyeater, wandering albatross and spotted-tailed quoll) and six as vulnerable (painted snipe, black-browed albatross, large-eared pied bat, greyheaded flying-fox, green turtle and green and golden bell frog).

The painted snipe and regent honeyeater are also listed as a migratory species in the *EPBC Act,* as are a further six species listed as vulnerable in the *TSC Act* only.

No listed endangered populations of fauna occur within the study area.

Of the 60 threatened and migratory species assessed, 29 have some potential to occur on the subject site. Of these, 12 species (seven threatened and five migratory) are known or highly likely to occur within or near the subject site.

The threatened fauna species that were recorded near the subject site and have the potential to forage within the study area include:

- Masked Owl (*Tyto novaehollandiae*) - (Vulnerable – *TSC Act*);
- Squirrel glider (*Petaurus norfolcensis*) - (Vulnerable – *TSC Act*);
- Grey-headed flying-fox (*Pteropus poliocephalus*) – (Vulnerable – *TSC and EPBC Act*);
- East-coast freetail-bat (*Mormopterus norfolkensis*) – (Vulnerable – *TSC Act);*
- Eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) – (Vulnerable – *TSC Act*);
- Little bentwing-bat (*Miniopterus australis*) – (Vulnerable – *TSC Act*);
- Large-eared pied bat (*Chalinolobus dwyeri*) – (Vulnerable – *TSC and EPBC Act).*

The species that have some potential to occur within the study area as suitable habitat may be available include:

- White-browed woodswallow (*Artamus supercilliosus*) – (Prelim. determination *TSC Act);*
- Varied sittella (*Daphoenositta chrysoptera*) – (Prelim. determination *TSC Act);*
- Little lorikeet (*Glossopsitta pusilla*) – (Vulnerable – *TSC Act);*
- Swift parrot (*Lathamus discolor*) – (Endangered – *TSC and EPBC Act*);
- Black-chinned honeyeater (*Melithreptus gularis gularis* – (Vulnerable – *TSC Act);*
- Scarlet robin (*Petroica boodang*) – (Prelim. determination *TSC Act*);
- Osprey (*Pandion haliaetus*) (Vulnerable – TSC Act; Migratory – *EPBC Act*);
- Little eagle (*Heiraaetus morphnoides*) – (Prelim. determination *TSC Act*);
- Powerful owl (*Ninox strenua*) – (Vulnerable – *TSC Act*);
- Regent honeyeater (*Xanthomyza phrygia*) – (Endangered – *TSC and EPBC Act*; Migratory – *EPBC Act);*
- Eastern false pipistrelle (*Falsistrellus tasmaniensis*) – (Vulnerable – *TSC Act);*
- Greater broad-nosed bat (*Scoteanax rueppellii*) – (Vulnerable – *TSC Act*);
- Southern myotis (*Myotis macropus*) – (Vulnerable – *TSC Act*);
- Wallum froglet (*Crinia tinnula*) – (Vulnerable – *TSC Act*).

The migratory species known to occur, fly over, and/or forage within or near the study area were found to be:

- Cattle egret (*Ardea ibis*);
- Great egret (*Ardea alba*);
- Black-faced monarch (*Monarcha melanopsis);*
- Rufous fantail (Rhipidura rufifrons);
- Rainbow bee-eater (*Meraps ornatus*);
- Satin flycatcher (*Myiagra cyanoleuca*);
- White-bellied sea eagle (Haliaeetus leucogaster) and;
- White-throated needletail (*Hirundapus caudacutus*).

2007 Field Survey

Ninety-eight fauna species were recorded within the study area during the field survey for the *Ecological Assessment for a Local Environment Study* (Ecotone Ecological Consultants 2008) including 70 birds, 20 mammals, two reptile and six frog species. Three of these were introduced species and the remainder native.

Eight threatened fauna species (squirrel glider *Petaurus norfolcensis*, grey-headed flying-fox *Pteropus poliocephalus*, east-coast freetail-bat *Mormopterus norfolkensis*, eastern bent-wing bat *Miniopterus schreibersii oceanensis*, little bent-wing bat *Miniopterus australis*, large-eared pied bat *Chalinolobus dwyeri*, osprey *Pandion haliaetus* and masked owl *Tyto novaehollandiae*) were recorded within the study area.

A probable identification of a southern myotis *Myotis macropus* call was made using ultrasonic call analysis.

Four additional listed migratory species, the cattle egret, rufous fantail, satin flycatcher and white-bellied sea-eagle, were also recorded.

2009 Field Surveys

The field survey carried out as part of this EA recorded 35 fauna species, including 31 birds, two mammal and two frog species. No threatened species were recorded.

Two migratory species listed under the *EPBC Act* were identified (cattle egret and white-bellied sea-eagle). Three bird species not recorded in 2007 were also identified (white-naped honeyeater, brown warbler and striated pardalote).

Four main habitat types were recorded:

- Paperbark woodland;
- Paperbark woodland with scattered eucalypts;
- Open grassland (most of the subject site); and
- Water filled drains.

8.4.1 Impacts on Threatened Fauna

The potential impacts of the proposed Facility on threatened fauna species, populations, EEC and critical habitats are summarised in **Table 8-2**.

Table 8-2: Fauna Impact Assessment

Impact	Assessment
Impact on the lifecycle of a threatened species and/or population	White-browed woodswallow (*Artamus supercilliosus*) • Not recorded during 2007 or 2009 field surveys, however there is one record from within 2.5 km of the subject site (*DECCW Wildlife Atlas*). • It is unlikely that the proposed Facility would significantly affect the lifecycle of this species however some displacement from the buffer zone may occur as a result of expected increased noise and dust levels.
	Varied sittella (Daphoenositta chrysoptera) • Not recorded during 2007 or 2009 field surveys, however there are 14 records from the locality (within 10 km of the subject site) (DECCW Wildlife Atlas). • It is unlikely that the proposed Facility would significantly affect the lifecycle of this species, however some displacement from the buffer zone may occur as a result of expected increased noise and dust levels. Little Lorikeet (Glossopsitta pusilla) • Not recorded during the 2007 or 2009 field surveys. • Potential foraging habitat occurs in the form of eucalypt trees during flowering periods. • Given the nomadic nature of the little lorikeet, the possible removal of a very narrow strip of vegetation along the western boundary of the subject site is unlikely to affect the lifecycle of this species. Swift Parrot (Lathamus discolor) • Not recorded during the 2007 or 2009 field surveys. • Potential foraging habitat occurs in the form of eucalypt trees during winter flowering periods. • Given the large foraging range of the swift parrot during its winter migration, the possible removal of a very narrow strip of vegetation along the western boundary of the subject site is unlikely to affect the lifecycle of this species. Black-chinned honeyeater (Melithreptus gularis gularis) • Not recorded during 2007 or 2009 field surveys, however there are 11 records from the locality (within 10 km of the subject site) (DECCW Wildlife Atlas). • Potential foraging habitat occurs in the form of winter flowering eucalypt and melaleuca trees within the buffer zone for the project. Given the large foraging range of the regent honeyeater during its winter migration, the possible removal of a very narrow strip of vegetation along the western boundary of the subject site is unlikely to affect the lifecycle of this species
	Scarlet robin (Petroica boodang) • Not recorded during 2007 or 2009 field surveys, however there are 7 records from the locality (within 10 km of the subject site) (DECCW Wildlife Atlas). • The open grassland of the subject site may provide potential seasonal foraging habitat, however foraging is more likely to occur in the adjacent open forests/woodland.

Impact	Assessment
	• As nest sites are generally in drier undulating open forests and woodland this species may not breed in the local area. • It is unlikely that the proposed Facility would significantly affect the lifecycle of this species however some displacement from the buffer zone may occur as a result of expected increased noise and dust levels. Osprey (Pandion haliaetus) • The osprey was observed flying along Cockle Creek on two consecutive days during the 2007 survey. • It is likely that a nest site occurs within the locality and possibly not far from the subject site, however it is unlikely to nest in the vegetation surrounding the proposed Facility. • As this species is a fish eater it would not forage on the site. • It is considered highly unlikely that the proposed Facility would significantly affect the lifecycle of this species. Little eagle (Heiraaetus morphnoides) • Not recorded during 2007 or 2009 field surveys, however there are six records from the locality (within 10 km of the subject site) (DECCW Wildlife Atlas). • This species could forage over the site and could potentially nest within the larger trees in the surrounding forest/woodland, however the trees within the immediate buffer zone are probably too small. • It is highly unlikely that the proposed Facility would significantly affect the lifecycle of this species. Masked owl (Tyto novaehollandiae) • Recorded in the north-west corner of the study area in the 2007 field survey. • Could potentially forage within the subject site. • This species is unlikely to breed in close proximity to the subject site as only one large tree hollow was recorded during the habitat assessment • It is considered unlikely that the proposed Facility would significantly affect the lifecycle of this species, however some displacement from the buffer zone to adjoining bushland may occur as a result of expected increased noise and dust levels.
	Powerful Owl (Ninox strenua) • Not recorded during the 2007 or 2009 field surveys, however DECCW Wildlife Atlas records occur from within 2.5 km of the subject site. • The subject site itself provides no habitat value due to the lack of trees, however the vegetated buffer zone provides a potential foraging area. • Although a small strip of vegetation may need to be removed along the western boundary for the proposal, this is highly unlikely to affect the lifecycle of the powerful owl, as no hollow bearing trees would be lost and prey availability is unlikely to change.

Impact	Assessment
	Regent Honeyeater (Xanthomyza phrygia) • Not recorded during the 2007 or 2009 field surveys. • Potential foraging habitat occurs in the form of winter flowering eucalypt and melaleuca trees within the buffer zone. • Given the large foraging range of the regent honeyeater during its winter migration, the possible removal of a very narrow strip of vegetation along the western boundary of the subject site is unlikely to affect the lifecycle of this species. Squirrel Glider (Petaurus norfolcensis) • Recorded in vegetated areas adjoining the subject site during the 2007 survey period. • As no hollow-bearing trees would be removed and only a very narrow strip of vegetation may be removed along the western boundary of the subject site, it is unlikely that the proposed Facility would significantly affect the lifecycle of this species. Grey-headed Flying-fox (Pteropus poliocephalus) • Recorded foraging within forest remnants adjoining the subject site during the 2007 surveys. • Due to the small number of trees that may need to be removed along the western edge of the subject site and the large area over which the grey-headed flying fox forages, the proposal is highly unlikely to displace the grey-headed flying-fox. • The removal of any habitat for this species would contribute to the cumulative loss of habitat for the species. • As no known flying-fox camps were identified or would be disturbed, it is considered highly unlikely that the proposed Facility would disrupt the breeding cycle or roosting behaviour of the grey-headed flying-fox.

Impact	Assessment
	Cave-roosting Bats – Eastern Bent-wing Bat (Miniopterus schreibersii oceanensis), Little Bentwing Bat (Miniopterus australis) and Large-eared Pied-bat (Chalinolobus dwyeri) • All of these Bat species were recorded foraging in the local area during the 2007 field survey. • No breeding habitat in the form of caves or tunnels occurs on the subject site. • There is potential foraging habitat for each species within the subject site as well as in or above surrounding open forested areas and scattered trees. • The proposed Facility would reduce or modify the total area of potential foraging habitat within the local area, however as these species forage over a large area and the area to be lost/modified is small, it is unlikely to significantly affect the lifecycle of any threatened cave-roosting bat. Hollow-roosting Bats – Eastern False Pipistrelle (Falsistrellus tasmaniensis), East-coast Freetail-bat (Mormopterus norfolkensis), Greater Broad-nosed Bat (Scoteanax rueppellii) • The east-coast freetail-bat was recorded foraging within forest remnants adjoining the subject site during the 2007 surveys. • The greater broad-nosed bat has been recorded within 2.5km of the subject site and the eastern false pipistrelle within the locality (DECCW Wildlife Atlas). • Potential foraging habitat occurs in the cleared subject site. • None of the identified tree hollows in the surrounding buffer zone would be lost and therefore there would be no loss of potential roost sites. • The proposed Facility would result in the loss/modification of a relatively small area of foraging habitat however, given the mobility and expected large foraging range of these species, this loss is not considered to be significant. • The proposed Facility would be unlikely to significantly affect the lifecycle of these species. Southern Myotis (Myotis macropus) • Tentatively recorded from a probable ultrasonic call on the edge of the wetland to the east of the subject site in the 2007 field survey. • This species is not expected to roost in or near the subject site however individuals may occasionally forage over the cleared land. The proposed Facility would be unlikely to significantly affect the lifecycle of this species.
	Wallum froglet (Crinia tinnula) • Not recorded during the 2007 or 2009 field surveys. • Potential habitat occurs within the freshwater wetland immediately to the south east of the subject site and other wet areas. • Changes to water quality and hydrology as a result of the proposed Facility may be an issue for this species. However if the water quality and flows from the site are controlled as proposed, it is unlikely that the lifecycle of this species would be significantly affected.
Impact on the habitat of a threatened species, population or ecological community	The proposal may result in the removal of a very narrow strip of vegetation along the western boundary of the subject site. No hollow bearing trees would be lost. Foraging habitat for the squirrel glider, grey-headed flying-fox and nectar feeding birds would be minimally reduced. The foraging capabilities of insectivorous bats in general and possibly the masked owl within the subject site would be reduced.

Impact	Assessment
	Nearby swamp habitats could be affected by changes to water quality and flow regimes, however with the implementation of the proposed Water Cycle Management Plan for the site, it is unlikely that the proposed Facility would impact on water quality.
Impact on any threatened species or populations that are at the limit of its known distribution	The subject site is not at or near the limit of the distribution of any threatened species.
Impact on current disturbance regimes	Current disturbance regimes within the subject site include: • clearing of natural vegetation; • minor rubbish dumping; • the subject site has been filled and vegetated with introduced grassland; • feral animals; and • grazing by cattle. The proposed Facility would result in an increased human presence, therefore there would be increased traffic movements, machinery noise (crushers, grinders and separators), dust, if not suppressed adequately and possibly lighting during night operations. Management measures as part of the CEMP and OEMP for proposed operations would address these potential impacts.
Impact on habitat connectivity	There would be no change to habitat connectivity, apart from the construction of the entry road at The Weir Road, as the subject site is already cleared of natural vegetation. The security fence and infrastructure of the project would prevent or hinder movement across the site by terrestrial fauna species, however connectivity around the site to the north would still be maintained.
Impact on critical habitat	No critical habitat is currently listed in the NSW *TSC Act* or Commonwealth *EPBC Act* for the subject species within the study area.

Source: Ecotone 2009

8.4.2 Koala Habitat Assessment – SEPP 44

The subject site does not represent koala habitat. Much of the woodland surrounding the subject site has been identified as 'potential koala habitat' based on the presence of food tree species listed in *SEPP 44.*

Three food tree species, *Eucalyptus tereticornis, E. haemastoma* and *E. robusta,* listed on Schedule 2 of *SEPP 44* occur in the buffer surrounding the subject site.

Ball honeymyrtle swamp forest is dominant in much of the remaining buffer and although melaleuca species are not listed in *SEPP 44,* some species are known to be important koala habitat in other areas (e.g. Melaleuca quinquenervia in Port Stephens LGA). The scribbly gum/swamp mahogany/paperbark swamp forest in the north-western part of the study area represents 'potential koala habitat'.

The lack of evidence of koala presence through scat searches and the fact that no records occur near the subject site, indicates that the study area does not represent 'core koala habitat' as defined in *SEPP 44*, therefore further assessment under *SEPP 44* is not required.

8.5 Key Threatening Processes

Seventeen key threatening processes were identified under the *EPBC Act*, with four being potentially relevant to the proposed Facility. These include:

- ***Dieback caused by the root-rot fungus (Phytophthora cinnamomi):*** infection of some species of native plants by this plant pathogen could occur into the site if contaminated soil were inadvertently imported in fill or on machinery, tools, boots or clothing. Protocols should be established to prevent this occurring.
- ***Land Clearance:*** very little, if any, clearance of native vegetation would occur as a result of the proposed Facility.
- ***Infection of amphibians with chytrid fungus resulting in chytridiomycosis:*** the movement of water, soil or plant matter from wet drainage lines or onto the subject site during construction has the potential to spread chytrid fungus. The level of chytrid fungus prevalence on the subject site and in the surrounding area is unknown but should not be assumed to be absent.
- ***Loss of terrestrial climatic habitat caused by anthropogenic emissions of GHG:*** the proposed Facility, during construction and operational phases, may result in an incremental contribution to the anthropogenic global emissions of GHG thus contributing to the overall loss of terrestrial climatic habitat for some threatened species on a global basis. **Section 18.0** addresses GHG emissions as they pertain to the proposed Facility.

8.6 Environmental Safeguards

Ecotone has proposed the following mitigation strategies to manage the potential flora and fauna impacts associated with the proposed Facility.

Vegetation Offsets

To compensate for the small area of EEC habitat cleared or modified, and the possible removal of a few individual threatened trees, appropriate offsets would be provided on-site in two areas of retained natural vegetation in the south-western and south-eastern corners of the site. Soil would be removed from a bare, weedy part of this area. The area would then be restored to the same level as the adjoining natural vegetation and reinstated with local provenance plantings of the same species as the adjoining remnant, including the threatened *Angophora inopina*. Professional bush regeneration including removal and management of weeds would be applied in the existing vegetation remnants. Details of the proposed rehabilitation treatment to these areas are outlined in **Section 14.5.1**

Construction Management

A site perimeter fence (stock fence) would be installed prior to the commencement of construction works to prevent accidental intrusions into adjoining areas of natural vegetation, particularly the swamp and wetland areas.

Temporary fences or barriers should be installed on the development side of the surveyed edges of the EEC in the south-eastern and south-western corners of the property during construction, to protect the EEC from accidental intrusions by machinery and to prevent inappropriate stockpiling of soil and building materials in the EEC areas.

Runoff and sedimentation from the proposed works areas would be managed during the construction phase using current best practice sediment and erosion control measures.

A protocol for the prevention of *Phytophthora cinnamomi* infection of native plants should be developed, included in the CEMP and implemented during construction.

Landscape Rehabilitation and Management

All species to be used for rehabilitation and restoration of retained natural areas and the embankment would be of local provenance.

Angophora inopina (propagated from seed of local provenance) is included in the planting list for the proposed Facility to be planted in areas of similar habitat to that in which it currently occurs in the site, to offset any loss of trees that cannot be protected due to the proposed Facility.

Weed control protocols would be developed and implemented. These protocols would include all weeds from areas cleared during construction being completely removed from the site and not allowed to enter adjacent habitat.

Significant weeds must be controlled along the perimeter of the site in the area of the landscaped embankment wall and prevented from invading adjoining natural bushland.

Tree Felling Protocol

Depending on the number and size of trees to be removed, a tree felling protocol may need to be developed and implemented to minimize harm to all fauna species during the clearing of trees. The tree felling protocol would be developed and implemented by a suitably qualified ecologist with previous experience supervising the felling of trees and should involve as a minimum the following key steps of:

- establishment of the best time of the year for felling;
- pre-felling mapping of habitat trees;
- inspections of trees on the day of felling;
- procedures for the safe removal of fauna species from trees prior and post felling; and
- a relocation/release protocol.

8.7 Conclusions

The subject site consists primarily of cleared, open and weedy pasture, however, threatened and significant ecological communities and flora species surround the subject site up to its boundary. A small rectangle at the edge of the EEC *Swamp Sclerophyll Forest on Coastal Floodplains* would be removed or modified by the proposal in the south-eastern corner of the subject site. This patch amounts to approximately 80m^2 in area and is in poor condition. This loss would be offset within the property in areas of retained natural vegetation at the southern end of the site that would be restored and rehabilitated.

One vulnerable flora species listed by both the *NSW TSC Act* and Commonwealth *EPBC Act*, *Angophora inopina*, occurs at moderate abundance around the perimeter of the site within the 30m buffer beyond the subject site. Seven individuals of the species that occur along the western boundary or slightly within the subject site may be affected by the bund wall, but would be protected from the wall by retaining walls wherever practicable. Given the proposed protective measures in combination with the presence of numerous individuals of this species within the 30m buffer area beyond the subject site that would remain unaffected, a significant impact on the local population of the species is not considered likely.

Eight threatened fauna species were recorded within the study area during the 2007 surveys. A probable identification of a southern myotis *Myotis macropus* was also made. All of these threatened species are listed as Vulnerable in Schedule 2 of the *NSW TSC Act*. The large-eared pied bat is also listed as Vulnerable and the osprey as Migratory on *the EPBC Act.*

Four additional listed migratory species were also recorded within the study area in 2007. No threatened species were recorded during the 2009 surveys and habitat assessment of the subject site, however the squirrel glider was recorded in 2007 in adjoining habitat and therefore could occur within the proposed vegetated buffer zone.

Ecotone has concluded that the impacts on threatened fauna (as well as non-threatened species) would be minimal for the following reasons:

- there are no identified hollow bearing habitat trees being removed;
- the subject site is primarily devoid of natural habitats;
- vegetated corridors for terrestrial and arboreal species would still remain in their current state;
- most of the species assessed are highly mobile and either have a large home range or are nomadic; and
- large areas of better quality habitat occur on adjoining land.

Impacts from increased noise, traffic movements, dust and lighting have the potential to displace fauna from the buffer zone, however this is not considered likely to result in the local extinction of any of the species assessed and would be considered to have minimal impact given the range of mitigation measures proposed as part of the CEMP and OEMP for the proposed Facility.

The flora and fauna assessment also concluded under the Commonwealth *EPBC Act* that a significant impact would not occur on listed endangered, vulnerable or migratory species and therefore referral to the Federal Minister of the Environment is not required.

9.0 Heritage

9.1 Introduction

The overall aim of the Heritage Assessment was to identify the Aboriginal and European heritage values of the project land, identify potential development impacts on those values and provide suitable management recommendations. To achieve these aims the following objectives were established:

- to consult with the relevant local Aboriginal community groups regarding the specific social value of land in the site;
- to understand the regional research context of any Aboriginal sites or objects, and any historic sites or items, in the site;
- to identify documented Aboriginal heritage sites/objects and/or historic heritage sites within the site;
- to identify and record any Aboriginal sites and objects, and any historic sites or items within the site, if required;
- to assess the cultural significance of Aboriginal sites and objects in the site in consultation with the Aboriginal stakeholders, if applicable;
- to assess the cultural significance of historic heritage sites and items in the site (if applicable); and
- to prepare recommendations on the management of Aboriginal and historic heritage values within the site (if applicable), when compared with the proposed Facility footprint.

This section provides an overview of the Heritage assessment. The full assessment is included as **Appendix I** of this EA.

9.2 Methodology

The heritage assessment adopted a two-stage process in accordance with DECCW's *Part 3A EP&A Act Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DECC 2007). The Stage One investigation consisted of a preliminary (desktop) assessment to identify whether any Aboriginal and/or historic heritage values are associated with the study area and consultation with relevant Aboriginal stakeholders. The Stage One investigation comprised of:

- consultation with relevant Aboriginal stakeholders in accordance with the *Interim Community Consultation Requirement for Applicants* (DEC 2004);
- consultation with the Council's Heritage Advisor and pertinent Historical Society to identify other heritage issues;
- an Aboriginal site and report keyword search of DECCW's Aboriginal Heritage Information Management System (AHIMS) database for the study area curtilage and surrounding environment;
- a search of the Register of National Estate (RNE) and the NSW Heritage Office State Heritage Register (SHR) and Inventory (SHI);
- a search of relevant local planning instruments for listed items of heritage significance;
- a review of existing Aboriginal and historic heritage assessments and documents for the site and nearby region to provide a regional and local picture on the heritage issues likely to occur in this area; and
- preparation of a heritage constraints map.

The results of this Stage One assessment indicated there were unlikely to be any constraints to development on heritage grounds. Therefore, a more detailed assessment under Stage Two, which would involve field survey, was not considered warranted.

The Assessment was conducted in accordance with appropriate State legislation, namely the NSW *NPW Act* and *Heritage Act 1977,* and relevant guidelines, specifically the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1997), the *Interim Community Consultation Requirements for Applicants* (DEC 2004) and the *Heritage Manual* (Heritage Office 1996).

Aboriginal community consultation was undertaken in accordance with the DECCW *Interim Community Consultation Requirements for Applicants* (DEC 2004). These guidelines outline a process of inviting Aboriginal groups to register their interest in being party to consultation (including local newspaper advertising), seeking

responses on proposed assessment methodology, and seeking comment on proposed assessments and recommendations. Detail regarding the consultation process can be found in the Heritage Assessment in **Appendix I** and results of the consultation are summarised below.

Native Title Services did not respond to the requests for information on Aboriginal stakeholders. LMCC responded suggesting that KLALC should be consulted. DECCW also responded and provided a list of seven potential Aboriginal stakeholder groups. However three were different LALCs and only one LALC (KLALC) was relevant. Similarly, the Office of Registrar for Aboriginal Land Owners responded recommending contact with three LALCs of which only KLALC was relevant.

No other Aboriginal community groups responded to the invitations to register interest in the project. Consequently only one Aboriginal stakeholder group – KLALC – was involved in the consultation process for this project.

Following the 10 day response period, a methodology statement was provided to KLALC which advised the two-stage assessment process as required in DECCW's *Part 3A EP&A Act Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DECC 2007). The methodology statement also advised that the results of the Stage One assessment indicated there were unlikely to be any constraints to development on heritage grounds. The methodology statement advised that AECOM were proposing that no further heritage assessment or fieldwork was required. The methodology statement also referred to a report by KLALC on lands including the study area advising that there were no constraints to development and that no further KLALC involvement was required. KLALC did not make a written response to the methodology, however during a preliminary phone call with Lois Towney, a KLALC representative, the proposed methodology was discussed and agreed that a full Aboriginal heritage assessment was not warranted.

A copy of AECOM' Draft Heritage Assessment (**Appendix I**) was provided to KLALC requesting written comments back within 14 days. No written response was received, therefore it is assumed that KLALC agrees with the report's findings.

9.3 Issues/Impacts

9.3.1 Registered Aboriginal Sites

A search of DECCW's AHIMS database revealed that there are 34 registered Aboriginal sites within a 5 x 5 km area centred over the subject site. The search also revealed that there were no registered Aboriginal sites within the subject site. The majority of sites are associated with developments occurring in the various urban centres of Edgeworth, Cardiff and Glendale, associated with linear infrastructure developments such as roads, transmission lines and pipe lines, or associated with mine developments. Only three Aboriginal sites have been registered along Cockle Creek itself (#38-4-0377, 0378 and 0397) located about 1km west of the site on the northern side of the creek (see Effenberger 1995).

A review of the sites identified in the AHIMS search showed that a range of Aboriginal site types have been identified in the local area. Of the 34 sites, a total of 12 sites were categorised as "open camp sites" consisting of stone tool artefacts, either as isolated finds or low density artefact scatters. Nearly half the sites (15 sites) were not formally categorised into site types. However a review of the site features for those 15 sites was undertaken and allowed inferences on the types of sites registered.

The heritage assessment determined that stone artefact sites are the most common in the local area with axe grinding grooves across the landscape also occurring.

9.3.2 Previous Assessment of the Site

A previous survey of a 65ha area between Cockle Creek to the north and east and The Weir Road to the south was found to be the most relevant to the site for the following reasons:

- The subject site occupies the southwest corner of the area previously surveyed;
- The survey informed the *Local Environment Study for Land North of Teralba* (CH2MHill 2008) for a (then) proposed recreational sporting development and a crushing and recycling plant (CH_2MHill 2008);
- An Aboriginal heritage assessment was conducted in conjunction with KLALC. KLALC submitted a report to CH_2MHill (reproduced in **Appendix I**);
- The field survey identified a number of bush tracks that had scatters of milky quartz and river gravel lithics;
- No Aboriginal artefactual evidence was identified;

- The report identified high levels of disturbance throughout the area including illegal dumping of waste;
- The results of the survey were limited by high levels of vegetative cover and poor ground surface visibility;
- The report, which is supported by KLALC, suggests that the area has low potential for Aboriginal sites;
- KLALC's research did not identify any significant traditional or ceremonial cultural sites;
- CH_2MHill (2008) concluded that predictive modelling identified a high likelihood for Aboriginal cultural material to be "*concealed below the vegetated ground surface as a result of general use of the area*";
- KLALC's report concluded that there is nothing in the area to halt or delay development. Furthermore, KLALC did not see any need to be involved in any further site inspection.

9.3.3 Summary of Heritage Assessment Findings

- The Stage One investigation, which involved reviews of previous archaeological and heritage surveys, together with searches of relevant heritage databases for records of heritage-listed sites, did not identify any known heritage sites within the site.
- The site has been subjected to extensive land disturbance in previous years as a result of deposition of biosolid waste (nightsoil) to a depth of up to 1m over the whole site. Other disturbance activities include land clearance and construction of a transmission line tower.
- The Assessment concluded that environmental factors associated with the site (flooding, shallow duplex soils) together with knowledge of the archaeological signature of the local region, suggests that the archaeological potential for the site is limited to the possible occurrence of subsurface deposits in the natural ground soils below the imported fill.
- Previous land disturbance is likely to impact on the significance of archaeological deposits if present.
- It was determined that because of the distance from Cockle Creek (250m), together with a floodplain landscape, that there is a low probability that such deposits exist. If however they are present they are likely to be limited to low density 'background scatter'.
- As the entire site would be raised to a level of 2 to 3 m above ground surface levels, any impacts to any subsurface deposits are likely to be limited to a small portion of the site associated with excavation of ponds.
- No heritage impacts have been identified, nor are heritage impacts considered likely.
- No previously recorded Aboriginal sites or historic heritage items occur within the site.
- On the basis of this assessment, the proposed development is unlikely to encounter Aboriginal objects or historic relics.

9.4 Environmental Safeguards

A number of environmental safeguards should be effective in managing the potential heritage issues associated with the construction of the proposed Facility.

- Should any objects be identified during the course of site works, all works must cease and the DECCW (Hunter Branch, Environment Protection and Regulation Division, Regional Archaeologist) contacted in regard to appropriate permit requirements before any further impact is undertaken;
- Should suspected skeletal material be uncovered during the course of site works, all works must cease and the DECCW, the NSW Police and the NSW Coroners office contacted immediately, regardless of any existing DECCW permits for the proposed development;
- All contractors who work within the confines of the study area should be made aware of the *NPW Act 1974* (as amended) and the fact that it is an offence to move, disturb or destroy Aboriginal objects without the prior written permission of the Director General of the DECCW.

9.5 Conclusions

The heritage assessment concluded that whilst it is acknowledged that evidence of Aboriginal activity may be found in any part of the landscape, the environmental conditions of the site, particularly in relation to previous disturbance and flooding, together with the presence of shallow duplex soils, indicates that significant deposits of archaeological material are unlikely to be present in the natural ground soils of the site below the current fill layer. Should archaeological materials be present, they are likely to be in the form of low density stone artefact deposits of a type commonly encountered in the Lake Macquarie and Lower Hunter areas. These deposits, if present, are likely to be general 'background scatter'. It is unlikely that any historic archaeological material would be encountered within the site.

Consequently, it was determined that there is no requirement for further heritage assessment of the site. However should archaeological materials be identified during construction, in particular human skeletal material, works should cease and the appropriate authorities (DECCW and KLALC) be notified immediately.

10.0 Traffic

10.1 Introduction

AECOM was commissioned to undertake a *Traffic Impact Assessment* for the proposed Facility. The traffic assessment included a review of existing traffic conditions, an evaluation of the potential impacts from a future development scenario, and the development of criteria for future development and potential mitigation measures to be adopted. The Traffic impact Assessment was prepared in accordance with the RTA's *Guide to Traffic Generating Developments.*

This section provides an overview of the *Traffic Impact Assessment*. The full assessment is included as **Appendix J** of this EA.

10.2 Existing Traffic Conditions

10.2.1 Public Transport, Pedestrian and Cycle Facilities

The closest railway station is located approximately 2km south of the subject site. Teralba is serviced by the Newcastle and Central Coast Line which runs between Sydney and Newcastle. The frequency of trains servicing Teralba station is shown in **Table 10-1.**

Table 10-1: Frequency of Train Services at Teralba Station

Direction	AM Peak (0700-0900)	PM Peak (1600-1800)	Off Peak (1000-1500)
Newcastle to Sydney	3	3	4
Sydney to Newcastle	3	4	5

Source: Cityrail.info, 2009

There are no bus services in the vicinity, however Toronto Bus Services operate a service that links Toronto with Teralba.

There are two cycleways in the vicinity of the site. One cycleway extends from Macquarie Drive in Warners Bay, along the esplanade to Speers Point Park (Speers Point Park is located approximately 4km from the site on the eastern side of Five Islands Road). A second cycleway extends from Edwards Park in Booragul and follows the foreshore to Five Islands Road, where it joins the Warners Bay cycleway (Edwards Park is located approximately 5km from the site on the eastern side of Five Islands Road).

10.2.2 Strategic Road Network

The two major regional roads in the vicinity of the site are the Sydney-Newcastle Freeway (F3) and the Pacific Highway.

The F3 Freeway is a 127km motorway linking Sydney to the Central Coast, Newcastle and Hunter Regions. The freeway alternates between two and three lanes in each direction for its length. The northern section of the freeway to the west of the site, from north of Wyong to its terminus at John Renshaw Drive, has twolanes in each direction. The freeway has a speed limit varying between 80 and 110km/h. Traffic on the F3 can access the site via the West Wallsend Interchange (from the south only) or the Newcastle Interchange.

The Pacific Highway is a 1,025km major transport route which links Sydney and Brisbane along the east coast of Australia. The section of the Pacific Highway to the east of Teralba, has two lanes in each direction and a speed limit that varies between 60km/h and 80km/h.

10.2.3 Local Road Network

The local road network in the vicinity of the site consists of The Weir Road, Griffen Road and Racecourse Road.

The Weir Road is a sealed road that runs in an east-west direction and has a single lane in each direction. The shoulder of The Weir Road is unsealed and there is no kerb or gutter. The Weir Road connects the proposed facility to the suburb of Barnsley.

Racecourse Road connects to The Weir Road and runs in a north-south direction parallel to Cockle Creek. The road is also sealed and has a single lane in each direction. The Racecourse Road provides connection between the proposed facility and the suburb of Teralba.

Griffen Road connects to Racecourse Road at a priority controlled T intersection. It is a two-way, undivided sealed road with a single lane in each direction. The local road network is shown in **Figure 10.1.**

Figure 10-1: Local Road Network

10.3 Traffic Volumes

10.3.1 Daily Traffic Counts

RTA Traffic Volume Data has been obtained to determine the historical traffic growth and current mid-block traffic flows in the surrounding area. **Table 10-2** shows historical Average Annual Daily Traffic (AADT) volumes at a station in the vicinity of the proposed Facility. The location of the station is on Five Islands Road in Teralba.

Table 10-2 Historical Traffic Volumes and Growth

Station Number	Location	1995	1998	2001	2004	Ave % growth /yr
05.976	Five Islands Rd, Teralba, N of Anzac Parade	30,608	31,878	31,919	33,273	**0.9%**

Source: RTA Traffic Volume Data

10.3.2 Peak Hour Traffic Counts

Based on the forecast operation pattern of the proposed Facility, the peak operation period would occur during the morning hours which coincide with the morning 'journey to work' peak hour. Therefore it is expected that the proposed Facility would have the greatest impact on the road network during the weekday AM peak hour. On this basis, AECOM's traffic impact assessment has focused only on the analysis on the morning peak hour.

In addition to the RTA data, manual traffic counts were undertaken by Australasian Traffic Surveys (ATS) during the AM (7am – 9am) peak period on 30th July 2009 at the following intersections:

- Five Islands Road / Toronto Road;
- Racecourse Road / Griffen Road; and
- Northville Drive / The Weir Road.

These intersections are considered to be major intersections in the vicinity of the subject site that might be impacted from additional traffic generated by the proposed Facility. Analysis of the data shows that the AM peak period for the network was between 8am and 9am.

It is understood that traffic from some existing Council recycling operations located at Rhondda Road is using the intersection of Five Islands Road and Toronto Road, which would cease when the proposed recycling facility is opened. However, the actual amount of traffic from the existing Council operations is unknown and cannot be removed from the collected traffic data for further assessment. Therefore, the traffic volumes that have been modelled would represent a worst case scenario.

10.3.3 Intersection Performance

Intersection assessment based on the surveyed traffic data has been carried out using SIDRA 3.2, a computer based modelling package which calculates isolated intersection performance.

The main performance indicators for SIDRA 3.2 include:

- degree of saturation (DoS) – a measure of the ratio between traffic volumes and the capacity of the intersection;
- average delay – how long in seconds the average vehicle waits at the intersection; and
- level of service (LoS) – a measure of the overall performance of the intersection.

Table 10-3: Performance Criteria for Intersections

Level of Service	Average Delay (secs/veh)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents would cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: RTA 2002

Table 10-4 summarises the existing intersection operation in the AM peak hour.

Table 10-4 AM Peak Hour Intersection Performance

Intersection	Int. Type	Int. LoS	Int. DoS	Ave Delay (s)	Longest Queue (m)	Longest Queue Movement
Five Islands Road / York Street	Roundabout	A	0.778	10.5	73	Toronto Rd S Left/ Through
Racecourse Road / Griffen Road	Give way	A	0.046	4.5	3	Racecourse Rd S
Northville Drive / The Weir Road	Give way	A	0.132	1.8	2	The Weir Road

LoS – Level of Service
DoS – Degree of Saturation

The analysis shows all three intersections operate at an acceptable level of service in the morning peak. The Five Islands Road and York Street roundabout operates at LoS A with spare capacity and minimal delays. The south approach of Toronto Road is the worst with queue lengths up to 73m and delays of 10.5 seconds, given it is the major traffic approach. The through traffic on Toronto Road is sensitive to right turning traffic from the east approach of First Street in the morning peak resulting in possible extensive queuing.

The priority intersections of Racecourse and Griffen Road as well as Northville Drive and The Weir Road operate efficiently with minimal delays. Analysis shows both intersections have significant spare capacity on the worst movement with a DOS of only 4.6% and 13% of the lane capacity.

10.4 Future Conditions

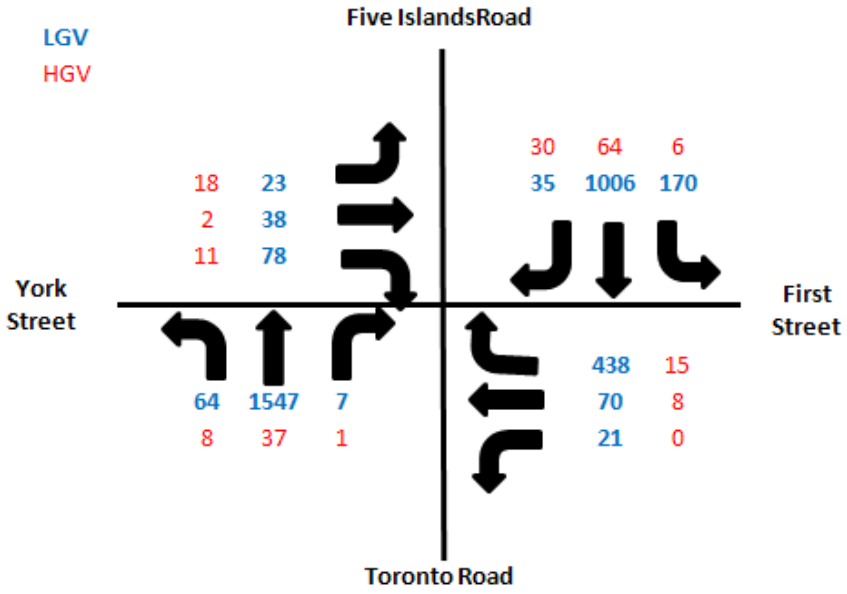
A review was undertaken of the increased traffic flows on the road network for the future years, prior to any proposed developments on-site. Future year assessment was based on a 10 year forecast from commissioning of the proposed Facility in 2012. It was assumed the forecast year for the assessment of the future case would be the year 2022.

10.4.1 Background Traffic Growth

A background growth rate of 0.9% per annum is determined from published historical RTA Traffic Volume Data. The background growth rate of 0.9% p.a. has been applied to the existing network flows to forecast the future traffic conditions in 2022 (without the proposed development).

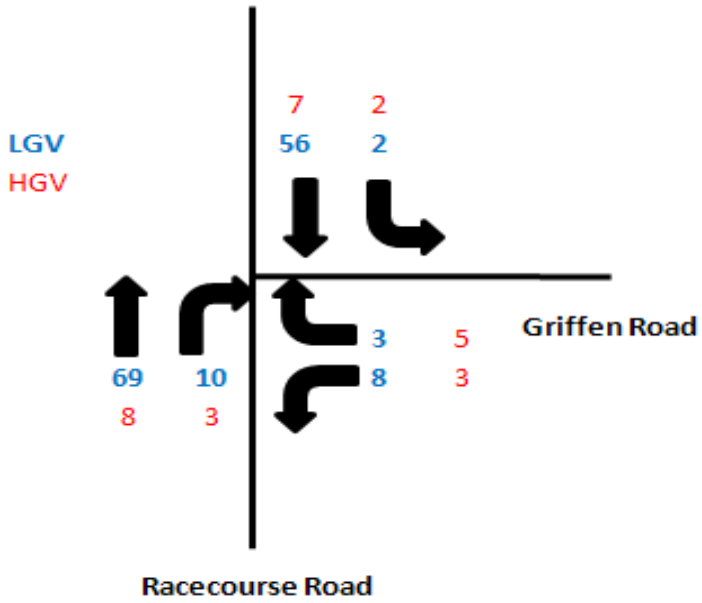
The estimated traffic volumes at key intersections under this scenario (2022 without development traffic) are shown in **Figure 10-2** and **Figure 10-3**.

Figure 10-2: AM Peak Five Islands Road / Toronto Road Intersection in 2022



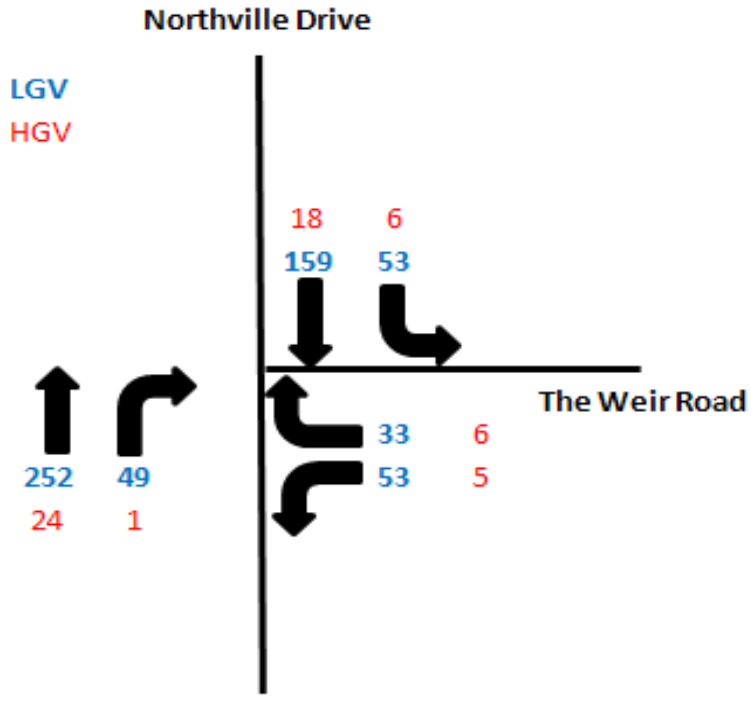
LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 10-3: AM Peak Racecourse Road / Griffen Road Intersection in 2022



LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Figure 10-4: AM Peak Northville Drive / The Weir Road Intersection in 2022



LGV – Light Goods Vehicles including Cars and Motorcycles
HGV – Heavy Goods Vehicles

Committed Development

As part of the LES process recently undertaken for the area, a sporting and recreational facility is proposed to be developed to the east of the proposed Facility. This sporting and recreational facility would consist of two large parcels which would be developed as follows:

- Site 1: three (3) soccer fields overlaid with one cricket field.
- Site 2: two (2) rugby league fields overlaid with one cricket field.

It is assumed the proposed recreational development would generate most traffic on weekday evenings and weekend afternoons and therefore cumulative traffic impacts between these developments and the recycling facility are considered negligible, as the proposed Facility would have its peak operation hours during weekday mornings. As a result the sporting and recreational development has not been included as part of the committed development traffic for this assessment.

Future Intersection Performance

The intersections of Five Islands Road / York Street, Racecourse Road / Griffen Road and Northville Drive / The Weir Road have been assessed using *SIDRA Intersection 3.2* for the future year scenario (2022) with no geometric changes to the existing scenario and no development trips generated by the proposed Facility.

Table 10-5: AM Peak Hour Intersection Performance in 2002 (without proposed development)

Intersection	Int. Type	Int. LoS	Int. DoS	Average Delay (sec)	Longest Queue (m)	Longest Queue Movement
Five Islands Road / York Street	Roundabout	B	0.889	13.9	127	Toronto Rd S Left/ Through
Racecourse Road / Griffen Road	Give way	A	0.051	4.5	3	Racecourse Rd S
Northville Drive / The Weir Road	Give way	A	0.150	1.8	2	The Weir Road

LoS – Level of Service
DoS – Degree of Saturation

The analysis in **Table 10-5** shows that all three intersections still operate at an acceptable level of service in the morning peak. The Five Islands Road and York Street roundabout has a decrease in level of service from LoS A in the base case to LoS B in the future, however still with spare capacity and minimal delays. The south approach of Toronto Road is the worst with extensive queue lengths increasing from 73m in the base case to 127m and delays increasing from 10.5 seconds to 13.9 seconds.

The priority intersections of Racecourse Road and Griffen Road as well as Northville Drive and The Weir Road would operate efficiently with minimal delays. Analysis shows both intersections have significant spare capacity on the worst movement, with a DoS of only 5.1% and 15.0% of the lane capacity.

10.5 Proposed Operations

10.5.1 Operational Activities

Proposed operational access and circulations of the proposed Facility is outlined in **Section 2.5** of this EA. The following tables show the proposed production and operation of the proposed Facility at maximum capacity of approximately 200,000tpa. The delivery of feedstock into the proposed Facility would typically take place between the hours of 7am and 4pm, with 5% of that occurring during the network AM peak hour (8am to 9am). The transportation of materials out of the proposed Facility would take place between the hours of 6am and 3pm, with 10% of that occurring during the network AM peak hour (8am to 9am). It should be noted that the operation of the proposed Facility does not coincide with the road network peak hour of 4pm to 5pm.

The volume and timing of feedstock delivery and materials transport off site are shown in **Table 10.6** and **10.7.**

Table 10-6: Proposed Facility Production – Feedstock In

Operations	Amount (tonnes per annum)	Operational timings
Concrete Feedstock	120,000	6 days per week / 50 weeks per year
Recycled Asphalt Pavement	30,000	6 days per week / 50 weeks per year
Mulch*	10,000	6 days per week / 50 weeks per year
Aggregate	2,000	6 days per week / 50 weeks per year
Miscellaneous	40,000	6 days per week / 50 weeks per year
Sealing Aggregate	4,000	6 days per week / 50 weeks per year
Total	**196,000 (excluding mulch)**	

Source: CH2MHILL 2008
**Unit of mulch = m^3*

Table 10-7: Proposed Facility Production – Materials Out

Operations	Amount (tonnes per annum)	Operational timings
Concrete Feedstock	120,000	6 days per week / 50 weeks per year
Recycled Asphalt Pavement	30,000	6 days per week / 50 weeks per year
Mulch*	10,000	6 days per week / 50 weeks per year
Aggregate	2,000	6 days per week / 50 weeks per year
Miscellaneous	40,000	6 days per week / 50 weeks per year
Sealing Aggregate	4,000	6 days per week / 50 weeks per year
Total	**196,000 (excluding mulch)**	

Source: CH2MHILL 2008
**Unit of mulch = m^3*

It is proposed that the transportation of materials would be from two directions. It is assumed that approximately 60 percent of the material would be transported via Teralba, Racecourse Road and The Weir Road and the remaining 40 percent of the material would come from the west via Barnsley and The Weir Road.

It is intended that heavy vehicles travelling via Teralba would use Racecourse Road, York Street and Toronto Road to access Five Islands Road. Anzac Parade has a load limit of five tonnes and it is not intended for heavy vehicles generated by the proposed development to use Anzac Parade as a thoroughfare between William Street and Five Islands Road.

10.5.2 Proposed Parking Demand

Up to a maximum of five employees would use their own vehicle for transport to and from work. Assuming that the employees work during the same hours, there would be a maximum need of five parking spaces. The current site arrangement allows for six parking spaces outside the office block, which would cater for the maximum employee parking demand.

It is not expected the truck loadings generated by the proposed Facility would require on-site parking as the trucks would generally enter the Facility to unload the feedstock or remove the material and then leave the Facility immediately. However, the proposed Facility would provide some on-site short-term parking for operation vehicles servicing the Facility.

10.5.3 Construction Activities

The 200,000 tonne of fill required to fill the site would be imported over a period in the order of three years. It is assumed that the fill would be imported to the site using 30 tonne ridged body trucks.

10.6 Traffic Impact Assessment

10.6.1 Trip Generation

The trips generated by the proposed Facility are based on the amount of feedstock and material to be transported by truck, the truck loading assumptions and the operational requirements. The truck loading assumptions are as follows.

Table 10-8: Truck Loading Assumptions

Operation	Truck load amount (tonnes / load) - Materials in	Truck load amount (tonnes / load) - Materials out
Concrete Feedstock	6	6
	12	12
	30	30
Recycled Asphalt Pavement	12	12
Aggregate	10	10
Miscellaneous	12	12
Sealing Aggregate	30	12
Mulch	10m3	10m3

Source: CH2MHILL 2008

Table 10.9 below shows the number of trucks that would be generated by the proposed Facility. The number of trucks per hour is based on the operational hours of the proposed Facility discussed previously above. The number of associated truck movements, which is based on two movements per truck (one movement into site and one movement out) are also shown in the tables. This would represent the worst case scenario where it is assumed that there is no coordination in truck deployment between the 'feedstock in' and 'materials out' movements – a loaded truck would leave the proposed facility empty after unloading the feedstock and another empty truck is required to remove the materials from the proposed facility.

Table 10-9: Truck Movements associated with the Proposed Facility – Feedstock In

Operation	Truck movements per year	Truck movements per day	Truck movements per hour*
Concrete Feedstock (6 tonnes/load)	6,400	22	2
Concrete Feedstock (12 tonnes/load)	10,800	36	2
Concrete Feedstock (30 tonnes/load)	2,240	8	1
Recycled Asphalt Pavement	5,000	16	1
Mulch	2,000	6	1
Aggregate	400	2	1
Miscellaneous	6,666	22	2
Sealing Aggregate	266	1	1
Total	**33,774**	**112**	**11**

Source: CH2MHILL 2008
**-5% of daily movements*
Note: Aggregate 2000 tonnes = 10 tonnes per load = 200 loads = 400 movements

Table 10-10: Truck Movements associated with the Proposed Facility – Materials Out

Operation	Truck movements per year	Truck movements per day	Truck movements per hour*
Concrete Feedstock (6 tonnes/load)	5,600	18	2
Concrete Feedstock (12 tonnes/load)	7,400	24	3
Concrete Feedstock (30 tonnes/load)	3,920	14	2
Recycled Asphalt Pavement	5,000	16	2
Mulch	2,000	6	1
Aggregate	400	2	1
Miscellaneous	6,666	22	3
Sealing Aggregate	666	2	1
Total	**31,654**	**106**	**15**

Source: CH2MHILL 2008
**-10% of daily movements*

The table above shows that the proposed Facility would generate approximately 26 truck movements (11 movements in and 15 movements out of the proposed Facility) in the peak hour.

There would be a maximum of five employees at the proposed Facility who would use their own vehicle for transport to and from work creating an additional 10 vehicle movements per day. It is assumed that five vehicle movements would be made in the AM peak and five vehicle movements would be made in the PM peak.

It should be noted, there is a difference in the number of trucks allocated between the material operations, particularly 'Sealing Aggregate' in **Table 10.8.** This assumption is based on discussions and agreement with Council. This is reflected in the calculations of total truck movements estimated per year as shown in **Table 10.9** and **Table 10.10** for sealing aggregate.

Based on current traffic distribution, it is assumed that approximately 60 percent of the heavy vehicle movements would come and leave via Teralba and Racecourse Road and 40 percent of the heavy vehicle movements would come and leave from the west via Barnsley and The Weir Road. As there is no information on the location from which employees would journey to work, a 50/50 split between the two routes has been assumed.

10.6.2 New Access Layout and Intersection Performance

The new access to the site has been modelled as a two lane - two way road intersecting The Weir Road at a priority T- intersection shown in **Figure 10.5** . The intersection would form a type BAR (Basic Right Turn) treatment. This is the minimum treatment for a right turn movement from a through road to a side road and local access points. This treatment would provide sufficient trafficable width for heavy vehicle to pass on the left of a single unit stationary vehicle. The performance of the intersection of the site access road and Racecourse Road is outlined in **Table 10-11**.

Table 10-11: New Access Road, Intersection Performance in 2022 AM Peak

Intersection	Int. Type	Int. LoS	Int. DoS	Average Delay (sec)	Longest Queue (m)	Longest Queue Movement
New Access Rd / The Weir Road	Give way	A	0.054	2.3	2	Right turn from the New Access Road

LoS – Level of Service
DoS – Degree of Saturation

Using the minimum intersection treatment, the performance of the access road intersection in **Table 10.11** shows an overall acceptable LoS A. The worst movement is shown to be the right turn from the new access road onto

the Weir Road having a DoS of approximately 5%. The queue for the worst movement is also shown to be less than 10m.

10.6.3 Impact on Surrounding Network

When compared to the projected 2022 AM Peak hour intersection performance (without the proposed development), the impacts of development traffic on the surrounding network during the AM peak hour of 2022 is negligible.

Table 10-12: Development Traffic Impacts on Surrounding Network (2022 AM peak)

Intersection	Int. Type	Int. LoS	Int. DoS	Average Delay (sec)	Longest Queue (m)	Longest Queue Movement
Five Islands Road / York Street	Roundabout	B	0.904	14.7	135	Toronto Rd S Left/ Through
Racecourse Road / Griffen Road	Give way	A	0.060	4.4	4	Racecourse Rd S Through
Northville Drive / The Weir Road	Give way	A	0.150	2.0	3	The Weir Rd – Right Turn

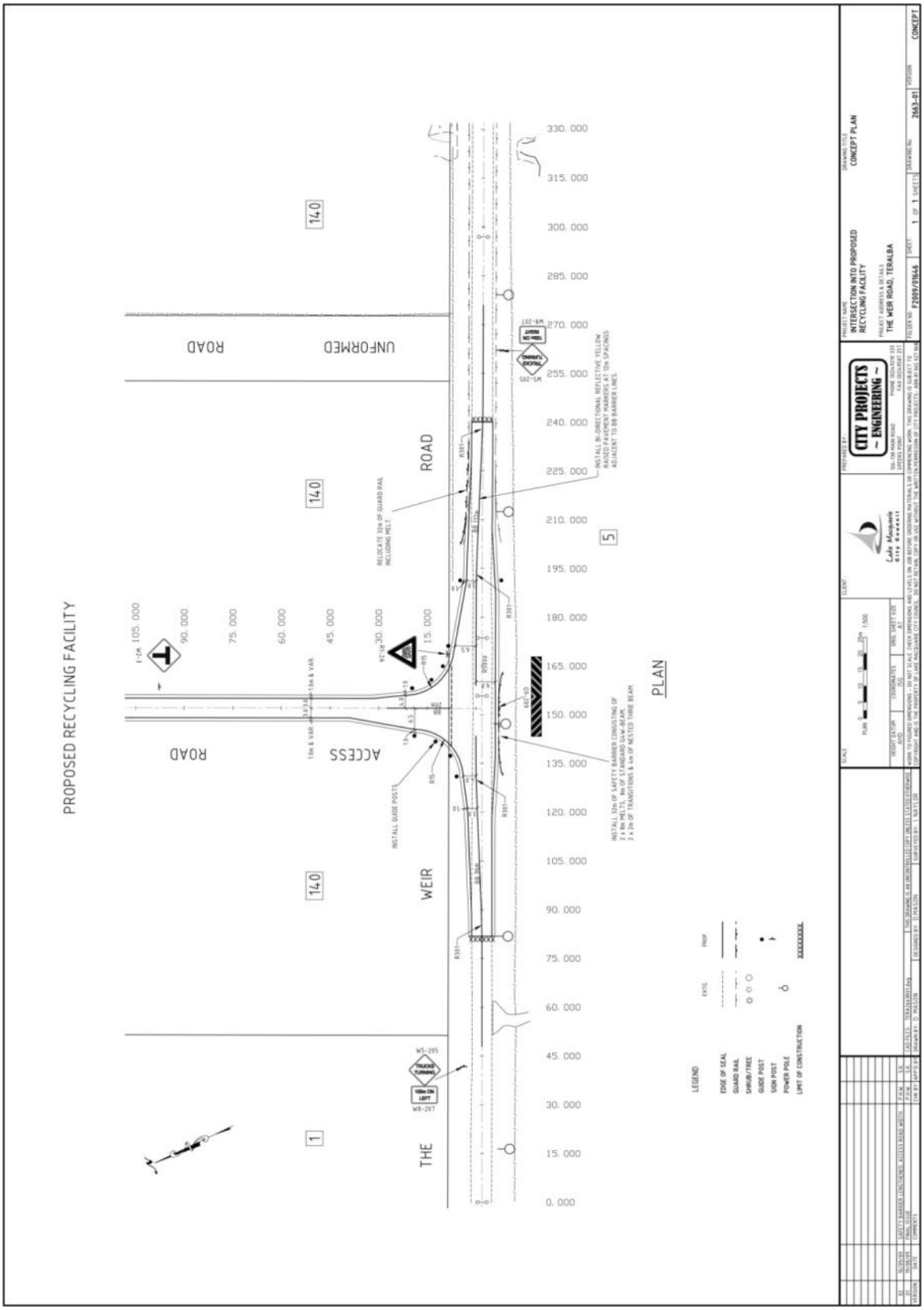
LoS – Level of Service
DoS – Degree of Saturation

The 'average delay' calculations in **Table 10.5** and **Table 10.12** for all intersections are based on an overall weighted average. The intersection of Racecourse and Griffen Road scenario is shown to have marginally improved delay due to development traffic. Due to increasing traffic from the development on Racecourse Road, there is no delay associated with this movement. The sign controlled approach of Griffen Road (critical approach) is subject to a delay and would show this parameter to increase with every future year. However, the effect of these extra vehicles on Racecourse Road in the overall average outweighs the increased delay at the give-way sign on Griffen Road.

The analysis shows that all three intersections operate at an acceptable LoS and there is no change in LoS from the base case during the morning peak in 2022. The Five Islands Road and York Street roundabout maintains the same LoS B with spare capacity and minimal delays. The south approach of Toronto Road still fares poorly with extensive queue lengths increasing from 127m in the base case to 135m and delays increasing from 13.9 seconds to 14.7 seconds.

The priority intersections of Racecourse and Griffen Road as well as Northville Drive and The Weir Road operate efficiently with minimal delays. Analysis shows both intersections have significant spare capacity on the worst movement, with a DoS of only 6.0% and 15.0% of the lane capacity.

Figure 10-5: Proposed Access Intersection



Source: City Project Engineering

10.6.4 Construction Traffic Impacts

Assuming a worst case scenario of importing 100,000 tonne of fill using 30 tonne trucks and 300 working days in any one year, the construction stage would generate 11 heavy vehicle trips (22 truck movements) per day. Given that the heavy vehicle generation during the construction stage is much less than the operation stage and the surrounding road network would operate with an acceptable LoS during the operation stage, the impacts during the construction stage are considered to be negligible.

10.7 Conclusions

Under existing traffic conditions, the major intersections in the vicinity of the proposed development operate at an acceptable LoS and have spare capacity during the AM peak hour.

It is expected that the proposed Facility would generate a total of approximately 26 heavy vehicle movements and 5 car movements during the AM peak hour. The traffic impact analysis has shown that the surrounding road network would operate with an acceptable LoS and with spare capacity with the additional traffic.

The proposed access intersection has been designed as a priority T-intersection with a typical BAR (Basic Right Turn) treatment. This is the minimum treatment for a right turn movement from a through road to a side road and local access points. This treatment would provide sufficient trafficable width for a heavy vehicle to pass on the left of a single unit stationary vehicle. The proposed access would operate with acceptable LoS in the future scenario.

11.0 Extractive and Mineral Resources

11.1 Introduction

The *Local Environmental Study for Land North of Teralba* (CH_2MHILL 2008) assessed the suitability of land to support the development of recreational sporting development as well as the proposed Facility. The LES examined the extractive and mineral resources within a study area which extends beyond the boundaries of this site but encompasses the entirety of this site.

The LES study area was identified as being of interest to the Department of Industry and Investment (DII). As a result CH_2MHILL consulted the DII and invited it to comment on extractive and mineral resources within the study area.

11.2 Issues/Impacts

11.2.1 Coal

The site is known to be underlain by the Newcastle Coal Measures and lies within the Killingworth-Wallsend Mine Subsidence District. Oceanic Coal Australia Ltd owns a number of mining leases (ML) and consolidated coal leases (CCL) in the area, including:

- CCL 718, which covers the proposed area;
- CCL 725, which is located north of the area; and
- ML 459, which is located west of the area.

The Young Wallsend and Borehole seams are located both within and near the site; however these have both been worked out. In this regard, there are no remaining identified coal resources beneath the site.

11.2.2 Petroleum and Gas

The site is covered by Petroleum Lease (PEL) 267, which is owned by Sydney Gas Operations Pty Ltd. According to the LES, the site is considered to have low potential for coal seam methane, however as the Greta Coal Measures are in the region, there may be potential for future exploration in the vicinity of the site.

11.2.3 Other Extractive Resources

Teralba Quarry, which is operated by Metromix Pty Ltd, is located approximately 2km to the southwest of the site. This is a large scale operation, extracting coarse aggregate and construction sand.

The DII has no titles relating to the operating of Teralba Quarry as loam, sand, river gravel, and coarse aggregate materials such as basalt, granite and sandstone are not prescribed minerals under the *Mining Act 1992.*

11.3 Conclusions and Recommendations

Although there are a number of leases for extracting resources over the site, the coal seams have been mined out and there is little potential for the mining of methane gas. The proposed Facility is also unlikely to impact upon the extraction of sand and aggregate at the Teralba Quarry. As the site lies within a mine subsidence area, the MSB would be consulted before permanent structures are constructed.

12.0 Bushfire Threat Assessment

12.1 Introduction

Australian Bushfire Protection Planners (ABPP) was engaged to prepare a Bushfire Protection Assessment to provide advice on the bushfire protection measures required for the construction of the proposed Facility.

This section provides an overview of the Bushfire Protection Assessment. The full ABPP report is included as **Appendix K** of this EA.

12.2 Methodology

The bushfire protection assessment was undertaken to address the aims and objectives of *Planning for Bushfire Protection 2006* including:

- Determine the classification of the vegetation on and surrounding the site in accordance with the vegetation classification system contained in *Planning for Bushfire Protection 2006*;
- Undertake an assessment to determine the slope of the land on and surrounding the development site;
- Undertake a Bushfire Protection Assessment to determine bushfire protection strategies for the proposed development that address the following matters:
  - Provision of building setbacks (Defendable Space) from vegetated areas and the siting of buildings to minimize the impact of radiant heat and direct flame contact;
  - Fire fighting water supplies;
  - Access requirements for emergency service vehicles;
  - Construction standards to be used for the future buildings within the proposed development to minimize the vulnerability of buildings to ignition from radiation and ember attack;
  - Land management responsibilities; and
  - Evacuation management.

This assessment has been prepared having regard to the following legislative and planning requirements:

- Section 79C(1) of the *EP&A Act;*
- Sections 63(1) and 63(2) of the *Rural Fires Act 1997;*
- *TSC Act 1995;*
- *NV Act 2003*; and
- *Planning for Bushfire Protection – 2006.*

12.2.1 Site Inspection

The subject site was inspected on the 8th July 2009 to assess the topography, slopes, vegetation classification and land use within and adjoining the development site.

Visual assessment was undertaken to determine likely fire runs, influence of terrain on wind patterns within the bushfire prone vegetation and an assessment of access and egress to the development site. Adjoining properties were also inspected to determine the surrounding land use / land management

12.3 Bushfire Hazard Assessment

Planning for Bushfire Protection 1991 defines bushfire hazard as the “availability of fuel”. The document also defines threat as being a “measure of the scale of impact or significance in terms of hazard and risk”.

Planning for Bushfire Protection 2006 defines bushfire risk as “the chance of a bushfire igniting, spreading and causing damage to assets of value to the community. Risk may be rated as extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset”.

LMCC has prepared a Bushfire Prone Land Map under the provisions of Section 146 of the *EP&A Act 1979.* An extract of this map is provided as **Figure 12-1** below and shows that the site contains Category 1 Bushfire Prone Vegetation and is impacted by the 100 metre wide buffer zone to the Category 1 Bushfire Prone Vegetation on the land surrounding the site.

The site inspection undertaken on the 8th July 2009 confirmed the accuracy of the Bushfire Prone Land Map.

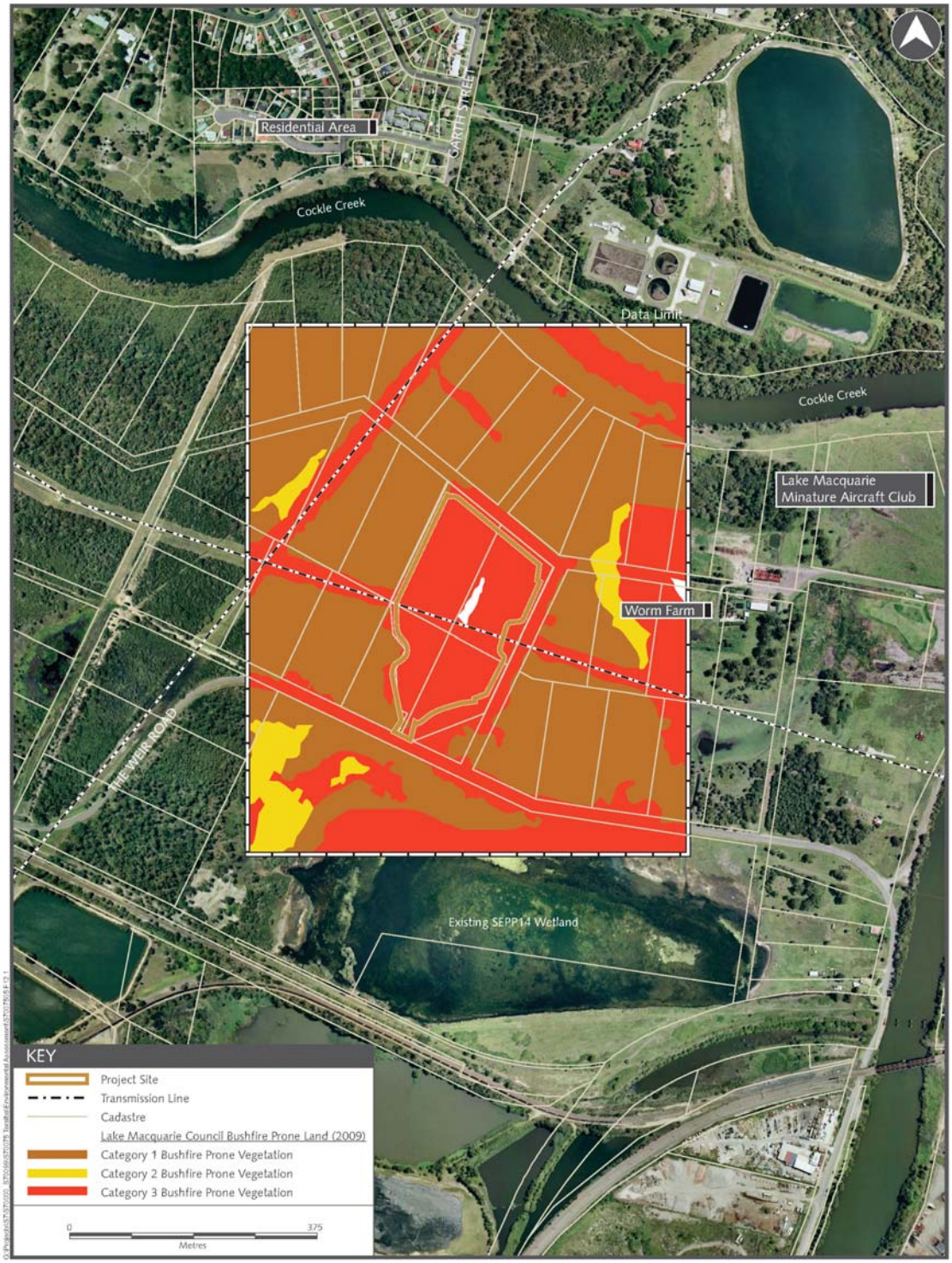
12.3.1 Methodology

Planning for Bushfire Protection 2006 does not provide a methodology for determining bushfire hazard – it defers instead to bushfire prone land determined in accordance with the "*Bushfire Prone Land Mapping Guideline"*, issued by the RFS on the 7th April 2004.

To be able to undertake a bushfire hazard assessment, *Circular C10 (1983)issued by the DoP in 1983* provides a suitable methodology. This methodology rates the vegetation and slope and provides an index value to each.

The overall bushfire hazard score is determined by multiplying the vegetation index by the slope index.

Figure 12-1: Extract of the Lake Macquarie Bushfire Prone Land Map



12.3.2 Assessment to Determine the Bushfire Hazard to the Development

The vegetation that presents the potential bushfire threat to the proposed Facility is the Swamp Forest on the subject site and on the adjoining land.

The Swamp Forest vegetation has a vegetation index score of 0.95. The effective slope is level for all aspects of the subject site. The slope index score for level land is 1.0. Therefore the bushfire hazard score for the Swamp Forest vegetation is 0.95 x 1.0 = 0.95, which equates to a numerical bushfire hazard rating of low.

12.3.3 Assessment of Bushfire Threat

Bushfire Threat is the "measure of scale of impact or significance in terms of hazard and risk".

The bushfire hazard to the proposed Facility, from the Swamp Forest bushfire prone vegetation on the land adjoining the development site has been determined to be low, using the methodology provided by *Circular No. C10.*

However, the bushfire risk to the proposed Facility is high, as the Swamp Forest vegetation has the potential to produce high intensity fires. These fires may develop into crown fires which could impact upon the proposed Facility by producing levels of radiant heat which may cause injury to workers and ignite stored materials and unprotected buildings and equipment.

This vegetation also gives off excessive amounts of burning embers due to the fibrous nature of the bark on species such as the Ball Honeymyrtle Swamp Forest, resulting in burning ember ignition of combustible materials, equipment and unprotected buildings.

The bushfire threat to the proposed Facility is therefore high.

12.4 Bushfire Protection Assessment

12.4.1 Provision of Defendable Space

Appendix 2 of *Planning for Bushfire Protection 2006* provides the following procedure for determining setback distances (APZ) for **residential development** in bushfire prone areas:

a) Determine vegetation formation as follows:
   - Identify vegetation in all directions from the site for a distance of 140 metres;
   - Consult Table A2.1 to determine the predominant vegetation type; and
   - Select the predominant vegetation formation as described in Table A2.1.

a) Determine the effective slope of the land under the predominant vegetation Class.

b) Determine the appropriate fire [weather] area in Table A2.2.

c) Consult Table A2.3 and determine the appropriate setback [APZ] for the assessed land use, vegetation formation and slope range.

The methodology does not determine the requisite defendable space requirements for Class 5 – 10, non-residential and *'Special Fire Protection Purpose'* development.

Table 12-1 examines the width of defendable space requirements based on the widths required to provide a separation distance which is sufficient to minimise flame contact with the building/s and to provide a fire-fighting platform wide enough to permit the safe extinguishment of the fire, after the fire front has passed.

Table 12-1 Determination of Defendable Space to Proposed Buildings

Aspect	Vegetation within 140m of Development	Predominant Vegetation Formation Class *[Table A2.1 Planning for Bushfire Protection 2006]*	Effective Slope of Land	Flame Zone Width determined by Calculation	Recommended width of Defendable Space
South west of Office Building	Swamp Mahogany / Paperbark / Woollybutt Swamp Forest within and adjoining the site	Swamp Forest	Level	16m flame length for Forested Wetland vegetation on level ground	20m for Level 3 construction to the Office Building
East of Storage Sheds	Ball Honeymyrtle Swamp Forest within and adjoining the site	Swamp Forest	Level	16m flame length for Forested Wetland vegetation on level ground	20m for Level 3 construction to the Office Building
South east of Product Bins	Swamp Mahogany / Paperbark / Woollybutt Swamp Forest within and adjoining the site	Swamp Forest	Level	16m flame length for Forested Wetland vegetation on level ground	20m for Level 3 construction to the Office Building

The assessment provided in **Table 12-1** identifies the minimum widths of defendable space widths required to the buildings on the site to minimise flame contact. The recommended width of 20m for the defendable space would reduce the likelihood of flame contact on the structures and also the level of radiant heat on the buildings to 22kW/m^2.

The level of radiant heat necessitates the application of Level 3 construction standards to the wall of the buildings exposed to the radiant heat, whilst the remaining walls and the roof of the buildings would be constructed to comply with Level 1 of A.S. 3959 – 1999 – *'Construction of Buildings in Bushfire Prone Areas.'*

12.4.2 Vehicular Access

Chapter 4, Section 4.2 "Access" of *Planning for Bushfire Protection 2006* provides specifications on the access provisions for firefighting operations within developments which are subject to bushfire attack.

Vehicular access to the proposed Facility from The Weir Road would be via a single entry road and entry gate. This access, and the internal access roadway, would be designed and constructed to accommodate rigid and articulated heavy vehicles and would therefore provide suitable access for fire-fighting appliances similar to NSW Rural Fire Service Category 1 Tankers and NSW Fire Brigade Composite Appliances.

A network of perimeter fire trails [proposed and existing] would provide fire-fighting access between the buildings and storage facilities within the site and the adjacent bushfire prone vegetation.

The new fire trails would be located on top of the low bund wall and designed and constructed to comply with the standards required by Section 4.11.3(3) of *Planning for Bushfire Protection 2006* – [road width of 4.0m within a managed corridor 6.0m wide and capable of carrying 15 tonne GVM].

These new fire access trails would connect, through locked security gates on the boundary of the site, to the existing fire access trails within the road reserves along the eastern and northern boundaries of the site. These existing access tracks would be constructed to a standard which permits access for Category 1 NSW Rural Fire Service Tankers and connect to the existing gravel formation within the Griffen Road reserve which provides emergency access to the east.

12.4.3 Water Supply for Fire-fighting

A reticulated water supply for potable water supply is also proposed for the site. Fire-fighting water supply would be supplied from onsite storage tanks and water storage ponds.

The water storage tanks would feed a pump which supplies fire hose reels fitted to the exterior of the Office and Storage Shed buildings. The number of hose reels would be determined so that all points of the exterior of the buildings are covered by a 30m hose line length and the water stream from the end of the hose.

12.5 Environmental Safeguards

Strategies to mitigate the potential bushfire risk to the proposed Facility are as follows:

Provision of Defendable Space to the Office Building and Storage Sheds:

A minimum 20m wide defendable space [building setback] would be provided between the bushfire hazard and the building. The defendable space would be maintained as an Inner Protection Area in accordance with the specifications of Appendix A2.5 of *Planning for Bushfire Protection 2006.*

Landscape Management

Management of the defendable spaces/landscaped areas within the subject site would comply with the following:

- maintain a clear area of low cut lawn or pavement adjacent to the building;
- keep areas under shrubs and trees raked and clear of combustible fuels;
- utilise non-flammable materials such as Scoria, pebbles and recycled crushed bricks as ground cover to landscaped gardens in close proximity to building; and
- trees and shrubs would be maintained in such a manner that tree canopies are separated by 2m and understorey vegetation is not continuous [retained as clumps].

Construction Standards to the Office Building and Storage Sheds

The office building and storage sheds would be constructed to comply with Level 1 specifications as defined by *A.S. 3959 – 1999 – Construction of Buildings in Bushfire Prone Areas* except for those elevations which are exposed to the bushfire hazard. These elevations would be constructed to comply with Level 3 specifications as defined by *A.S. 3959 – 1999 – Construction of Buildings in Bushfire Prone Areas.*

The following additional construction standards should be applied to the Buildings:

- the roof gutters shall be fitted with a non-combustible leaf/gutter guard;
- access doors [pedestrian and vehicle] to the Storage Sheds shall be fitted with weather seals that seal the bottom, stiles and head of the door against the opening/frame to prevent the entry of embers into the building. Particular attention shall be paid to the gap at the head of the door curtain;
- any external vents or grills shall have stainless steel mesh with a maximum aperture of 2mm square fitted to prevent the entry of embers through the opening;
- ventilation louvres shall be screened with stainless steel flymesh with a maximum aperture of 2mm;
- roof ventilators shall be fitted with stainless steel flymesh to prevent the entry of embers into the building; and
- external doors to the south-western elevation shall be protected against the entry of embers – threshold, stile and head seals shall be fitted to doors.

Water Supplies for Fire-fighting

The water storage tanks would feed a pump which supplies the fire hose reels fitted to the exterior of the office and storage shed buildings.

Emergency & Evacuation Planning

CiviLake would undertake a ‘risk assessment’ which identifies the external and internal threats to the facility. Following the risk assessment an ‘Operations/Emergency Procedures Manual’ would be prepared which identifies operational/emergency procedures required in order to address the management of the identified risk.

An Emergency Response and Evacuation Plan would be prepared for the Facility and included in the OEMP. The evacuation plan would address the protocols for the timely relocation of staff/visitors in the event that an emergency occurs, both within the site or within the local area.

A copy of the evacuation plan would be provided to the Local Emergency Management Committee/Police, NSW Fire Brigade and RFS.

The evacuation plan would comply with AS 3745 - 2002 *"Emergency Control Organisation and Procedures for Buildings, Structures and Workplaces".*

12.6 Conclusions

The subject site is surrounded by vacant land that contains unmanaged vegetation which is bushfire prone and therefore must comply with the provisions of *Planning for Bushfire Protection 2006.*

Implementation of the safeguards provided in **Section 12.5** would provide the level of protection required to the proposed Facility.

The assessment of the bushfire protection requirements and potential levels of bushfire attack on the proposed Facility indicates that the development of the site can be undertaken in a manner that balances development opportunities and the protection of life, property and the environment.

13.0 Hazard and Risk Assessment

13.1 Introduction

The proposed Facility has a number of potentially hazardous operations including fuelling of plant and equipment, potentially contaminated run-off and equipment fires. These operations have the potential to impact offsite or cause bushfire at the adjacent properties. A Preliminary Hazard Assessment (PHA) has been prepared for the proposed Facility, is summarised below and is included as **Appendix L** of this EA.

13.2 Methodology

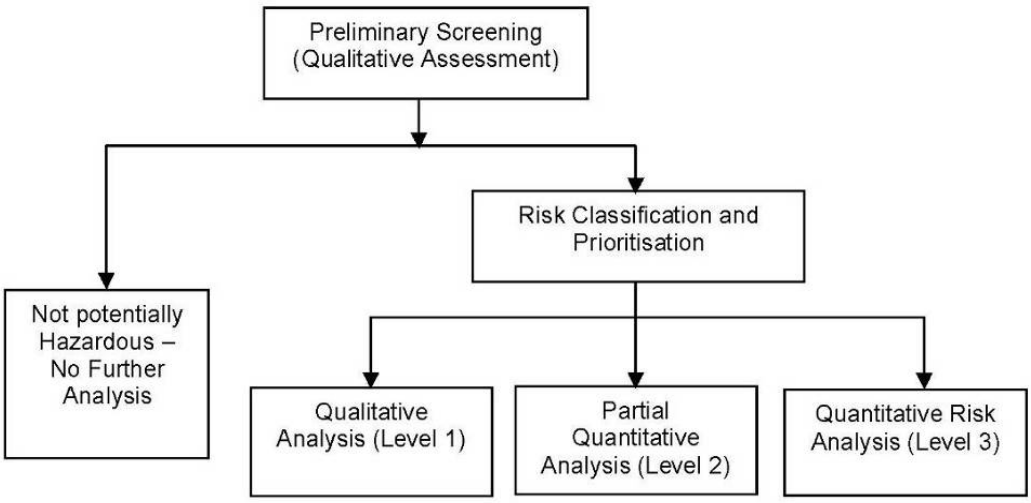
The methodology selected for the PHA was that prescribed in *Hazardous Industry Planning Advisory Paper No.6, Hazard Analysis Guidelines (Department of Urban Affairs and Planning (DUAP) 1994).*

A Multi Level Risk Assessment approach has been used to assist in setting the level of study required for the proposed Facility. The approach considered the development in the context of its location, the quantity and type (i.e. hazardous nature) of dangerous goods likely to be stored and used, and its technical and safety management control. The Multi Level Risk Assessment Guidelines are intended to assist industry, consultants and the consent authorities to carry out and evaluate risk assessments at an appropriate level for the proposed Facility being studied.

The Multi Level Risk Assessment approach is summarised in **Figure 13.1**. There are three levels of assessment, depending on the outcome of preliminary screening. These are:

- **Level 1** – **Qualitative Analysis**, primarily based on the hazard identification techniques and qualitative risk assessment of consequences, frequency and risk;
- **Level 2** – **Partially Quantitative Analysis**, using hazard identification and the focused quantification of key potential offsite risks;
- **Level 3** – **Quantitative Risk Analysis (QRA),** based on the full detailed quantification of risks, consistent with *Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis.*

Figure 13-1: The Multi Level Risk Assessment Approach



The SEPP 33 *Hazardous and Offensive Development Application Guidelines (DUAP1997)* has also been utilised to assist in the selection of the appropriate level of assessment. This guideline states the following:

It is considered that a qualitative PHA may be sufficient in the following circumstances:

- *Where materials are relatively non-hazardous (for example corrosive substances and some classes of flammables);*
- *Where the quantity of materials used are relatively small;*
- *Where the technical and management safeguards are self-evident and readily implemented;*
- *Where the surrounding land uses are relatively non-sensitive.*

In these cases, it may be appropriate for a PHA to be relatively simple. Such a PHA should:

- *Identify the types and quantities of all dangerous goods to be stored and used;*
- *Describe the storage/processing activities that would involve these materials;*
- *Identify accident scenarios and hazardous incidents that could occur (in some cases, it would also be appropriate to include consequence distances for hazardous events);*
- *Consider surrounding land uses (identify any nearby uses of particular sensitivity);*
- *Identify safeguards that can be adopted (including technical, operational and organisational), and assess their adequacy (having regards to the above matters).*

A review of the potential hazards at the proposed Facility indicates that the hazardous materials proposed for storage at the site are minimal and that the majority of hazards would arise from potential rainwater run-off that could impact the environment. Hence, the majority of issues listed above apply to the proposed recycling Facility and a qualitative PHA has therefore been performed, supplemented by quantitative analysis where appropriate.

13.3 Hazard Analysis

The PHA identified the following potential hazards:

- dangerous goods stored and handled at the proposed Facility;
- storage shed – minor storage;
- contaminated run-off;
- refuelling of vehicles and plant; and
- contaminated material deliveries.

13.3.1 Dangerous Goods Stored and Handled at the Proposed Facility

A review of the inventory of materials stored and handled at the proposed Facility indicates that the following goods would be stored and handled at the site:

- Back-up diesel fuel (40L) would be stored in the storage shed in a Dangerous Goods (DG) Cabinet that would comply with the requirements of *AS1940 The Storage and Handling of Flammable and Combustible Liquids .* The storage of diesel fuel in quantities less than 1,000L is classified as minor storage.
- Mobile plant would be used at the proposed Facility including front end loaders and diesel powered shredders, screens and mills. Large quantities of diesel fuel would not be stored at the site, however, a small diesel tanker would attend the site to fuel the mobile equipment as required.

The site processes waste materials that could contain contaminants. Rainwater impacting the site could become contaminated by the materials stored in the open areas of the site. Rainwater run-off could, therefore, cause damage to the biophysical environment adjacent to the proposed Facility. Release of potentially contaminated water could result in impact to these sensitive areas.

In addition, larger contaminants (e.g. bottles, cans, drums, cylinders) of dangerous goods could enter the site mixed with waste materials. These materials could be released during processing (i.e. crushing and screening), resulting in contaminated materials release, flammable liquid ignition and fire and flammable gas ignition and explosion.

Each hazard is assessed in detail below.

13.3.2 Storage Shed – Minor Storage

Back-up diesel fuel (40L) would be stored in the shed in a DG Cabinet that would comply with the requirements of AS1940 . The storage of diesel fuel in quantities less than 1,000L is classified as minor storage.

In the event of a fuel leak into the cabinet, the liquid would fall to the base of the cabinet and be contained within the bund of the cabinet. The cabinet bund would contain any spills and prevent any release offsite, hence, there would be no impact offsite from such an incident. Notwithstanding the spill containment facilities provided by the cabinet, it would be necessary to clean up the spill. Hence, it is recommended that a spill kit be provided adjacent to the diesel storage area.

In the event of a release of fuel (diesel) in the cabinet, there is a potential for the liquid to ignite, resulting in a fire. The cabinet would be fire rated to contain any fire incidents, preventing heat radiation impact beyond the confines of the cabinet. Hence, there would be no impact offsite or potential for fire growth as the fire would be contained within the cabinet itself. Notwithstanding the containment of fire within the DG cabinet, local fire fighting may be required to contain the fire in the vicinity of the cabinet or to extinguish the fire in the cabinet itself. It is therefore recommended that a dry powder type fire extinguisher be installed adjacent to the back-up diesel storage area.

In summary, there would be no impact offsite as a result of the storage of small quantities of diesel fuel at the facility. Hence, this incident has not been carried forward for further analysis.

13.3.3 Contaminated Run-Off

During the processing of waste (i.e. concrete) there is a potential for dust and grit to be released from crushing equipment, reaching the ground and forming layers on processing equipment. Dust (e.g. concrete) is lime based and has the potential to have a high pH value (i.e. highly alkaline). Hence, when rainwater impacts the dust there is a potential for the water to become contaminated resulting in a highly alkaline liquid escaping offsite.

To eliminate the potential for contaminated water to be released offsite, the proposed Facility would be constructed with a number of water storage ponds that would collect and treat rainwater on site and prevent contaminated discharge to the environment (see **Figure 7.3**).

The objective of containment of rainwater is not just for the protection of the environment, but to maintain a site based water supply for dust suppression. Whilst the proposed site water retention system is primarily for Facility water supply, it does minimise the surface water runoff risks associated with the potential for impact to the environment.

Based on the above analysis, potentially contaminated stormwater release is considered to be a low risk and therefore would not constitute a significant hazard to the environment.

13.3.4 Refuelling of Vehicles and Plant

The proposed Facility would operate with a number of internal combustion engine powered components (e.g. front end loaders, shredders, etc.). This equipment would require periodical refuelling using a small 4,500L tanker that would visit the site and refuel the equipment directly to the fuel tanks using a tanker mounted pump and fuel bowser type nozzle.

During the refuelling operation there is a potential for fuel leaks and spills to occur from split or failed hoses, overfill of the truck/equipment or tanker/vehicle tank failure. Whilst the likelihood of these incidents would be low, heat radiation impact offsite could occur if the incident eventuated.

A detailed fire impact analysis has been conducted to determine whether fire incidents could impact offsite, resulting in ignition of bushland adjacent to the site, causing a bushfire in the adjacent forested areas. **Table 13-1** lists a summary of the results of the heat radiation impact analysis. The full fire impact analysis can be viewed in **Appendix K**.

Table 13-1: Impact Distance from Selected Heat Radiation Levels Vehicles/Plant Refuelling Fire

Heat Flux (kW/m^2)	Distance to Heat Flux (m)
35	7.2
23	8.7
15	10.6
12.6	11.5
10	12.9
8	14.4
4.7	18.5
2*	28

** Heat of the sun at mid-day in summer*

A review of the potential impacts of heat radiation indicates that wood may be ignited from a naked flame where impacted by heat radiation in excess of 12.6kW/m^2 for extended periods. Hence, if this level of heat radiation is conservatively used as the criteria for this incident, then from **Table 13-1** the distance to this level of heat radiation impact is anything less than 11.5m.

In the event a release incident and fire occurs, during refuelling within 11.5m of the boundary, there is a potential for the adjacent bushland to be ignited resulting in a bushfire. It is therefore recommended that a dedicated refuelling procedure be established for mobile plant (e.g. front end loaders, screens, crushers, etc.) and that when such plant is refuelled, it be performed at least 12m from the boundary.

13.3.5 Contaminated Material Deliveries

Material deliveries to site may be contaminated with a number of dangerous goods, with the most likely goods being:

- corrosives (e.g. pool chemicals) in bottles or small containers (<5 L);
- small cylinders of LPG (<9 kg);
- fuel/oil containers (<20 L); and
- toxic products (e.g. herbicides/pesticides) in small containers (<5 L).

All loads entering the proposed Facility would be inspected for contaminants. The site entry gatehouse would be constructed with two levels, the upper level containing a platform where gate operators can inspect the loads entering the site in high sided trucks. Hence, the potential for large containers of contaminated material entering the site is low. However, smaller containers of the sizes listed above could enter the site concealed in the load itself.

The potential for impacts offsite from corrosives or toxics is negligible, as once the materials are processed, the breaching of a container, within the crusher or shredder, would release the contents of the container to the ground around the equipment.

The release of flammable/combustible liquids from 20L containers could result in minor fires in the immediate vicinity of the equipment in which the containers was breached. This would result in a smaller fire than that assessed previously in this EA. Hence, there would be no impact offsite as long as the recommendations made in **Section 13.4** are adopted.

In the event of an LPG cylinder (9kg) being passed through a shredder/crusher, there is a potential for the cylinder to be damaged, releasing the gas into the machine. Ignition of the gas within the confines of the machine would result in an explosion. An analysis of a 9 kg gas explosion has been undertaken by AECOM (see **Appendix L** for details). The maximum permissible explosion overpressure at the site boundary, before addition assessment is required, is 7kPa, and the distance to 7kPa is 24.5m. The site boundary is located about 70m from the crushing equipment, hence, there is no explosion overpressure impact exceeding the permissible criteria.

Based on this analysis, it is recommended that the operational plant is located no closer than 25m to the site boundary.

13.4 Environmental Safeguards

Based on the analysis conducted in the PHA a number of recommendations are made to ensure the proposed Facility meets the requirements of the SEPP 33 *Hazardous and Offensive Development Application Guidelines* and *Hazardous Industry Planning Advisory Paper No.4. Risk Criteria for Land Use Safety Planning (draft)(DoP 2008)*, including:

Spill Kit

It is recommended that a spill kit be installed in the storage shed and that personnel at the site be trained in spill cleanup and use of the spill kit.

Fire Extinguishers

In the event of a diesel spill, ignition and fire in the shed, the spill would be limited in area and hence fire magnitude would be relatively small. To ensure fire growth potential is minimised, first attack fire fighting would be applied using fire extinguishers. It is therefore recommended that a dry powder fire extinguisher be installed in the shed. It is also recommended that personnel at the site be trained in the use of first attack fire fighting.

Refuelling Location

In the event of a fuel spill during refuelling of vehicles and mobile plant at the site, there is a potential for ignition and fire. Heat radiation from such fires could impact adjacent bushland resulting in bushfire. The analysis in this study identified that a fire during refuelling could result in initiation of a fire in adjacent bushland if the refuelling fire occurred within 12m of the site boundary. It is therefore recommended that a dedicated refuelling procedure be established for mobile plant (e.g. front end loaders, screens, crushers, etc.) and that when such plant is refuelled, it be performed at least 12m from the boundary

Location of Plant

It was identified that there is a potential for a gas cylinder to enter the site within waste materials. This cylinder could be crushed in the plant and equipment resulting in gas release and explosion. The adverse impact from such an explosion could reach distances up to 25 m from the explosion location. It is therefore recommended that the operational plant (e.g. crushers, shredders, etc. be located no closer than 25 m to the site boundary.

13.5 Conclusions

The analysis conducted by AECOM within the PHA indicates that the site does not exceed the risk criteria published in Hazardous Industry Planning Advisory Paper No.4. *Risk Criteria for Land Use Safety Planning*. Hence, it is concluded that the proposed Facility may be classified only as a potentially hazardous facility and therefore is permissible in the proposed location with the adoption of recommended safeguard measures.

14.0 Amenity and Visual Impact

14.1 Introduction

A visual impact assessment was prepared to consider the visual impact of the proposed Facility on surrounding land users and make recommendations for mitigation measures that may be required to reduce potential visual and amenity impacts arising from the proposed Facility. This section provides an overview of the visual impact assessment. The Visual Assessment report is included as **Appendix M** of this EA.

14.2 Development Information

As outlined in **Section 2.4** the proposed Facility would consist of an administration building an2d gatehouse, a pug mill and mobile plant, a concrete batching plant, two storage sheds, water tanks, parking facilities, access roads and a number of stockpiles for process feed materials and the end products for reuse. A number of product bins would also be built for storage. There would also be a number of surface water storage areas (ponds) and site grading to prevent site runoff into the surrounding areas. **Table 14-1** shows approximate heights of plant and buildings that have been considered within the visual impact assessment. Buildings would be painted in aesthetic colorbond colours, such as *bushland, pale eucalypt* or *wilderness.*

Table 14-1: Estimated Plant and Building Heights

Element	Approximate Height
Pug mill	17m
Mobile plant (asphalt recycler etc)	8m
Communications receiver (mounted on building)	10m
Stockpiles	6-8m
Storage sheds	6m
Weighbridge / entry structure	6m
Concrete batching plant and silo	10m

14.3 Methodology

Observer locations were chosen using a combination of topographic map interpretation and substantial exploration of the surrounding area by car and on foot. Observer locations comprised of publicly accessible areas, as well as areas not able to be publicly accessed, but with the potential for views to the site from dwellings or other important observer types, e.g. from recreation areas (see **Figure 14.1**). Observer locations that were not included in this report were either deemed not significant due to very low observer numbers, or the site being substantially obscured from view by landform or by other factors such as housing and trees.

Figure 14-1: Map of Photo Points and Observer Locations

14.4 Visual Impact Assessment

14.4.1 Location 1 - North-Eastern Corner of Site

Entry to the site can be made at present though the north-eastern corner, along a gravel road (Griffen Road). The site at this point appears as a clearing amongst remnant bushland. The heavily vegetated boundary of the site acts as a visual buffer to the surrounding areas. From this location no residential areas / housing could be seen (**Plate 14-1**).

The only vantage point overlooking the property was what appears to be coal processing equipment and the hillside beyond, which appeared to be heavily vegetated (**Plate 14-2**). The proposed Facility is to be situated on the inner edge of the drainage swale (**Plate 14-3**). The bushland vegetation community to the east and north of this point is identified as Ball Honeymyrtle Swamp Forest (**Plate 14-4**).

Plate 14-1: View from north-eastern corner of the site

Plate 14-2: Coal processing plant on the southern horizon line of the site

Plate 14-3: Drainage channel

Plate 14-4: Ball Honeymyrtle Swamp forest

14.4.2 Locations 5, 6 and 7 - Waratah Golf Club, Argenton & Residences, Boolaroo

The view east along the electrical easement from the site terminates at a group of buildings and a cleared hillside beyond (**Plate 14-5**). These buildings appear to be the Waratah Golf Club (observer location 5) and industrial buildings beyond, with some industrial and cleared land on the eastern adjacent hillside.

Although the golf club and designated area of industrial land may have some views through to the proposed Facility, it is assumed that the visual prominence of the proposed Facility would be very low due to the distance from the site (approximately 960m from the Club to the centre of the site), and the presence of a substantial patch of intervening vegetation within the golf course.

A number of elevated sites in Boolaroo and Argenton were investigated, including the top of First Street (observer location 6, with an approximate viewing distance of 1950m), Second Street, Third Street and Fourth Street (observer location 7, with an approximate viewing distance of 2150m), Boolaroo (**Plate 14-6** and **Plate 14-7**).

Although there are a number of individual houses near the cul-de-sac ends of these streets that may have views over the site, AECOM could not find a position where a clear view of the site could be obtained. It is anticipated that only a small number of people would have views to the site from this location and that the visual prominence of the proposed Facility within the site would be low given the viewing distance, the relatively small area of the development within the broad extent of the forested floodplain, and the screening effect of the forest immediately adjacent to the site, which is in the order of 6 to 8 metres tall.

In addition, the key elements of the view from this location are dominated by industrial elements, including the coal processing plant to the south of the site. Viewed elements of the proposed Facility would therefore not be out of context within this setting.

Plate 14-5: View looking east down the transmission easement from within the subject site

Plate 14-6: View from Racecourse Road south of the subject site showing elevated dwellings with the potential for views to the site

Plate 14-7: View from Racecourse Road showing elevated dwellings

14.4.3 Location 8 - Proposed Bunderra Development Site

The proposed Bunderra development site (Potential Observer Location 8, former Pasminco Smelter Site) has areas that are likely to be situated high enough on the hillside to provide views to the site (**Figure 14-2**).

If this area were to be developed, it is expected that some of the taller elements of the proposed Facility would be visible, but as with the expected views at Observer Locations 6 and 7, the visual prominence of these elements would be expected to be very low due to the viewing distance and industrial context of the adjacent areas.

Figure 14-2: Map of Teralba locality showing elevated land within the proposed Bunderra development site

14.4.4 Location 3 - Southern Boundary (Proposed Entry) of the Site

The middle of the southern boundary of the site is proposed as the entry point for the proposed Facility. From this location, due to the vegetation that borders the site, a clear view from The Weir Road into the site is only possible for approximately 25m either side of the point of entry (**Plate 14-8**).

The vegetation on the southern boundary of the site has been identified as Swamp Mahogany / Paperbark / Woollybutt Swamp Forest which has sporadic weed infestation in areas that have been trampled by cattle. The open areas of this community are dominated by Melaleucas and Carex appressa, whereas adjoining higher, filled areas have significant weed growth, mainly Tobacco Bush.

The Weir Road currently sits around a metre higher than the site and offers only limited views into the site (**Plates 14-9 to 14-12**).

Plate 14-8: View south from inside site boundary, towards The Weir Road

Plate 14-9: View north-west into the site from The Weir Road

Plate 14-10: View north-east into the site from The Weir Road

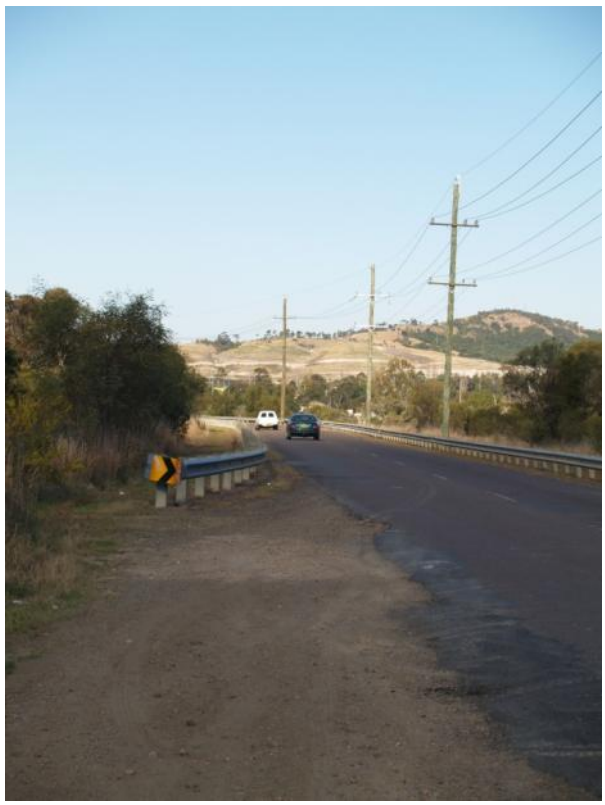


Plate 14-11: View east from proposed entry

Plate 14-12: View west from proposed entry

14.4.5 Location 4 Western Boundary of the Site

The ground plane on the western boundary of the site rises from the area adjacent to The Weir Road, which is boggy and colonised by remnant Swamp Mahogany / Paperbark / Woollybutt Swamp Forest. A dryer area north of the electrical easement is colonised by Scribbly Gum / Red Bloodwood / Smooth-barked Apple Open Forest (**Plates 14-13to 14-16**). There are clear views across the site form the electrical transmission easement.

Plate 14-13: View east across site, along electrical transmissioneasement

Plate 14-14: View east across site, along electrical transmission easement

Plate 14-15: Scribbly Gum / Red Bloodwood / Smooth-barked Apple Open Forest

Plate 14-16: Scribbly Gum / Red Bloodwood / Smooth-barked Apple Open Forest

14.5 Environmental Safeguards

Three primary treatment types are recommended for the landscape remediation of the site in order to reduce the visual prominence of the proposed Facility within the landscape. These are discussed in the Landscape Management Plan in **Appendix M** which also includes a specialised planting palette for water treatment elements.

14.5.1 Bush Regeneration/Restoration

This treatment is proposed for the southern end of the site, external to the proposed embankment that surrounds the built elements of the proposed Facility. A Swamp Mahogany / Paperbark / Woollybutt Swamp Forest vegetation community inhabits this area, which is prone to periodic waterlogging. An elevated fill area within the south-west corner of the site falls outside of the proposed embankment. This fill is proposed to be removed to bring the area back to pre-development levels and hydrologic regime. This area would be planted out with a diverse planting suite from the species present in the adjoining Swamp Mahogany / Paperbark / Woollybutt Swamp Forest.

14.5.2 Entry Treatment

A simplified palette of species chosen from the Scribbly Gum/Red Bloodwood/Smooth-barked Apple Open Forest community is proposed for the entry treatment, as the entry area would be raised above the surrounding low lying area, and therefore relatively less subject to periodic inundation and waterlogging than the adjacent remnant patches of Swamp Mahogany/Paperbark/Woollybutt Swamp Forest. The planting palette would include some dry-tolerant species of the Swamp Mahogany/Paperbark/Woollybutt Swamp Forest community and would visually tie in the entry area with the adjoining retained landscape setting.

14.5.3 Perimeter Embankment Planting

The perimeter/embankment planting would comprise of a dense cover of native grasses with strategically located small stands of trees. The planting approach facilitates the embankment perimeter planting being managed as an APZ with the grasses required to be slashed at approximately three monthly intervals during the hotter period of the year, to maintain reduced ground fuel loads.

A highly simplified plant palette chosen from the Scribbly Gum/Red Bloodwood/Smooth-barked Apple Open Forest vegetation community would suit the drier soils on the embankment and batters surrounding the proposed Facility.

Tall stands of trees on the embankment would also further reduce the visual prominence of the development when viewed from the surrounding areas.

14.6 Conclusions

The subject site is not readily viewed from any sensitive observer locations. Where it is viewed, the development is likely to be of low visual prominence due to:

- viewing distance;
- restricted height of observer locations, i.e. the viewing angle is very low and only affords low slanted views into the site;
- low numbers of viewers from these observer locations; and
- substantial screening from surrounding remnant vegetation.

Where elements within the site are viewed, it is likely they would be viewed within the context of the mining and other industrial development in the near vicinity, thereby providing some visual context for the development.

The application of the recommended landscape remediation measures or environmental safeguards outlined above would further reduce the visual prominence of the proposed Facility from the surrounding areas.

15.0 Air Quality Impact Assessment

15.1 Introduction

AECOM has prepared a quantitative Air Quality Assessment using estimates of feed materials, together with publicly available meteorological and ambient air quality data to assess potential impacts. Dispersion modelling was undertaken using AUSPLUME (v6.0) to estimate the ground level concentrations of dust [total suspended particulates (TSP) and fine particulates (PM_{10})] and odour expected to be generated from operation of the facility. The assessment considered emissions from the facility when operating at the proposed maximum throughput level of in the order of 200,000 tpa.

The assessment was conducted in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005). Emission factors published by the Australian Government for the National Pollutant Inventory were used to estimate dust emissions from the proposed operations. Odour emission rates measured at a green waste facility in Sydney were used as conservative estimates of possible odours generated by the operations. Ambient PM_{10} concentrations measured at the DECCW's monitoring station in Wallsend were added to the maximum predicted concentrations predicted by the dispersion modelling to develop cumulative pollutant concentrations, which were compared against air quality criteria specified by the DECCW.

This section provides an overview of the Air Quality Assessment. The full AECOM is report included as **Appendix N** of this EA.

15.2 Existing Environment

Air quality in the Lake Macquarie area is considered to be reasonable. The city falls within the Greater Metropolitan Airshed and, as such, can receive pollutants from as far away as Wollongong depending on wind patterns. Pockets of reduced air quality are found near emission sources, including industry and roads with high heavy vehicle traffic[1]. The main sources of particulates near the site are electricity generation and coal mining operations, while the neighbouring worm farm and sewerage treatment plant are potential local sources of odour.

15.2.1 Climate

The Bureau of Meteorology (BOM) records meteorological data at a number of automatic weather stations around the country. The closest BOM station to the site is located at Nobbys Signal Station, approximately 17 km east-northeast of the proposed site. Average climate parameters are shown in Appendix A to the Air Quality Assessment.

The warmest temperatures occur between November and March, with the warmest average maximum temperatures occurring in January (26 ^{0}C). The coldest temperatures are recorded in the winter months, with the lowest average minimum temperature occurring in July (8 ^{0}C).

The highest average rainfall is recorded in March with 120 mm, while November is the driest month (70 mm). Humidity in the area is relatively high, with recorded levels typically between 56 and 80 %. Wind speeds are typically higher at 3 pm compared to 9 am, although there is little difference in the wind speeds recorded diurnally between May and July.

Winds recorded at 9 am are predominantly drainage valley flows, blowing from the northwest with a smaller westerly component. In the afternoons, sea breezes from the east – south quadrant dominate. Wind speeds of up to 40 km/h have been recorded. Wind roses are shown in Appendix B to the Air Quality Assessment.

15.2.2 Dust

The DECCW operates a network of air quality monitoring stations at various locations around the State. The closest, most representative station to the proposed project is located at Wallsend. The Wallsend station monitors PM_{10} particulate levels; a summary of the recorded data is shown in **Table 15.1.**

[1] Lake Macquarie City Council State of the Environment Report, 2008

Table 15-1: Wallsend Ambient Monitoring Data Summaries

Year	PM_{10} ($\mu g/m^3$)	
	Max. 24 Hr Average	Annual Average
2005	50.7	18.2
2006	52.0	18.5
2007	50.9	17.3
2008	56.5	15.4
2009	2150.3*	26.7
Maxima	56.5	26.7
Ambient Air Quality Goal	***50***	***30***

* *Recorded during a severe dust storm – excluded from calculations*

The above data indicate that particulate levels in the area exceed the ambient air quality goals for 24 hour maximum concentrations.

Deposited dust is not publically monitored in the area immediately surrounding the site. Mannering Colliery, located approximately 27 km southwest of the proposed development, monitors deposited dust levels via a network of 5 dust gauges (DG1-5) around the colliery. Data published in 2007 indicated that the maximum measured dust deposition level in the area between 2001 and 2006 was 2.9 g/m^2.month as shown in **Table 15-2**.

Existing deposited dust levels at the subject site are expected to be lower than this, due to the relative lack of close dust generating sources. The 2.9 g/m^2.month maximum was adopted as a conservative background estimate of deposited dust for this assessment.

Table 15-2: Average Dust Deposition (insoluble solids, g/m2.month) - Mannering Colliery

Year	DG1	DG2	DG3	DG4	DG5
2001	1.3	0.9	1.0	1.4	0.8
2002	2.9	0.7	1.0	1.1	0.7
2003	1.2	0.6	1.0	0.7	0.8
2004	0.5	0.5	1.0	0.6	0.7
2005	1.0	0.8	1.0	0.7	1.0
2006 (Jan - Jun)	0.8	1.0	1.0	0.7	0.9

Source: Holmes Air Sciences (2007), Mannering Colliery – Continuation of Mining – Air Quality and Greenhouse Gas Impact Assessment.

15.2.3 Odour

Ambient odour monitoring is not typically undertaken, and no publically available data were identified for the area surrounding the subject site. It should be noted that odours from different sources are not typically cumulative; that is, odours from the worm farm would be expected to be quite different to that from the proposed Facility and from the neighbouring sewage treatment plant as the odours are from different types of materials and have different characters. As such, existing odours in the area are not likely to be increased by odour emissions from the proposed Facility. In fact, the strength and character of odours from the worm farm, due to its processing of putrescibles material, may serve to mask any potential odour emissions from the proposed Facility.

15.3 Atmospheric Dispersion Model

Emissions of dust and odour from the proposed facility were assessed by dispersion modelling using AUSPLUME v6.0. AUSPLUME is a Gaussian plume dispersion model developed by the Victorian EPA. AUSPLUME is approved by the DECCW for use in regulatory assessments undertaken in NSW. The model uses the Gaussian dispersion model equation to simulate the dispersion of a plume from point, area or volume sources. Mechanisms for determining the effect of terrain on plume dispersion are also included. AUSPLUME operates on an hourly time step, and, therefore, requires hourly dispersion parameter data, including wind speed and wind direction. The dispersion of each pollutant plume is determined for each hour using conventional Gaussian model assumptions. Gaussian models are best used to identify pollutant concentrations at receptor locations close to emissions sources, as they can overestimate concentrations at longer distances.

Dispersion modelling was undertaken in accordance with the guidelines in the DECCW's Approved Methods[2].

15.3.1 Modelling scenarios

Emissions estimates were prepared for the proposed facility assuming maximum potential operation (i.e. 200,000 tpa). The following assumptions were made in the development of the emissions inventory and entry of emissions into the dispersion model:

- all processing activities (stockpile unloading, loader and pug mill activities) were assumed to occur continuously between the proposed operating hours of 7 am – 6 pm (in reality, operations are typically likely to occur from 7 am – 3.30 pm on weekdays, 7 am – 1 pm on Saturdays and none on Sundays);
- material deliveries and stockpile loading were assumed to occur continuously (24 hours per day) to account for after hours deliveries; and
- concrete batching was assumed to occur for one hour per day, modelled at 7 am (the first hour of operation) to account for potential worst-case meteorological activities.

These assumptions were conservative, and are likely to overestimate potential dust emissions from the site. Water sprays and wind breaks (provided by the vegetated perimeter berm) were assumed mitigation measures for all relevant dust sources.

15.3.2 Meteorological data

Meteorology in the area surrounding the proposed Facility is affected by several factors such as terrain and land use. Wind speed and direction are largely affected by topography at a small scale, while factors such as synoptic scale winds and complex valley drainage flows that develop during night hours, affect wind speed and direction on a larger scale.

Meteorological data required by AUSPLUME include wind speed, wind direction, temperature and an estimation of the stability class and mixing height for the area surrounding the subject site. Meteorological data are preferably sourced from on-site dedicated meteorological stations that have recorded data over a number of years. Data were obtained from Hunter Water Australia from the meteorological station at Edgeworth sewage treatment plant, but were found to be unsuitable for dispersion modelling purposes[3]. Meteorological data were, therefore, generated using The Air Pollution Model (TAPM), developed by CSIRO, for the year 2007. TAPM was run using the parameters shown in Table 15.3.

[2] *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.* Department of Environment and Conservation (NSW), 2005

[3] Modelling requires hourly data for a minimum 12 month time period. Data provided by Hunter Water was for an insufficient time period.

Table 15-3: Meteorological Input Parameters

Parameter	Input
TAPM v4.0	
No. of grids (spacing)	4 (30 km, 10 km, 3 km, 1 km)
No. of grid points	25 x 25 x 25
No. of vertical levels	25
Year of analysis	January 2007 to December 2007
Centre of analysis	32°56,151°36.5

15.3.3 Emissions inventory

Emissions entered into the dispersion model are shown in Table 15-4 (dust) and Table 15-5 (odour). Dust emission rates were calculated using emission factors published in *Emission Estimation Techniques for the National Pollutant Inventory*. A literature review was conducted to determine odour emission rates; emissions used were those used in a study conducted by Holmes Air Sciences based on odour measurements taken at an Australian Native Landscapes green waste facility at Eastern Creek, NSW. These data have been used in a number of odour impact assessments for a range of facilities, including large landfills and composting activities. Due to the scale and type of facility from which the odour measurements were taken, the emission rates adopted are expected to substantially overestimate odour concentrations from the proposed Facility, which is expected to generate minimal (if any) odours due to the nature of the materials accepted at the site and the lack of composting activities.

Table 15-4: Emissions Inventory – Dust Sources

Dust Sources	Source Type	Emissions (g/s)		Hours
		PM_{10}	TSP	
Wind erosion (stockpiles)	Area (12,427 m^2)	0.02	0.05	continuous
Roads (wheel-generated dust) (8 sources)	Volume	0.01	0.01	continuous
Loading (stockpiles)	Volume	0.01	0.03	continuous
Unloading (stockpiles)	Volume	0.09	0.20	7 am - 6 pm
Loaders (3 sources)	Volume	0.028	0.06	7 am - 6 pm
Concrete batching	Volume	0.0143	0.06	7 am
Pugmill	Volume	0.022	0.06	7 am - 6 pm

Potential odour sources were taken to be the green waste stockpile, the bioretention pond that receives leachate from the green waste stockpile, and the product bins storing the blended soil/green waste mixtures. The receival of green waste was not considered likely to generate odour emissions as material delivered to the site would be dry and not decomposing and would be stored on site for a limited period. Furthermore, no published data regarding likely odour emissions from this type of material could be found at the time of preparation of this report. As such, odour emissions from the receival of green waste material were not included in the assessment. Emission rates assumed for the identified sources are shown in Table 15.5.

Table 15-5: Emissions Inventory - Odour Sources

Odour Source	Area (m^2)	SOER* ($OU/s/m^2$)	OER*(OU/s)	Near field peak to mean ratios		Assumptions
				Convective (A -D)	Stable (E, F)	
Green waste stockpile	1,763	0.13	236.2	0.33	0.31	-
Bioretention pond	450	0.17	76.5	0.43	0.39	Assumed to be a leachate pond in aerobic condition
Product bins (2 sources)	70	0.04	2.8	0.10	0.092	Product assumed to be 70% soil, 30% organic matter based on advice from CiviLake; the emission rate was, therefore, assumed to be 30% of the emission rate from the green waste stockpile

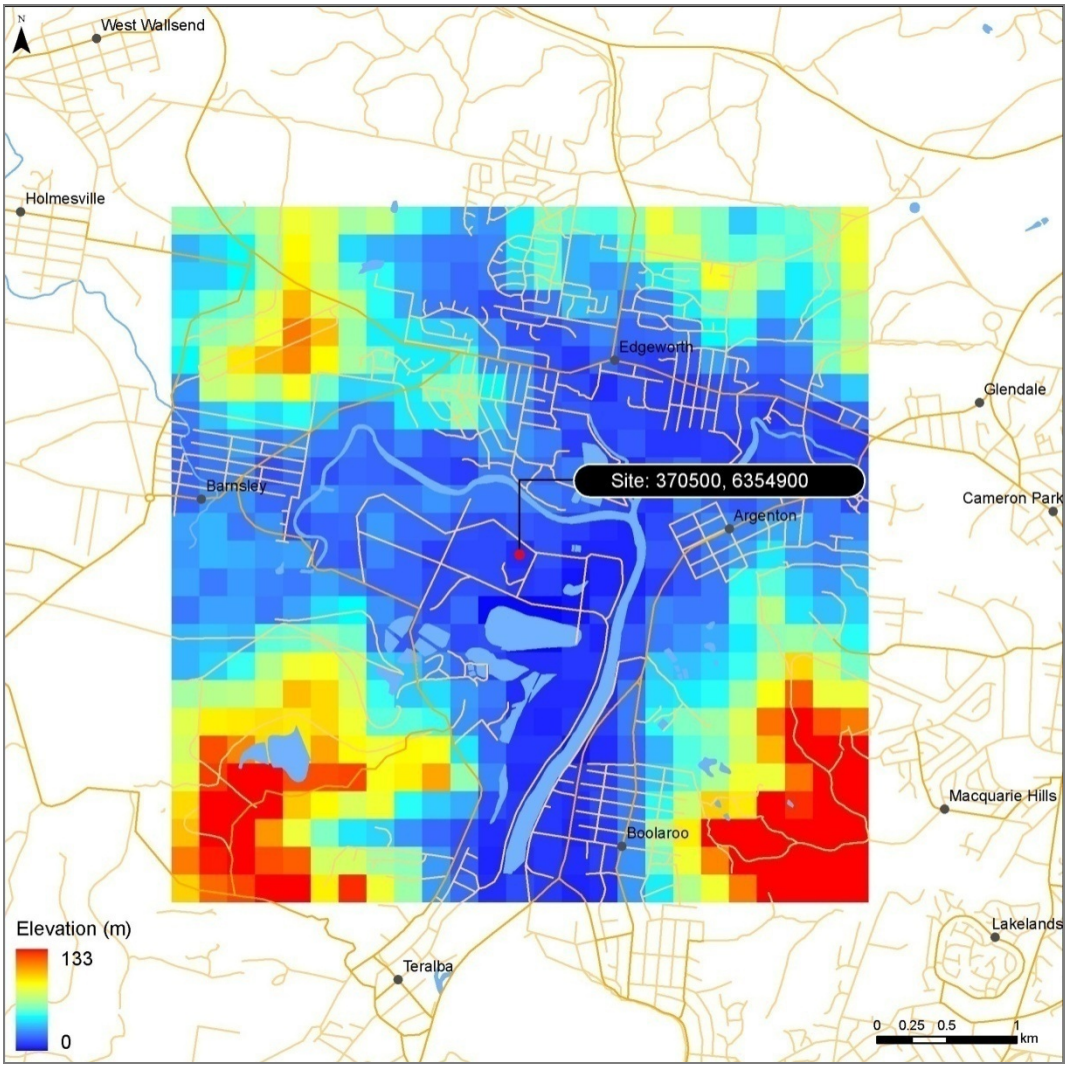
15.3.4 Terrain Data and Sensitive Receptors

The terrain surrounding the facility was digitised for entry into the model. A 5 km x 5 km grid with a 0.2 km spacing, centred approximately on the site, was used as shown in **Figure 15-1**. Sensitive receptors were identified through inspection of aerial photographs for the closest potential residences, and included in the dispersion modelling to generate predicted ground level pollutant concentrations at these locations. The receptors are described in Table 15-6.

Table 15-6: Sensitive Receptor Details

No.	Easting	Northing	Elevation
1	368921	6355445	10
2	369433	6354728	11
3	369620	6354654	9
4	369593	6355692	12
5	370429	6355592	10
6	371172	6354685	3
7	371109	6354555	5
8	371106	6354389	2
9	371086	6354314	0
10	371606	6355132	10
11	371592	6354737	8

Figure 15-1: Terrain



15.4 Air Quality Impacts

Dust and odour are the main air quality emissions that may result from operation of the proposed Facility.

15.4.1 Dust

Predicted PM10 Concentrations

Predicted ground level PM_{10} concentrations were assessed for the 24 hour and annual time periods. The predicted maximum annual average concentrations resulting from operation of the facility alone (i.e. excluding background concentrations) are shown in **Figure 15-2**, while maximum 24 hour concentrations are shown in **Figure 15-3**. Concentrations predicted at the identified sensitive receptor locations are provided in Table 15-7**.**

Figure 15-2: Predicted Maximum Annual Average PM_{10} Concentrations ($\mu g/m^3$)

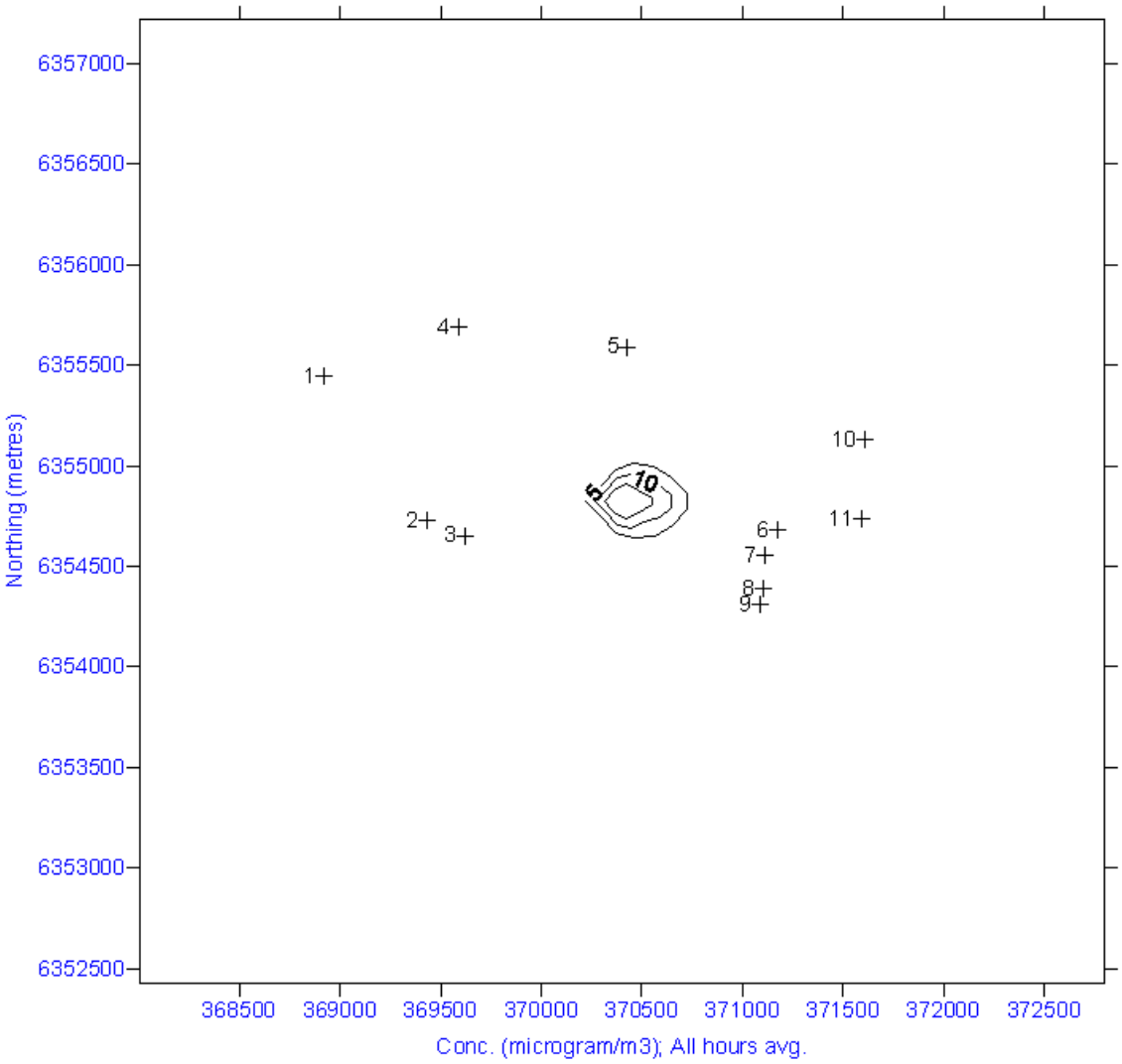
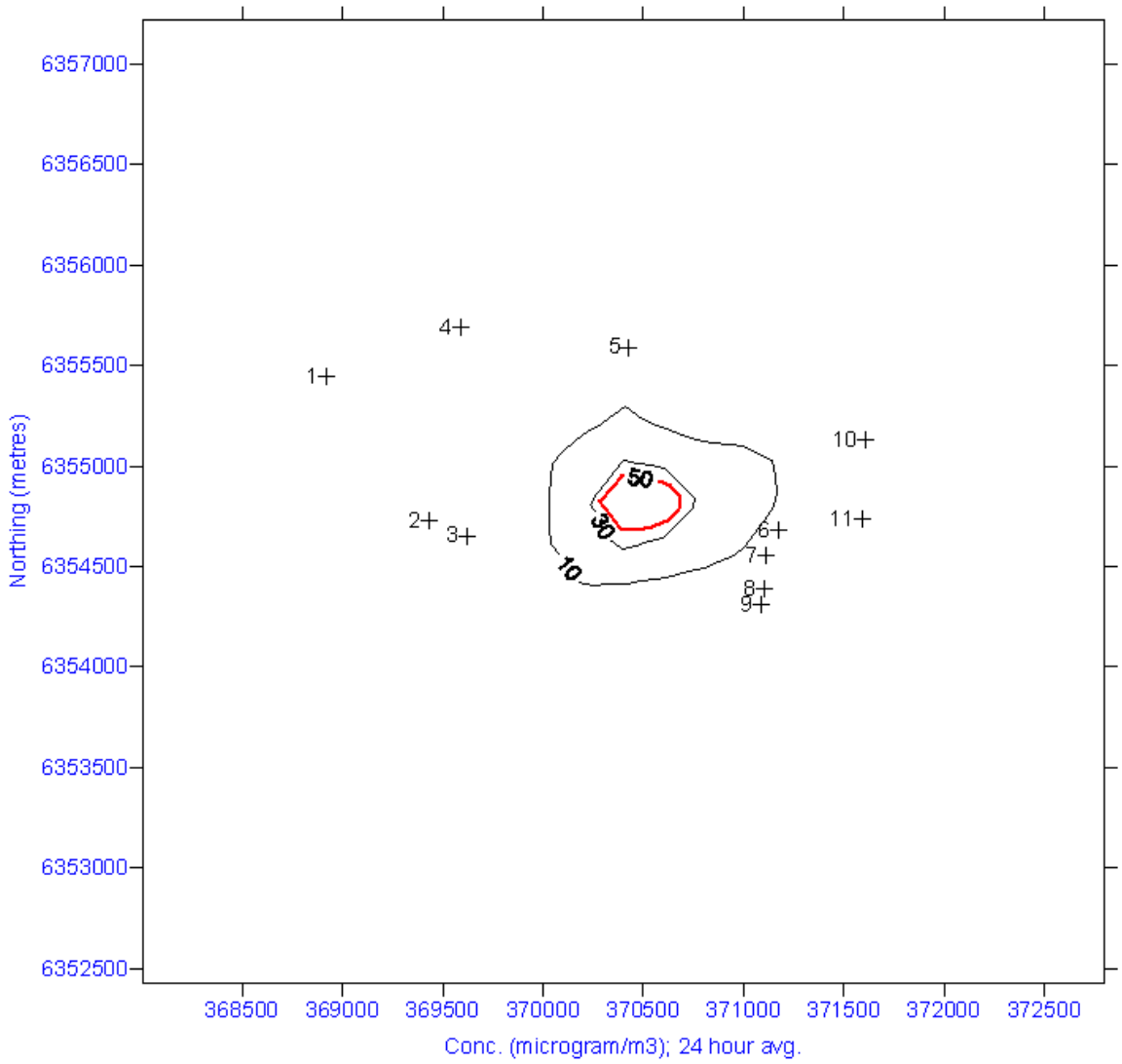


Figure 15-3: Predicted Maximum 24 Hour PM_{10} Concentrations ($\mu g/m^3$)



Due to the elevated background concentrations, cumulative 24 hour PM_{10} concentrations are not shown in Table 15-8. Contributions of the Facility to annual PM_{10} levels was very small as shown below, and cumulative annual PM_{10} concentrations were predicted to be lower than the impact assessment criterion. The development is not, therefore, expected to substantially affect long-term fine particulate levels in the area.

Table 15-7: Predicted Ground Level Concentrations of PM10 (□g/m3)

Receptor Number	Maximum Predicted Concentrations (μg/m^3)		
	24 Hour PM_{10}	Maximum Annual PM_{10}	Cumulative Annual PM_{10}
1	1.4	0.1	26.8
2	2.2	0.2	26.9
3	2.5	0.3	27.0
4	1.8	0.2	26.9
5	4.7	0.4	27.1
6	7.6	0.7	27.4
7	8.5	0.8	27.5
8	7.9	0.6	27.3
9	6.8	0.5	27.2
10	6.5	0.3	27.0
11	6.7	0.4	27.1
Impact assessment criteria	**-**	**-**	***30***

As shown in **Figure 15-2**, no exceedances of the 24 hour PM_{10} criterion were predicted at any sensitive receptor location based on modelled emissions from the facility alone. The DECCW Approved Methods, however, require maximum cumulative concentrations to be compared to the guideline criterion. The maximum background concentration of 24 hour PM_{10} exceeds the criterion of 50 μg/m^3. As such, a contemporaneous impact and background assessment was undertaken for 24 hour PM_{10} for sensitive receptor 7, which was the sensitive receptor for which the dispersion model returned the highest predicted concentration. Contemporaneous results are shown in Table 15-8**.**

Table 15-8: 24 Hour Average PM10 Concentrations (□g/m3) at Receptor 7

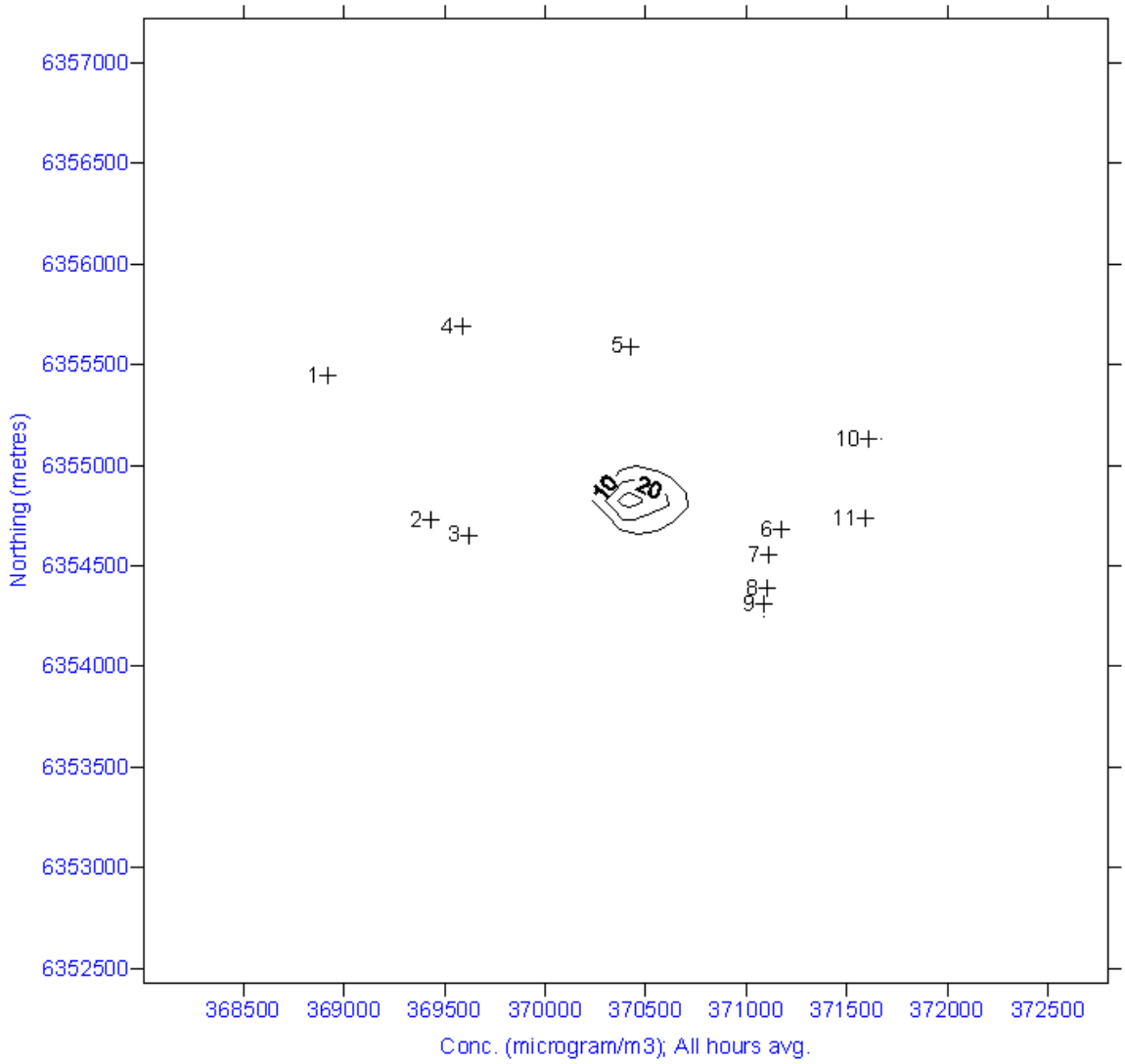
Highest Background Concentrations				Highest Predicted Increments			
Date (2007)	Background	Predicted Increment	Total	Date	Background	Highest Predicted Increment	Total
05/05	**50.9**	4.45	**55.35**	3/08	21.05	8.47	29.52
04/05	**50.8**	2.64	**53.44**	13/09	33.37	5.97	39.34
03/10	46.5	1.28	47.78	28/08	16.80	5.23	22.03
06/10	41.1	1.85	42.95	27/08	16.47	4.94	21.41
30/01	38.4	0.86	39.26	13/05	21.51	4.79	26.30
30/10	37.3	0.01	37.31	27/07	24.34	4.78	29.12
28/01	37.2	0.55	37.75	24/07	23.83	4.67	28.50
16/10	36.6	1.31	37.91	3/06	26.05	4.50	30.55
12/01	36.0	0.00	36.00	5/05	**62.76**	4.45	**67.21**
11/01	35.1	0.00	35.10	26/07	28.63	4.27	32.90
N.B. Exceedances are noted in **bold type**.							

As shown, operation of the proposed development was not predicted to result in any additional exceedances of the 24 hour PM_{10} impact assessment criterion based on either the highest background concentrations or the highest predicted contributions from the facility (i.e. the only exceedances are where there are already background exceedances). As such, the development is not expected to adversely affect short-term fine particulate concentrations in the area.

TSP

TSP were modelled over the annual time scale. The predicted maximum TSP concentrations resulting from operation of the Facility alone are shown in **Figure 15-4**. As shown, the maximum predicted concentrations were centred on the subject site. Concentrations predicted at sensitive receptor locations are provided in **Table 15-9**.

Figure 15-4: Predicted Maximum Annual Average TSP Concentrations (µg/m^3)



TSP concentrations are not publically monitored. In order to provide an estimate of cumulative TSP concentrations, ambient PM_{10} was expected to represent 40 % of the ambient TSP concentration specified in **Table 15-1** (i.e. ambient TSP was assumed to be 66.8 µg/m^3 compared to 26.7 µg/m^3 of PM_{10}). Concentrations at all modelled sensitive receptor locations were well below the impact assessment criterion, with the contribution from the facility being negligible in most instances. As such, the facility is not expected to adversely affect local long-term TSP concentrations.

Table 15-9: Predicted Ground Level Concentrations - TSP (µg/m3)

Receptor	TSP Concentration (µg/m^3)	
	From Facility	Cumulative
1	0.19	67.0
2	0.39	67.2
3	0.53	67.3
4	0.32	67.1
5	0.60	67.4
6	1.16	68.0
7	1.25	68.0
8	0.98	67.8
9	0.85	67.7
10	0.44	67.2
11	0.58	67.4
Impact assessment criterion		***90***

Deposited Dust

The results of the dust deposition modelling are shown in Table 15-10. The impact assessment criteria for deposited dust allows a maximum increase of 2 g/m^2.month over existing dust levels, or a maximum total dust deposition level of 4 g/m^2.month at any location. As predicted deposition levels at all sensitive receptor locations were below these levels, and as such the operation of the proposed facility is not expected to adversely affect levels of deposited dust in the local area.

Table 15-10: Predicted Ground Level Concentrations - Deposited Dust (g/m2.month)

Receptor	Deposited Dust Concentration (g/m^2.month)	
	From Facility	Cumulative Concentration
1	0.01	2.91
2	0.03	2.93
3	0.04	2.94
4	0.03	2.93
5	0.05	2.95
6	0.1	3.0
7	0.1	3.0
8	0.1	3.0
9	0.1	3.0
10	0.03	2.93
11	0.04	2.94
Impact assessment criteria	***2*** *(maximum allowable increase)*	***4*** *(maximum total level)*

15.4.2 Odour

Results of the odour modelling are shown in **Figure 15-5** and Table 15-11. As discussed in **Section 15.2.3**, odour concentrations are not cumulative unless they come from similar sources with similar characters. As there are no similar odour sources in the area, background odour concentrations relevant to this project (i.e. those representative of green waste only, rather than putrescibles waste or sewerage) were assumed to be negligible. Concentrations at all sensitive receptor locations were well below the adopted impact assessment criterion of 2 OU. It should be noted that the data presented represent maximum concentrations (100th percentile) and are, therefore, more conservative than the 99th percentile concentrations to which the impact assessment criterion relates.

Figure 15-5: Predicted Maximum Odour Concentrations (1 second nose response time)

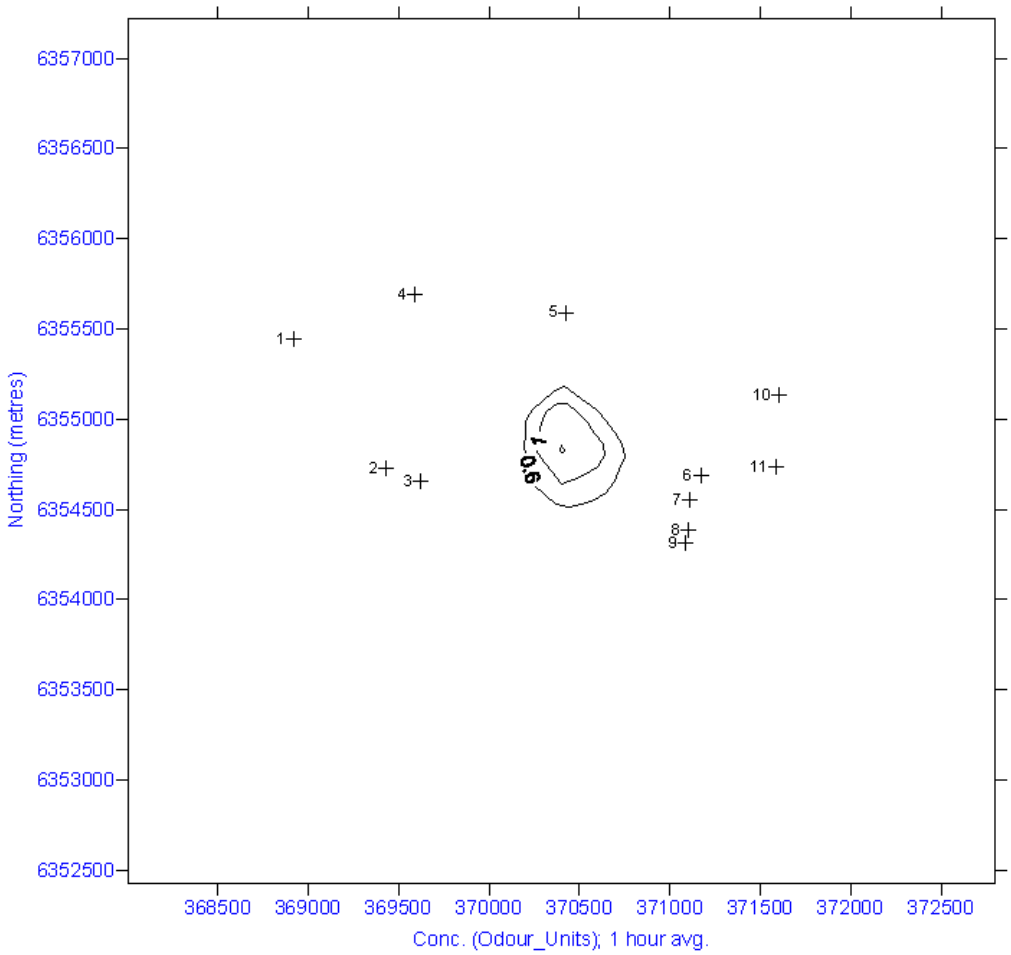


Table 15-11: Predicted Ground Level Odour Concentrations (OU/m2)

Receptor	Predicted Odour Concentration (OU)
1	0.12
2	0.17
3	0.12
4	0.14
5	0.16
6	0.28
7	0.27
8	0.25
9	0.24
10	0.19
11	0.18
Impact assessment criterion	***2***

15.5 Environmental Safeguards

Based on the air quality assessment, a number of recommendations are made to ensure potential dust and odour impacts from the site are managed as detailed below.

15.5.1 Construction – Dust

The CEMP for the proposed Facility would include dust mitigation measures. Such measures should include undertaking activities that are most likely to generate dust, such as excavation/fill works, only during periods of low wind speed. Exposed areas should be stabilised as soon as possible to minimise dust generation. Water sprays should be used on unsealed areas and stockpiles.

15.5.2 Operation – Dust

The OEMP for the proposed Facility would include measures such as:

- Use of water sprays for:
  - all processing activities; and
  - on all exposed stockpiles as required.
- Reduced operation during windy conditions;
- Covering of vehicles with potentially dusty loads before leaving the site;
- Installation of a wheel wash for vehicles travelling onto and off-site;
- Sealing of operational surfaces wherever possible, and cleaning them regularly;
- Use of water carts on unsealed areas when required; and
- Maintenance of the vegetated perimeter berms to serve as a barrier to dust emissions leaving the site.

The proposed project design includes construction of sealed/gravel roads from the public roadway to the gatehouse and use of water sprays to suppress deposited particles on unsealed roads and stockpiled material, which would also serve to minimise dust emissions.

The DECCW guidelines do not specify performance requirements or measures for biological particulate matter, such as particles generated by green waste. General particulate minimisation and mitigation activities should serve to control emissions of both biological particulates and ultrafine ($PM_{2.5}$) particulate matter.

15.5.3 Operation - Odour

The minimisation of offensive odours from the Facility would require the use of appropriate management and control techniques, which should be developed by the operator in consultation with the DECCW. Such practices would include:

- Good housekeeping and raw material handling practices;
- Careful screening of raw materials (all potentially malodorous raw materials delivered to the site or material with a sufficiently high moisture content that are likely to give rise to odour during storage prior to use would be rejected or subjected to special handling/storage procedures to minimise off-site odour emissions). The size of stockpiles would be kept to a minimum;
- Good site drainage would be maintained to prevent green waste from becoming waterlogged.

As water captured on the site has the potential to generate odour if it becomes anaerobic, consideration would be given to implementing processes and/or equipment to minimise potential odour emissions, such as using captured site water for dust suppression/cleaning wherever feasible and appropriate, and/or aerating or treating the water. Leachate ponds can generate odours if they become anaerobic, such as through leachate ponding in the drainage system or inadequate aeration in the storage system. To minimise adverse effects, the leachate collection and storage systems should be designed in accordance with DECCW guidelines and maintained appropriately.

The proposed vegetated perimeter berm may not only assist with minimising off-site dust emissions, but may possibly reduce odour emissions from the site as well by enhancing turbulence and vertical mixing, thereby improving dispersion.

As the proposed Facility would not accept materials such as food waste, odour generation at the site is expected to be minimal. Stockpiles of green waste material (both feed and product) should be kept as small as practicable, and the quantity of materials received for processing should be based on current trends for product demand. Material turnover at the site is intended to be high, with green waste materials stored on site for no more than two months.

15.6 Conclusion

The concentrations of all pollutants predicted to be emitted from the site were below the relevant impact assessment criteria when assessed in isolation and cumulatively (by adding existing background pollutant concentrations to the predicted site emissions). For maximum 24 hour PM_{10}, the elevated background concentration required a contemporaneous impact assessment to be conducted, which was achieved using hourly monitored data obtained from the DECCW's monitoring station at Wallsend with the hourly model predictions to develop predicted cumulative concentrations. Again, the analysis predicted no exceedances of the impact assessment criterion.

With the implementation ofappropriate management and mitigation measures , dust and odour emissions from the proposed facility are not expected to adversely affect local air quality in terms of fine particulate, total particulate or deposited dust levels, or to adversely affect the amenity or health of sensitive receptors in the area.

16.0 Noise Impact Assessment

16.1 Introduction

Hunter Acoustics has prepared an Acoustic Assessment, and makes appropriate recommendations for noise control measures to ensure that the proposed Facility does not become a source of offensive or intrusive noise during construction or operation. This section provides an overview of the Acoustic Assessment. The full report is included as **Appendix O** of this EA.

16.2 Acoustic Environment

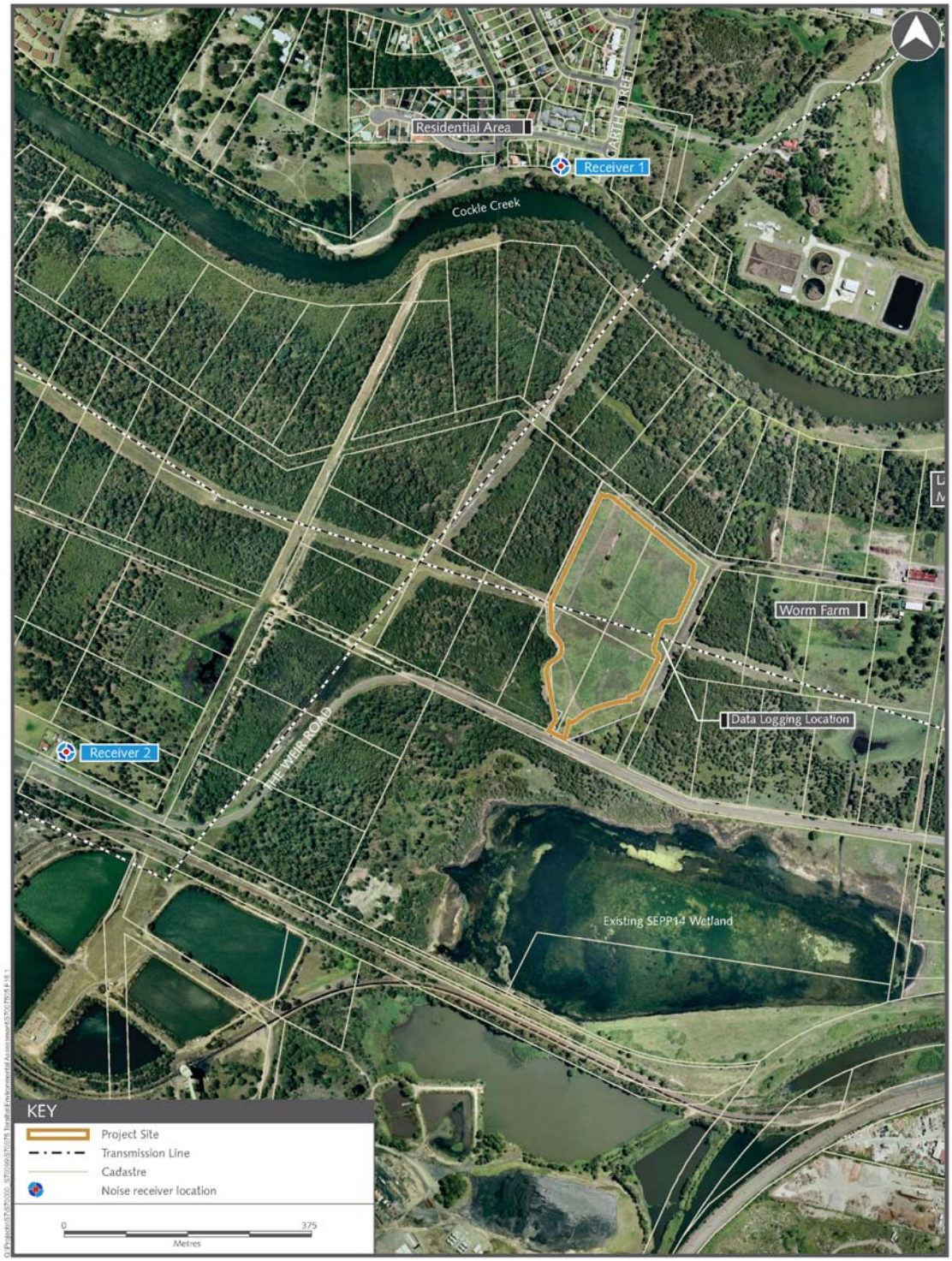
The acoustic climate for the closest residential receptors, which are located in Martin Place, Edgeworth, are within a suburban environment that is exposed to consistent traffic noise and urban hum.

For the purpose of this assessment two residential receivers were nominated:

- **Receiver 1**: Martin Place, Edgeworth located approximately 600 m to the north west;
- **Receiver 2:** The Weir Road approximately 850 m to the south west.

Figure 16-1 illustrates the location of noise receivers.

Figure 16-1: Location of Noise Receivers



16.3 Noise Impacts from the Proposed Facility Operations

Noise emissions capable of generating adverse noise impacts may come from:-

- Truck movements and truck generated noise from material receiving and stockpiling operations;
- Noise from materials handling equipment such as loaders used to manage stockpiles and relocate materials for processing and dispatch;
- Noise from the operation of crushing and screening plant;
- Noise from green waste shredding;
- Noise from operation of the Pug Mill for the production of road base material;
- Noise from the concrete batching plant;
- Noise from deliveries of cement and fly ash to the site for the concrete batching plant and the Pug Mill; and
- Noise from asphalt recycling equipment.

Daytime noise emissions may come from any of the equipment listed above but night time noise emissions would only come from the operation of trucks and loaders on the site for materials receiving and stockpile handling. The layout of the equipment is shown on the site plan in **Figure 2-1**.

The proposed Facility would operate on a batch basis to service the requirements of incoming and outgoing products as required. This means that on any given day, there would be variations in the amount of time the equipment within the facility operates and the number of trucks that it services to meet demands.

The proposed Facility's plant and equipment such as crushers, shredders, batching plant and the pug mill may operate continuously throughout the day to process the available feedstock material into product. Although equipment may operate on an infrequent or campaign basis, it is regarded as a continuous sound source.

Total truck movement is expected to be 112 movements per day for incoming feedstock and 106 movements per day for outgoing product, with peak hourly truck movements of 11 vph and 15 vph for incoming feedstock and outgoing product respectively. The vehicles would be primarily truck and dog combinations. Access for vehicles to and from the facility is via two roads, via The Weir Road, running East / West towards Barnsley, or via Racecourse Road, running North / South towards Teralba. CiviLake expects that 60% of the traffic movements would be via Racecourse Road with the remaining movements via Barnsley.

Residential receptors that may be potentially affected by traffic noise on the route along Racecourse Road are located approximately three kilometres by road to the south of the proposed facility. There are a number of residences and commercial facilities in York Street that are exposed to potential increases in traffic noise due to traffic from the proposed development.

16.4 Methodology

The assessment undertaken by Hunter Acoustics was conducted in accordance with the *Industrial Noise Policy* (INP) released by the DECC in December 1999. Ambient and background noise levels for the area were established by acoustic data logging with a Rion NL-04 Sound Level Meter (Serial Number: 10206334, Last calibrated: July 2008) at the base of the power pole on site over the period 17th to 22nd of November 2008. The Rating Background Level (RBL) was determined in accordance with Section 3 and Appendix B of the INP and the appropriate intrusiveness criteria determined.

16.4.1 Noise Criteria

The limiting criteria for normal daytime operating conditions, in accordance with the DECC INP *1999*, is the day time intrusiveness criteria, at 45 dB(A) $L_{eq15\ min}$ for all types of operations including receiving and stockpile materials handling, processing operations and production operations. Compliance with the day time intrusiveness criteria would ensure compliance with the daytime Acceptance Noise Level (ANL).

The limiting criterion for the night time receiving and unloading material and for stockpile operations is the night time ANL criteria of 40 dB(A) $L_{eq15\ min}$ and the sleep disturbance criteria of 53 dB(A)L_{A01}. Compliance with the night time ANL criteria would ensure compliance with the night time intrusiveness levels.

16.4.2 Meteorology

The proposed facility would conduct processing and production operations only during daytime hours, therefore, the effects of noise enhancing temperature inversion conditions were not considered for processing operations, as temperature inversions generally occur outside the operating times for processing.

Night time noise enhancing atmospheric conditions was considered for receiving and handling of feedstock at night time.

Wind speeds of less than 3 metres per second do not occur in any given direction for more than 30% of the time in any season, therefore, noise enhancing conditions caused by wind are not required to be assessed. Wind roses showing wind speed and direction for the area have been taken from Williamtown RAAF weather station.

16.4.3 Site and Stationary Noise Sources

Sound Power Levels for general sources used in the modelling process including, trucking and loader operations, crushers with screens, mobile screens, and concrete plants have been taken from Hunter Acoustics data base of similar equipment that has previously been measured by Hunter Acoustics in accordance with *AS 1217* and *AS 1055*.

The sound emission levels of specialised plant for this facility, including the pug mill, asphalt recycler, and cement delivery truck have been measured on site by Hunter Acoustics at the Teralba quarry where they are currently in operation.

To determine the predicted received noise levels at affected receivers from the proposed Facility, the measured noise source levels from Hunter Acoustics data base were propagated as octave band spectra using ENM software that includes allowance for distance attenuation, topographic and man made barriers, atmospheric absorption and ground absorption and reflection.

The noise predictions were made for the proposed operations under neutral conditions for daytime and for 3 degree C temperature inversion conditions for night time emissions.

Point to point calculations were also conducted to sensitive receivers to more accurately quantify the received noise levels. The calculated point to point received noise levels are shown in **Table 16.1.**

16.5 Noise Impact Assessment

16.5.1 Processing Operations

Table 16.1 shows the predicted received noise levels at each of the receiver locations for normal operating conditions and operating with a mobile crusher. **Table 16.1** also shows the predicted received noise levels at the receiver locations for night time materials drop off under 3 degree C temperature inversion conditions.

Table 16-1: Point to Point Calculations

Name	Location	Received Noise Level dB(A)	
		All Plant (including crusher and shredder)	All Plant (including shredder and without crusher)
Receiver 1	Martin Place	47	45
Receiver 2	The Weir Road	45	44
Daytime Criteria Residential		**45**	
	Griffen Road	52	51
Daytime Criteria Commercial		**65**	
		Night Time Material Drop Off 3 Deg C Inversion	
		LAeq 15min	LA01 1min
Receiver 1	Martin Place	38	48
Receiver 2	The Weir Road	33	43
Night Time Criteria Residential		**40**	**53**

Source: Hunter Acoustics 2009

*** Classified as a Commercial Receiver.*

Table 16.1 shows that the received noise levels at the receivers are consistent with the daytime target noise goals for the worst case operating conditions at Receiver 2 only and less than the target noise goals when either the crusher or the shredder is not operational. The model assumes the presence of sound barrier walls adjacent to both the tub grinder and the crusher. The predicted received noise levels are consistent with the daytime ambient acoustic climate and noise is not likely to be identified as a source of concern during the day.

The night time predicted received sound levels are below the target noise goals under noise enhancing conditions and are also below the sleep disturbance criterion under noise enhancing conditions.

16.5.2 Traffic Noise

Changes in traffic noise levels for the worst case peak hour resulting from the inclusion of the development traffic to traffic flows on York Street are shown in **Table 16.2** below.

The night time traffic volumes are taken to be 3% of the daily traffic flow which typically represents the time between 10pm and 11pm. The night time development traffic volumes are considered to be the peak volume for the supply of feed stocks or 11 vehicles per hour.

Table 16-2: Worst Case 1 hour Peak Noise level at York Street Residences for 2022

	Daytime Traffic Noise Without Development Traffic	Daytime Traffic Noise With Development Traffic	Night Time traffic Noise Without Development Traffic	Night time traffic Noise With Development Traffic
	67 dB(A)	68 dB(A)	60	60
ECRTN Criteria	60		55	
	But in All Cases less than 2 dB(A) increase due to the development			

Source: Hunter Acoustics 2009

Environmental Criteria for Road Traffic Noise (ECTRN)

The traffic noise predications in Table 16-2 show that while the future traffic noise on Work Street is above the DECCW targets in the ECTRN, the proposed development does not increase the traffic noise level by more than 2db (A) and therefore the traffic noise inputs from the proposed Facility are considered acceptable.

16.5.3 Construction Noise

Table 16.3 shows the Sound Power Levels of plant and equipment likely to be used in the construction process of the facility and predicted received construction noise levels.

Table 16-3: Sound Power Levels for the Construction Process

Plant Item	Individual Sources SWL dB(A)	Worst Case SWL dB(A)
Excavator	110	114
Dozer	112	116
Concrete mixing truck	107	
Concrete pump	103	
Mobile crane	88	88
Pneumatic hand tools	114	144
Total		**114**
Worst Case Received at Receiver 1		40
Worst Case Received at Receiver 2		35
Construction Noise Limit		**50**

Source: Hunter Acoustics 2009

Sound Power Level (SWL)

The total Sound Power Level for the worst case scenario during the construction process of the proposed Facility is assessed as having a worst case received noise level of 40 dB(A). This is less than the operational noise of the proposed Facility and well below the target noise goals for operation. Noise levels would therefore remain non intrusive during the construction process.

16.6 Environmental Safeguards

The following mitigation measures would be implemented to ensure that noise emissions from the proposed plant are adequately controlled and do not become a source of offensive noise:

- Reversing alarms or audible warning devices on loaders and other equipment would be of broadband type and have levels that do not to exceed 85 dB(A) when measured at a distance of 7m directly behind the rear of the equipment (Fit BBS-TEK Alarms - Medium & Light Duty Model 600-BBS087 or equivalent).
- Sound attenuation barriers would be erected around the crusher and tub grinder to have a minimum crest height that is 3m above the finished ground level. The design and location of the barriers are to be at the direction of a suitably qualified acoustics consultant and be coordinated with the operational requirements of the proposed Facility. The specifics of the design shall be detailed during final project design. Sound power levels of the proposed plant would be verified by an appropriately qualified acoustic consultant after commissioning.

16.7 Conclusion

The assessment has shown that the proposed Facility would comply with the requirements of the NSW INP and is not likely to become a source of offensive or intrusive noise. In this regard, the proposed Facility would meet the noise criteria for both daytime and night time operations and would not cause an excessive increase in traffic noise along the access roads.

17.0 Utilities and Infrastructure

This section discusses infrastructure requirements for the site including:

- Water supply;
- Waste water management;
- Power Supply;
- Communications;
- HV Electrical Transmission Easement.

Gas supply is not required for the site.

17.1 Water Supply

Water supply would be required for dust control, for the site amenities and for the pugmill, concrete crushing and batching plant operations.

As discussed in **Section 7**, water supply to service the Facility would mainly be from a number of stormwater ponds. It is estimated that there would be sufficient water in the ponds on site to supply the operations on average 80% of the time.

A small amount of additional water storage is suplie din above ground tanks which collect water from building rooves.

Reticulated water supply would be required as a back-up in dry periods when there is insufficient water in the ponds / tanks.

The total annual water demand for the Site based on operational requirements is estimated by CiviLake to be in the order of 26,000KL.

It is estimated that in a dry year, when limited water is available in the onsite ponds, that up to around 10,000kL per year may be required to be supplied from water mains. The peak demand is estimated to be around 40kL over a 3hr period based on filling up a 10,000L water tanker and the 20,000L pugmill tank over a 3hr period with some additional capacity.

Hunter Water on the 5 October 2009 provided formal Preliminary Servicing Advice for reticulated water supply which stated that the proposed development can be serviced by a new pipe connecting to the existing 150mm water main located at the intersection of The Weir Road and Racecourse Road (some 800m to the east of the Site).

CiviLake would obtain Hunter Water approval prior to installation of the new water service.

As discussed in **Section 2,** above ground water storage tanks would be provided to supply the amenities within and around the office and storage shed buildings.

17.1.1 Fire Fighting Water Supply

LMCC has advised that as there are no buildings greater than 500m^2 in area specific fire fighting water supply is not required.

However, based on recommendations from the bushfire assessment in **Section 12**, as a precautionary measure it is proposed to provide a total of 50,000L of static water storage specifically for fire fighting purposes in above ground storage tanks.

This exceeds the requirements of LMCC *Development Control Plan (DCP) No. 1 (Revision 03)* which states that where a site is not connected to a reticulated water service, a minimum water supply of 10,000L is required to be available for fire fighting purposes.

The fire fighting water is proposed to be stored in two dedicated tanks, one close to the storage sheds and one close to the office building. The tanks would be supported by a fire-proof structure and have a pump booster system and fire hose.

Tanks would be required to be continually refilled from ponds on the site (or from the mains water supply during low rainfall periods) to ensure at least 50,000L of water is available at all times for fire fighting purposes.

17.2 Wastewater Management

Waste water on the site would be generated from toilets, showers and water basins.

The proposed development would have a total of two small toilet blocks one with shower facilities, servicing a staff of approximately 5 people.

Waste water generation would be in the order of 500L / day based on the assumption of:

- Around 40 toilet flushes per day (based on 4 flushes for each of the five workers plus 20 flushes by visitors) at an average of approximately 5L per flush;
- Up to 3 showers per day at approximately 80L per shower; and
- Water basin use of up to 50L per day.

At present there is no reticulated sewer service in the vicinity of the proposed Facility.

Given the lack of reticulated sewer in the vicinity of the site and the relatively small quantity of wastewater that the proposed Facility is expected to generate, it is proposed to manage wastewater on the site though installation of a small, low maintenance package sewerage treatment system.

The proposed treatment system would be a proprietary product that would be selected during the detailed design phase and may include a system such as the 'Biolytix® Treatment System', which uses a combination of biological treatment and filtration to treat waste water to a point where it can be beneficially and safely reused on site. Two systems would be installed, one near the office building and one near the storage sheds comprising tanks to store effluent for onsite uses such as irrigation of the landscaping bunds on the site with treated water (which have a total area of approximately 5,000m^2).

The required capacity of the systems would be further assessed during the detailed design phase and a monitoring program established.

The LMCC *DCP No. 1 (Revision 03)* states that on-site treatment systems are not suitable on land that:

- is located within 100m of a water body;
- is located within 250m of a water supply well or dam;
- is located on a slope steeper than 1 in 8 (12%);
- is below the 5 year ARI floodplain;
- are above 2.4m AHD;
- is within 1m of the seasonally high water table or bedrock;
- where onsite soils with permeability greater than 3.5m per day;
- where a reserve irrigation area is not available for emergency use.

The proposed onsite wastewater treatment system is assessed in relation to these requirements as follows:

- The site is not within 100m of a water body or within 250m of a water supply well or dam (noting that an online search of the NSW Water Information database indicated there were a number of registered groundwater bores within 250m of the site but they were all monitoring bores);
- The system is not proposed to be installed on an area with a slope steeper than 1 in 8 (12%);
- The site would be raised above the 100 year ARI flood level and hence the system would not be affected by the 5 year ARI flood and would also be located at a height greater than 2.4m AHD;
- As the systems would be in sealed tanks the level of groundwater is not considered significant to the proposed treatment system installation. Subject to detailed design, where possible the base of the tanks would be installed above the groundwater table. The system would not be installed within 1m of bedrock;
- The site is currently underlain by a layer of fill which contains varying quantities of clay. The site would be further filled during development of the Facility and LMCChas advised that a high proportion of the material used to fill the site would be clay. This would be expected to have a permeability less than 3.5m per day. LMCC have also advised that irrigation would be by sprinkler systems. The low permeability fill layers along with the relatively low volume of treated effluent being generated and the method of irrigation would be expected to prevent significant infiltration to groundwater;

- There are substantial landscaped areas available within the property boundary (e.g. in the south-western corner of the property) upon which irrigation can occur if emergency discharge of the treated water is required.

It is considered that installation of an onsite treatment system is a sustainable solution for sewage management on the site and would not pose a significant risk to the environment.

17.3 Power Supply

The proposed Facility would be provided with a low voltage 415V 3-phase 50Hz electricity supply to service the asphalt recycler, pug mill, concrete batching plant, two water pumps , office building, two storage sheds, amenities and lighting around the buildings and site entrance.

The maximum demand of the power load has been assessed to be 400 amps per phase, based on load assessment of a similar site conducted by HCB Electric Pty Ltd for CiviLake.

Energy Australia has provided a Design Information Package (DIP) (DIP SC-00096) on 7 August 2009 (as amended on 3 September 2009) based on the above power demand requirements.

In accordance with Energy Australia's requirements specified in the DIP the proposed Facility would:

- be connected via a 11kV connection to the recently installed Energy Australia feeders on The Weir Road;
- erect an 11kV Air Break Switch into this feeder route to the east of the connection point; and
- provide a 400kVA 3 phase 11kV/433V, 50Hz pole mount substation on the site which would have adequate capacity to supply the required power demand with approximately 40% spare capacity.

It is anticipated that an overhead connection would be made to Pole IU-51253 adjacent to the proposed Facility, with a standard Energy Australia 11kV tee, to the new pole mount substation, to be located on the site. The proposed overhead 11kV high voltage conductor would be Mercury 7/4.50 AAC or CCT 120, as specified in the DIP.

The location of this pole mount substation would be in close proximity of The Weir Road, to reduce the extent of the easement and Right of Way; an Energy Australia requirement. A minimum 4 metre wide Right of Carriageway is required to the substation. This new pole mount substation would also accommodate an Energy Australia standard Underground to Overhead (UG/OH) connection to the site's Low Voltage Distribution Board.

Soil resistivity testing would be undertaken to determine the final location of the pole mount substation and earthing details.

CiviLake has advised that low voltage (LV) supply is required to service the weighbridge, pugmill, asphalt recycler, concrete batching plant, the office building, two storage sheds and the water pumps in the stormwater ponds.

A LV distribution board suitably rated for the site demand would be installed in the new weighbridge building close to the pole mount substation for the distribution of LV supply to the site loads. The distribution board fault current level would be provided by Energy Australia, later in design process. Underground LV cables would connect the pole top transformer to the distribution board.

LV power supply would then be provided from the distribution board to the above facilities. Due to nature of the site operation, all LV distributor cables would be routed underground and enclosed in HD PVC orange conduits for additional protection. Distribution pits or pillars would be provided as required to facilitate supply cables teeing off to buildings / plant etc. The wiring distribution from the distribution board would comply with the requirements of AS/NZ 3000.2000, AS/NZ 3008.1 and Service and Installation Rules of New South Wales.

The low voltage cables can be located in shared trenches with other services such as communications and water where appropriate.

A Concept Plan of the power supply and distribution to the site is provided in the Combined Services Drawings shown in **Figure 17.1 and Appendix B.**

AECOM has been engaged to complete the Level 3 Design for the proposed Facility. Energy Australia approval of the Level 3 Design would be required.

As discussed in **Section 18** renewable energy would be generated on the site using solar panels and potentially a wind turbine and would be fed back to the grid reducing the facilities net energy usage. For additional information refer to **Appendix P.**

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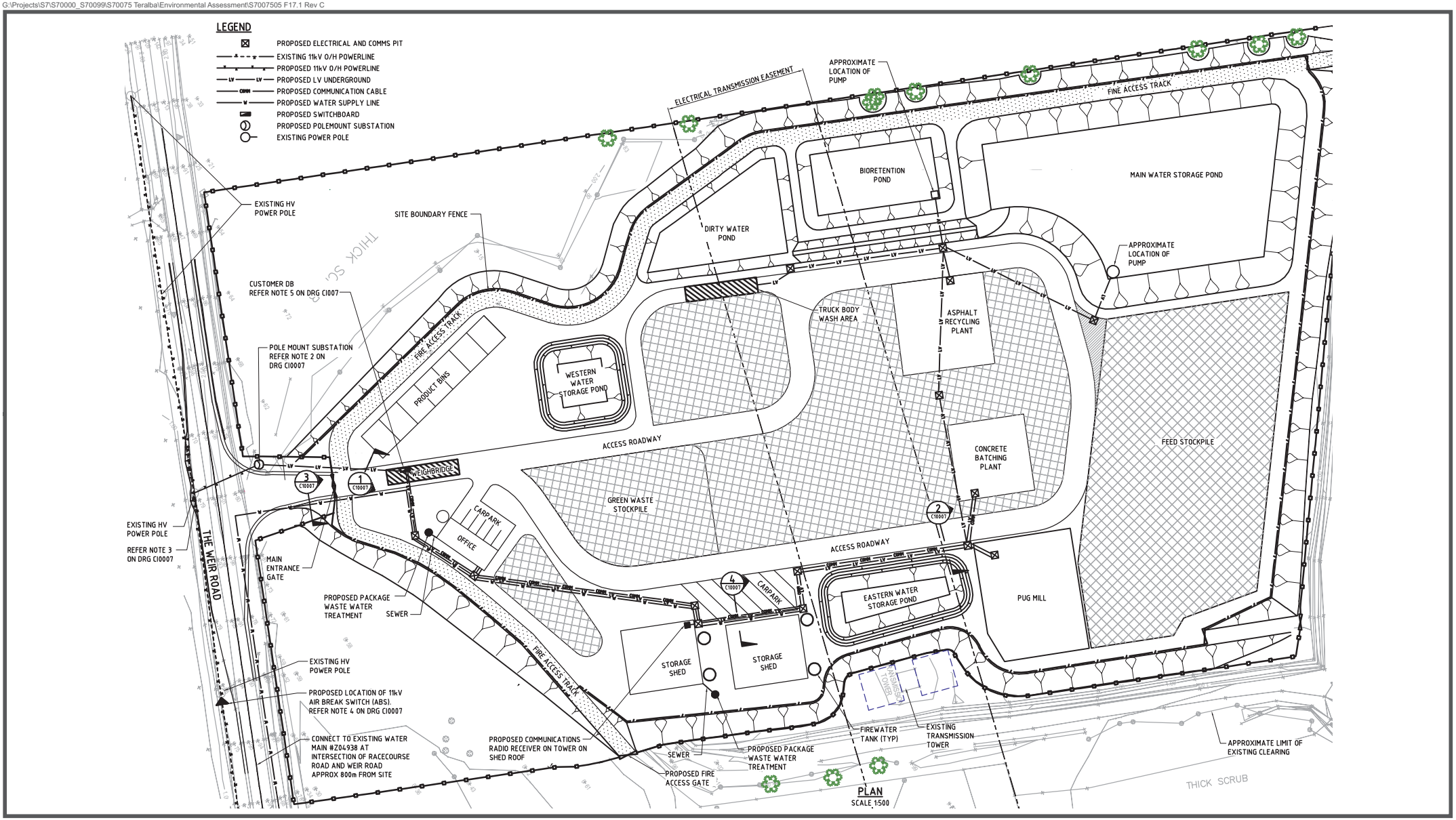

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Combined Services Plan

Lake Macquarie City Council
Environmental Assessment
Teralba Sustainable Resource Centre
Teralba

Figure
17.1

17.3.1 Electrical Transmission Easement

An electrical transmission easement for a 132kV overhead power lines transects the site from east to west as shown on **Figure 1-3**. A lattice tower for the power lines (TowerIU-50817) is present within the easement close to the eastern boundary of the site.

Energy Australia in 20 October, 2009 advised of the following requirements with regard to the transmission line easement:

- A 12mx12m area centred on the tower either side of the tower base be provided for access which must not be built on or have obstructions to access;
- The total height of land build-up and stockpiles should not exceed:
  - RL of 10m for 65m from the centre of Tower number IU-50817;
  - RL of 8m for the following 30m; and
  - RL of 6m for the following 130m.

Activities that may occur within the easement, include driving/ parking of cars and trucks, operation of mobile plant (with a height limit of 4m), planting of trees, plants and shrubs up to 4m in height and storing / stockpiling of materials that would not burn.

The proposed permanent plant and buildings would be located outside the area of the electrical transmission easement and would not have any impact on the 132kV overhead power lines.

Measures to address safety in respect to the electrical transmission easement would be developed in consultation with Energy Australia and be included in both the CEMP and OEMP for the proposed Facility.

17.4 Communications

LMCC presently operates a radio microwave communications network from a commercial tower on Sugarloaf Range. The intention is to use this existing communications platform to connect the proposed Facility to the LMCC Administration Building.

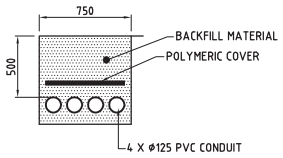
Both phone and data services would be supported across this radio. A small tower would be erected on either the site office building or one of the storage sheds. The radio receiver would be approximately 300 mm square and the tower height would be determined by using a cherry picker during site construction. It is possible that the light weight tower may be up to 10m high to clear the trees opposite the entrance roadway, however it is considered likely that 2-3m would suffice.

Trenches would contain conduits for communications to connect to the weighbridge, administration building, storage sheds, the pugmill and the concrete batching plant, see **Figure 17.2.**

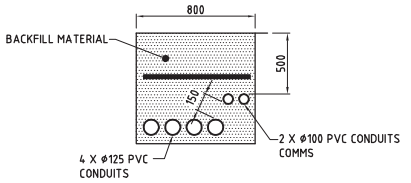
The Combined Services Drawing shows the proposed approximate location of the radio receiver and internal communication conduits (see **Figure 17.1**). (Refer to **Appendix B**).

NOTES

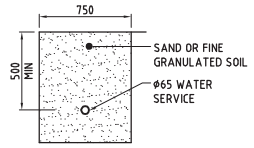
1. LOCATIONS OF ALL PROPOSED SERVICES SHOWN ARE INDICATIVE ONLY AND ARE TO BE CONFIRMED DURING DETAILED DESIGN.
2. PROPOSED LOCATION OF POLE MOUNT SUBSTATION IS INDICATIVE ONLY. FOR SUBSTATION POLE & EARTHING DETAILS REFER TO EA STANDARD DRAWING 566089& 566126.
3. EXISTING HV POLE TO BE AUGMENTED TO ACCOMMODATE PROPOSED OVERHEADS MAINS TEE OFF TO POLE MOUNT SUBSTATION. FOR POLE TEE OFF CONSTRUCTION REFER EA STANDARD DRAWING 513917.
4. PROPOSED 11kV ABS TO BE MOUNTED ON EXISTING HV POLE. FOR ABS ARRANGENT REFER EA STANDARD DRAWING 175902.
5. PROPOSED LOCATION OF CUSTOMER DISTRIBUTION BOARD IS INDICATIVE ONLY. FINAL LOCATION TO BE ADVISED. INSTALLATION TO COMPLY WITH SERVICE AND INSTALLATION RULES OF NSW AND AS/NZ 3000 WIRING RULES.
6. ELECTRICAL / COMMUNICATIONS PITS TO BE INSTALLED AT CHANGE IN DIRECTIONS AND AT A MAXIMUM INTERVAL OF 80m FOR STRAIGHT SECTIONS. LOCATONS AND NUMBER OF PITS TO BE CONFIRMED BY CLIENT
7. HV POWER SUPPLY TO SITE SUBJECT TO LEVEL 3 DESIGN AND ENERGY AUSTRALIA APPROVAL
8. WATER SUPPLY TO SITE SUBJECT TO HUNTER WATER FEASABILITY STUDY AND APPROVAL
9. APPROPRIATE SERVICES PROTECTION TO BE INSTALLED WHERE SERVICES CROSS ROADS OR ACCESS WAYS



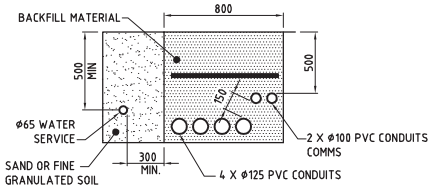
SECTION 1 LV CABLE TRENCH
N.T.S C10006



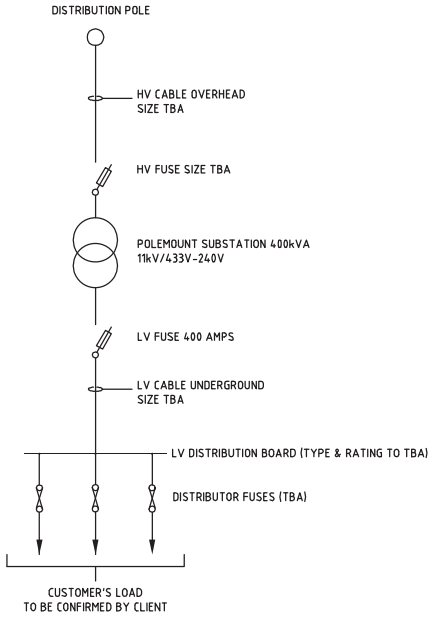
SECTION 2 COMBINED TRENCH LV & COMMS
N.T.S C10006



SECTION 3 WATER TRENCH
N.T.S C10006



SECTION 4 COMBINED TRENCH WATER, LV & COMMS
N.T.S C10006



SINGLE LINE DIAGRAM

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Combined Services Details

Lake Macquarie City Council
Environmental Assessment
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Figure
17.2

18.0 Sustainability and Energy

18.1 Introduction

Recycling facilities are inherently sustainable as they displace the demand for virgin finite resources. The result of this is a reduction in the net lifecycle GHGfor a newly manufactured product compared with making the same product from new materials. Recycling also minimises the volume of waste going to landfill resulting in reductions in waste handling emissions and also a reduction in the land area required for landfill. Performance of the proposed Facility would further be enhanced through a number of renewable energy, remediation and resource balance strategies. The proposed Facility would contribute to a sustainable environment in the following ways:

- Remediating and developing a previously contaminated site. The use of brownfield rather than greenfield sites prevents damage to areas that currently act as carbon sinks and provide ecological and biodiversity benefits to the environment and local communities;
- Using waste material from construction sites to make new products, thereby reducing waste to landfill, demand on virgin materials and emissions generated to create materials from virgin products;
- Removing noxious weeds and regenerating landscape to the north east of the site;
- Managing and recycling stormwater on the site to supply in the order of 80% of the site's water needs;
- Eliminating contaminated discharge through stormwater controls and treatment;
- Providing perimeter planting that acts as a carbon sink and benefits local ecology;
- Using solar hot water;
- Installing solar photovoltaics on storage sheds to feed energy back into the grid which displaces emissions associated with fossil fuelled power stations and also reduces the site's electricity bills.

As part of the sustainability assessment, an assessment was made as to the feasibility of various renewable energy options, the extent of GHG emissions that would be produced by the proposed Facility and the implications of a future potential Carbon Pollution Reduction Scheme (CPRS) for the proposed Facility. The findings of these assessments are discussed in the following sub-sections.

18.2 Renewable Energy Options

Three options for renewable energy generation were considered on this project. These were wind turbines, photovoltaic arrays and solar hot water (see **Appendix P** for details).

18.2.1 Photovoltaic Array

A photovoltaic array installed on the storage sheds is a technically viable renewable energy generation technology for the proposed Facility. It is understood that CiviLake proposes to proceed with a progressive build-up of photovoltaic capacity on the site commencing with installation of an approximate 3kW photovoltaic system during construction. An additional 3kW per year may be added over ten years to provide a system with an approximate total capacity of 30kW. With each 3kW system, the average energy output would be just over 4,000kWh per year (refer Table 18-1), saving around 4 tonnes of carbon dioxide equivalent (CO2e) and $529 off electricity bills (assuming a $0.13 retail electricity tariff for feed-in). With a 30kW system, the total emission saving is 43 tonnes of CO2e per year with an annual energy output of 40,700kWh per year. The energy generated from this system would be fed back into the power grid.

Table 18-1: Energy Production and CO_2e Savings

	100kW	3kW	30kW
Annual average solar radiation (kWh/m²/yr)	1,618		
Annual average insolation on tilted array (kWh/m²/yr)	1,697		
PV system orientation	North-west		
Tilt angle	25 degrees		
PV system area (m²)	800	23	230
Annual energy output (kWh/yr)	141,000	4,070	40,700
Annual carbon saving (tonne.CO2e/yr)	149	4	43

Table 18-2: Basic PV Array Cost Estimate

	100kW	3kW	30kW
Estimate System cost ($ /m2 of cell area)	$1,450		
Installation capital cost $ (CiviLake)	$ 1,160,000	$33,4621	$334,6151
Retail electricity tariff (starting flat-rate price)	$0.13		
Electricity savings per year @ flat 13 cents per kWh [$]	$18,300	$529	$5,290

Note 1 Assuming the installed price per kWh does not vary at this system scale

18.2.2 Wind Turbine

An elementary feasibility study on the use of wind turbines was undertaken using data for Maryville, which is 20km to the east of the subject site. Conservative estimates for wind data were used since the site is in a topographical depression. A wind turbine may be a viable option but should Council wish to pursue this option, further investigation should be completed to obtain site-specific data that could inform a thorough feasibility study.

Based on conservative wind speed estimates, a 5kW wind turbine would save $380 per annum in electricity bills and around 3 tonnes of CO_2e.

Table 18-3: Aerogenesis 5kW Turbine:Energy Output and CO_2e Reduction Estimates

Average daily energy output @ 3.3m/s wind	8 kWh per day
Average annual energy output @ 3.3 m/s wind	2,920 kWh per annum
Annual electricity saving (@ 13cents flat rate)	$380 saving per annum
Annual carbon saving (tonneCO2e /yr)	3 per annum
Cost of Aerogenesis 5kW turbine	$30,000 cost installed

18.2.3 Solar Versus Wind Energy

A conservative estimate indicates that a $30,000 investment in a small wind turbine could generate approximately 3,000 kWh per annum (assuming that a consistent wind with an average speed of 3.3m/s, and not less than 3m/s, is available on site). A $30,000 investment in a small (3kW) photovoltaic array could generate approximately 4,000 kWh per annum (note that the wind turbine output is highly sensitive to site specific conditions). A 10% increase in average wind speed compared to the values used in this estimate may result in similar annual yields to the PV system. The annual PV energy output can be estimated with greater certainty based on documented solar insolation levels for the region.

When making a final selection between alternative renewable technologies, it is important to consider the following:

- Solar radiation is more consistent and reliable at a fixed location, compared with local winds;
- Wind turbines are highly sensitive to the wind speed at the local site. As the assumptions on wind speed in this report are conservative, actual wind speeds may be greater than assumed. Even a small increase in wind speed can have a large effect on the power output and this may mean that a wind turbine on the site could produce more electricity than predicted (refer to **Appendix P**);
- Should Council wish to pursue the wind turbine option or seek a detailed comparison between the two technologies, it is recommended that local wind speeds be determined in order to assess the actual potential energy output of a particular wind turbine. Local winds are best determined via an anemometer or small weather station; data logging for at least one year is desirable;
- Local topography, including depressions and wind blockage effects, can significantly alter local wind speed. Consequently, if any future buildings or changes to the site are anticipated, these should also be considered in assessing the feasibility of a wind installation;
- An advantage of the solar option is that it is relatively easy to build up capacity over a period of time;
- Both technologies can be installed on the roofs of the proposed buildings. There is sufficient roof space available on the proposed site sheds to accommodate Council's proposed strategy for building solar capacity of 30kW. The roof space required for wind turbines would depend on the type of turbine and aerodynamic blockage effects. This would require additional investigation following the site specific wind analysis. There may also be additional structural consideration required during the roof design;
- It is also relatively common to use a mix of the two technologies. This may provide greater certainty that on any given day power would be generated.

18.2.4 Solar Hot Water

The north facing roof of the 200m² office block shown in **Figure 2-1** provides the optimal location for the solar hot water system installation. An estimation of the solar hot water system required for around 5 occupants and associated energy savings are presented in the **Table 18-4.**

Table 18-4: Solar Hot Water System Energy Savings and CO2 Reductions

Occupant (estimated)	5
Hot water requirements (L/person/day)	50
Estimate of collector area required [m^2]	$5m^2$
Daily energy required to heat hot water (kWh/day)	14
Annual energy required to heat hot water (kWh/year)	5,100
Annual solar contribution percentage	90%
Annual energy saving (kWh/yr)	4,400
Annual carbon saving ($kgCO_2e/yr$)	4,700

The approximate cost of a five-star gas in-line boost household system is in the order of $7,000, excluding installation. Such a system would be comprised of the following:

- Stella 360L tank;
- 200L per hour recovery;
- 3 solar panels (5 people).

18.3 Renewable Energy Recommendations

- A photovoltaic array is proven technology that would provide consistent and reliable energy to feed to the electricity grid. A photovoltaic array can be installed on the storage sheds and built up over a period of time to increase energy generation capacity and reduce carbon emissions and energy bills.
- Although cost for energy production of photovoltaics and wind turbines per tonne of carbon saved are roughly comparable, the installation of photovoltaics is likely to be simpler and require less space.
- Further investigation to determine site-specific wind data should be carried out if Council wishes to proceed with installation of a wind turbine, as the sole power source or mixed with PV. The current data cannot provide a definitive comparison between photovoltaic and wind technology for the proposed site.
- Installation of a solar hot water system on the office buildings would reduce carbon emissions and energy use.

18.4 Greenhouse Gas Emissions

Understanding the carbon footprint of the proposed Facility and which aspects of the proposed Facility are carbon intensive, is particularly relevant given the changes occurring on the Australian policy landscape. The transition to mandatory reporting arising from the introduction of the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) has been put on hold indefinitely by the Australian government. There is however, potential for a carbon priced economy to be introduced in the future. As a result, an assessment of the Facility with regard to the NGER Act and potential obligations under a future CPRS has been undertaken.

18.4.1 National Greenhouse and Energy Reporting Act 2007

The NGER Act underpins the CPRS by providing the emissions and energy data on which obligations under the CPRS would be based. The NGER Act requires that when a corporation which has 'operational control' meets the set *facility* or *corporate group* thresholds for GHG emissions, energy production or energy use it is required to report its:

- GHG emissions (Scope 1 and Scope 2 emissions);
- energy production;
- energy consumption; and
- other information specified under NGER legislation;

for that reporting year (reporting years follow the financial year).

Individual facilities that emit over 25 kilotonnes (kt) of CO_2e GHG emissions or produce or consume100 terrajoules (TJ) of energy must report under the NGER legislation. Further, corporate groups (which have operational control over a number of facilities) that emit over 50 kt of CO_2e GHG emissions or produce or consume 200TJ of energy in the third (2010-11) reporting year must report under the NGER legislation. NSW local governments are currently not required to report under the NGER Act if they meet/exceed the NGER corporate group thresholds as they are not "corporations".

Reportable Greenhouse Gas Emissions

GHG emissions are categorised into three different scopes (either scope 1, 2 or 3) in accordance with the Intergovernmental Panel on Climate Change (IPCC) and Australian Government GHG accounting/classification systems. The NGER reportable GHG emissions are Scope 1 and Scope 2 emissions.

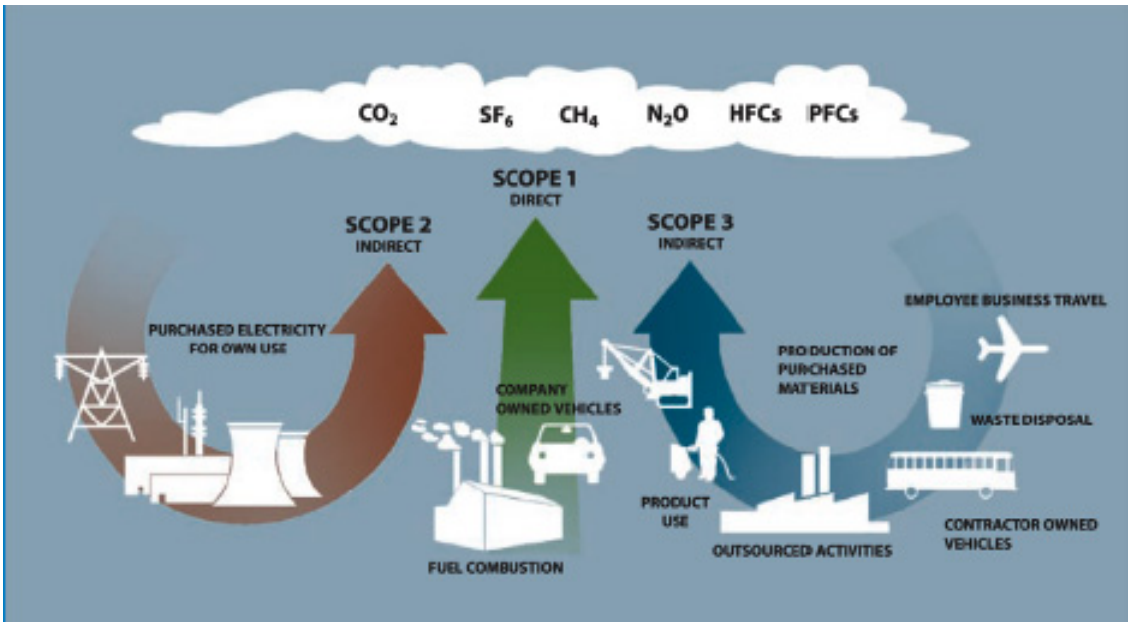
Scope 1 emissions, also called "direct emissions" are emissions which are generated directly by the project, e.g. emissions generated by the use of diesel fuel by construction plant/equipment.

Scope 2 emissions, also referred to as "indirect emissions" are emissions which are generated outside of the project's boundaries to provide energy to the project, e.g. the use of purchased electricity from the grid.

Scope 3 emissions are upstream emissions due to third party supply chains that are in direct relation to the project (e.g. extraction, production and transport of purchased materials and waste disposal offsite).

Figure 18-1 illustrates the GHG emissions scope.

Figure 18-1: GHG Emission Scopes



(Source: http://www.yale.edu/sustainability/images/emissions.jpg 2009)

The Scope 1 and 2 emissions associated with operating the proposed Facility have been estimated at just over 4 kt CO_2e per year (refer to emission calculation report in **Appendix Q**), which is well under the 25 kt CO_2e per year threshold requiring NGER reporting. The facility's operational energy use has been estimated to be 52,000 kWh per year, which is also well below the 100TJ per year energy use threshold.

Hence the proposed Facility is not expected to exceed the NGER facility thresholds that require reporting.

It is noted that the requirement to report Scope 1 and Scope 2 emissions under NGERS differs from the liability under the CPRS.

18.4.2 Carbon Pollution Reduction Scheme

While the CPRS has been put on hold indentify by the Australian government, other countries continue to move towards a carbon priced economy, as demonstrated by the approval of the New Zealand governments Emissions Trading Scheme (ETS) in July 2010. As such, an assessment of the Facility with regard to obligations under a potential future CPRS is outlined below.

The Australian government's goal was to reduce Australia's emissions by 60 percent of 2000 levels by 2050. The CPRS would set a cap on the amount of emissions that can be generated and charge emitters per tonne of CO_2e generated.

Not all corporations that would be required to report under existing NGER legislation would be subject to CPRS liabilities. Facilities that trigger the threshold under the NGER Act for *Scope 1* emissions would be required to participate in the CPRS by purchasing permits to emit CO_2e gases. At the end of each compliance period (one financial year), a permit is surrendered for every tonne of CO_2e emitted.

The White Paper position on materials recovery facilities is as follows:

> *Waste sector businesses such as materials recovery facilities do not have fugitive emissions but use energy, with energy emissions being covered upstream. The Scheme will encourage resource recovery because the alternative—sending waste to landfill—will become more expensive once pollution permits are required for emissions from waste landfill facilities. The Scheme is also likely to provide incentives to manufacture recycled products because in more circumstances the alternative—manufacturing products from new materials—is more emissions-intensive and will therefore become more expensive once energy and industrial process emissions are covered throughout the economy.*

Scheme obligations for facilities such as those under this application would be triggered if the proposed Facility:

- has direct (Scope 1) emissions of 25 kt or more of CO_2e a year (excluding emissions associated with use of fuel); or
- uses 100 TJ or more of energy per year.

The Scope 1 emissions associated with operating the proposed Facility have been estimated at just over 4 kt CO_2e per year, which is well under the 25 kt CO_2e per year threshold for triggering CPRS obligations. Additionally all of these Scope 1 emissions are associated with fuel use, which are covered by upstream fuel facilities. It is estimated that the proposed Facility would use 52,000 kWh of energy per year, which also would not trigger CPRS energy use obligations.

As the scheme has been put on hold indefinitely, there is no requirement for the proposed Facility to report under NGER or CPRS at this time. It is recommended that a GHG emissions inventory and/or energy audits be carried out if operations increase or change, or if the legislation is altered.

18.5 Conclusions

There is no requirement for the proposed Facility to report under NGER as the proposed Facility would produce GHG emissions which are well under the threshold for triggering reporting obligations. However, it is recommended that a GHG emissions inventory and/or energy audit be carried out if operations increase or change, or if the legislation is altered.

19.0 Waste Avoidance and Recovery

19.1 Introduction

This section identifies the various waste sources that would be generated by the proposed Facility, during construction of the Facility, reprocessing works and general operation of the site.

The NSW Waste and Resource Recovery Strategy 2007 (NSW WARR) aims to maximise conservation of natural resources and to minimise environmental harm from waste management and disposal of solid waste. It is a response to a growing population in NSW and a healthy economy that is producing more goods and services.

To comply with the NSW WARR, the proposed Facility would aim to reduce the production of waste and where waste generation is unavoidable, to promote reuse and recycling in accordance with the waste hierarchy (shown in **Figure 19-1**). Where on-site reuse or recycling is not practicable, appropriate off-site recycling or disposal facilities would be employed, ensuring the responsible treatment of all waste streams.

Figure 19-1: The Waste Hierarchy

The primary purpose of the proposed Facility is to reduce waste and promote recycling, by reprocessing materials that otherwise would require disposal to landfill, into useful products. Hence the development of the Facility is in accordance with the NSW WARR and the *Waste Hierarchy* .

Nevertheless the proposed Facility would generate some small quantities of waste and hence environmental safeguards that would minimise the potential impacts related to waste management are recommended.

19.2 Construction Phase

The predominant activity that would occur during the construction stage is the importation of clean fill material to raise the site levels.

CiviLake would be adopting strict protocols during this filling stage to ensure that only suitable material (i.e. classifying as ENM or VENM and geotechically suitable) is delivered to the site. This protocol is discussed in Section 2.3.1 of this EA and would be further detailed in the CEMP. The protocol would include testing of material before it is transported to the site and then inspections as it enters the site and as the material is tipped. Any loads of material that are deemed unsuitable would be rejected. Based on implementation of this protocol it is considered highly unlikely that unsuitable material would be delivered to the site and hence practically all fill material delivered to the site would be used in the filling resulting in limited or no waste generation.

In the unlikely event that unsuitable materials were delivered and tipped on the site during the construction phase, they would be segregated, sampled for waste classification in accordance with the NSW DECC (2008) *Waste Classification Guidelines,* before being disposed of to a suitably licensed landfill.

Other aspects of construction are only likely to generate minor wastes noting that the structures proposed for the site (sheds and office building etc) are likely to be prefabricated and there would only be a small construction workforce.

The construction contractor should adopt strategies to manage and where possible, minimise waste during the construction stage. This includes the provision of adequate and well marked, onsite waste storage facilities as well as:

- Avoiding over-estimation of materials, minimising packaging, and where possible buying environmentally approved and recycled products;
- Procedures for the collection and sorting of recyclable construction waste materials;
- Provisions for storage, collection and recycling of daily waste from construction workers; and
- Procedures for removal and disposal of (non reusable/recyclable) waste from the site

Where the on-site reuse of waste generated during construction is not possible, appropriate off-site recycling or disposal facilities would be employed, ensuring the responsible treatment of all waste streams.

19.3 Operation Phase

As discussed in Section 2, materials that would be imported to the site for processing would include:

- Concrete;
- Asphalt / roadbase;
- Green waste;
- Bricks;
- Tiles; and
- Clean soil.

In addition certain materials would be brought onto the site which do not require reprocessing such as packing sand and crusher dust; topsoil and backfill / drainage aggregate.

Products generated from the proposed Facility would be sold internally for Council operations and externally to suitable markets in the building and civil engineering industries in the Lower Hunter.

CiviLake has advised that generation of waste materials from the feedstock and processing at its current facility is negligible and it would expect this to also apply to the proposed Facility.

The main potential for waste generation is from materials that cannot be processed within the proposed Facility due to material unsuitability (contamination, asbestos etc).

To avoid unsuitable material entering the site, CiviLake would design and implement an *Incoming Waste Quality Plan* which would be included within the OEMP. Some key aspects of these procedures would include:

- Setting up the site with appropriate controls such as advising suppliers that contaminated or otherwise unsuitable materials would not be accepted, installing appropriate warning signage, ensuring workers receiving and inspecting wastes are appropriately trained etc.
- Requiring persons bringing loads to the site to complete a questionnaire about the source of the material and sign confirming the material is free from contamination.
- Visual inspections of each load as the material enters the site and then as it is tipped.
- Any suspect loads would either be rejected outright or investigated further.
- Implementing a regular program of review of the site's systems and operations and random testing of materials.

Based on implementation of this protocol, it is considered highly unlikely that significant quantities of unsuitable material would be delivered to the site and hence practically all feedstock delivered to the site would be processed into product resulting in limited or no waste generation.

Should unsuitable materials be accepted onto the site and later identified, they would be segregated, sampled for waste classification in accordance with the NSW DECC (2008) *Waste Classification Guidelines* before being disposed of to a suitably licensed landfill.

Small quantities of materials such as plastic or timber from time to time are found in concrete feedstock. Where quantities of these materials are in excess of that allowed by the appropriate resource recovery exemption they would be separated, placed into skip bins and disposed of to a suitable landfill.

Material reinforcement bars from the concrete would be separated and sent to a metal recycler for recycling.

Appropriate recycling and general waste bins would be provided for daily waste generated by the operational workforce.

Generation of hazardous wastes (e.g. oils, fuels, grease, solvents, etc) would be very minimal mainly from maintenance to plant on the site. Such wastes would be collected in designated storage containers and collected by appropriate licensed contractors for recycling, treatment and /or disposal.

Any other general wastes on the facility would be collected into skip bins for recycling or offsite disposal as appropriate.

19.4 Environmental Safeguards

As discussed in the previous sections, a number of environmental safeguards would be implemented during all phases of the project to minimise waste and, to re-use and / or recycle potential generated wastes and where this is not practicable to responsibly and lawfully dispose of wastes.

A *Waste Management Plan* would be included within both the CEMP and OEMP documenting how waste would be managed on the site and complying with the *Waste Avoidance and Recovery Act 2001*and other relevant guidelines such as DECC's *Waste Classification Guidelines* (DECC, 2008)

The *Waste Management Plan* would:

- Provide a discussion of the regulatory framework governing waste management in NSW;
- Identify potential waste streams on the site;
- Document procedures to minimise waste generation; where waste is generated to encourage recycling or reuse; and where this is not practicable to ensure waste is responsibly and lawfully disposed off the site;
- Provide procedures for management of hazardous wastes;
- Document procedures for classification of wastes;
- Details of how waste would be quantified, stored, treated (on site) and disposed; and
- Detail reporting and recording procedures to track wastes in accordance with regulations.

Some mitigation measures that would be implemented during the construction phase and that would be documented in the *Waste Management Plan* in the CEMP would include:

- Contingency measures in the event that unsuitable materials were delivered and accepted at the site including segregation, waste classification and offsite disposal to a suitable landfill;
- Provision of adequate and well marked, onsite waste storage facilities;
- Avoiding over-estimation of materials, minimising packaging, and where possible buying environmentally approved and recycled products;
- Provisions for storage, collection and recycling of daily waste from construction workers; and
- Procedures for removal and disposal of (non reusable/recyclable) waste from the site.

In addition an *Imported Fill Validation Plan* would be prepared to ensure that material imported to the site is suitable for use in the site filling

Mitigation measures that would be implemented during the operation phase and that would be documented in the *Waste Management Plan* in the OEMP would include:

- Implementation of an incoming waste quality plan to ensure that material imported to the site is suitable for use in processing;
- Contingency measures in the event that unsuitable materials were delivered and accepted at the site including segregation, waste classification and offsite disposal to a suitable landfill;
- Provision of adequate and well marked, onsite waste storage facilities;
- Provisions for storage, collection and recycling of daily waste from site workers;
- Procedures for removal and disposal of (non reusable/recyclable) waste from the site; and
- Collection of minor quantities of hazardous wastes (oils, grease etc) into suitable storage containers to be collected by appropriate licensed contractors for recycling, treatment and /or disposal.

19.5 Conclusion

The proposed Facility would reduce waste and promote recycling, by reprocessing materials that otherwise would require disposal to landfill, into useful products. The proposed Facility would generate minimal quantities of waste both during construction and operation. Procedures to ensure that such waste generation is minimised and where wastes are generated they are managed in accordance with the NSW WARR and other relevant guidelines would be documented in waste management plans to be included in the CEMP and OEMP.

20.0 Cumulative Impacts

20.1 Introduction

Cumulative impacts on the environment can result from a combination of a number of different elements within a project as well as from other projects operating within the same general locality.

20.2 Cumulative Impacts from the proposed Facility

As part of the development of the proposed Facility, there are examples where a number of discrete environmental impacts, when combined and not managed, have the potential to generate a greater level of impact. For example, noise, amenity, traffic and air quality impacts have the potential when combined to cause more significant impacts on surrounding properties than in isolation, particularly if not carefully managed.

The potential cumulative impacts associated with the various elements of the proposed Facility are considered to be acceptable and manageable based upon the control measures described within this document and/or to be determined in the preparation of subsequent Environmental Management Plans required by the project approval.

20.3 Cumulative Impacts with Other Projects

Cumulative impacts must also take into account other major projects planned in the local area. The proposed Facility has been considered in the context of existing developments and future approved projects in the locality. Existing uses in the area comprise of environment conservation, industrial, rural residential and residential. The nearest industrial operation is the Council owned and operated Teralba Worm Farm Waste Education Centre, which is approximately 300m to the east of the subject site. The nearest residential property is approximately 500m to the north of the subject site on Martin Place in Edgeworth.

A search of Council's approvals register found the only recently approved projects that would be of relevance to the proposed Facility include an industrial development and two lot subdivision approved in 2007, located at 19 Racecourse Road, approximately 650m south east of the subject site. The cumulative impact of the approved projects with the proposed Facility is considered to be negligible.

20.4 Conclusions

The detailed technical assessments contained in this EA report address the potential cumulative impacts of the proposed Facility. In summary the cumulative impacts are considered to be acceptable and manageable based on the environmental safeguards and mitigation measures proposed.

21.0 Statement of Commitments

21.1 Introduction

In accordance with the EA requirements under part 3A of the *EP&A Act*, the following Statement of Commitments (SoC) is provided. The SoC sets out CiviLake's environmental commitments and details on the environmental management and monitoring of the proposed Facility during its construction and operational activities.

21.2 Statement of Commitments

The SoC prepared in respect of the proposed construction and operation of the proposed Facility has been compiled on an issues basis and is informed by the environmental risk analysis and impact assessment undertaken as part of this EA. The SoC has been written in a format which can be incorporated into project approval issued to act as the conditions of that approval.

Table 21-1: Statement of Commitments

Issue	Commitment
General	CiviLake would prepare and implement the following management plans for the Facility: • A CEMP covering: - site security and access; - site signage requirements (including contact numbers) and hours of operation; - sediment and erosion control, soil / stockpile management and stormwater management; - noise control; - air quality control (dust and odour); - hazardous materials (fuels etc) storage, use, refuelling and maintenance , emergency response etc; - measures required to be implemented for the proposed excavation works; - waste management; - traffic management ; - material tracking and documentation; - procedures for safely working in and around the electrical easement; - groundwater and acid sulphate soil management (where excavations are required); - *Imported Fill Quality Plan*; - EEC protection / landscape; - heritage (contingency in event aboriginal artefacts encountered); - *Bushfire Management Plan*; - monitoring requirements; and - contingencies.

Issue	Commitment
	• An OEMP addressing: - site security and access; - site signage requirements (including contact numbers) and hours of operation; - stockpile management; - operation, maintenance and monitoring of the stormwater management and treatment system; - noise control; - air quality (dust and odour); - hazardous materials (fuels etc) storage, use, refuelling and maintenance , emergency response etc; - imported waste quality plan (i.e. procedures to check imported wastes meet a relevant resource recovery exemption); - waste management; - traffic management ; - material tracking and documentation - procedures for safely working in and around the electrical transmission easement; - EEC protection / landscape; - heritage (contingency in event aboriginal artefacts encountered); - bushfire management plan; - monitoring requirements; and - contingencies.
Contamination	A detailed design specifying the construction/composition requirements for the capping layer would be developed.
	Fill material imported onto the site would be tested as required to meet DECCW requirements and be geotechnically suitable.
	Groundwater monitoring would be conducted to establish, with a greater level of confidence, groundwater flow direction, hydraulic conductivity and whether identified contaminated groundwater is migrating off-site.
	A contingency plan would be considered in the event that groundwater quality does not improve following the placement of the cap and/or contaminated groundwater is migrating off-site.
	Methane monitoring would be carried out ot determine whether there is vapour generation which may pose a hazard to both the construction and future site workers.
	A Site Validation Report would be prepared following placement of the capping layer and the additional groundwater and methane monitoring, to certify that the site is suitable for operation of the recycling facility.
Water Management	CiviLake would ensure that the site is designed and constructed in accordance with AECOM's *Water Cycle Management Plan*.
Flora and Fauna	A site perimeter fence (stock fence) would be installed prior to the commencement of construction works to prevent accidental intrusions into adjoining areas of natural vegetation, particularly the swamp and wetland areas.

Issue	Commitment
	Temporary fences or barriers would be installed on the development side of the surveyed edges of the EEC in the south-eastern and south-western corners of the property during construction to protect the EEC from accidental intrusions by machinery and to prevent inappropriate stockpiling of soil and building materials in the EEC areas.
	Runoff and sedimentation from the proposed works areas would be managed during the construction phase using current best practice sediment and erosion control measures.
	A protocol for the prevention of *Phytophthora cinnamomi* infection of native plants would be developed and implemented during construction.
	All species to be used for rehabilitation and restoration of retained natural areas and the embankment would be of local provenance.
	Weed control protocols would be developed and implemented. These protocols would include all weeds from areas cleared during construction being completely removed from the site and not allowed to enter adjacent habitat.
	Significant weeds would be controlled along the perimeter of the site in the area of the landscaped embankment wall and prevented from invading adjoining natural bushland.
	Depending on the number and size of trees to be removed, a tree felling protocol may need to be developed and implemented to minimize harm to all fauna species during the clearing of trees.
Heritage	Should any objects be identified during the course of site works, all works must cease and the DECCW (Hunter Branch, Environment Protection and Regulation Division, Regional Archaeologist) be contacted in regard to appropriate permit requirements.
	Should suspected skeletal material be uncovered during the course of site works, all works must cease and the DECCW, the NSW Police and the NSW Coroners office be contacted immediately, regardless of any existing DECCW permits for the proposed development.
	All contractors who work within the confines of the study area should be made aware of the *NPW Act 1974* (as amended) and the fact that it is an offence to move, disturb or destroy Aboriginal objects without the prior written permission of the Director General of the DECCW.
Bushfire	A minimum 20m wide defendable space [building setback] would be provided between the bushfire hazard and the building. The defendable space would be maintained as an Inner Protection Area in accordance with the specifications of Appendix A2.5 of *Planning for Bushfire Protection 2006.*
	Management of the defendable spaces/landscaped areas within the development site would comply with the following: • a clear area of low cut lawn or pavement adjacent to the building would be maintained; • areas under shrubs and trees would be raked and clear of combustible fuels; • non-flammable materials such as Scoria, pebbles and recycled crushed bricks would where possible be used as ground cover in close proximity to building; and • trees and shrubs would be maintained in such a manner that tree canopies are separated by 2m and understorey vegetation is not continuous (retained as clumps).
	The office building and storage sheds would be constructed to comply with Level 1 specifications as defined by *A.S. 3959 – 1999 – Construction of Buildings in Bushfire Prone Areas* except for those elevations which are exposed to the bushfire hazard. These elevations would be constructed to comply with Level 3 specifications as defined by *A.S. 3959 – 1999 – Construction of Buildings in Bushfire Prone Areas.*

Issue	Commitment
	The following additional construction standards would be implemented: • the roof gutters would be fitted with a non-combustible leaf/gutter guard; • access doors [pedestrian and vehicle] to the Storage Sheds would be fitted with weather seals that seal the bottom, stiles and head of the door against the opening/frame to prevent the entry of embers into the building. Particular attention would be paid to the gap at the head of the door curtain; • any external vents or grilles would have stainless steel mesh with a maximum aperture of 2mm square fitted to prevent the entry of embers through the opening; • ventilation louvres would be screened with stainless steel flymesh with a maximum aperture of 2mm; • roof ventilators would be fitted with stainless steel flymesh to prevent the entry of embers into the building; and • external doors to the south-western elevation would be protected against the entry of embers – threshold, stile and head seals would be fitted to doors.
	The water storage tanks would feed a pump which supplies fire hose reels fitted to the exterior of the office and storage shed buildings. The number of hose reels would be determined so that all points of the exterior of the buildings are covered by a 30m hose line length and the water stream from the end of the hose.
	CiviLake would undertake a 'risk assessment' which identifies the external and internal threats to the facility. From this risk assessment an '*Operations/Emergency Procedures Manual'* would be prepared which identifies operational/emergency procedures required in order to address the management of the identified risk.
	An *Emergency Response and Evacuation Plan* would be prepared for the Facility and included in the OEMP. The evacuation plan would address the protocols for the timely relocation of staff/visitors in the event that an emergency occurs, both within the site or within the local area.
Hazard and Risk	CiviLake would install spill kits in the storage shed and train personnel at the site in spill cleanup procedures and use of the spill kits at the site.
	A dry powder fire extinguisher would be installed in the shed. Personnel at the site would be trained in the use of first attack fire fighting.
	A procedure for the refuelling of mobile plant (e.g. front end loaders, crushers, screens, etc.) would be developed and refuelling operations would be performed no closer than 12m to the site boundary.
	Operational plant (e.g. crushers, shredders, etc. would be located no closer than 25 m to the site boundary.
Visual	CiviLake would ensure that the site is landscaped and rehabilitated in accordance with the *Landscape Management Plan* prepared by AECOM 2010 .
Air Quality	Excavation/fill works would only be undertaken during periods of low wind speed. Exposed areas would be stabilised as soon as possible to minimise dust generation. Water sprays would be used on unsealed areas and stockpiles.
	The OEMP would include measures such as:

Issue	Commitment
	• Use of water sprays for: - all processing activities; and - on all exposed stockpiles as required. • Reduced operation during windy conditions; • Covering of vehicles with potentially dusty loads before leaving the site; • Installation of a wheel wash for vehicles travelling onto and off-site; • Use of water carts on unsealed areas when required; and • Maintenance of the vegetated perimeter berms to serve as a barrier to dust emissions leaving the site. Reversing alarms or audible warning devices on loaders and other equipment would be of broadband type and have levels that do not to exceed 85 dB(A) when measured at a distance of 7m directly behind the rear of the equipment (Fit BBS-TEK Alarms - Medium & Light Duty Model 600-BBS087 or equivalent).
Noise	Sound attenuation barriers around the crusher and tub grinder would be constructed to have a minimum crest height that is 3m above the finished ground level. The design and location of the barriers would be at the direction of a suitably qualified acoustics consultant and be coordinated with the operational requirements of the proposed Facility.
	Sound power levels of the proposed plant would be verified by an appropriately qualified acoustic consultant after commissioning.
Waste	CiviLake would develop a *Waste Management Plan* to be included in the CEMP and OEMP for the proposed Facility detailing the means by which CiviLake would manage recyclable and waste materials at the site.
Infrastructure and Utilities	A Section 50 Compliance Certificate would be obtained from Hunter Water following installation of the water service connecting to the Hunter Water Main. Energy Australia would be consulted during preparation of the CEMP and OEMP with respect to work within the electrical transmission easement. Energy Australia approval would be obtained on the Level 3 Power Design. A minimum of 50,000L of fire fighting supply water would be provided in above ground water storage tanks on the site.

22.0 Project Justification

22.1 Introduction

The proposed Facility provides an opportunity to consolidate a number of existing operations into one facility which is consistent with other industrial activities in the area, and has the potential to contribute positively to the local and regional economies. This Section provides a discussion of the justification of the proposed Facility based on site selection, economic, biophysical and social considerations. This Section also examines ESD as it relates to the proposed Facility.

22.2 Site Selection and Suitability

A detailed site selection process was undertaken by Council in order to inform the 2008 *Local Environment Study for LandNnorth of Teralba* (CH_2MHill), and subsequently as part of the LES process. The site selection process resulted in the subject site being the preferred option for the proposed Facility.

22.2.1 Investigation of Alternative Sites

In 2004, Council identified the need for the proposed Facility and subsequently began investigations into suitable sites. During the site option investigations, Council identified the following parameters for investigation of suitable sites namely:

- Volume processed annually: up to 200,000 tonnes;
- Area of land required: 6 to 10 hectares;
- Materials targeted: asphalt, gravel, concrete, brick, tile, green waste and clean fill;
- Plant required: water cart, 2-3 loaders, 1-2 screeners, weighbridge; and
- Water storage: up to 300,000L.

These parameters assist in determining the ideal site for a recycling facility. Other considerations for determining the ideal site included:

- Distance from feedstock generation;
- Distance from end markets;
- Proximity to residents;
- Planning constraints;
- Traffic movements;
- Risks;
- Synergistic opportunities; and
- Other proposed land uses.

Potential land parcels were identified through consultation with internal and external parties within the public and private sectors. A summary of the available sites and suitability of each is provided in **Table 22.1.**

Table 22-1 Potential Sites Considered

Site	Feedstock Haulage (ave km)	Area (ha)	Current Use	Land Owner	Proximity to Houses	Suitability
Stockyard Quarry	13	3	Acid sulfate dredge management	Crown	>500m	Low due to existing use
McDonalds Quarry	3	10	Storage of soils	Council	<200m	Low due to proximity to houses
Oakdale Road Quarry	11	16.05	Some rehabilitation	Crown	<200m	Low due to proximity to houses

Site	Feedstock Haulage (ave km)	Area (ha)	Current Use	Land Owner	Proximity to Houses	Suitability
Hawkmount Quarry	25	519.3	Quarry	Crown	>500m	Medium due to haulage distance
Mirrabooka Quarry	35	10.4	Developing Council approved sporting fields	Council and Crown	<200m	Low due to sporting field development
Awaba Landfill	16	32.57	Council's waste management facility	Council and Crown	>500m	Low due to existing use
Devil's Elbow Quarry	16	2	Nil – natural rehabilitation	Crown	>500m	Low due to small area of land
Pilatis Quarry	10	10.25	-	Crown	<200m	Low due to proximity to houses
Subject Site, The Weir Road	8	10	Previously used for sludge disposal	Council	>500m	High
Croudace Quarry	11	6.875	Nil	Crown	<200m	Low due to proximity to houses
Marmong Sewage Treatment Works	8	50	Previously a sewage treatment works	Hunter water	<200m	Low – offered to Council to purchase – offer denied. Urban area with low industrial activity
Bolton Quarry	8	13.4	Nil – some rehabilitation	Council	<200m	Low due to proximity to houses
Awaba Quarry	16	12.5	Nil - minimal disturbance	Crown	<200m	Low due to proximity to houses
Teralba Quarry	7	2.2	Nil – some rehabilitation	Council	<200m	Low due to proximity to houses and zoning restrictions
Belmont Quarry	17	16.96	Long term storage of culvert and pipe materials	Council	<200m	Low due to proximity to houses
Swansea Quarry	24	6	Stockpiling and processing of road base material and dredge material	Council	200-500m	Low due to haulage distance and may conflict with Wallarah Peninsula development

Many of the sites listed in **Table 22.1** were considered to be unsuitable for the establishment of the proposed Facility due to existing or proposed use, size constraints, proximity to residentuil areas and planning constraints. Further, with rising fuel costs, haulage distances impacted on the long term financial viability of certain sites. Of these sites considered by Council in the site option investigation, the subject site was found to be the most favourable.

An option not listed in **Table 22.1** but considered by Council at the time was the Metromix Quarry. Metromix is a privately operated quarry from which Civilake currently lease an area for recycling of concrete and asphalt and for the storage of reclaimed asphalt pavement. Civilake discussed the option of expanding the Civilake operation on the site; however, certain factors limited this option, primarily, Metromix currently lease the land from a third party, meaning Council would be required to sub-lease the land from Metromix, making security of tenure a high risk.

As a result of the site option investigation, Council concluded that the subject site would offer a number of features and opportunities for the proposed recycling Facility, namely:

- the site is flat, large and Council owned;
- the site is contaminated with biosolid trenches from a sanitary disposal operation;
- the site is greater than 500m from the nearest resident and adequately buffered by bushland;
- two access routes exist to the site, one via Barnsley and the other via Teralba, reducing the impact of truck movements,
- the site is close to feedstock generation and markets for products,
- there is potential to utilise the Teralba Worm Farm as a shop front for domestic products generated by the proposed Facility (mulch, crushed terracotta etc.), and
- the proposed sporting field developments and subsequent infrastructure in the vicinity of the site would require large quantities of recycled products for construction.

22.2.2 Proximity to Future Development

The site is situated relatively close to Council's centre of development. This proximity to development, which would provide feedstock for processing and end markets for products, would save CiviLake significant transport costs and reduce GHG contributions from freight.

The *LHRS 2006* provides a strategic planning guide for the lower Hunter from 2006 to 2031. It identifies a number of development focal points in close proximity to the proposed Facility, which would subsequently require substantial resources from CiviLake and the proposed Facility. The *LHRS (2006)* outlines the following:

- Cardiff/ Glendale identified as an "Emerging Major Regional Centre" which is expected to "grow and take on the role of major centres in the future". Up to 4000 additional dwellings are projected for this area;
- In the order of 3200 additional dwellings are projected for the Charlestown area;
- Main Road, Edgeworth is one of five renewal corridors, which combined would accommodate 4000 new dwellings in total; and
- West Wallsend and Black Hill (Newcastle LGA) to be developed for employment land to accommodate 16,500 new jobs.

With a proposed 36,000 new dwellings, housing projections for Lake Macquarie make up approximately one third of the total new dwellings proposed for the five Lower Hunter Councils. While a portion of the new development in the Lake Macquarie LGA is towards the southern end of the Lake, the majority would be to the north, within a 10km radius of the proposed Facility.

22.2.3 Compatibility of Adjoining Land Uses

As per Council's recent rezoning, land adjoining the proposed Facility is zoned for conservation (riparian habitat) and open space. The sporting field developments would benefit from the establishment of the proposed Facility as it would supply fill, soil, construction and mulch products for the construction of the sporting fields and associated infrastructure, and Council would utilise plant and equipment from the proposed Facility for the spreading and levelling of materials for the sporting field developments.

The Teralba Worm Farm Waste Education Centre also operates on land 300m to the east of the site. The Waste Education Centre would promote the recycling operations and potentially operate as a shop front for public access to recycled products generated at the proposed Facility. The Teralba Worm Farm is currently an outlet for small quantities (less than 1000tpa) of compost, vermicast, mulch and other soil and waste minimisation products.

While the site is largely cleared of native vegetation, vegetation surrounds the site to the north, east and west, providing considerable buffer areas. The site is located approximately 500m from the nearest residential property to the northwest, and buffered by 400m of dense bushland.

22.3 Strategic Justification

Schedule 2 of the *EP&A Regulation* requires that justification of any proposed project be provided with regard to biophysical, economic and social considerations together with the principles of ESD.

22.3.1 Biophysical Considerations

The existing site is highly disturbed through previous operational activities including biosolid disposal and adjistment. Therefore, the key biophysical considerations for the proposed project with respect to potential impacts are those to receivers external to the site.

The key potential biophysical effects associated with the proposed Facility include:

- noise;
- air quality, including air emissions, odour and GHG emissions;
- water quality including effluent management and stormwater; and
- flora and fauna.

Potential biophysical impacts have been discussed in detail previously in this EA. With the adoption of suitable environmental safeguards, the proposed Facility has been found to be satisfactory with regard to potential impacts relating to noise, air quality, GHG emissions, water quality and flora and fauna. Appropriate environmental safeguards have been included in the Statement of Commitments in **Section 21.0** of this EA. The proposed Facility is therefore justifiable in terms of the biophysical elements of the environment.

22.3.2 Economic Considerations

Currently, less than 17% of the 110,000 tonnes of material generated from CiviLake's operations each year is value added or on sold. A large percentage of the material is disposed of at significant cost. The development of the proposed Facility would result in a number of economic benefits for Council. These benefits include:

- savings in waste disposal;
- income from product sales;
- income from weighbridge charges;
- savings from consolidating plant and resources; and
- savings from transport efficiencies.

These factors have created a sound business case for the development of a Council owned and operated recycling facility.

The development of the proposed Facility would create a productive use of land which would otherwise be largely unsuitable for many other uses, due to previous land use and contamination, therefore promoting an orderly and economic use of land.

The development of the proposed Facility would also have economic benefits for the local and regional construction industry. In this regard, a portion of the recycled material generated at the proposed Facility would be sold externally and delivered to suitable markets in the building trade and civil engineering industries in the Lower Hunter. The proposed Facility would provide these markets with the opportunity to purchase recycled materials, which cost less than virgin materials. Materials can also be sold to CiviLake via the proposed Facility, presenting further economic opportunities for the local and regional construction industry with regard to waste disposal savings and income from product sales.

The economic impacts of the proposed Facility are considered to be beneficial to the local economy with regard to the generation of local employment opportunities. The proposed Facility would generate employment during its pre-planning, construction and operational phases of the proposal. As a result of this employment, there would be additional indirect economic activity created for the local economy.

Given these benefits, the proposed Facility is justifiable on economic grounds.

22.3.3 Social Consideration

The potential effects of the proposed Facility on social and cultural aspects of the area were examined in this EA, and included consideration of:

- visual amenity;
- air quality;
- noise;
- hazard and risk;
- heritage; and
- traffic and transport.

The assessments presented in this EA indicate that provided appropriate mitigation and management measures as outlined in the SoC are implemented, the proposed Facility would have a minimal and acceptable impact on socio-cultural issues. The proposed project is therefore justifiable on social grounds.

22.3.4 Ecologically Sustainable Development

Schedule 2 of the *EP&A Regulation* establishes four interrelated principles of ESD: the Precautionary Principle; intergenerational equity; biological diversity and ecological integrity; and valuation and pricing of environmental resources. Under the *EPBC Act 1999,* decision-making processes for the proposed Facility need to be addressed by including economic, environmental, social and equitable considerations.

The ESD principles and decision-making processes associated with the proposed Facility are provided below.

Precautionary Principle

The precautionary principle outlines the need to act with caution to prevent environmental degradation whether or not a risk to the environment has been scientifically demonstrated. The identification of potential impacts to the environment has been assessed through detailed specialist studies undertaken as part of this EA. This precautionary approach has enabled the proposed Facility to be designed to avoid significant impacts particularly on the natural and social environment. The detailed environmental assessments have identified appropriate environmental management measures to be developed and implemented to minimise potential impacts so that significant adverse environmental outcomes are avoided. This precautionary approach would enable the proposed Facility to proceed while mitigating environmental degradation.

As such, the proposed project is consistent with the precautionary principle.

Intergenerational Equity

The principle of intergenerational equity places an onus on ensuring that the health, diversity and productivity of the environment are maintained, if not enhanced, for the benefit of current and future generations.

The proposed Facility would provide further social and economic benefits to the community through employment opportunities.

The Facility also promotes the recycling and reuse of materials, reducing the need for use of virgin materials, thus contributing towards both the reduction of GHG production and the preservation of finite natural resources for the benefit of future generations.

The proposed Facility would have minimal effect on the health of either the environment or local residents during construction and operation, through the implementation of mitigation measures.

The EA involved an assessment process aimed at fully understanding potential impacts, particularly site contributions to GHG (refer to **Section 18**). The proponent is committed to maximum practical reduction of GHG and it's intention through the course of the project is to reduce the greenhouse contributions from the proposed Facility through the introduction of technologies onto new and existing plant.

The proposed Facility is, therefore, considered to be consistent with the principle of intergenerational equity.

Biological Diversity and Ecological Integrity

This principle requires the maintenance and conservation of a full and diverse range of plant and animal species. An assessment of the effects of the proposed Facility on biological diversity and ecological integrity is contained in **Section 8.0.**

The site has been subjected to significant disturbance through past use of the site for disposal of biosolids, resulting in the majority of the site having insignificant ecological value. The proposed environmental management practices to be implemented during construction and operation of the proposed Facility would minimise adverse effects on the ecology of the surrounding sensitive environments including Cockle Creek and the nearby SEPP 14 wetland. A *Landscape Management Plan* addressing bush regeneration, entry treatment and perimeter planting as well as providing a specialised planting palette for water treatment elements also forms part of the environmental safeguards for the proposal.

As such, the proposed Facility is believed to be consistent with the principle of biological diversity and ecological integrity.

Valuation and Pricing of Environmental Resources

The Intergovernmental Agreement on the Environment (IGAE) and *POEO Act 1997* require improved valuation, pricing and incentive mechanisms to be included in policy making and program implementation. In the context of environmental assessment and management, this translates to environmental factors being considered in the valuation of assets and services.

Integration of environmental and economic goals is a key principle of ESD, which can be measured undertaking a cost-benefit analysis, that is, by measuring the costs of proceeding with a project against the benefits arising from the project.

Given the different values placed on the environment, and the various components of the environment, it is difficult to assign a monetary value against the environmental costs and benefits associated with the project. In this context, the approach adopted for this project is the management of environmental impacts through appropriate safeguards, and to include the cost of implementing recommended safeguards in the total cost of the project.

Relevant to the consideration of the valuation and pricing of environmental resources are the impact assessment and alternative options which have been developed during planning of the proposed Facility. The relative costs of CiviLake continuing its operations out of a number of sites has been deemed to have a higher cost on the environment when compared to consolidating its operations into one site.

The value of the environment is also managed through the legislative process by imposing financial penalties or requirements to rehabilitate on persons responsible for polluting the environment.

CiviLake would implement the safeguards and monitoring requirements outlined in this EA to minimise potential environmental impacts associated with the proposed Facility, and to minimise the potential for pollution to occur.

Decision-making Process

Under the *EPBC Act 1999*, decision-making processes need to include economic, environmental, social and equitable considerations in the short and long term. This EA has provided an assessment of the proposed Facility in terms of these considerations. This would then need consideration by the DoP in determining approval for the proposed Facility under Part 3A of the NSW *EP&A Act*, and by the DECCW in determining the license conditions ot be included in the EPL for the Facility.

22.3.5 Conclusion

The proposed Facility, if operated in accordance the SoC, is considered to be in accordance with the principles of ESD. The proposed Facility would:

- protect natural resources by providing sustainable recycled materials for use within the public and private construction sectors;
- provide an improvement to the operating environmental performance of CiviLake's existing operations; and
- provide additional employment prospects and subsequent economic benefits to the local economy.

23.0 Conclusion

This EA seeks the approval of the Minister for Planning for a Sustainable Resource Centre on the subject site located within Lake Macquarie Council LGA.

The project has been declared a 'major development' under *SEPP (Major Development) 2005* and is therefore subject to assessment and approval under Part 3A of the *EP&A Act*. This EA has been prepared in accordance with the DGRs for the project to facilitate this process.

The proposed Facility would be a crushing, grinding and separating operation for construction and green waste materials including concrete, asphalt, recycled asphalt pavement, road base, green waste, bricks, tiles and soil. CiviLake currently generates over 110,000 tonnes of hard material from its own operations. Less than 17% of this material is value added or on sold, while a large percentage of the material is disposed of at significant cost. The nearest recycling facilities with the capacity to store and process CiviLake generated material into new products exist outside the LGA. These factors coupled with the increases in the Section 88 Waste levy under the POEO Act, have created a sound business case for the development of a Council owned and operated recycling facility.

The proposed Facility would consolidate a number of CiviLake's existing waste management and recycling operations into one facility. The subject site has been nominated as the preferred location for the consolidation of these existing operations, and has been found to be most suitable site with regard to proximity to future development and compatibility with adjoining land uses. In this regard, the site is situated relatively close to Council's centre of development. This proximity to development, which would provide feedstock for processing and end markets for products, would save CiviLake significant transport costs and reduce GHG contributions from freight. While the site is largely cleared of native vegetation, vegetation surrounds the site to the north, east and west, providing considerable buffer areas. The site is located approximately 500m from the nearest residential property to the northwest, and buffered by 400m of dense bushland.

The project has been assessed in terms of the full range of its potential environmental, social and economic impacts in accordance with the *EP&A Act* and Regulation as well as the principles of ESD. The project would:

- protect natural resources by providing sustainable recycled materials for use within the public and private construction sectors;
- provide an improvement to the operating environmental performance of CiviLake's existing operations; and
- provide additional employment prospects and subsequent economic benefits to the local economy.

The project, incorporating the mitigation measures recommended in this EA is considered to provide significant economic and environmental benefits and would contribute towards the achievement of the objectives of local and State government waste policy.

The Proponent, CiviLake is committed to ensuring the preparation and implementation of the environmental management and monitoring plans, further investigations and studies and environmental mitigation measures detailed in the SoC for the proposed Project approval.

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Appendix A

Director Generals Requirements

Appendix B

AECOM Concept Design Drawing Package

Appendix C

Site Assessment and Remediation Full Report

Appendix D

Remedial Action Plan

Appendix E

Acid Sulfate Soil Management Plan

Appendix F

Water Cycle Management Plan

Appendix G

Flood Study

Appendix H

Ecology Assessment

Appendix I

Heritage Assessment

Appendix J

Traffic Assessment

Appendix K

Bushfire Protection Assessment

Appendix L

Preliminary Hazard Analysis

Appendix M

Visual Impact Assessment

Appendix N

Air Quality Assessment

Appendix O

Noise Assessment

Appendix P

Renewable Energy

Appendix Q

Greenhouse Gas Inventory

Appendix R

Consultation