Kimbriki Environmental Enterprises

# Kimbriki Resource Recovery Project

## Environmental Assessment

## Volume 1 – Main Report

February 2011





# Submission of Environmental Assessment

Prepared under the Environmental Planning and Assessment Act 1979, Section 75H

| | | |
|---|---|---|
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| | In respect of: | Kimbriki Resource Recovery Project |
| Development Application | Applicant name: | Kimbriki Environmental Enterprises Pty Ltd |
| | Applicant address: | Kimbriki Road, Terrey Hills NSW<br>Locked Bag 6, Terrey Hills NSW 2084 |
| | Land to be developed: | The project is to be carried out on land as shown in the Environmental Assessment. |
| | Lot no, DP/MPS, vol/fol etc | Lot 4 DP 255466 |
| Environmental Assessment | An Environmental Assessment is attached. | |
| Certificate | I certify that I have prepared the contents of this Environmental Assessment and to the best of my knowledge:<br>◗ It is in accordance with the requirements of Part 3A;<br>◗ It contains all available information that is relevant to the Environmental Assessment of the development; and<br>◗ That the information contained in the Environmental Assessment is neither false nor misleading. | |
| | Signature |  |
| | Name | David Gamble |
| | Date | 11 February 2011 |

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# Executive Summary

## INTRODUCTION

Kimbriki Environmental Enterprises Pty Ltd (the proponent) is proposing to construct and operate two purpose-built advanced waste sorting and treatment facilities at the existing Kimbriki Resource Recovery Centre in Terrey Hills (referred to as 'the project' for the purposes of this environmental assessment).

The project is part of an overall plan for improved resource recovery. It addresses a need for a regional solution for the disposal of residual putrescible waste from the local government areas of Manly, Mosman, Pittwater and Warringah after the closure (and expiration of the contract for disposal) of the landfill at the Belrose Waste and Recycling Centre in 2014.

This environmental assessment has been prepared by GHD Pty Ltd (GHD) in accordance with the requirements of Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). It has been prepared to support applications to the NSW Minister for Planning for concept plan and project approval and to address the requirements of the Director-General of the NSW Department of Planning (the Director-General's requirements) dated 4 June 2010.

## THE PROPONENT

The proponent for the project is Kimbriki Environmental Enterprises Pty Ltd. The proponent is a company limited by shares, with the shares held by Mosman, Manly, Warringah and Pittwater Councils (referred to as the SHOROC councils for the purposes of the environmental assessment).

The proponent is the main waste management and resource recovery service provider for the SHOROC councils.

## LOCATION OF THE PROJECT

The project is located within the Warringah local government area of Sydney's Northern Beaches. The project is situated wholly within the boundary of the existing Kimbriki Resource Recovery Centre. Land to be occupied by the project is referred to as 'the site' for the purposes of this environmental assessment, and is shown in Figure E.1.

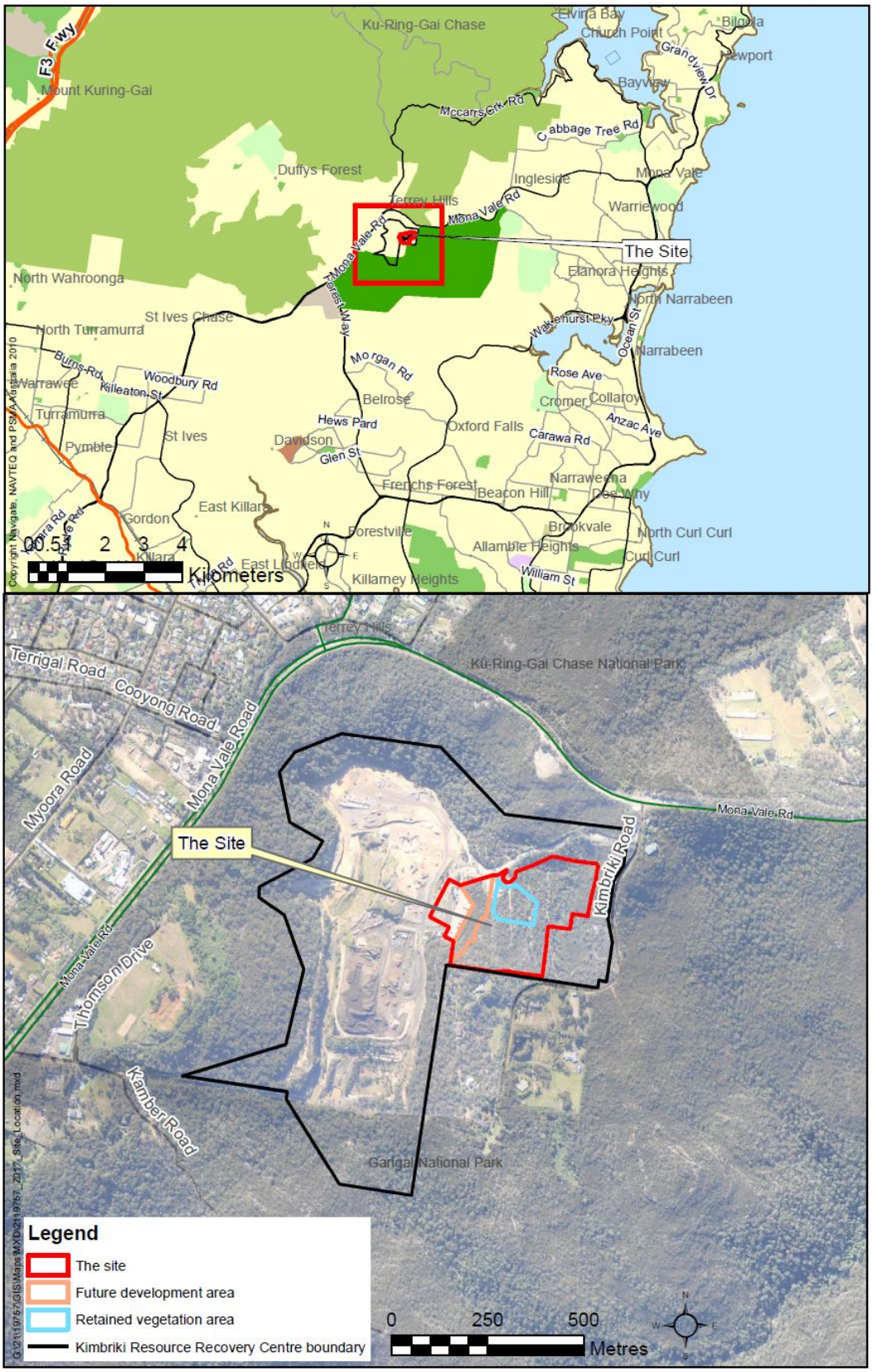



**Figure E.1 Site location**

## CURRENT ACTIVITIES

The Kimbriki Resource Recovery Centre currently receives approximately 232,000 tonnes of waste and recyclables per year of which approximately 70% is recycled and the remaining material landfilled onsite.

## THE PROJECT

The project involves the construction and operation of two main facilities on the site:

- A materials recovery facility (MRF); and
- A resource recovery facility (RRF).

The MRF would receive and sort up to 60,000 tonnes per year of dry recyclable materials collected as part of the municipal kerbside collection services provided by Mosman, Manly, Warringah and Pittwater Councils.

The RRF would receive and process up to 100,000 tonnes per year of kerbside collected food and garden waste and mixed residual wastes. The RRF would include separation equipment and aerobic enclosed tunnel composting technology to produce a variety of compost products and extract valuable recyclables from the incoming waste streams.

As a result of the project, the total inflow of material to the Kimbriki Resource Recovery Centre would rise to approximately 348,000 tonnes per year. Approximately 245,000 tonnes per year (70%) of this material would leave the Kimbriki Resource Recovery Centre as recycled product.

The project also includes the following ancillary infrastructure:

- Internal roadways;
- Weighbridge;
- Staff amenities and ablutions; and
- Staff parking facilities.

The project also involves redesigning the intersection of Mona Vale Road and Kimbriki Road to address some of the existing and possible future operational and safety issues.

The locations of the key components of the project are shown on Figure E.2.

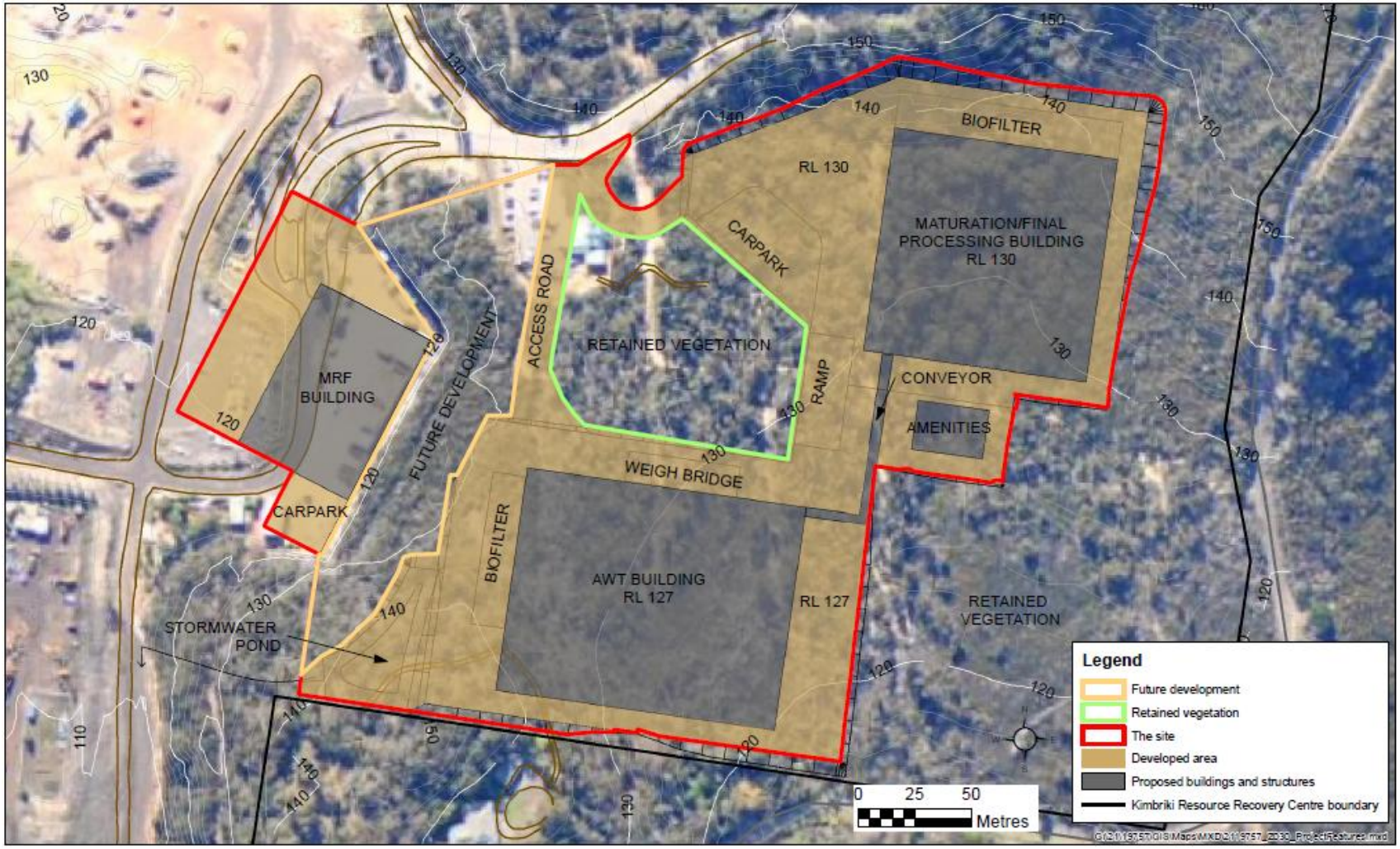



**Figure E.2 Key components of the project**

## THE ENVIRONMENTAL ASSESSMENT PROCESS AND APPROVAL SOUGHT

The proponent is seeking concurrent concept plan and project approval from the Minister for Planning under Part 3A (sections 75J and 75O) of the EP&A Act.

On 9 July 2010, the Executive Director, Major Projects Assessment of the Department of Planning, as delegate of the Minister of Planning, authorised the submission of a concept plan for the project and confirmed application of Part 3A by a Minister's 'clause 6 opinion'.

This environmental assessment document provides the information required to support the applications for approval in accordance with the requirements of the EP&A Act.

## CONSULTATION

A comprehensive government agency, community and stakeholder consultation program was implemented as part of the preliminary environmental assessment and continued throughout the environmental assessment process.

The aim of consultation has been to create awareness about the project and identify issues for consideration during the preparation of the environmental assessment documentation.

Consultation involved a range of methods including distribution of information brochures, media releases, letters, feedback forms, community information sessions, information on the Kimbriki website and council briefings and workshops. Potentially affected neighbours were also visited by project staff.

All agencies consulted have indicated their general support for the project. The proponent has received limited feedback from the general community and other stakeholders. The few issues or concerns raised have been addressed in this environmental assessment.

## PROJECT NEED

Residual putrescible waste from the SHOROC region is currently disposed of at the Belrose Waste and Recycling Centre (the 'Belrose landfill'), which has been in operation since 1979. The contract for the SHOROC councils to dispose of residual waste at the Belrose landfill expires in November 2014. After this time, if no local alternative for the disposal of putrescible waste from the SHOROC region is found, it would need to be transferred a long distance to remote landfills. This would increase the cost of waste disposal and would generate additional environmental impacts such as greenhouse gas emissions.

Consequently there is a need for a local residual putrescible waste disposal facility for the SHOROC region from 2014 onwards.

The project would allow putrescible waste from the SHOROC region to be processed within the region and the residuals (after extraction of resources and stabilisation) to be disposed of at the existing landfill within the Kimbriki Resource Recovery Centre.

In addition, as the project would involve construction of materials processing and resource recovery facilities, it would increase regional diversion of waste from landfill, assisting the SHOROC councils to help deliver on the NSW Government's target of 66% resource recovery from the municipal sector during the project's lifespan (as set out in the NSW Waste Avoidance and Resource Recovery Strategy 2007).

The project is expected to divert approximately:

- 95% of the incoming source separated garden and food organics stream;
- 40% of the incoming mixed waste stream; and
- 90% of the recyclables stream.

It is estimated that overall (at full operation) the project would divert approximately 70% of incoming waste from landfill.

There are also financial imperatives driving the project. Increased diversion of waste from landfill would assist the SHOROC councils to reduce future financial liabilities associated with the Waste and Environment Levy and provide greater control over future waste management costs. The Waste and Environment Levy is currently $70.30/tonne (2010/11) and is rising each year, through to at least 2016, by $10/tonne plus annual adjustments for CPI. The project would reduce the volume of waste being disposed at landfill and therefore reduce the future waste levy payments by the SHOROC councils.

## SITE DESCRIPTION

The site, which covers an area of 8.6 hectares (ha), would be situated in the eastern portion of the Kimbriki Resource Recovery Centre. Beyond the boundaries of the Kimbriki Resource Recovery Centre the key land uses surrounding the site include public open space to the north and west, Garigal National Park to the east and south, Mona Vale and Kimbriki Roads to the north and east and residential housing to the north east and south.

The residential housing is located along Kimbriki Road and comprises a total of eight properties, four of which have been designated by the proponent as 'project properties' (owned by the landowner of the site, Warringah Council, in conjunction with the other three SHOROC councils, who have let them to the proponent) and the remaining four of which are privately owned.

The site comprises areas of cleared land as well as areas of moderately disturbed bushland. The site is located within the upper reaches of Deep Creek, which is a tributary of Narrabeen Lagoon. No defined streams are present within the site however minor localised drainage lines are evident to the south.

## ENVIRONMENTAL ASSESSMENT

### Biodiversity

A comprehensive flora and fauna assessment was undertaken for the project by Ecotone Ecological Consultants.

The site layout has been designed to avoid as much native vegetation and fauna habitat as possible. However, the project would result in the clearing of approximately 5.75 ha of moderately disturbed native vegetation and fauna habitat.

No endangered populations or threatened ecological communities listed by the *Threatened Species Conservation Act 1995* (TSC Act) would be affected by the project. Similarly, no critically endangered ecological communities listed by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) would be impacted.

A koala habitat assessment was undertaken in accordance with SEPP 44. It was concluded that whilst the vegetation on the site represented potential koala habitat, it did not represent 'core' habitat.

However, vegetation removal would impact on one flora species (*Tetratheca glandulosa),* which is listed as vulnerable by the TSC Act and the EPBC Act. The project would result in the removal of two *Tetratheca glandulosa* plants and 0.56 ha of its habitat.

The project would also result in the loss of potential habitat for two endangered species (southern brown bandicoot and spotted-tailed quoll) listed in the schedules of the EPBC Act. However, given the large areas of similar bushland available within surrounding bushland, including the Garigal and Ku-ring-gai Chase National Parks, together with the implementation of a comprehensive biodiversity offset strategy, it was concluded that the project would not result in a significant reduction to local populations of fauna known or likely to occur on the site.

Therefore, no significant impacts were predicted to matters of national environmental significance under the EPBC Act. However, considering there would be a direct impact on the *Tetratheca glandulosa* species and loss of potential habitat for the endangered southern brown bandicoot and spotted-tailed quoll, a referral will be submitted to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities.

An offset strategy (Figure E.3) has been developed for the site to compensate for the loss of habitat for threatened and significant species and native vegetation generally. The selected offset areas are located in the immediate vicinity of the site and in bushland areas of the wider Kimbriki Resource Recovery Centre. The offset areas would be reserved in perpetuity, physically protected, and managed to ensure the long-term survival of threatened and significant flora, fauna and ecological communities.

It should be noted that the size and scope of the areas to be offset are currently under negotiation with government agencies, and may therefore vary slightly from those shown in the figure.

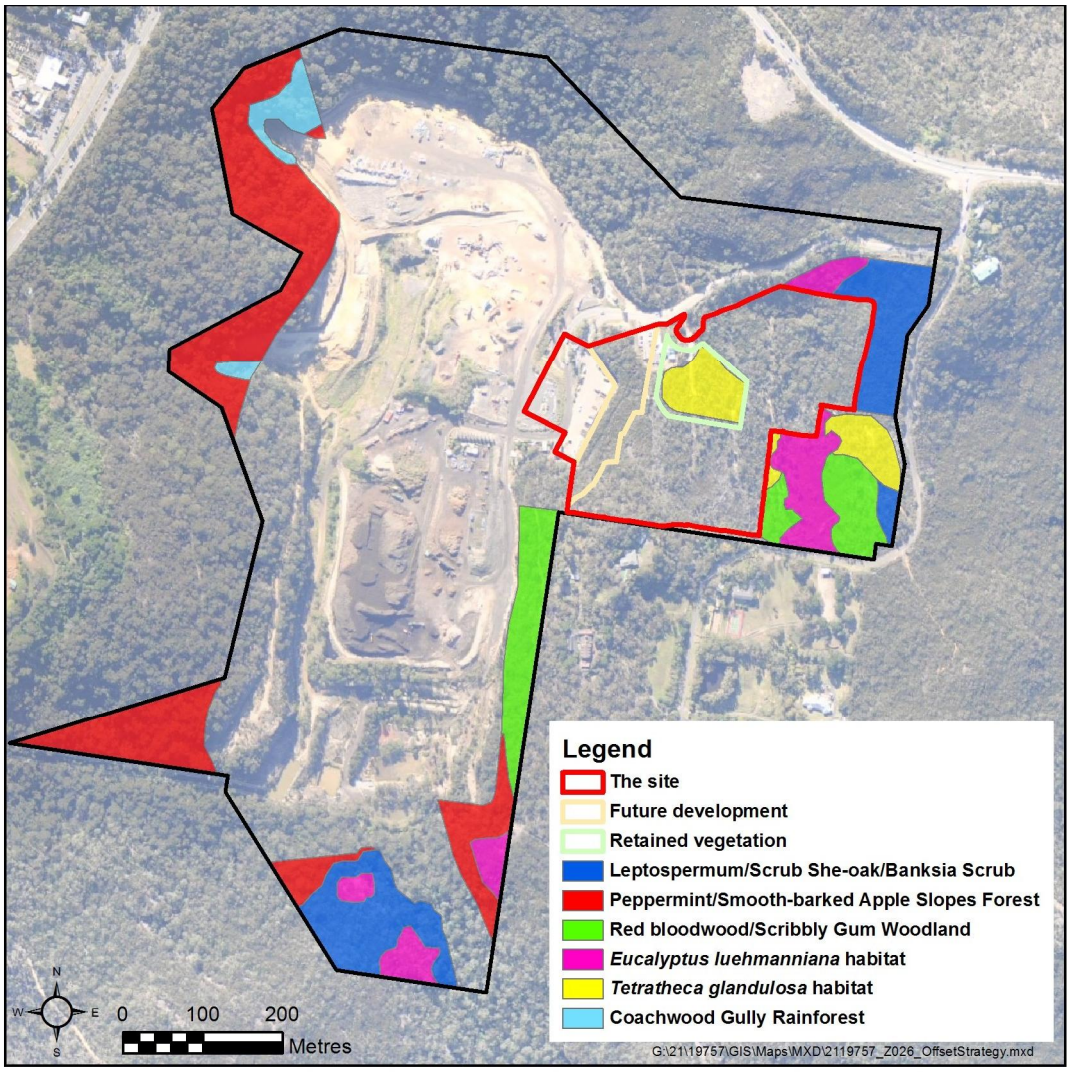



**Figure E.3 Offset strategy**

### Air quality and odour

A comprehensive air quality and odour assessment was undertaken for the project by PAE Holmes.

*Construction (dust)*

Potential dust emissions generated during construction activities were modelled. The results of dust modelling show that the maximum 24-hour and average annual $PM_{10}$ concentrations at the nearest affected residences would be well below the relevant DECCW criteria. Dust generated during construction activities are also predicted to be well below the DECCW dust deposition criteria.

When considering the cumulative dust impacts associated with the operation of the existing Kimbriki Resource Recovery Centre and the project construction activities, it is predicted that both $PM_{10}$ and total suspended particulates (TSP) levels would be well within the 24-hour and annual average criteria.

A dust management plan would be prepared as part of the construction environmental management plan and would include the following dust control measures:

- Managing stockpiles to suppress dust emissions;
- Watering of unsealed haul roads and disturbed surfaces (including construction areas);
- Restricting the size of disturbed surfaces as much as practicable;
- Prevention of truck over-loading and covering dusty loads; and
- Vehicle movement controls, particularly entrance to and exit from construction work sites (and washing down trucks before they leave the site).
- When conditions are excessively dusty and the dust emissions criteria from construction activities cannot be maintained, all dust generating activities would cease until dust suppression can be adequately carried out; and
- Dust monitoring would be undertaken during construction. Monitoring would comply with the DECC (2007) *Approved Methods for the Sampling and Analysis for Air Pollutants in NSW*.

*Operation (odour)*

A number of design features have been incorporated into the RRF building design to reduce the potential for air quality impacts, particularly the escape of dust and fugitive odours:

- The proposed composting tunnels, control equipment and receiving area would be housed within a fully enclosed building, which would be maintained at negative air pressure;
- Air vents in the sides of the buildings would allow fresh air to be drawn in to replace the volume of air being extracted by electrically driven fans. These fans would run continuously to maintain the buildings at negative pressure;
- The buildings would be fitted with doors, which would be kept closed as much as possible;
- Deodorising technology (such as a biofilter or odour scrubber) would be installed to treat the air collected from the buildings before it is released to the atmosphere; and
- The biofilters would be enclosed and vented through stacks one metre above the roof line to disperse any odour such that air quality goals for odour can be met.

Furthermore, both biofilters have been carefully located to minimise potential odour impacts, considering the site topography and meteorology.

These design measures to reduce odour have been included in the air quality modelling. The air quality modelling work indicates that the project would meet stringent air quality goals (99$^{th}$ percentile odour concentrations of 2 ou) at all privately owned residences near the site during operation. Cumulative odour emissions that include current emissions associated with the existing landfill would also meet this odour criterion.

The specifications provided to prospective equipment suppliers would dictate the technical and environmental performance the equipment would be expected to meet, based on the proponent's operational requirements and the conditions of consent for the project.

In addition to the above design features, a number of operational controls and management measures will be implemented to further control odour generation. These would be detailed in an odour management plan which would be prepared as part of the operation environmental

management plan detailing measures for the control of odour generation. Management practices would include:

- Minimising outdoor handling of materials;
- Traffic management procedure to co-ordinate the delivery schedule and avoid a queue of the incoming or outgoing trucks outside the building for extended periods of time;
- Spill management procedures to include immediate cleanup of any spill/leakage from the incoming and outgoing trucks;
- Maintaining an odour complaint logbook and in the event of a complaint immediately investigate any unusual odour sources (including spill or leakage in the traffic areas) within the Kimbriki Resource Recovery Centre boundary and take appropriate action to eliminate these;
- Real-time processing of odorous feedstock material and no stockpiling of raw materials for more than a day under normal operating conditions;
- Managing stockpiles to facilitate natural ventilation to prevent anaerobic zones; and
- Installation of additional air curtains above each fast speed door entrance to reduce emissions as trucks enter and leave the building.

### Noise

#### *Construction*

A quantitative assessment of construction noise was undertaken in accordance with DECCW's *Interim Construction Noise Guideline (ICNG) (2009)*. The construction noise assessment involved consideration of the construction program and likely construction activities.

The results of the assessment indicated that:

- The noise affected management level is predicted to be achieved at residences on Mona Vale Road and residents immediately to the east of the site on Kimbriki Road; and
- The noise affected management level is predicted to be exceeded at residences south of the site on Kimbriki Road for the majority of the construction period.

Background noise levels during the day-time period at residences south of the site are 33 dB(A) therefore the INCG noise affected management level which represents the point above which there may be some community reaction to noise is 43 dB(A). Since the noise affect management level is exceeded at some residences there may be some moderate construction noise impacts that need to be managed. However the impacts are not anticipated to be high since the 'highly noise affected' management level of 75 dB(A) is not predicted to be exceeded at any residence during the construction period. Moderate construction noise impacts are commonly associated with construction projects where residences are in close proximity.

To manage noise impacts the mitigation measures detailed in chapter 10 would be implemented to reduce the level of impact. In accordance with the ICNG requirements, this will include informing residents to the south of the project of the nature of the works, the expected noise levels, duration of construction period and site contact details. The details of all mitigation and management measures would be included in a construction noise management plan, which would be prepared prior to the commencement of construction.

*Operation*

The buildings and project operation would incorporate the following features and measures to reduce the potential for noise impacts:

- All doors on the AWT building (except the front end loader access door) would be kept closed when they are not being used. Automatic doors would be installed;
- Building insulation, where appropriate, would be installed in the AWT and MRF buildings; and
- Tunnel ventilation and biofilter fans would be located inside the AWT and maturation/final processing buildings to ensure noise levels outside of operational hours are maintained below the project specific noise goals at all times;
- Tunnel ventilation and biofilter fans would be selected so that an internal noise level of 80 dB(A) is achieved. The internal noise level would be checked for compliance upon commissioning;
- The AWT and maturation/final processing building design would incorporate acoustic air intake louvers on the northern side of buildings; and
- A low noise front end loader with broadband reversing alarm would be used between the maturation/final processing building and the AWT building.

Acoustic noise modelling of operation noise was undertaken. The results of modelling indicated that project specific noise goals would be achieved at all nearby sensitive receivers, assuming the design measures listed above are incorporated in the project design and operation during both day time and night time.

Modelling of traffic noise indicated that the increase in traffic noise emissions on Kimbriki Road would be less than 2 dB(A). The increase in traffic noise emissions on Mona Vale Road would be insignificant. The results of the traffic noise assessment indicate that there would not be any significant traffic noise impacts at surrounding sensitive receivers.

### Traffic and transport

The intersection of Mona Vale Road and Kimbriki Road operates satisfactorily, with a level of service between A and C for most movements. The exception to this is the weekday AM peak period, where the right-turn movement into Kimbriki Road and right-turn movement out of Kimbriki Road both operate at a level of service of F (i.e. extra capacity is required). However, whilst delays are encountered, relatively short queues are currently experienced (approximately four vehicles) and the project would not significantly worsen this current situation.

There is an opportunity to improve the safety of the intersection through this project by undertaking physical works, and introducing specific operational procedures for the morning peak, when right-turn movements are difficult. This is proposed to be undertaken as part of the project.

*Construction*

The peak number of daily vehicle movements during the construction period is estimated to be around 180 movements, or 90 trucks per day on a weekday; and around 90 movements, or 45 trucks per day on a Saturday. This would occur during the excavation stage of construction (which lasts approximately 22 weeks).

As well as the truck movements, there would also be an increase in staff light vehicle movements associated with staff. Typically the construction workforce of up to 50 persons (under normal conditions) and up to 100 persons (during busy periods such as concrete pours) would arrive at the site by car due to the lack of nearby public transport services. As such, there could be up to 200 additional daily movements occurring due to staff arrivals and departures.

Intersection performance modelling has shown that the Mona Vale Road/Kimbriki Road intersection would operate satisfactorily (a level of service of A, B or C) during all peaks with the exception of the weekday morning peak.

To minimise the impacts of the project during the construction phase on the intersection of Mona Vale Road and Kimbriki Road, construction related vehicles arriving during the AM weekday peak would be managed by:

- Implementing a right-turn ban for construction related vehicles only from Kimbriki Road between 7 am to 9 am on weekdays;
- As far as possible, scheduling deliveries of construction materials outside the AM peak; and
- Encouraging car-pooling, minibuses and other means to limit the number of construction worker vehicles entering the site during the AM peak.

Consideration would also be given to providing 'Trucks Turning' warning signage (Sign No. W5-205) on the Mona Vale Road approaches to Kimbriki Road.

Parking for construction workers (approximately 50 during the majority of works) would be provided on site in the area of the proposed upper level car park, within an overflow area located adjacent to the proposed car park and adjacent to the proposed MRF building on the lower level. 65 spaces in total would be provided for construction worker vehicles.

In order to accommodate the parking demands associated with construction staff during peak events, such as concrete pours, additional temporary parking spaces would be made available to accommodate the demand from up to 100 vehicles.

*Operation*

The transport of additional waste materials as a result of the project is estimated to generate a net increase of up to 145 truck movements and 141 light vehicle movements per day. This equates to a total daily increase in traffic volumes along Mona Vale Road of 0.8%, based on the existing daily volume of approximately 36,000 vehicles per day. The increase in traffic is expected to occur mainly on weekdays with a small proportion, mostly light vehicles, on Saturdays and Sundays. Operation of the project is not considered likely to impact cyclists travelling along Mona Vale Road.

Intersection operational performance modelling has shown that the Mona Vale Road/Kimbriki Road intersection would operate satisfactorily (i.e. have a level of service of A, B or C) during all peaks with the exception of the weekday morning peak in which the right turn in to Kimbriki Road and the right turn out of Kimbriki Road are predicted to operate unsatisfactorily (i.e. a level of service of F).

To overcome the capacity issues for the right-turn movements into and out of Kimbriki Road, and to minimise the impacts of the project during the operational phase on the intersection of Mona

Vale Road and Kimbriki Road, the following restrictions on traffic movements would be implemented during the AM weekday peak period:

- Encouraging trucks to arrive at the Kimbriki Resource Recovery Centre from the east and depart to the west; and
- Encouraging trucks to arrive after 9 am.

It should be noted that it is unlikely that kerbside waste and recyclable collection vehicles would be seeking to enter the site until well after the morning peak due to the nature of their work schedules. Workers would typically commence collection work at 6 am and would take at least approximately four hours to fill the vehicle before arriving at the site to discharge their loads. Based on this work schedule, it is also expected that the collection vehicles they would have been on site, discharged their loads and exited the site well before prior to the afternoon peak at 4 pm. This has been taken into account in the traffic modelling.

Staff commencing work at 6 am would also arrive before the morning peak and would have finished their afternoon shift prior to 4 pm. A small number of staff would arrive at 9 am and leave around 5 pm, but this would be no more than 20% of the total workforce.

Approximately 59 staff would be required and adequate parking spaces for these staff would be provided as part of the design of the project.

### Soil and Water

*Surface water - construction*

Cut-off drains, silt fences and other erosion controls would be used during the construction period to prevent sediments from being carried offsite or into retained vegetation areas. A site sediment and erosion control plan would be prepared, in accordance with requirements of the Blue Book (Managing Stormwater: Urban Soils and Construction, Department of Housing).

Stormwater from the construction areas would be collected in appropriately sized sediment basins, and discharged to the existing council stormwater management system. Appropriate erosion and sediment controls would be implemented before any construction commences. On this basis, the potential construction impacts on water quality of nearby creeks are considered to be insignificant.

*Surface water - operations*

Up-gradient runoff that currently enters the site would be diverted around the new site operational areas, and continue its natural flow path to the south. This would provide the water necessary to maintain existing ecological systems down gradient of the site. Overflow from roof rainwater tanks would also be directed to the retained vegetation areas located to the south-east of the site to supplement these existing flows.

However, to ensure that the natural flows are replicated as closely as possible, and that retained vegetation areas do not receive significantly more water than they do currently, additional roof water would be directed to the existing Kimbriki Resource Recovery Centre stormwater system.

Rain falling directly onto roads and operational areas would be collected in a first flush stormwater pond located in the southwest corner of the site. The pond would be used to capture any pollutants and litter that may be washed into the site stormwater drains and to provide

detention capacity during storms and rain events. The pond would overflow to the existing Kimbriki Resource Recovery Centre stormwater system.

Stormwater collection drains along the edges of the platform would collect rainwater that falls upon paved areas, and water from the AWT building roof (subject to final design). Any water overflowing from the pond would be relatively free of pollutants such as sediments, as it would come from paved areas or from the roofs of buildings.

The capacity of the existing sedimentation treatment system would be upgraded by the proponent to cope with the increased flows associated with the project. On this basis, the water quality impacts associated with site operations would be negligible.

*Soils*

An estimated 220,000 $m^3$ of soil and sandstone (in ground volume) would be excavated from the site. Approximately 45,000 $m^3$ of this material would be used for filling of low lying areas of the site (after onsite processing) and for construction of retaining walls.

It has been estimated (based on existing geotechnical information) that the excavated material would comprise approximately 70,000 $m^3$ of topsoil and sand and 150,000 $m^3$ of sandstone (in-ground volumes). Retaining walls needed for the south eastern edges of the platforms may be able to be constructed from sandstone boulders excavated from the site, subject to engineering requirements. Apart from the soils within the development area being impacted by excavation and refilling, there would be no impacts on other soils in the local area.

*Ground water*

There are no existing groundwater extraction wells at the Kimbriki Resource Recovery Centre. No groundwater extraction would be required for the project. All activities would take place on a sealed concrete slab, so there is no potential for contaminated water to enter the water table.

Sealing of large areas of the site would potentially reduce future groundwater recharge levels. However, the shallow depth of soil over most of the development site, and the site geology (sandy shallow soil overlying sandstone) suggests that there is currently little absorption of groundwater into the water table, especially in the upper parts of the development site. Hence sealing of much of these areas is unlikely to affect groundwater recharge levels.

The retained vegetation areas (which are of considerable size) would continue to be potential groundwater recharge areas. Roof water that is directed to these retained vegetation areas, and direct run on (in the north western area and in the south eastern area) would potentially still be able to enter the water table through cracks in the sandstone. Thus it is concluded that the impacts on groundwater would not be significant.

*Flooding*

The stormwater management system would minimise the likelihood of flooding on site during site operations. Since the development site is much higher than the existing eastern drain, and water from upgradient catchments would be diverted around the site, flooding is also unlikely.

*Salinity*

The site is not located in an area of salinity hazard. Process water from the tunnel composting would be recirculated back into the process and would not be irrigated. Hence, the project is not expected to have any impacts on local salinity.

*Contamination*

The land on which the project is located is considered unlikely to have been contaminated by past or present uses. The land proposed for the construction of the RRF is bushland with fire management access tracks being the only form of land disturbance. The land proposed for the construction of the MRF is a hardstand area that is currently used for the drop-off and dispatch of recyclables. The land has been used for this purpose since its initial excavation in the early 1990s.

Appropriate management measures will be implemented to avoid any soils becoming contaminated during operation of the project. These measures will be detailed in the soil and water management plan.

*Acid sulphate soil*

According to the Australian Soil Resource Information System National Acid Sulphate Soils maps, the site is located in an area with extremely low probability of acid sulphate soils. The project is unlikely to have any acid sulphate soils impact.

### Greenhouse gas

The total Scope 1, 2 and 3 emissions during construction amount to 17,690 t CO2-e or 590 t CO2-e per annum assuming a design life of 30 years. Total annual emissions during operation amounts to 19,650 t CO2-e. The estimated annual emissions from the construction and operational stages of the project is 20,240 t CO2-e (assuming a design life of 30 years).

Implementation of the project would result in diversion of a significant quantity of waste, including organic waste (from source separation of some food and garden organics), from landfill. This waste would otherwise have contributed to landfill gas generation. Furthermore, the mixed residual waste from the SHOROC region would undergo stabilisation through the tunnel composting process, significantly reducing the methane generating potential of the waste once landfilled.

The project will allow for the treatment and aggregation of wastes and recyclables in the region and avoids dependence on long haul transport for either disposal or refinement. The alternative options all have a significantly higher dependence on transport with the attendant higher emissions.

### Heritage

No sites of Aboriginal origin or places of potential archaeological interest were identified during the site survey. The Aboriginal heritage assessment concluded that the absence of sites is considered to be representative of the current situation and that there are no constraints to the project on archaeological grounds.

The project would not impact on any items of non-Aboriginal heritage.

### Hazards and fire risks

*Hazards*

In accordance with the requirements of *State Environmental Planning Policy 33*, a preliminary risk screening of the project was undertaken. The results of the preliminary risk screening indicated that a preliminary hazard analysis is not required, as storage quantities for all materials and transportation frequencies do not exceed the respective thresholds and are not considered potentially hazardous. However, to demonstrate that potential hazards have been considered and control measures put in place, a hazard identification process was completed. The hazard identification process did not identify any significant hazards with the potential for offsite impact that would not be suitably controlled.

*Fire risks*

The site is zoned bushfire prone according to a Bushfire Prone Land map certified by the Commissioner of the NSW Rural Fire Service for the Warringah local government area. Vegetation within and adjoining the site constitutes a potential bushfire threat, with adjoining lands also classified as bushfire prone or bushfire buffer.

A bushfire risk assessment was undertaken for the project. The assessment concluded that the project would not change the bushfire hazard, and would increase the provision of fire fighting services and access within the eastern portion of Kimbriki Resource Recovery Centre. The assessment recommended bushfire protection measures be implemented as part of the project, including asset protection zones. The proponent has committed to implementing these measures.

### Visual amenity

The site is partially visible from a limited number of offsite locations. Visual features of the project include three processing buildings (of approximate height 10-12 m), an amenities building (of approximate height 3-6 m), roads, parking and paved areas.

Numerous screening, layout and design features have been incorporated into the project design in order to minimise visual impacts from offsite locations. These include:

- Retaining existing vegetation along the site perimeters and undertaking additional tree planting and landscape works along key perimeter locations;
- Choose external building surfaces and materials that blend in with the natural surroundings and minimise visual impacts.

In addition, the use of recycled materials during construction of the buildings and surrounding areas would be incorporated into the detailed design process. This would display to the greater community the proponent's ongoing commitment to the use of sustainable materials and to reducing environmental impacts.

Given that the project is consistent with the nature of development on the wider Kimbriki Resource Recovery Centre, the overall visual impacts of the project are not considered significant.

### Socio-economic

*Social impacts*

The project is consistent with the land use of the Kimbriki Resource Recovery Centre, and would not impact on community use of the surrounding area.

The project would have positive employment impacts both during construction and operation. During the construction phase of the project the estimated workforce would be 40-50 full time positions and this could increase to 80-100 positions during peak construction periods. The project would employ up to approximately 60 people when it is operational.

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

The project would provide the SHOROC councils and their local communities with an opportunity to become a part of a local, integrated waste management solution at the Kimbriki Resource Recovery Centre. The project would complement and further develop the existing resource recovery activities at the centre.

*Economic impacts*

The increased diversion of waste from landfill would assist SHOROC councils reduce future financial liabilities associated with the waste and environment levy. The project would reduce the volume of waste being disposed of to landfill and therefore reduce future waste levy payments. In addition if no regional option for waste disposal is found, putrescible waste from the SHOROC region would (most likely) need to be transported long distances. The cost of transport would increase as a result of the extended transport distance and the potential introduction of a price for carbon.

The combined impact of these increases is expected to push the cost of on-going landfill disposal of SHOROC's putrescible waste to $300 per tonne by 2014. These costs would continue to rise and become more volatile beyond that time.

This compares to the project's estimated cost of disposal commencing at around $300 per tonne in 2014 but with significant surety and stability on future disposal costs.

For businesses in the SHOROC region, the main benefit of the project would be the opportunity for greater local disposal of a wider range of source-separated wastes, meaning lower costs for disposal and improved resource recovery.

## PROJECT JUSTIFICATIONS AND CONCLUSIONS

The justification for the project is based on a number of factors, including the fact that the project:

- Is consistent with the objects of the EP&A Act;
- Is consistent with the strategic direction for waste management in NSW;
- Meets a need for alternative waste technologies to increase resource recovery from municipal waste and divert valuable materials from landfill;

- Is consistent with the proponent's objectives and strategic drivers;
- Would enable the SHOROC councils to better manage their long term waste management costs and reduce greenhouse gas emissions associated with landfilling their waste; and
- Uses proven technologies that best match the needs of the SHOROC region.

The environmental assessment has examined a number of key issues surrounding the project, including identification of potential adverse impacts.

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

# Part A
# Introduction and Context

# 1 Introduction

## 1.1 Overview

Kimbriki Environmental Enterprises Pty Ltd (the proponent) is proposing to construct and operate two purpose-built advanced waste sorting and treatment facilities at the existing Kimbriki Resource Recovery Centre in Terrey Hills (referred to as 'the project' for the purposes of this environmental assessment).

GHD Pty Ltd (GHD) has been engaged by the proponent to prepare documentation to support an application for approval for the project. The proponent is seeking approval of the project in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

## 1.2 Key features of the project

The project involves the construction and operation of two main facilities:

- A materials recovery facility (MRF); and
- A resource recovery facility (RRF).

The Kimbriki Resource Recovery Centre currently receives approximately 232,000 tonnes of waste and recyclables per year of which approximately 70% is recycled and the remaining material landfilled onsite.

The MRF would receive and sort up to 60,000 tonnes per year of dry recyclable materials collected as part of the municipal kerbside collection services provided by Mosman, Manly, Warringah and Pittwater Councils.

The RRF would receive and process up to 100,000 tonnes per year of source separated food and garden organics and mixed municipal wastes. The RRF would include separation equipment and aerobic enclosed tunnel composting technology to produce a variety of compost products and extract valuable recyclables from the incoming waste streams.

As a result of the project, the total inflow of material to the Kimbriki Resource Recovery Centre would rise to approximately 348,000 tonnes per year. Approximately 245,000 tonnes (70%) of this material would leave the Kimbriki Resource Recovery Centre as recycled product.

The project also includes the following ancillary infrastructure:

- Internal roadways;
- Weighbridge;
- Staff amenities and ablutions; and
- Staff parking facilities.

More detailed information on the project is provided in chapter 6.

## 1.3 Location of the project

The project is located within the Warringah local government area of Sydney's Northern Beaches (refer to Figure 1.1).

The project would be located wholly within the boundary of the existing Kimbriki Resource Recovery Centre. As illustrated in Figure 6.1, the project (including the MRF, RRF and ancillary infrastructure) would be situated on the eastern portion of the Kimbriki Resource Recovery Centre. Land to be occupied by the project is referred to as 'the site' for the purposes of this environmental assessment. The site is located within the suburb of Terrey Hills. It is within the bounds of lot 4 of DP 255466.

The site is surrounded by a well-vegetated buffer of existing vegetation and is situated immediately to the north of Garigal National Park. Four privately owned residences are located along Kimbriki Road, with the nearest situated approximately 30 metres (m) from the southern boundary of the site.

Chapter 4 provides a detailed description of the site and surrounds.

## 1.4 The proponent and the Kimbriki Resource Recovery Centre

### 1.4.1 The proponent

The proponent for the project is Kimbriki Environmental Enterprises Pty Ltd. The proponent is a company limited by shares, with the shares held by the Mosman, Manly, Warringah and Pittwater Councils.

The four shareholder councils belong to a regional organisation of councils referred to as the Shore Regional Organisation of Councils. The organisation that administers this regional organisation is called SHOROC. SHOROC is a partnership between the councils that make up the region of the Northern Beaches and Mosman from Bradleys Head to Barrenjoey – Manly, Mosman, Warringah and Pittwater Councils.

The people that make up SHOROC are the mayors, councillors, executives and staff of the partner councils as well as the team that staff the SHOROC organisation.

For the purposes of the environmental assessment, Mosman, Manly, Warringah and Pittwater Councils are collectively referred to as the 'SHOROC councils', and the four local government areas administered by these councils are referred to as the 'SHOROC region'.

### 1.4.2 Kimbriki Resource Recovery Centre

The Kimbriki Resource Recovery Centre was originally established in 1974 as a landfill. At this time the landfill was operated by an unincorporated business of Manly, Mosman, Warringah Councils, with Pittwater joining in 1992. A joint services committee comprising representatives from each of the councils managed the landfill operations.

In 1989-90 resource recovery operations commenced and the Kimbriki Resource Recovery Centre became a recycling and waste disposal centre. This shift from waste disposal to resource recovery means that the remaining life of the Kimbriki landfill now exceeds 60 years at the present rate of filling.

In 2009 a new company, Kimbriki Environmental Enterprises Pty Ltd, was created to own and operate the Kimbriki Resource Recovery Centre. The business is directed by an independent non-executive board of directors, and an experienced management team, appointed by the SHOROC councils.

Whilst the proponent's board is comprised of independent parties, their shareholders are the four SHOROC councils and as the shareholders they have the final say in company affairs. The constitution sets out protocols for consultation, notification and reporting requirements from the proponent to the shareholders as well as the respective roles and responsibilities of the parties in their various capacities as members of the company.

The proponent is the main waste management and resource recovery service provider for the SHOROC councils.

## 1.5 The need for the project

### 1.5.1 Finding a location to dispose of waste

Residual putrescible waste from the SHOROC region is currently disposed of at the landfill at the Belrose Waste and Recycling Centre (WRC), which has been in operation since 1979. The contract for the SHOROC councils to dispose of their kerbside collected mixed residual waste at the Belrose landfill expires in November 2014, when the landfill is expected to reach capacity. If no regional option for the disposal of putrescible waste from the SHOROC region is found after this time, it would need to be transferred a long distance to remote landfills.

As a result there is a need to find a location to dispose of residual putrescible waste from the SHOROC region to replace the Belrose landfill. The project would address this need by allowing putrescible waste from the SHOROC region to be processed within the region. The residuals, after extraction of resources and stabilisation, would be disposed of at the existing landfill within the Kimbriki Resource Recovery Centre.

### 1.5.2 Increasing regional waste diversion rates

The project would increase regional diversion of waste from landfill, assisting SHOROC councils deliver the NSW Government's target of 66% resource recovery from the municipal sector (as set out in the *NSW Waste Avoidance and Resource Recovery Strategy (WARRS) 2007*). It would also assist in meeting the increasingly strong demand for sustainable waste management and resource recovery solutions in the region.

### 1.5.3 Reducing financial costs under the waste and environment levy

There are also financial imperatives driving the project. Under section 88 of the NSW *Protection of the Environment Operations Act 1997* (POEO Act), all scheduled waste facilities are required to pay a levy on each tonne of waste disposed of to landfill (the 'waste and environment levy').

The waste and environment levy is designed to encourage resource recovery and recycling of waste. It is added to the disposal charges set by landfill operators and provides an incentive to reduce the amount of waste generated and to seek alternatives to landfill disposal.

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

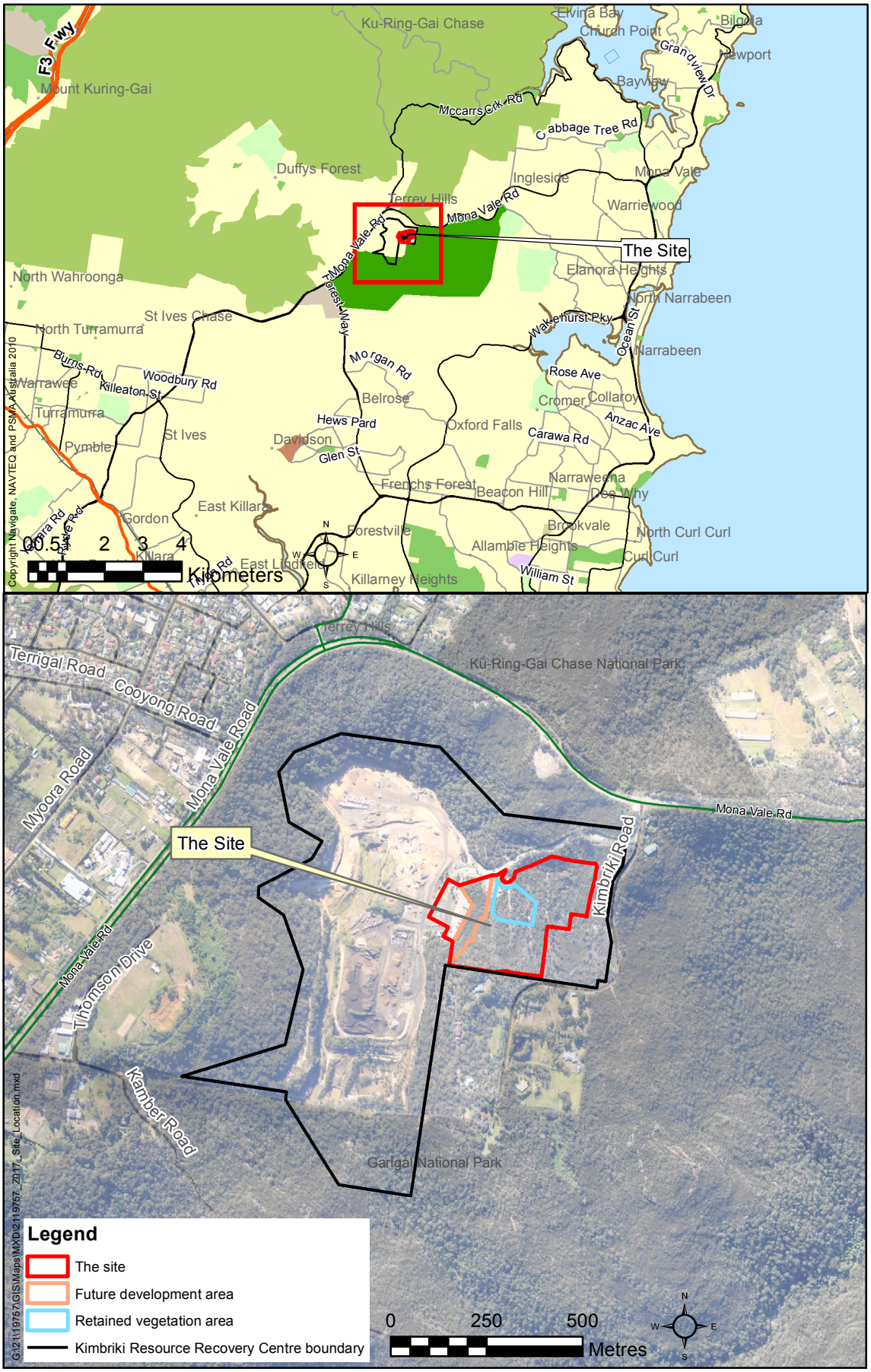



**Figure 1.1 Site location**

## 1.6 Overview of the approval requirements and the environmental assessment

### 1.6.1 Summary of approval requirements

The proponent is seeking concept plan and project approval from the Department of Planning under Part 3A (sections 75J and 75O) of the EP&A Act.

Schedules 1 and 2 of *State Environmental Planning Policy 2005 (Major Development)* identify the types of development that require approval under Part 3A. The project meets the definition of resource and waste related industries included in schedule 1, and is therefore a project to which Part 3A applies.

On 9 July 2010, the Executive Director, Major Projects Assessment of the Department of Planning, as delegate of the Minister of Planning, authorised the submission of a concept plan for the project and confirmed application of Part 3A by a Minister's 'clause 6 opinion' (Appendix B).

Approval of a concept plan for the project has been sought to overcome a potential short-term prohibition of the project under the *Warringah Local Environmental Plan 2000.*

The Minister for Planning is the determining authority for the project, an environmental assessment (this document) is required to support the application for approval in accordance with the requirements of the EP&A Act.

Further information on the assessment requirements for the project is provided in chapter 2.

## 1.7 Purpose and structure of this environmental assessment

This environmental assessment has been prepared in accordance with the EP&A Act and the Director-General's requirements (included in Appendix A). The environmental assessment provides:

- Information on the project, including the project need and alternatives considered;
- A description of the existing environment and an assessment of the potential key environmental impacts of the project identified by the Director-General's requirements; and
- The proponent's commitments in terms of measures to minimise and manage potential environmental impacts.

The environmental assessment is structured as follows:

#### Volume 1 – Environmental assessment (main report)

Volume 1 includes:

- Part A Introduction and Context - including:
  - An introduction to the environmental assessment (chapter 1);
  - Information on assessment requirements (chapter 2);
  - A summary of the consultation that occurred during the assessment process (chapter 3); and

- A description of the site including location, land ownership, land use and the environmental setting and information on the existing operations of the Kimbriki Resource Recovery Centre (chapter 4).

- Part B The Project - including:
  - An overview of strategic planning drivers, the project need and alternatives considered (chapter 5); and
  - A description of the project (chapter 6) including plans of proposed building works, the MRF and RRF processes, likely waste streams, classifications and quantities, construction activities and likely staging of construction works.
- Part C Environmental Assessment - including:
  - An environmental risk analysis identifying key potential environmental issues (chapter 7); and
  - The results of the assessment of key environmental issues identified by the Director-General's requirements and the environmental risk analysis (chapters 8 to 17).
- Part D Project Justification and Conclusions - including:
  - Proposed environmental management and monitoring (chapter 18),
  - A statement of commitments made by the proponent in relation to mitigation, management and monitoring of potential environmental impacts (chapter 19); and
  - The conclusion and justification for the project including an evaluation of the project with regard to social, economic and environmental considerations and the results of the environmental assessment (chapter 20).
- Part E References, Glossary of Technical Terms, Abbreviations, Symbols and the Project Team.

### Volume 2 and 3 – Appendices

Volumes 2 and 3 contain the specialist technical/background reports prepared as part of the environmental assessment process, supporting correspondence and consultation information:

- Appendix A Director General's requirements
- Appendix B Department of Planning and agency correspondence
- Appendix C Community consultation report and material
- Appendix D Site and technology selection report
- Appendix E Flora and fauna assessment report
- Appendix F Air quality and odour assessment report
- Appendix G Noise assessment report
- Appendix H Traffic and transport assessment report
- Appendix I Geotechnical and groundwater investigation report
- Appendix J Water management report
- Appendix K Greenhouse gas assessment report
- Appendix L Aboriginal heritage assessment report

- Appendix M Hazard analysis report
- Appendix N Bushfire constraints report
- Appendix O Existing approvals
- Appendix P Warringah Council in principle acceptance of offset security process

# 2 Statutory framework

*The proponent is seeking concurrent approval from the Department of Planning under Part 3A (Sections 75J and 75O) of the EP&A Act. This chapter outlines the legislative requirements that apply to the project and defines the environmental assessment process. Specifically this chapter:*

- *Confirms the authorisation to submit a concept plan under Section 75M of the EP&A Act in order to overcome a short-term permissibility issue;*
- *Confirms the application of Part 3A of the EP&A Act, and notes specific requirements;*
- *Considers other legislation and environmental planning instruments in terms of any other approvals that may apply to the project or requirements for the environmental assessment; and*
- *Summarises the environmental assessment and approval process.*

## 2.1 Approval process under the Environmental Planning and Assessment Act 1979

### 2.1.1 Concept approval

On 9 July 2010 the Executive Director, Major Projects Assessment of the Department of Planning, as delegate of the Minister for Planning, authorised the submission of a concept plan for the project (refer Appendix B). This environmental assessment document contains the information required under Section 75M of the EP&A Act:

- An outline of the scope of the project and development options (chapter 6);
- The proposed staging and timing of the project (section 6.5); and
- Other matters required by the Director-General (refer table references in section 2.4.1).

A concept plan approval is being sought to overcome a short-term prohibition of the project (refer section 2.2). Where the Minister has approved lodgement of a concept plan, it is open to the Minister to approve the project, even if the project, or part of it, is prohibited by an environmental planning instrument.

The Department of Planning has accepted this approach and recommended that the concept plan and environmental assessment documentation be submitted concurrently.

### 2.1.2 Application of Part 3A of the EP&A Act

Part 3A of the EP&A Act establishes an assessment and approval regime for major infrastructure projects. Part 3A applies to development that is considered to be a Part 3A project by either a state environmental planning policy (SEPP) or a Ministerial Order (Section 75B).

Schedule 1 of *State Environmental Planning Policy 2005 (Major Development)* (the Major Development SEPP) describes development which requires approval under Part 3A of the EP&A

Act. Specifically, Schedule 1, Group 9 relates to resource recovery or waste facilities. It includes the following (Clause 27(3)):

> *(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 project meets this description as it involves development of a MRF and RRF that would handle up to approximately 60,000 and 100,000 tonnes per year of recyclables and waste respectively, and has a capital investment value of approximately $70 million.

The application of Part 3A was confirmed by a Minister's 'clause 6 opinion' provided by the Executive Director, Major Projects Assessment of the Department of Planning, as delegate of the Minister of Planning on 9 July 2010 (refer Appendix B).

The proponent is therefore seeking:

- Approval of the concept plan for the project under Section 75O of the EP&A Act; and
- Approval of the project under Section 75J of the EP&A Act.

## 2.2 Permissibility of the project under relevant environmental planning instruments

### 2.2.1 Warringah Local Environmental Plan 2000

The *Warringah Local Environmental Plan 2000* (the LEP) currently applies to the site. The site is located on land which is referred to by the LEP as 'Locality B9 Mona Vale Road East'.

The LEP indicates the permissible and non-permissible land uses in the Mona Vale Road East locality. It is arguable that the intended activities associated with the project are prohibited under the land use categories of the LEP. The locality statement provides that development for the purposes of 'potentially hazardous industries' and 'potentially offensive industries' are prohibited within the Mona Vale Road East locality. The project could be a 'potentially offensive industry' within the meaning of the Warringah LEP as it would require a licence under the *Protection of the Environment Operations Act 1997*. However, as noted below, the project would be permissible under the draft Warringah Local Environmental Plan 2009.

As discussed in section 2.1.1, a concept plan approval is being sought to overcome this potential short-term prohibition. The Executive Director, Major Projects Assessment of the Department of Planning, has authorised submission of a concept plan.

#### Draft Warringah Local Environmental Plan 2009

Council has prepared the Draft Warringah Local Environmental Plan 2009 (the LEP 2009), which was exhibited between October and December 2009. On 8 June 2010 Council resolved to adopt the LEP 2009. The LEP 2009 has been forwarded to the Minister for Planning for publishing. The Minister may publish the LEP as resolved by Council; make amendments to it as he sees fit; or not proceed with the LEP at all. If the Minister makes the LEP, it will come into force from its publication date.

The LEP 2009 incorporates amended land use provisions for the site. The site is zoned by the draft LEP as Zone SP2 Infrastructure and the purpose shown on the land zoning map is 'Waste or Resource Recovery Project'. Any development that is ordinarily incidental or ancillary for this purpose, including environmental protection works and roads, is permissible with consent under these provisions. The project is therefore permissible with consent under the future zoning of the site.

## 2.3 Consideration of other legislation and environmental planning instruments

### 2.3.1 NSW legislation

#### Approvals that do not apply

Section 75U(1) of the EP&A Act specifies certain authorisations which are not required for an 'approved project' under Part 3A. These include the following authorisations, which may otherwise have been relevant to this project:

- *Fisheries Management Act 1994* – permit for work or structures within a waterway;
- *Heritage Act 1977* – approval to disturb an item or an excavation permit;
- *National Parks and Wildlife Act 1974* – a Section 87 research permit or a section 90 consent to destroy;
- *Native Vegetation Act 2003* – consent to clearing native vegetation;
- *Rural Fires Act 1997* – a bush fire safety authority under section 100B; and/or
- *Water Management Act 2000* – water use approval, water management work approval or activity approval.

These approvals would not be required if the Minister grants project approval to carry out the project under Part 3A.

#### Approvals legislation to be applied consistently

Under section 75V(1) of the EP&A Act, the following authorisations cannot be refused if necessary for the carrying out of an 'approved project' and are to be substantially consistent with an approval to carry out the project given under Part 3A:

- *Protection of the Environment Operations Act 1997* – an environment protection licence under Chapter 3 of the Act; and
- *Roads Act 1993* - a permit under s138 to impact on public roads.

*Protection of the Environment Operations Act 1997*

The Department of Environment, Climate Change, and Water (DECCW) administers the *Protection of the Environment Operations Act 1997* (POEO Act). The POEO Act establishes, amongst other things, the procedures for issuing of licences for environmental protection on aspects such as waste, air, water and noise pollution control.

The owner or occupier of premises engaged in scheduled activities is required to hold an environment protection licence (EPL) and comply with the conditions of that licence. The

proponent would require an EPL for the project because waste disposal, waste processing and waste storage are scheduled activities listed in Schedule 1 of the POEO Act.

The proponent currently holds the following two EPLs for existing operations:

- EPL 13090 for composing activities; and
- EPL 13091 for extractive activities, waste storage, waste processing (non-thermal treatment) and waste disposal (application to land).

The proponent is seeking to retain these existing EPLs and obtain a third licence for the proposed activities. This third licence would allow domestic waste to be received by the RRF and MRF without the waste and environment levy being applied as the waste crosses the weighbridge for disposal to landfill.

Both the MRF and RRF would produce some residual wastes requiring landfill disposal. This waste would be delivered to the landfill via the existing weighbridge system and the levy would be incurred at that stage. If this were not done, all incoming wastes would need to have the levy applied at the weighbridge and the proponent would have to apply to DECCW for a refund whenever waste derived products were removed from the site. In addition, some of the wastes being processed by the RRF would be lost due to evaporation and volatilisation of organic compounds during composting. It would be difficult to determine the amount of these losses. Therefore assessing the total volume of waste diverted from landfill, to enable a refund of the levy applied to all wastes entering the RRF, would be difficult. This was the reason that a second licence was issued for resource recovery activities. The proponent has advised that DECCW has agreed in principle to this licensing approach.

#### *Roads Act 1993*

The *Roads Act 1993* is administered by the NSW Roads and Traffic Authority (RTA), councils or the Department of Lands. The RTA has jurisdiction over major roads, councils over minor roads and the Department of Lands over road reserves or Crown roads.

Under Section 138, Part 9, Division 3 of the Roads Act, a person must not impact or carry out work on or over a public road otherwise than with the consent of the appropriate roads authority. Mona Vale Road is a classified road under the care and control of the RTA and Kimbriki Road is a local road under the care and control of Warringah Council. Some minor amendments to the intersection of Mona Vale Road and Kimbriki Road are proposed. A permit from the RTA would be required to undertake these works.

### Other NSW legislation

#### *Waste Avoidance and Resource Recovery Act 2001*

The *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) provides a framework for waste management in NSW. The WARR Act establishes a hierarchy to minimise the consumption of natural resources and final disposal to landfill of waste, by encouraging waste avoidance, reuse and recycling.

The WARR Act promotes integrated waste and resource management planning, programs and service delivery on a state-wide basis. It aims to ensure that waste is managed to reduce

environmental harm in accordance with the principles of ecologically sustainable development and the objectives of the POEO Act.

As a regional alternative waste technology (AWT) project servicing four council areas, the project would assist SHOROC councils deliver on the State Government's waste diversion target for municipal waste in the region. The project is therefore consistent with the objectives of the WARR Act.

*Threatened Species Conservation Act 1995*

DECCW is responsible for administering the *Threatened Species Conservation Act 1995* (TSC Act). The TSC Act requires that significance assessments be completed for all endangered ecological communities, threatened populations and species listed under the TSC Act that would be directly or indirectly affected by the project.

Ecotone Ecological Consultants Pty Ltd was engaged to undertake a flora and fauna assessment of the Kimbriki Resource Recovery Centre, including the site for the project. A copy of the assessment is included at Appendix E and summarised in chapter 8. The assessment concluded that, with the implementation of recommended mitigation measures, including a comprehensive biodiversity offset strategy, the project would not significantly impact on endangered ecological communities or threatened species.

### 2.3.2 NSW Environmental planning instruments

#### State Environmental Planning Policy (Major Development) 2005

The Major Development SEPP identifies development to which the development assessment and approval process under Part 3A of the EP&A Act apply. As discussed in section 2.1.2, the project is listed under Schedule 1 of the SEPP and will therefore be assessed under Part 3A of the EP&A Act.

#### State Environmental Planning Policy No. 33 - Hazardous and Offensive Development

*State Environmental Planning Policy No. 33 - Hazardous and Offensive Development* (SEPP 33) requires the consent authority to consider whether an industrial proposal is a 'potentially hazardous industry' or a 'potentially offensive industry'. A hazard assessment is completed for potentially hazardous developments to assist the consent authority to determine acceptability. The Department of Planning has a draft guideline, entitled 'Applying SEPP 33' (July 2008), which is provides guidance on how SEPP 33 is applied. The draft guideline provides guidance as to when a project should be considered to be a 'potentially hazardous industry' or a 'potentially offensive industry'.

The draft guideline makes it clear that 'potentially hazardous industries' are to be limited to industries which pose a physical risk, such as explosives or fire. The project does not pose any physical risk such as explosion or fire and is therefore not considered to be a 'hazardous industry'.

The guideline states that any project which requires a 'licence under any pollution control legislation' should be considered 'potentially offensive' within the meaning of SEPP 33. As discussed in section 2.3.1, the project would require an EPL under the POEO Act, and should therefore be considered 'potentially offensive'. However, the guideline indicates that if the

assessment can demonstrate that the offence can be controlled to a level that is not significant (i.e. within the limits and criteria of an EPL) and if DECCW is willing to issue an EPL, then the industry would not be considered offensive.

The environmental assessment provides a comprehensive assessment of environmental impacts and mitigation and management measures associated with the project. It demonstrates that the project can operate within acceptable pollution criteria. The project would therefore not be considered a hazardous or offensive industry and would be permissible under SEPP 33.

### State Environmental Planning Policy No 44 – Koala Habitat Protection

*State Environmental Planning Policy No. 44 (Koala Habitat Protection)* (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas. SEPP 44 applies to the extent that in any local government area which is listed in the SEPP, the relevant council is restricted from granting development consent for proposals on land identified as core koala habitat without the preparation of a plan of management. The Warringah local government area is included in Schedule 1 of the SEPP and therefore SEPP44 is relevant to the project.

According to SEPP 44, it is necessary to determine whether a site subject to a proposal is considered 'potential koala habitat'. A koala habitat assessment was completed as part of the flora and fauna assessment undertaken for the project. The assessment indicated that no core koala habitat is present on site. Given that core koala habitat was not identified at the site, a plan of management is not required.

### State Environmental Planning Policy No 55 – Remediation of Land

*State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) applies to the whole of NSW and provides a State wide planning approach to the remediation of contaminated land.

Clause 7 of SEPP 55 states:

> *A consent authority must not consent to the carrying out of any development on land unless:*
>
> *(a) it has considered whether the land is contaminated, and*
>
> *(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or would be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*
>
> *(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land would be remediated before the land is used for that purpose.*

The land on which the project is located is considered unlikely to have been contaminated by past or present uses. The land proposed for the construction of the RRF is bushland with fire management access tracks being the only form of land disturbance.

The land proposed for the construction of the MRF is a hardstand area that is currently used for the drop-off and dispatch of recyclables. This area has been used for this purpose since its initial excavation in the early 1990s. It was initially excavated to be used for landfilling but the development of a landfill management plan in 1995 identified other areas better suited to

immediate landfilling. This area was then sealed and identified as being suitable for receiving, storing and out take of separated wastes like recyclables, tyres etc. A more recent revision of the landfill management plan in 2009 confirmed that this area was outside of areas needed for potential filling for at least 30 years. The area was identified in master planning works in 2009 as being suitable for resource recovery activities. The area has been sealed with asphalt since excavation and has not been used for any other activity; therefore it is unlikely to be contaminated.

### 2.3.3 Commonwealth legislation

#### Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas and species, populations and communities and heritage items.

The approval of the Commonwealth Minister of Sustainability, Environment, Water, Population and Communities is required for:

- An action which has, would have or is likely to have a significant impact on 'matters of National Environmental Significance' (NES matters). The current NES matters include:
  - The world heritage values of a declared World Heritage property;
  - The National Heritage values of a listed National Heritage place;
  - The ecological character of a declared Ramsar wetland;
  - Listed threatened species and ecological communities;
  - Listed migratory species;
  - The Commonwealth marine environment;
  - The Great Barrier Reef Marine Park; and
  - Nuclear actions.
- An action by the Commonwealth or a Commonwealth agency which has, would have or is likely to have a significant impact on the environment;
- An action on Commonwealth land which has, would have or is likely to have a significant impact on the environment; and
- An action which has, would have or is likely to have a significant impact on the environment on Commonwealth land, no matter where it is to be carried out.

There is no Commonwealth land affected by the project.

The project would not impact on any World Heritage Areas, National Heritage Places, Ramsar wetlands of international importance, Commonwealth marine areas or the Great Barrier Reef Marine Park. The project would not involve any nuclear actions.

The potential impact on threatened species and ecological communities has been considered by the flora and fauna assessment provided at Appendix E and summarised in chapter 8. The assessment indicated that no threatened ecological communities or migratory species listed in the EPBC Act were identified at the site. However, the project would impact on one vulnerable

flora species listed under the EPBC Act (*Tetratheca glandulosa*) and would result in the loss of potential habitat for two endangered fauna species (southern brown bandicoot and spotted-tailed quoll), two vulnerable fauna species (giant burrowing frog and grey-headed flying-fox) and one migratory species (black-faced monarch) listed under the EPBC Act.

The assessment concluded that, with the implementation of the recommended mitigation measures including a comprehensive biodiversity offset strategy, the impact to these species would not be considered significant. On this basis the project is not expected to be a controlled action requiring approval under the EPBC Act. A referral has been lodged with the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) to confirm this conclusion.

## 2.4 The application and assessment process

The application and assessment process for the project is summarised below, and outlined in Figure 2.1.

### 2.4.1 Assessment requirements

#### Director-General's requirements

Under clause 75F of the EP&A Act, the Director-General is required to prepare and issue the proponent with requirements for undertaking the environmental assessment. These identify key issues to be addressed and the level of assessment required.

The Director-General's requirements for the project were issued on 4 June 2010. A copy of the requirements is included in Appendix A. The matters raised by the Director-General for consideration, and the section of the environmental assessment that addresses them, are outlined in Table 2.1.

**Table 2.1 Director-General's requirements**

| Issue category | Requirement | Document reference |
|---|---|---|
| General requirements | Executive summary | Executive Summary |
| | Detailed description of: | |
| | The waste strategy | Section 5.2.2 |
| | Past, existing and approved operations/activities | Section 4 |
| | Detailed description of the project: | |
| | Need for the project | Section 5.4 |
| | Alternatives considered | Section 5.5 |
| | Likely staging | Section 6.5 |
| | Plans of proposed building works | Section 6.1 |
| | Risk assessment of potential environmental impacts | Chapter 7 |
| | Detailed assessment of the key issues | Refer below |

| Issue category | Requirement | Document reference |
|---|---|---|
| | Draft statement of commitments | Chapter 19 |
| | A conclusion justifying the project | Chapter 20 |
| Key issues | **Waste management** | |
| | Likely waste streams | Section 6.4 |
| | How waste would be treated, stored, handled and transported | Sections 6.3, 6.2 and 6.4.3 |
| | AWT technology, outputs and quality control measures | Sections 6.3, 6.2 6.4.2 and 6.4.3 |
| | Materials recycling process | Section 6.3 |
| | Measures employed to ensure compliance with DECCW's waste exemptions | Chapter 6 |
| | **Biodiversity** | Chapter 8 |
| | Impacts on threatened species and endangered ecological communities | Section 8.3 |
| | Measures to minimise impacts | Section 8.4 |
| | Proposed offset strategy | Section 8.4.1 |
| | Effectiveness and reliability of proposed measures and any residual impacts | Section 8.4 |
| | **Air quality and odour** | Chapter 9 |
| | Quantitative assessment of potential impacts and effectiveness of control measures | Section 9.5 |
| | Management of point and fugitive emissions | Section 6.2 |
| | Specifications of odour scrubbing equipment | Section 9.4.3 |
| | Mitigation of potential odour from any runoff | Section 9.4.4 |
| | How negative pressure would be maintained in processing buildings | Section 9.4.5 |
| | Waste to be stored outside | Section 9.4.6 |
| | Time of maturation process | Section 9.4.7 |
| | **Traffic and transport** | Chapter 11 |
| | Predictions of traffic volumes | Section 11.2 |
| | Assessment of predicted impact on surrounding road network, including modelling of the intersection | Section 11.2 |
| | Details of any proposed road upgrade works | Section 6.1.6 |
| | Proposed access and parking arrangements onsite | Section 6.1.6 |
| | **Soil and water** | Chapter 12 |

| Issue category | Requirement | Document reference |
|---|---|---|
| | Detailed water balance for the project | Section 12.3 |
| | Wastewater predictions and treatment measures | Section 12.3 |
| | Erosion and sediment controls during construction | Section 12.6.1 |
| | Stormwater management system | Section 12.3 |
| | Potential salinity, contamination, groundwater, flooding and acid sulphate soil impacts | Section 12.6 |
| | **Greenhouse gas** | Chapter 13 |
| | Assessment of scope 1, 2 and 3 emissions | Section 13.3 |
| | Measures to minimise greenhouse gas emissions | Section 13.4 |
| | **Noise** | Chapter 10 |
| | Quantitative assessment of potential noise impacts | Section 10.4 |
| Other issues | Heritage | Chapter 14 |
| | Hazards | Chapter 15 |
| | Visual | Chapter 16 |
| | Socio-economic | Chapter 17 |
| Consultation requirements | Consultation with nominated agencies, stakeholders and the community | Chapter 3 |

### Exhibition

If the environmental assessment is considered to meet the requirements, the Department would place it on public exhibition for at least 30 days. During the exhibition period, submissions would be invited from relevant agencies and members of the public.

The Department would provide the proponent with a copy of the submissions or a summary of the issues raised. The proponent would be asked to respond to the issues and may modify the project and the draft statement of commitments to minimise impacts on the environment if required.

If the project or statement of commitments were modified in response to issues raised, a preferred project report would be prepared to describe the scope of the revised project. The Director-General would make this report public.

### Assessment and determination

Following the exhibition period the Department would, on behalf of the Minister, review the environmental assessment, any preferred project report, and submissions received. Once the Department has completed its assessment, a draft assessment report would be prepared for the Director-General. This report may include recommended conditions of approval.

The recommended conditions would refer to the statement of commitments and may modify them and/or add additional provisions.

The assessment report would then be submitted to the Minister for determination. The Minister may refuse the project, or approve it with any conditions considered appropriate.

The Minister's determination and the Director-General's report would be published on the Department of Planning's website immediately following determination.

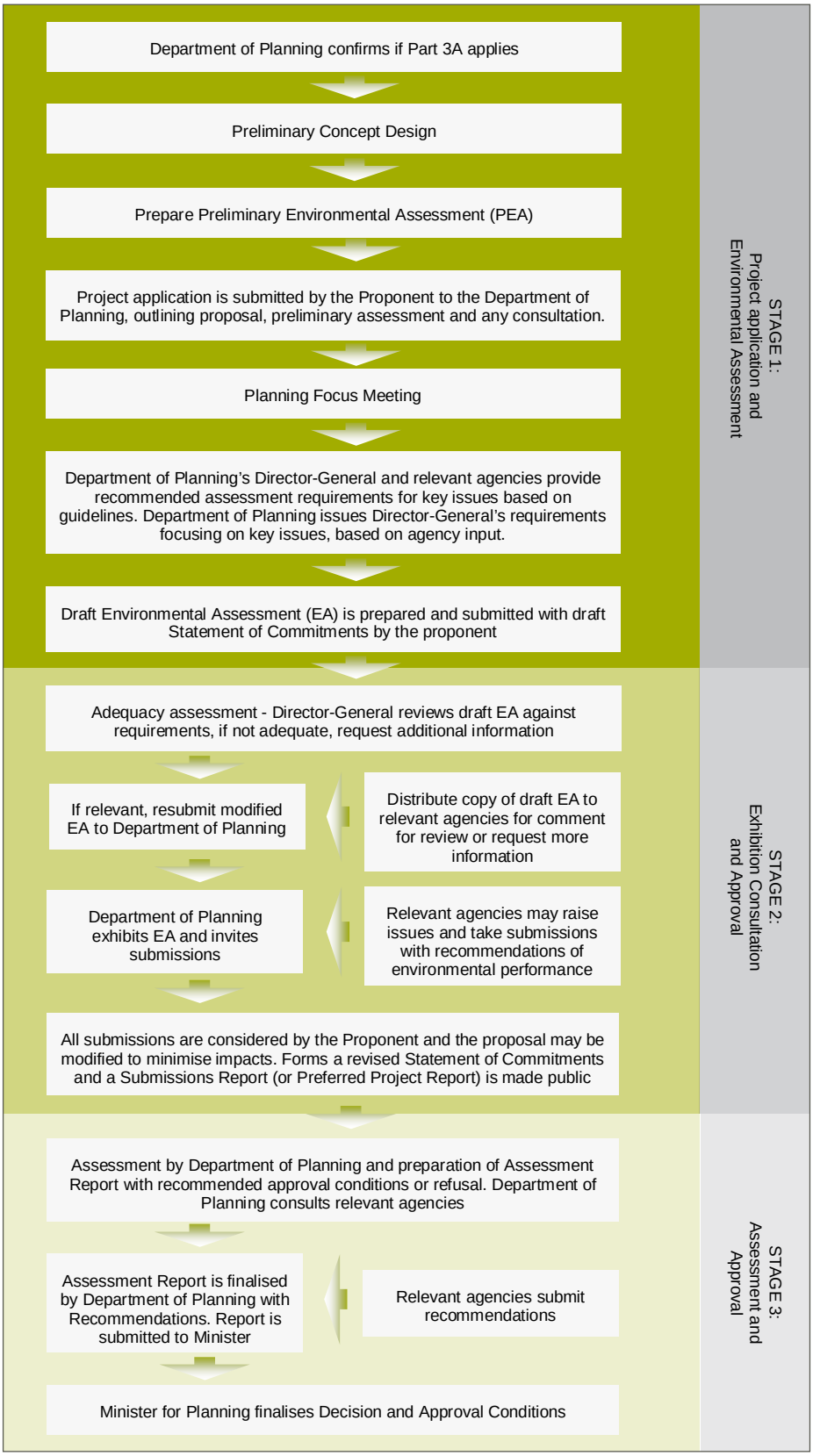



**Figure 2.1 The environmental assessment process under Part 3A of the EP&A Act**

# 3 Stakeholder and community consultation

*This chapter describes the consultation undertaken with the community and government stakeholders and the key issues raised during the consultation process.*

## 3.1 Community consultation

### 3.1.1 Overall approach and objectives

Community consultation for the project aimed to:

- Provide information about the project;
- Provide opportunities and mechanisms for community feedback and comments;
- Provide opportunities for the proponent to liaise with immediate neighbours about the project; and
- Identify key issues and concerns about the project for consideration during the environmental assessment process.

### 3.1.2 Identification of stakeholders – the community scan

One of the first tasks in the consultation process was to undertake a community scan. The objective of a community scan is to identify those groups and individuals likely to have an interest in the project (the project stakeholders) and to develop a database of contact details so that information about the project can be efficiently disseminated.

During preparation of the preliminary environmental assessment, the proponent worked with the communications and community relations managers of the SHOROC councils to identify a comprehensive list of stakeholder and interest groups. Key stakeholder groupings are summarised below. A full list is provided in Appendix C.

- Warringah, Mosman, Pittwater and Manly Councils;
- SHOROC;
- Neighbours;
- The broader SHOROC community;
- State Government agencies;
- Members of Parliament;
- Key community environmental groups in the four local government areas;
- Neighbouring councils;
- Current and future potential customers and users;
- Waste industry service providers.

A total of approximately 60 stakeholders were identified.

## 3.2 Consultation mechanisms

The main mechanisms used to consult with stakeholders during preparation of the preliminary environmental assessment and the environmental assessment included:

- Letters to adjoining residential properties;
- Project website;
- Information brochure;
- Information sheet;
- Media release and media briefing; and
- An onsite community information session.

Further information on these activities is provided below. Copies of all consultation material are included in Appendix C.

### 3.2.1 Letters to residents

A letter was delivered to each of the seven residential properties adjoining the Kimbriki Resource Recovery Centre in January 2010 to provide information on the project, offer individual meetings, and commit to personal follow-up. A copy of the information sheet was included with the letter.

The proponent met with residents during January 2010. The main issues raised during these meetings related to potential odour impacts and impacts on property values.

Another letter was delivered to residents of the seven properties in August 2010 to advise that the environmental assessment was being prepared, seek any feedback (via a feedback form) and offer a personal briefing.

Letters were also sent to invite residents of these properties to the community information session held on 4 September 2010.

### 3.2.2 Website

Information on the project, including the information sheet and brochure, was made available on the proponent's website www.kimbriki.com.au.

### 3.2.3 Information brochure

During preparation of the preliminary environmental assessment, the proponent developed an information brochure, *A Local Waste Solution for Local Waste*, to provide an overview of the project. A copy of the information brochure was distributed to stakeholders. The brochure was also made available on the website and at SHOROC council offices.

### 3.2.4 Information sheet

An information sheet was developed during the environmental assessment process to provide an overview of the project, the planning process and next steps. The information sheet was included with letters to stakeholders. It was also made available on the website and was supplied to SHOROC councils to be made available to ratepayers at their discretion. The information sheet was sent to stakeholders identified during the community scan.

### 3.2.5 Media release

Media releases providing information on the project were sent to the Sydney Morning Herald, North Shore Times and Manly Daily in August 2010. The releases included contact details and information on the community information session and how people could find out more about the project.

In response to the media release, the Manly Daily ran a story on the preparation of the environmental assessment on 24 August 2010. No follow-up community comments or letters to the editor appeared in the paper. On 1 September 2010 the paper ran a short piece alerting readers to the community information session to be held on 4 September 2010.

An article about the project also appeared in the waste industry magazine *Inside Waste Weekly* on 19 October 2010.

### 3.2.6 Community information session

A community information session was held on Saturday 4 September 2010 at the Eco House in the Kimbriki Resource Recovery Centre.

The community information session was publicised through a variety of mechanisms including:

- Letters sent to stakeholders;
- Phone calls to selected SHOROC council stakeholders to personally invite them to attend the event;
- Details posted on the Kimbriki website, SHOROC website and council websites; and
- A media release and article in the Manly Daily promoting the event.

Display panels were set up and representatives of the proponent, GHD and the communications and consultation consultant, KJA were in attendance to answer questions. Guests were invited to walk through the display and ask questions. Feedback forms and information sheets were also distributed.

Seven people, three of whom were from a property at Kamber Road, Terrey Hills (approximately 1.2 km away) attended the session.

### 3.2.7 Outcomes of community and stakeholder consultation

The level of input provided by stakeholders as a result of the consultation program has been low. Although feedback forms were made available through a number of mechanisms, including via mailouts and on the Kimbriki website, no completed feedback forms have been received. The proponent intends on leaving the feedback forms on the Kimbriki website throughout the exhibition period and any responses will be collated and analysed.

Input (issues and concerns raised) from stakeholders has involved:

- General community responses – no completed feedback forms, no calls received requesting further information, and no other representations were made;
- Neighbour responses – one neighbour, from Kamber Road, Terrey Hills, raised issues about the project in a letter and in person at the community information session, the proponent has since liaised extensively with this neighbour and representative from GHD have also visited their property to assess likely impacts;

- Media responses – the project received coverage on two occasions in the Manly Daily. On neither occasion did any related Letters to the Editor or other community comments appear in the paper;
- Meetings with the seven neighbours; and
- Community information session – seven people attended and three people (representing the same property) raised issues of concern.

The low number of formal responses and turn-out at the community information session suggests that interest in the project to date has been minimal. Informal comments on the project have been largely positive, particularly in relation to the environmental benefits.

A summary of the issues raised during consultation with stakeholders is provided in Table 3.1, including where the issues are addressed in the environmental assessment.

**Table 3.1 Issues raised during consultation with stakeholders**

| Issue grouping | Issue raised | Response | Reference in the Environmental Assessment |
|---|---|---|---|
| General | General interest in the project | Detailed information on the project plans has been included in the environmental assessment. | Chapter 6 |
| Waste | Interest in recycling | Detailed information on the materials recovery and resource recovery process has been included in the environmental assessment. | Sections 6.3 and 6.2 |
| Environmental impacts | Potential for odour as a result of the project | Processing of waste would take place in enclosed buildings. Odour management (biofilters and stacks) systems have been incorporated into the design. Odour modelling undertaken as part of the environmental assessment shows that odour criteria would be met at all privately owned nearby residences. | Chapter 9 |
| | Visibility of the buildings to neighbours | In consultation with the concerned neighbour, the proponent set up balloons to indicate the location and height of new buildings. This alleviated the neighbours concerns. An assessment of visual amenity has been undertaken as part of the environmental assessment. | Chapter 16 |
| | Noise during construction and operation | Processing activities would take place in enclosed buildings. Noise mitigation measures have been incorporated into the design (such as noise insulation) and noise modelling undertaken as part of the environmental assessment shows that noise criteria would be met at all privately owned nearby residences. | Chapter 10 |

## 3.3 Aboriginal consultation

### 3.3.1 Aboriginal stakeholder identification

The Aboriginal heritage consultant Archaeological Surveys & Reports Pty Ltd (ASR) undertook Aboriginal consultation activities for the project. ASR contacted the Metropolitan Local Aboriginal Land Council (LALC) to confirm that the site was within its management area and also to arrange for a Sites Officer to assist in the site inspection. The LALC Sites Officer assisted ASR with a site inspection that was undertaken on 30 September 2009.

In accordance with the DECCW (2005) *Interim Community Consultation Requirements for Applicants*, ASR also undertook activities to identify stakeholder groups wishing to be consulted about the project and invite them to register their interest. This search took two forms:

1. Letter to the LALC, Registrar of Aboriginal Owners, Native Title Services, the local Government Council and DECCW requesting lists of registered Aboriginal stakeholders; and
2. Advertisement placed in the local press (the Manly Daily) on 2 July 2010 inviting Aboriginal stakeholders to register their interest.

As a result, five stakeholders were identified:

- The Metropolitan LALC;
- Aboriginal Heritage Office;
- Aboriginal Education Consultative Group;
- Aboriginal Education Consultative Group; and
- One community member.

No responses to the newspaper advertisement were received.

### 3.3.2 Consultation activities and responses

On 10 August 2010, ASR sent a letter to each of the registered stakeholders. The letter included a summary of the background of the project, a description of the project site, the results of the investigation for the preliminary environmental assessment and details of recommendations. The letter also explained that as the proponent was applying for Part 3A approval, further consultation with registered Aboriginal stakeholders had become necessary. The letter stated further that the stakeholders had an opportunity to visit the site and/or provide any additional cultural information relevant to the site. Each stakeholder was requested to respond to the letter. No responses were received.

Following preparation of the draft Aboriginal heritage report, ASR sent a copy to each registered stakeholder seeking feedback or comments. No responses were received.

## 3.4 Utilities consultation

Energy Australia was contacted about the power requirements of the project. They indicated that the existing high voltage regional infrastructure would likely have sufficient capacity to provide energy for the project, but that some upgrading works may be required. The extent of upgrading works required would only be able to be determined after a detailed plan and application for connection are lodged.

## 3.5 Government agency consultation

Consultation with government agencies (including councils and NSW government departments) involved a planning focus meeting, council briefings and workshops, and input to the Director Generals requirements, as outlined below.

### 3.5.1 Planning focus meeting

A planning focus meeting was held at the proponent's offices on 23 April 2010. Representatives from the following Government agencies attended the planning focus meeting:

- Department of Planning;
- DECCW;
- RTA; and
- Warringah Council.

The proponent gave a presentation about the project.

The presentation provided a detailed description of the project, including the need for the project, applicable statutory framework, current operations at the Kimbriki Resource Recovery Centre, community consultation undertaken and the environmental setting and key environmental issues. A draft biodiversity offset strategy was also presented. The presentation was followed by a tour of the Kimbriki Resource Recovery Centre and the site for the project.

All agency representatives indicated their general support for the project. After the preliminary environmental assessment was prepared and submitted, the Department of Planning then issued Draft Director Generals requirements and confirmed acceptance of the proposed application process. DECCW indicated its general acceptance of the proposed approach to licensing. The RTA and Warringah Council representatives did not raise any major issues.

### 3.5.2 SHOROC council briefings and workshops

The project was developed in close consultation with the SHOROC councils at both officer and elected representative levels. Councillors and general managers from each of the four councils have received detailed briefings about the project.

The proponent also conducted three workshops with the general managers and officers of the four councils in the areas of waste management, communications and community relations.

Workshops and briefings will continue to keep council representatives informed about the progress of the project. Meetings with the council communications managers will continue during the planning process.

### 3.5.3 Government agency consultation

The Department of Planning requested that the following agencies provide input to the Director-General's environmental assessment requirements:

- DECCW;
- NSW Office of Water;
- RTA; and

- Warringah Council.

Letters requesting input on the project were also sent by GHD to each agency. The agencies were generally satisfied with the proposed plans. The issues raised in the responses received, and a reference to where these issues are considered in the environmental assessment, are outlined in Table 3.2.

**Table 3.2 Issues raised by agencies**

| Agency | Key issues | Reference in the environmental assessment |
|---|---|---|
| Roads and Traffic Authority | Amenity of Mona Vale Road | Chapter 11 |
| | Safety of intersection operation | Chapter 11 |
| Office of Water | Protection and enhancement of waterways and riparian land | Chapter 12 |
| | Groundwater and groundwater dependent ecosystems: | |
| | Impacts on surface water and ground water resources | Chapter 12 |
| | Groundwater issues and potential degradation to groundwater source | Chapter 12 |
| | Licensing | Chapter 12 |
| | Groundwater dependent ecosystems | Chapter 8 |
| Warringah Council | Director-Generals Requirements appear to cover all issues | |
| | Biodiversity: | |
| | Impacts on threatened species | Chapter 8 |
| | Protection of offset areas in perpetuity and long-term management | Section 8.4.1 |
| | Riparian and waterways: | |
| | Catchment which flows to Narrabeen Lagoon | Chapter 11 |
| | Waterway and wetland | Chapter 11 |
| | Waterway impact statement requirement | Chapter 11 |
| | Office of Water permit requirement | Section 2.2.1 |
| | Traffic: | |
| | Traffic impact assessment | Chapter 11 |
| | Planning: | |
| | Warringah LEP | Section 2.2.1 |

# 4 Description of the site and existing facilities

*This chapter describes the location of the site, land ownership and surrounding land use. The chapter also describes the Kimbriki Resource Recovery Centre, including its ownership, history, current licences and approvals, existing services and operations, and the existing environmental management and monitoring regime.*

## 4.1 Site location and ownership

The site is located within the Warringah local government area on Sydney's Northern Beaches (refer to Figure 4.4). The site is located in the suburb of Terry Hills, and is wholly within the boundary of the existing Kimbriki Resource Recovery Centre. As illustrated in Figure 6.1, the site would be situated on the eastern portion of the Kimrbiki Resource Recovery Centre.

The site is within the boundary of Lot 4 on DP 255466. This lot is owned by Warringah Council and leased on a long term basis to the proponent.

## 4.2 Site description

### 4.2.1 Site characteristics

The site measures approximately 8.6 ha including areas of retained vegetation that would not be developed. The part of the site that would be developed for the RRF measures approximately 5.75 ha. Approximately 0.6 ha would be required for the MRF. The site comprises areas of cleared or moderately disturbed land (MRF area) as well as areas of relatively undisturbed bushland (the RRF area).

Two buildings, which are used for office administration and amenities, and part of a car park are currently located on the site. Also, the area proposed for the MRF partly includes a hardstand area containing a building that was recently constructed for the consolidation of kerbside recyclables.

### 4.2.2 Geology/soils

The Kimbriki Resource Recovery Centre is underlain by the Hawkesbury Sandstone formation, which is a massive sedimentary formation varying in thickness from 60 m to 270 m. A description of site geology is provided in section 4.2.2.

### 4.2.3 Topography

The topography in the vicinity of the site is shown in Figure 4.1.

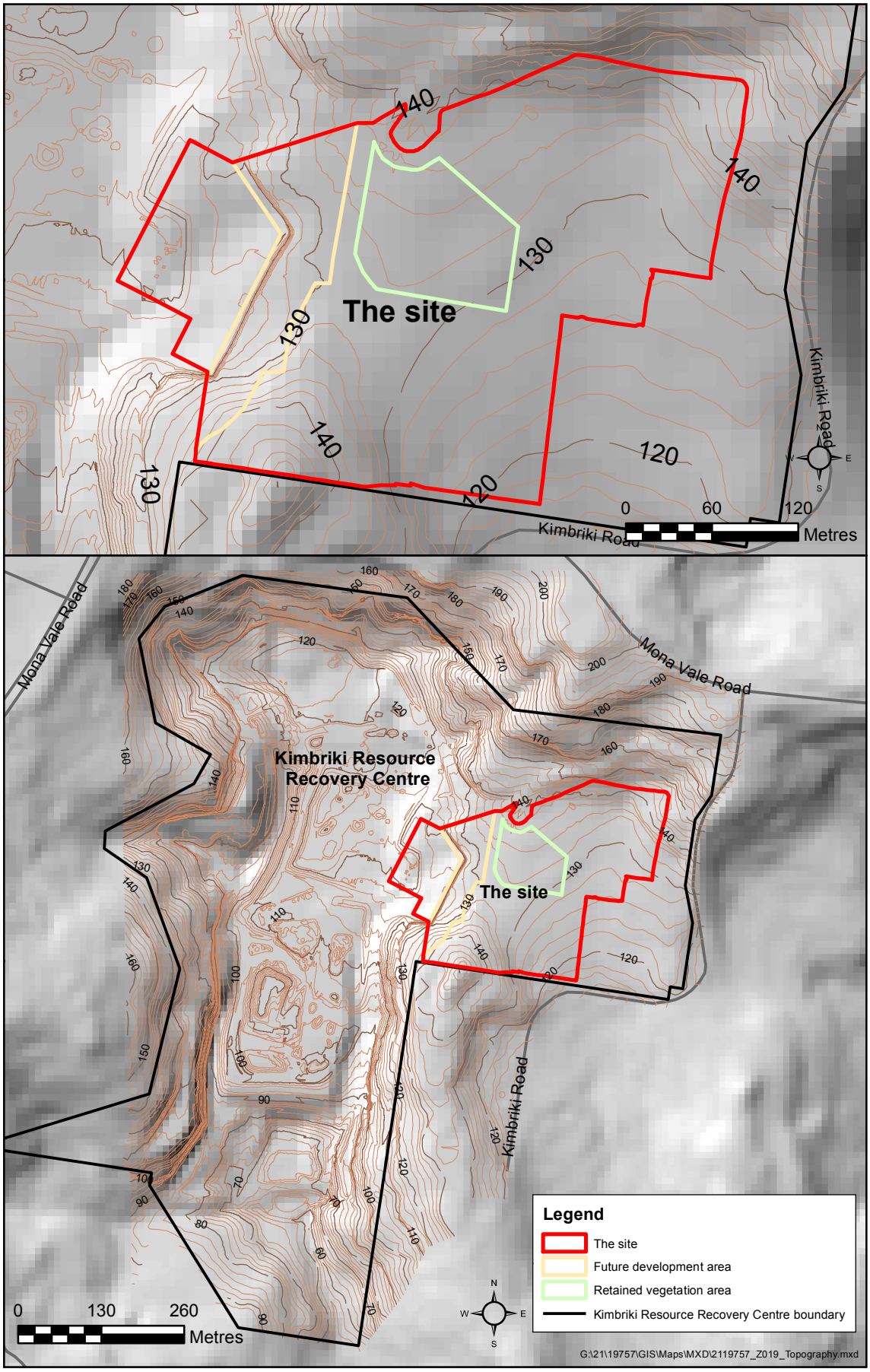



**Figure 4.1 Existing site topography**

The Kimbriki Resource Recovery Centre is situated within a valley open to the east-southeast, surrounded by relatively undisturbed vegetation. The ground slopes from a level of approximately 160 m Australian Height Datum (AHD) along the northern and western boundaries to approximately 70 m AHD, adjacent to the southern boundary.

Elevations within the site vary from approximately 125 m to 155 m AHD in the area for the RRF and from 119 m to 122 m AHD in the area for the MRF. The majority of the MRF area is flat, with an elevation of 120 m AHD.

### 4.2.4 Climate and meteorology

#### Temperature

The Bureau of Meteorology maintains a weather monitoring station (No. 066059) at Terrey Hills approximately 500 m west of the Kimbriki Resource Recovery Centre. A summary of weather statistics, recorded at this monitoring station between January and December 2009, is provided in Table 4.1. This shows that the lowest minimum and maximum daily temperature occurred in July (3.1 $^{o}$C) and June (12.7 $^{o}$C) respectively, and highest minimum and maximum daily temperatures occurred in November (27.2 $^{o}$C) and January (39.2 $^{o}$C) respectively.

**Table 4.1 Weather near the Kimbriki Resource Recovery Centre**

| Statistics | | Value | Month |
|---|---|---|---|
| Minimum temperature (daily) | lowest | 3.1 $^{o}$C | July |
| | mean | 13.6 $^{o}$C | |
| | highest | 27.2 $^{o}$C | November |
| Maximum temperature (daily) | lowest | 12.7 $^{o}$C | June |
| | mean | 22.1 $^{o}$C | |
| | highest | 39.2 $^{o}$C | January |
| Rainfall (daily) | lowest | 0 millimetres (mm) | |
| | highest | 182.8 mm | May |
| Annual Rainfall | | 968.4 mm | |

Source: Bureau of Meteorology Weather Station 066059, 2009

#### Rainfall

Figure 4.2 shows the monthly rainfall recorded at the Kimbriki Resource Recovery Centre during 2009. This year, the annual rainfall at the Kimbriki Resource Recovery Centre was 968.4 mm.

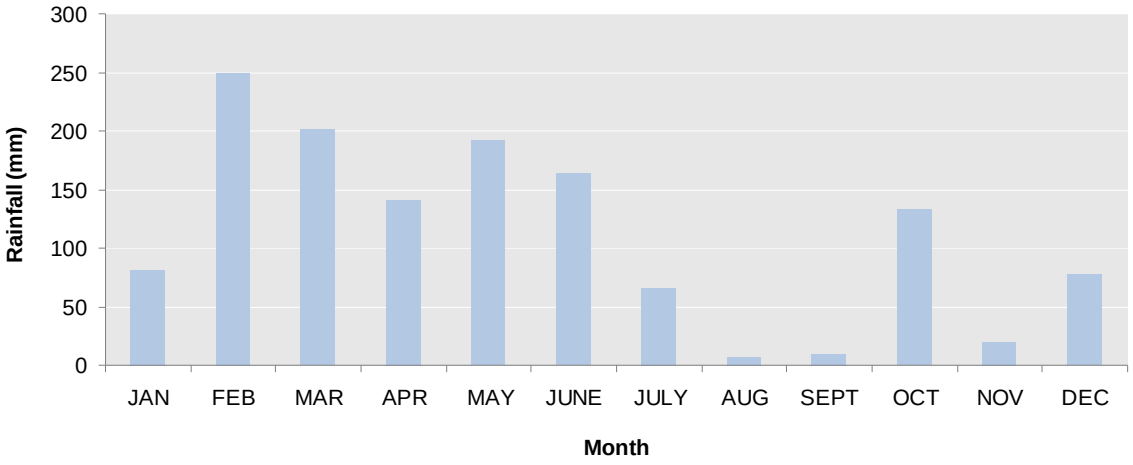



**Figure 4.2 Monthly recorded rainfall data**

### Wind

Figure 4.3 shows annual seasonal wind roses for 2009. The wind roses show the frequency of occurrence of winds by direction and strength. Figure 4.3 shows that on an annual basis, winds are predominantly from the north. Winds from the northeast and southeast are also dominant in summer, while in winter winds are generally from the west and northwest. Winds in autumn and spring are more variable in terms of direction.

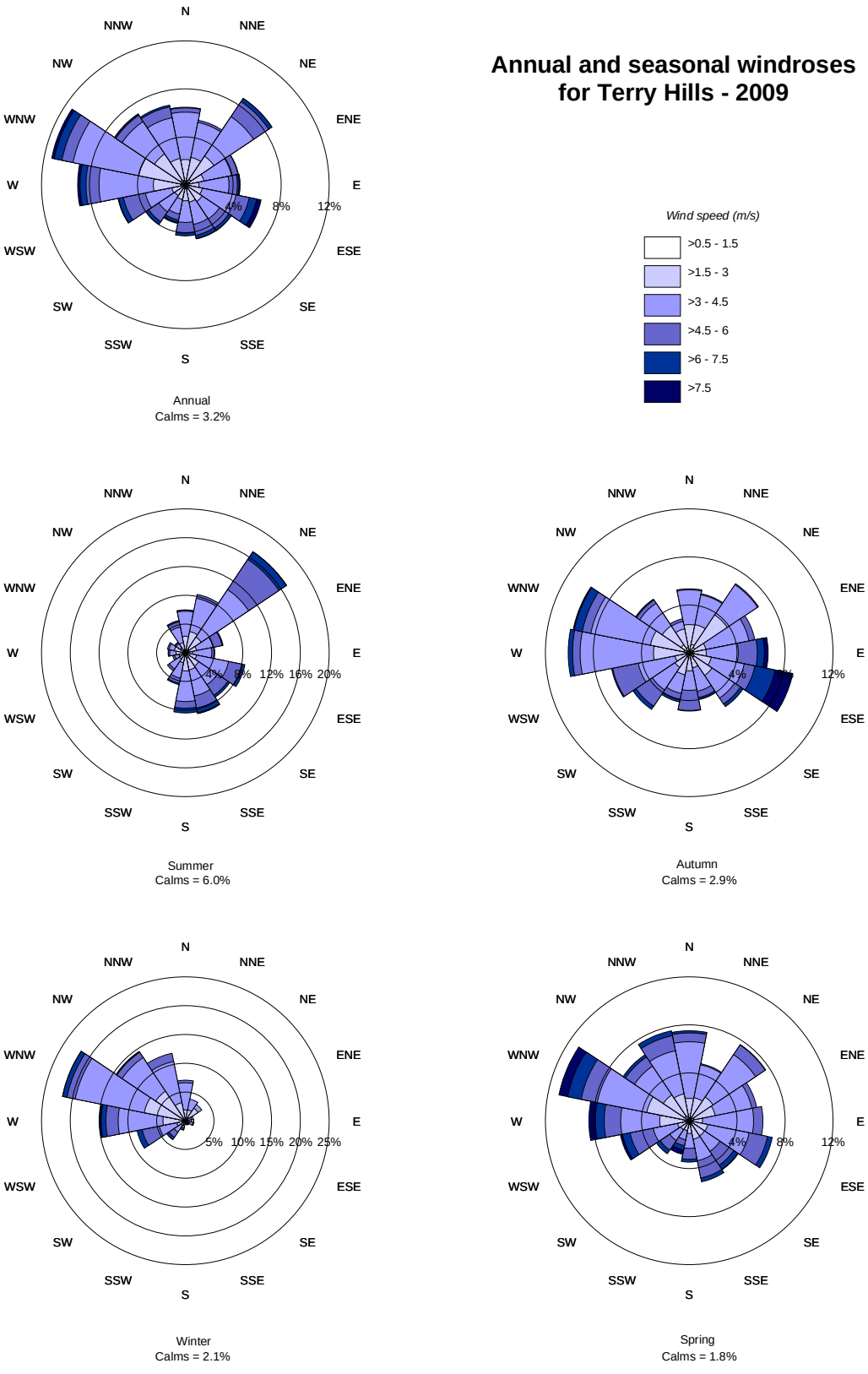



**Figure 4.3 Seasonal wind rose charts**

## 4.3 Surrounding land uses and land ownership

The land uses which immediately adjoin the site are listed below and shown on Figure 4.4

- The Kimbriki Resource Recovery Centre surrounds the site to the east, north and west, with existing operations at the centre located to the west of the site – further information on the Kimbriki Resource Recovery Centre is provided in section 4.4;
- Rural residential properties are located to the south – further information is provided below.

Land uses in the surrounding area are listed below:

- Public open space land (covered by bushland) to the north and west, owned by Warringah Council;
- Mona Vale Road to the north, and Kimbriki Road to east and south;
- A recreation reserve to the north, on the northern side of Mona Vale Road;
- A recreation/sporting reserve (J J Melbourne Hills Memorial Reserve) to the west;
- Ku-ring-gai Chase National Park further to the north and northeast;
- Garigal National Park to the south and east;
- Rural/residential housing to the south and southeast;
- Residential housing in the suburb of Terrey Hills, mainly to the northwest; and
- Retail/wholesale stores on the western side of Mona Vale Road (approximately 1 kilometre (km) to the west), focusing on nursery/landscaping/equestrian supplies.

All land between the northern and western boundaries of the Kimbriki Resource Recovery Centre and Mona Vale Road is owned by Warringah Council and zoned ‘Public Open Space’.

Figure 4.5 shows the ownership of land surrounding the site.

### 4.3.1 Rural-residential properties

Two areas of rural residential housing are located in the vicinity of the site. The first area includes two privately owned residences on the same block of land (1 Kimbriki Road) which are located on the eastern side of Kimbriki Road, near the entrance to the Kimbriki Resource Recovery Centre.

The second area is located to the south of the site, along Kimbriki Road. It includes a total of seven properties, four of which have been designated by the proponent as ‘project properties’ (including properties at 7, 8, 8A and 10 Kimbriki Road) and three of which are privately owned (at 4, 5 and 6 Kimbriki Road).

The 'project properties' are owned by the landowner of the proposed site, Warringah Council, in conjunction with the other three SHOROC councils, who have let them to the proponent until 2048. The councils purchased these four properties between 2002 and 2008 to provide a buffer between the remaining three privately owned residences on the eastern side of Kimbriki Road and the Kimbriki Resource Recovery Centre.

The councils and the proponent have signed a Call Offer Deed to ensure that the proponent has first purchase rights should the councils (as owners) experience additional loss of amenity as a

result of the project. In addition, there has been a caveat placed on the four properties to ensure they cannot be sold by the councils without firstly offering them to the proponent.

Another area of rural residential housing is located on Kamber Road, approximately one kilometre to the southwest of the site. This area contains two privately owned residences which are located on the southern side of Kamber Road.




**Figure 4.4 Surrounding land uses**

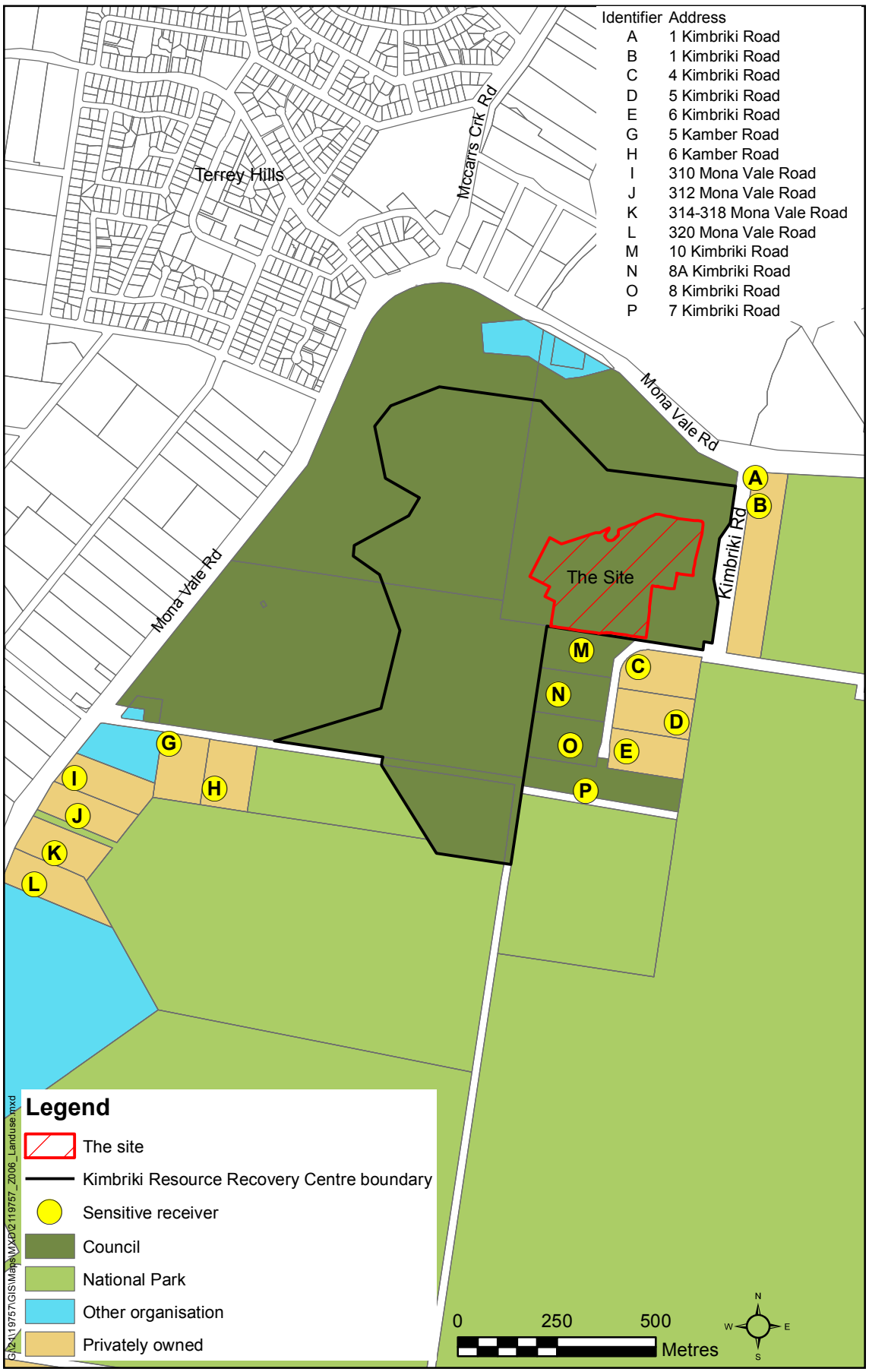



**Figure 4.5 Land ownership and neighbouring buildings**

## 4.4 Kimbriki Resource Recovery Centre

### 4.4.1 Land ownership

The Kimbriki Resource Recovery Centre is located on the following parcels of land:

- Lot 200/DP1044605;
- Lot 2/DP255466;
- Lot 4/DP244566;
- Lot 100/DP822376; and
- Lot 3/DP794191.

These lots are owned by Warringah Council and leased on a long term basis to the proponent.

### 4.4.2 History of the Kimbriki Resource Recovery Centre

The Kimbriki Resource Recovery Centre was established in 1974. It was initially developed as a landfill for the disposal of waste collected by local councils, residents and commercial users. More recently it has provided the community with a wide range of disposal services for special wastes, resource recovery services, the sale of recycled and reclaimed products, and waste management educational activities.

The Kimbriki Resource Recovery Centre receives and processes kerbside collected garden organics and hard (bulky) clean up waste from the four SHOROC councils. It is also the local resource recovery and disposal centre for self-haul customers in the SHOROC and wider northern suburbs region for non-putrescible wastes and recyclables.

An overview of the history of the Kimbriki Resource Recovery Centre is provided below:

| | |
|---|---|
| 1974 | The Kimbriki Resource Recovery Centre commenced operations as a landfill. In 1974, the Kimbriki Resource Recovery Centre was rezoned to 6(a) Existing Recreation. The Kimbriki Resource Recovery Centre fell within the provisions of *Interim Development Order No. 51.* |
| 1985 | The Kimbriki Resource Recovery Centre was rezoned to 1(a1) Non Urban and 6(a) Existing Recreation. |
| 1988 | The *Sydney Regional Environmental Plan No. 15 Terrey Hills* (amendment No. 1) came into force. The plan allowed for the operation of an inert waste disposal depot as a permissible use subject to council consent. |
| 1989-90 | Resource recovery operations commenced at the Kimbriki Resource Recovery Centre, reducing the amount of material disposed of to landfill. |
| 1992 | Pittwater Council joined and the Joint Services Committee was formed. |
| 1993 | An environment protection licence for operations at the Kimbriki Resource Recovery Centre was issued by the NSW Environment Protection Authority. |

| | |
|---|---|
| 1994 | A development application and accompanying environmental impact statement was lodged with Warringah Council for approval to continue to operate the landfill as an existing activity under the Sydney Regional Environmental Plan. |
| 1997 | Development consent was issued by Warringah Council with 78 consent conditions. One objection to the development application was lodged. As the result of an appeal to the approval, the matter was referred to NSW Land and Environment Court. |
| 1997 | The development application was approved by the NSW Land and Environment Court, with slight amendments to the consent conditions. |
| 2000 | The *Warringah Local Environmental Plan 2000* came into force, and the Kimbriki Resource Recovery Centre was rezoned to category Locality B9 Mona Vale Road East. |
| 2009 | Kimbriki Environmental Enterprises Pty Ltd was formed to own and operate the Kimbriki Resource Recovery Centre with the four SHOROC councils as shareholders. |

### 4.4.3 Existing facilities and services

The proponent operates a wide range of waste disposal and recycling activities at the Kimbriki Resource Recovery Centre. The layout of facilities at the centre is shown in Figure 4.6. The main activities and infrastructure are described below.

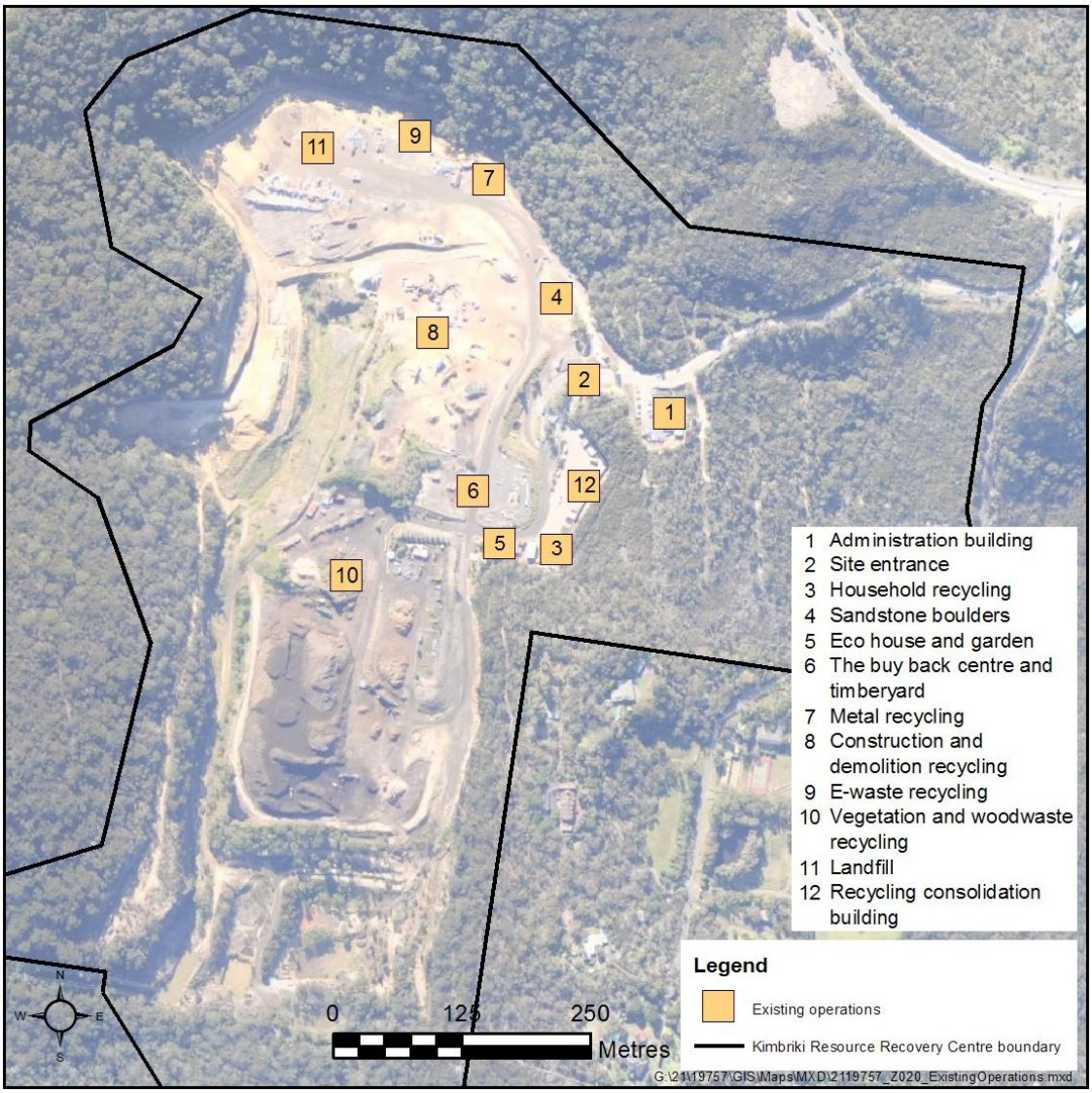



**Figure 4.6 Existing operations at the Kimbriki Resource Recovery Centre**

### Gatehouse, weighbridge and administration

The entrance to the Kimbriki Resource Recovery Centre is divided to separate vehicles carrying loads with fixed charges from those carrying loads requiring weighing for charging purposes. This ensures faster throughput during busy periods. Vehicles needing to be weighed are directed to the right over the weighbridge with all other vehicles directed to the left. Loads are assessed and colour coded tickets are issued to identify the class of waste or recyclables being delivered.




**Photo 4.1 Weighbridge**

The administration office (Photo 4.2) is located before the entrance to the Kimbriki Resource Recovery Centre and is staffed to assist with general enquiries, account services and the Eco House and Garden.




**Photo 4.2 Administration building**

### Household recycling area

Self-haul drop off of dry recyclables (paper, cardboard, containers) is delivered to the Household Recycling Area (area 3 on Figure 4.6). There are separate collection points for various recyclables including:

- Household recyclables such as bottle glass, recyclable plastics (polyethylene terephthalate (PET) and high density polyethylene (HDPE)), aluminium cans, and cardboard and paper;
- Vehicle batteries;
- Car tyres;
- Motor oil;
- Charity toy repair; and
- Charity clothing collection.

Material received in this area is consolidated and exported offsite for reprocessing/recycling.

The proponent has recently constructed a building for consolidation of kerbside recyclables (area 12 on Figure 4.6) collected from some of the SHOROC councils, to enable them to be bulked up and transported to a distant MRF. This building, which is shown in Photo 4.4, is intended to be used for this purpose until the MRF is built.



**Photo 4.3 Household recyclables drop-off area**




**Photo 4.4 Recyclables consolidation building**

### Sandstone boulders

Virgin sandstone rock is extracted (by ripping and hydraulic hammer) to construct a network of drains to create the surface water management system at the Kimbriki Resource Recovery Centre (see Photo 4.5). This also creates materials for sale; for use for engineering applications at the centre; and void space for landfill activities.

A portion of the extracted sandstone is crushed and screened onsite and is available for sale for use as an aggregate or fill material or for landscaping works. Also small and large sandstone boulders are available for sale (area 4 on Figure 4.6).




**Photo 4.5 Sandstone excavation**

### Eco House and Garden

In addition to waste management activities, the proponent has constructed and manages an educational facility, the Kimbriki Eco House and Garden (area 5 on Figure 4.6 and Photo 4.6). The Eco Garden and Eco House function centre were constructed from 95% reclaimed materials from landfill.

The Kimbriki Eco House and Garden centre was created to teach schools, local interest and community groups to consider some simple lifestyle changes to minimise garden and kitchen waste going to landfill and to use recycled materials for gardening and construction. Workshops (Photo 4.7) are conducted in this location.



**Photo 4.6 Eco House**



**Photo 4.7 Eco Garden workshop**

### Buy Back Centre and timberyard

Quality building materials, furniture and second-hand timber are salvaged from the landfill. Materials are separated, sorted and available for purchase from the Buy Back Centre and timberyard (Photo 4.8). The Buy Back Centre and timberyard is open seven days a week and caters for a range of customers from landscaping and construction wholesalers to residents. It is located at area 6 on Figure 4.6.



**Photo 4.8 Buy back centre and timberyard**

### Metal recycling

Metal, including whitegoods and car bodies, is placed in bins (area 7 on Figure 4.6) and collected by Sell and Parker for recycling. Non ferrous metals are collected for recycling by Associated Scrap. A total of approximately 4,500 tonnes of material is collected, recycled and diverted from landfill per year (Photo 4.9).




**Photo 4.9 Metal recycling area**

### Construction and demolition waste recycling

Concrete Recyclers (an onsite contractor) operates a construction and demolition waste recycling business (refer area 8 on Figure 4.6 and Photo 4.10), which receives approximately 70,000 tonnes of material per year. Material received includes waste concrete, asphalt, brick and roof tiles from local contractors and residents.

The material is carefully examined for potential contamination before being crushed to produce a range of recycled road bases, landscaping products, aggregates and sand. Other construction and demolition wastes are also recovered including metals, which are recycled with the other waste derived metals discussed above. Recycled products from brick, tile and concrete are available for sale.



**Photo 4.10 Construction and demolition recycling**

### E-waste recycling

Electronic waste (E-waste) is accepted at the centre and placed in the designated E-waste area (see area 9 on Figure 4.6 and Photo 4.11). The E-waste is then transferred to a specialised E-waste recycler for processing within Australia.

### Vegetation and wood waste recycling

Australian Native Landscapes (ANL) is an onsite contractor operating a vegetation and wood waste recycling business at the centre (area 10 on Figure 4.6). The operation receives approximately 70,000 tonnes of vegetation and wood waste per year.

The material is shredded and stockpiled for up to six months (see Photo 4.12) before it is screened and used to produce a variety of woodchip mulch and compost which can be purchased onsite alongside other horticultural products.




**Photo 4.11 E-waste collected during a council E-waste drop off weekend**



**Photo 4.12 Vegetation shredding**

### Landfill

Mixed non-putrescible waste is placed into the landfill (Photo 4.13), with some materials such as steel and pallets recovered from the tipping area for offsite export for beneficial reprocessing. Useful items like timber, windows and doors, furnishings and other household items are also extracted for sale at the Buy Back Centre.



**Photo 4.13 Landfilling operations**

### 4.4.4 Licences and approvals

The following approval and licences apply to the Kimbriki Resource Recovery Centre:

- *Development Consent 96/371* issued by Warringah Council – a consent under Section 91 of the EP&A Act, with an effective date of 10 July 1997;
- *Environment Protection Licence Number 13090* issued by Department of Environment and Climate Change (DECC) (now DECCW) under the POEO Act covering the scheduled activity – Composting;
- *Environment Protection Licence Number 13091* issued by DECC (now DECCW) under the POEO Act covering the scheduled activities:
  - Extractive activities;
  - Waste storage;
  - Waste processing (non-thermal treatment); and
  - Waste disposal (application to land).

#### Development Consent 96/371

Development Consent 96/371 (Appendix O) lists 78 consent conditions including that development must be carried out generally in accordance with the Development Application (received 12 October 1994), and as amended by additional information titled *'Environmental Impact for Present and Future Operations – Additional Information to Support the Environmental Impact Statement*' dated July 1995, *'Bat Survey'* dated 8 March 1996, and *'Report of Leachate Disposal by Injection into Existing Waste'* dated October 1996.

The Development Consent 96/371 approved the continued use of the Kimbriki Resource Recovery Centre as a non-putrescible landfill, the extension of the life of the landfill by increased

recycling, expansion of the landfill volume through quarrying and selling of ripped and bouldered sandstone, the construction of water pollution control facilities, and the rehabilitation of the site to an appropriate end use.

The Environmental Impact Statement accompanying the 1994 Development Application (Kinhill 1994) predicts the level of incoming waste to be 300,000 tonnes per year after 2007, and potentially up to 400,000 tonnes if economic activity is increased significantly. Hence the expected increase in waste flows to the Kimbriki Resource Recovery Centre as a result of the project (to approximately 348,000 tonnes per year) is consistent with the 1994 Development Application future estimates of annual incoming waste.

The 1994 Development Application (Kinhill 1994) also estimated that approximately 50% of incoming waste would be sold for recycling purposes, with the remainder landfilled. Since that time, the proponent has achieved even greater diversion of waste from landfill (approximately 70%) through improved recovery and recycling practices/technologies. This figure would be slightly lower when operations commence with a gradual increase in resource recovery as the project matures. At no time would the Kimbriki Resource Recovery Centre recycling level drop below 60%.

The Development Consent 96/371 lists four conditions for minimising the impact on the surrounding road network including road works at the intersection of Mona Vale Road and Kimbriki Road, money to be put into a trust fund for to cover 25% of the cost of traffic signals for the intersection (until signals are required), construction of a second inbound lane along the access road to the gatehouse and signage at the entrance on Kimbriki Road. The proponent has been provisioning these funds so that they are available when the RTA confirms the usage of signals conforms with its management plans for Mona Vale Road.

### Environment Protection Licence Number 13090

EPL 13090 authorises the carrying out of composting, waste storage and resource recovery. It allows the proponent to:

- Compost wood waste and garden waste; and
- Store and recover building and demolition waste.

There are no volume or mass limits applicable to these wastes/activities.

### Environmental Protection Licence Number 13091

EPL 13091 authorises the carrying out of extractive activities and waste disposal (application to land). It allows the proponent to:

- Store, process (non-thermal treatment) and dispose (application to land) of General Solid Waste (non-putrescible); and
- Dispose (application to land) of Asbestos Waste and Waste Tyres.

The EPL places an upper limit of 30,000 to 50,000 tonnes per year of sandstone extraction. There are no other volume or mass limits applicable to these wastes/activities.

### 4.4.5 Environmental management

#### Leachate management

Leachate is managed using a subsurface leachate collection system that transfers leachate to a sub-surface leachate reservoir, located at the southern end of the centre. This prevents it from discharging to Deep Creek.

A leachate cutoff barrier has been installed across the open end of the valley to collect and recirculate leachate generated from the landfill. The leachate is contained by the very low permeability underlying sandstone units and is recirculated by pumping from the reservoir into dry wells located in the upper waste mass, from where the leachate percolates back through the waste mass. The biological activity stimulated by this recirculation reduces the total nutrient content of the leachate.

#### Landfill gas management

There are no specific licence conditions relating to landfill gas monitoring at the Kimbriki Resource Recovery Centre, as a result of the low organic content of the waste. However, the proponent has embarked on a rigorous program of field testing for methane emissions from the entire Kimbriki Resource Recovery Centre, both within the active landfill and previously filled areas. Follow-up tests have been conducted to confirm the results. On-going monitoring of potential methane emissions will be conducted on an annual basis.

There is a requirement for quarterly testing for potential methane emissions of the area used for storage of composting organic matter. The proponent engages a consultant to conduct this testing, and any non-conformances are reported to the responsible contractor. The proponent ensures the responsible contractor undertakes appropriate remediation activities.

#### Water management

Surface water management mainly consists of a system of perimeter and cut-off drains (as shown in Figure 4.7) to ensure clean runoff entering the Kimbriki Resource Recovery Centre is intercepted before it comes into contact with waste materials.




**Figure 4-7 Existing stormwater management**

Surface water runoff from the interim capped and revegetated landfill area is collected by two inner perimeter drains. The drains terminate in two sedimentation dams near the southern boundary of the Kimbriki Resource Recovery Centre, and a third surface water holding dam which contains the discharge from the sedimentation dams during intermittent rainfall events.

The eastern sedimentation dam measures 70 m x 10 m x 2 m and has a current capacity of 1.5 ML. The western sedimentation pond measures approx 60 m x 20 m x 3 m and has a holding capacity of 3 ML. Along the western drain there are four siltation ponds, each measuring approximately 5 m x 5 m x 2 m. The central surface water holding dam measures 65 m x 40 m x 8 m and has a holding capacity of 20 ML.

The sedimentation dams are cleaned out annually. The eastern dam was cleaned out during October 2010. The western sedimentation dam was cleaned during September 2009. This dam is scheduled for clean out when rainfall conditions allow.

Water being held in both of the sedimentation dams is regularly siphoned into the surface water holding dam. Use of a siphon allows for access of the top layer of water from the sedimentation dams, which has the lowest level of suspended solids. This practice also allows for the water truck to fill from the surface water holding dam and ensures that the entire system has capacity to deal with intermittent rain events without discharging offsite.

### Fire management

There are two key areas for fire management:

- The early detection and assessment of bushfires in adjoining public lands and national parks; and
- Fire events within the active landfill or organic wastes in the composting area.

The onsite occupational health and safety system incorporates evacuation provisions in the event of bushfires, and regular communication with the Warringah/Pittwater Rural Fire Service. This ensures that the proponent is informed about potential threats and other activities such as hazard reduction burn off.

Early detection of any fire events is managed by a system of daily inspections within the centre and continual inspections of the landfill and organic composting areas by operational staff. In most cases, fires within the waste are minor localised events, easily managed with earthmoving equipment and the onsite water spray truck. The obligations of all staff in the event of a major fire within the waste or materials onsite are outlined in the occupational health and safety system.

### Litter management

Daily monitoring of the Kimbriki Resource Recovery Centre is undertaken for litter. In addition, the following activities are undertaken to minimise litter:

- Covering landfill waste daily;
- Litter retaining devices within the household recycling area;
- Gross pollutant traps at discharge points;
- Regular litter patrols;

- Signage requiring vehicles to cover loads; and
- Supplying 'cover your load' advice to customers.

The proponent also monitors the immediate vicinity and collects any illegally dumped waste for proper disposal.

#### Utilities and services

Electricity is supplied in high voltage form to two pole mounted sub-stations on the Kimbriki Resource Recovery Centre, which then feed low voltage electricity to the remainder of the Kimbriki Resource Recovery Centre through a network of overhead cables. A third pole mounted substation with a capacity of approximately 400 kVA is currently being installed to service the Eco-house and the construction and demolition recycling area.

The centre is supplied with water from the mains supply for use for amenities. This water is supplemented by tank water. Water intensive applications, including dust suppression and gardens, are supplied by water obtained from sedimentation dams onsite.

Effluent from the amenities is disposed of via a pump-out style septic system.

Phone services are supplied by aerial cable, data services by sub-surface fibre-optic cables.

#### Hours of operation

The Kimbriki Resource Recovery Centre is open to the public from 7:00 am to 5:00 pm, seven days a week including all public holidays except Good Friday and Christmas Day. The proponent's personnel and contractors are onsite between 6:00 am and 6:00 pm.

### 4.4.6 Environmental monitoring

Table 4.2 lists the environmental monitoring currently undertaken at the Kimbriki Resource Recovery Centre as per the requirements of EPLs 13090 and 13091.

**Table 4.2 EPL 13090 and 13091 environmental monitoring requirements**

| Type of monitoring points | Pollutant | Frequency |
|---|---|---|
| | ***EPL 13090*** | |
| Methane emissions (from vegetation stock piles) | Methane | Yearly / Quarterly |
| | ***EPL 13091*** | |
| **Groundwater** | Aluminium | Yearly |
| | Cadmium | Yearly |
| | Calcium | Yearly / Quarterly |
| | Chloride | Yearly / Quarterly |
| | Chromium (XI) | Yearly |
| | Chromium (total) | Yearly |
| | Cobalt | Yearly |

| Type of monitoring points | Pollutant | Frequency |
|---|---|---|
| | Dissolved oxygen | Yearly / Quarterly |
| | Copper | Yearly |
| | Ethyl benzene | Yearly |
| | Faecal coliforms | Yearly / Quarterly |
| | Lead | Yearly |
| | Manganese | Yearly |
| | Nitrate + nitrite | Yearly |
| | Nitrogen (ammonia) | Yearly / Quarterly |
| | Organochlorine pesticides | Yearly |
| | Organophosphate pesticides | Yearly |
| | Polycyclic aromatic hydrocarbons | Yearly |
| | Toluene | Yearly |
| | Total Phenolics | Yearly |
| | Xylene | Yearly |
| | Zinc | Yearly |
| | Total organic carbon | Yearly / Quarterly |
| | Total petroleum hydrocarbons | Yearly / Quarterly |
| **Surface water** | Barium | Yearly / Quarterly |
| | Benzene | Yearly / Quarterly |
| | Dissolved oxygen | Quarterly |
| | Faecal coliforms | Quarterly |
| | Redox potential | Quarterly |
| | Total dissolved solids | Yearly / Quarterly |

Notes: Surface gas monitoring – monitoring point 1 (EPL13090)
Discharge to waters - monitoring points 1-3 (EPL13091)
Surface water quality monitoring - monitoring points 5-15 (EPL13091)
Groundwater quality monitoring - monitoring points 16-20 (EPL13091)

Figure 4.8 shows the locations of the existing surface water and groundwater monitoring locations.

Clause L3 of EPL13091 outlines the following concentration limits for surface water discharges from the Kimbriki Resource Recovery Centre, due to a rainfall event of 5-year Average Return Interval 24-hour storm event or less:

- pH 6.8 to 8.5;
- Total suspended solids 50 mg/L;
- Biochemical oxygen demand 20 mg/L; and
- Nitrogen (ammonia) 1 mg/L.

There are no limits specified in EPL 13091 for any other analytes/potential contaminants that are required to be monitored in the licence.

The three offsite discharge points contained within EPL13091 are described as follows:

- Point 1. Discharge from western sedimentation dam to intermittent tributary of Deep Creek;
- Point 2. Discharge from eastern sedimentation dam to intermittent tributary of Deep Creek; and
- Point 3. Discharge from central surface water holding dam to intermittent tributary of Deep Creek.

Points 1 and 2 are current discharge points, while Point 3 (surface water holding dam) is a dam utilised for the overflow of water from the two sedimentation holding dams during intermittent rain events and that there is no discharge from this point at any time.

The proponent has been performing surface water monitoring prior to the year 2000. This monitoring includes both discharge monitoring (during and following rain events) and surface water monitoring. The results of this monitoring are reported to the DECCW in an annual return. Chapter 12 provides a snapshot of recent surface water and groundwater monitoring results from locations at the Kimbriki Resource Recovery Centre that are relevant to the site.

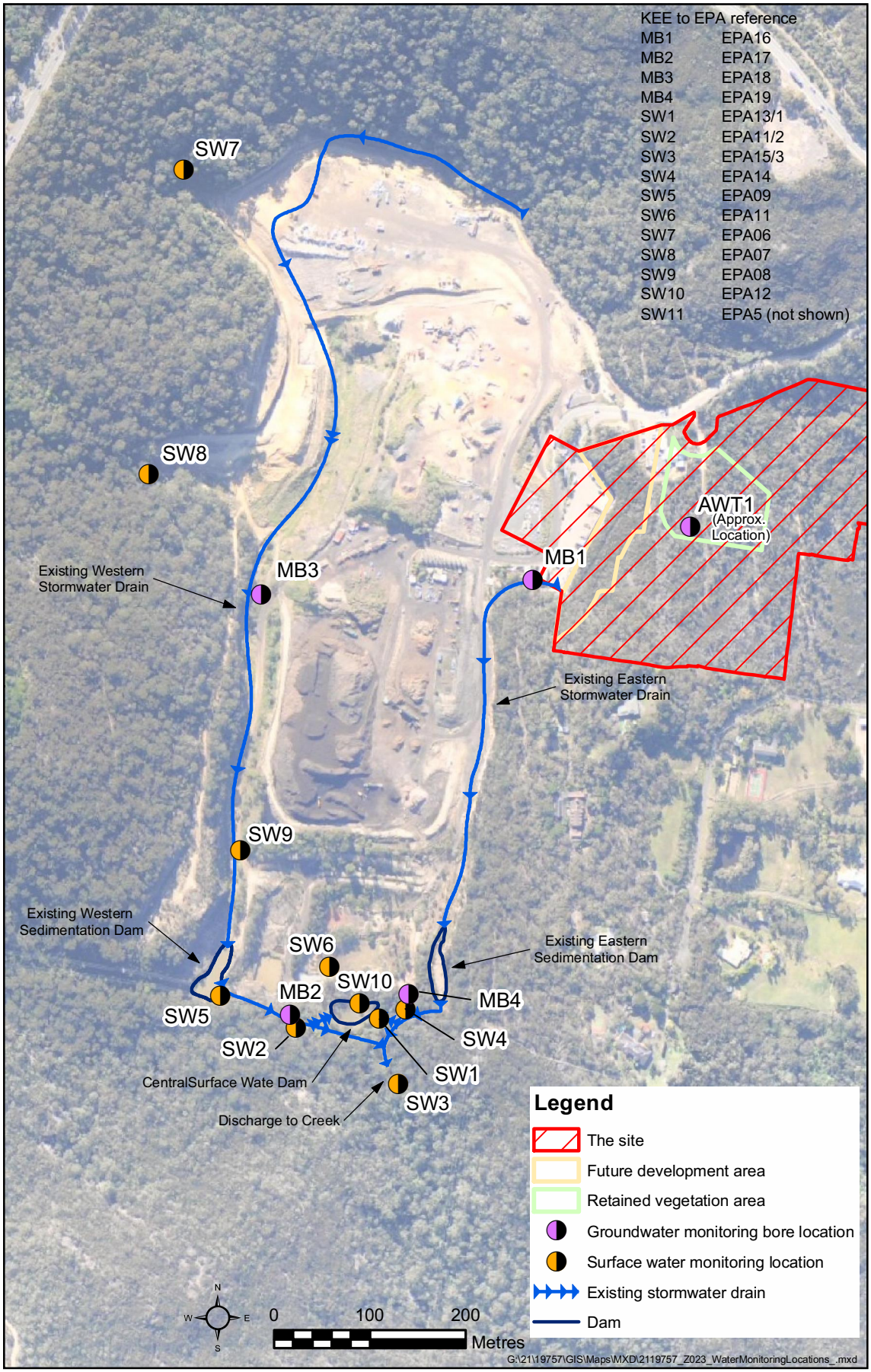



**Figure 4-8 Water monitoring locations**

In addition to the methane, groundwater and surface water monitoring described in Table 4.2, the proponent undertakes regular monitoring of environmental conditions at the Kimbriki Resource Recovery Centre, including monitoring of:

- Dust;
- Leachate;
- Litter;
- Rehabilitation and pollution controls;
- Records of pollution complaints; and
- Rainfall.

Figure 4.9 shows the locations of the existing five dust monitoring points.

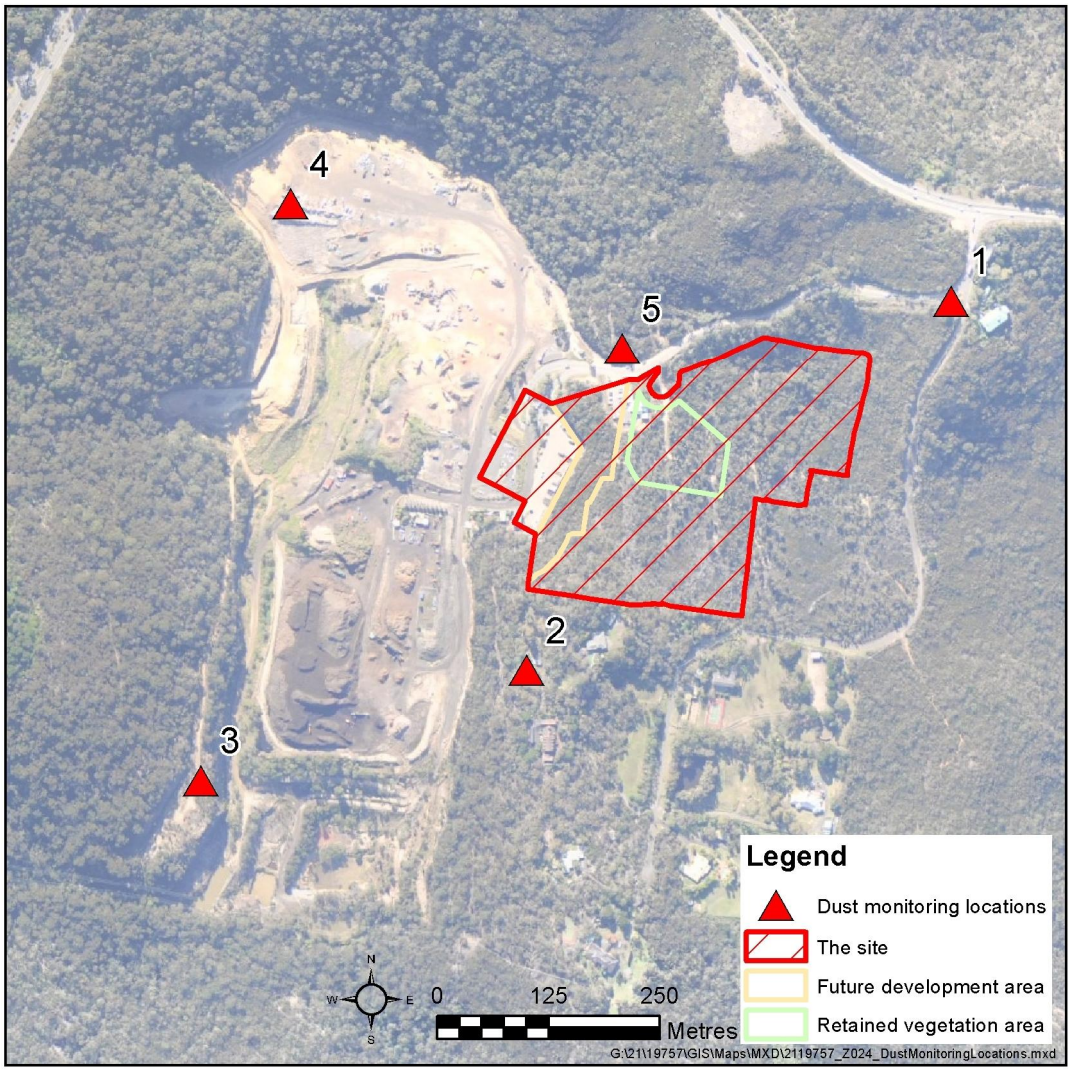



**Figure 4.9 Dust monitoring locations**

### 4.4.7 Proposed future works to improve environmental management at the Kimbriki Resource Recovery Centre

#### Management plan

To minimise the possibility of surface water runoff that contains high levels of suspended solids, the proponent has a management plan for the Kimbriki Resource Recovery Centre. This is detailed in its Landfill Environmental Management Plan (LEMP). In accordance with the LEMP, observations of the drainage system are made during rain events and as a result any necessary improvements in siltation control measures are implemented.

#### Cut off drains

The LEMP identifies the construction of a proposed outer perimeter cut off drain on a line that would essentially follow the boundary line of the landfill at its ultimate capacity. This drain would intercept waters flowing on to the Kimbriki Resource Recovery Centre from the extended catchment thus reducing flows to sedimentation dams from the extended catchment. This would allow for increased capacity within the sedimentation dams for surface waters generated onsite. Preliminary drawings and plans have been prepared for the northern section of this drain and it is planned to call tenders for the construction of this drain in early 2011.

#### Surface water management

The proponent has initiated other activities to better manage the movement of surface water on and off the Kimbriki Resource Recovery Centre including;

- A programme to hard surface all access roads, to ensure that any possibility of sedimentation runoff is minimised;
- Improving site drainage to relocate surface water flows away from the potential of mixing with waste and creating leachate. The first stage of this surface water diversion has involved new drainage lines being installed on the eastern and western sides of the facility. These new systems are designed to intercept the large amounts of surface water that flow onto the Kimbriki Resource Recovery Centre due to a catchment that extends to Mona Vale Road and manage water flows. These drainage systems are located in bedrock and do not traverse any area of the Kimbriki Resource Recovery Centre that has been previously landfilled. The construction of these drains was completed in April 2010. Siltation barriers were utilised during construction to prevent excavated materials entering the drainage system. Following construction the perimeters of these areas have been or are currently being vegetated.

#### Increased reuse of sedimentation pond water

The water collected in the sedimentation ponds is primarily used for dust suppression on the Kimbriki Resource Recovery Centre. Every fine day, approximately 100 kL of stored water is used for dust suppression onsite. Water within the western sedimentation dam is siphoned to the central dam for use in the water truck.

Surface water is also used for the irrigation of onsite landscaping as well as irrigating the Eco House and Garden complex. Surface water is also utilised in the vegetation processing area for dust management of vegetation management and washing down the hard stand discharge area.

Investigations are currently underway for the use of surface waters as dust suppression within the construction and demolition processing area.

### Continuing improvements

The proponent has implemented a policy to install silt trap fencing in areas where landfill operations will not be conducted for some time. This is in addition to the revegetation of the areas, especially the landfill batters.

A feasibility study has been completed, final concept confirmed and capital allocated for 2010/11 for works on the high level drain. Relocation of the crusher plant and current landfill operations will be subject to a revised water containment remediation plan, which is currently being prepared by the proponent.

# Part B
# The Project

# 5 Strategic context, project need and alternatives

*This chapter summarises the strategic framework that influenced development of the project, including the waste strategies at the metropolitan, regional, state and national levels. It also describes the need for the project and the alternatives that were considered and assessed during the project development process.*

## 5.1 Strategic planning drivers

### 5.1.1 National Waste Policy

The Commonwealth Government has recently developed a National Waste Policy: *Less Waste More Resources* (Environment Protection and Heritage Council 2009). The policy, which was adopted on 5 November 2009, builds on the 1992 *National Strategy for Ecologically Sustainable Development* and attempts to reduce the environmental impact of waste disposal. The policy sets the direction for Australia over the next 10 years, aiming to produce less waste for disposal and manage waste as a resource to deliver economic, environmental and social benefits. The policy establishes a comprehensive program for national coordinated action on waste across six key areas, being to:

- Provide a coherent, comprehensive national framework for waste management, resource recovery and waste avoidance over the next decade;
- Enable Australia to meet its international obligations in regards to the management of hazardous wastes and substances and persistent organic pollutants into the future and reduce the risk and legacy for future generations;
- Address market impediments and streamline the regulatory frameworks so that national companies and small businesses can operate effectively and efficiently and manage products and materials responsibly during and at end of life;
- Provide national leadership on waste and resource recovery where it is needed and facilitate collaboration between the states on national issues;
- Contribute to climate change, sustainability, innovation and employment opportunities; and
- Be high impact and cost effective by setting clear national directions and through collaborative, carefully targeted action that incrementally builds on the existing efforts of governments over a ten year period.

The overall objectives of the National Waste Policy are that all wastes, including hazardous wastes, are managed in a way that is consistent with Australia's international obligations, to protect human health and the environment. The policy also seeks to ensure that risks associated with waste are understood and managed to minimise intergenerational legacy issues.

The project would:

- Manage waste as a resource;

- Deliver economic, environmental and social benefits; and
- Contribute to sustainability, innovation and employment opportunities.

The project is therefore consistent with the aims and objectives of the National Waste Policy.

### 5.1.2 NSW strategic planning drivers

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

#### NSW Waste Avoidance and Resource Recovery Strategy

NSW Government's direction for waste is expressed in the WARRS 2007, which provides the framework for maximising conservation of natural resources and minimising environmental harm from waste management and disposal of solid waste. As indicated in Table 5.1, the strategy includes four key outcome areas and associated targets.

**Table 5.1 Broad targets for each outcome area in the WARRS 2007**

| Outcome area | Target |
|---|---|
| Preventing and avoiding waste | To hold level the total waste generated for the next 5 years |
| Increasing recovery and use of secondary resources | By 2014, to:<br>Increase recovery and utilisation of materials from municipal sector from the current 26% to 66%<br>Increase recovery and utilisation of materials from the commercial and industrial sector from the current 28% to 63%<br>Increase recovery and utilisation of materials from the construction and demolition sector from the current 65% to 76%. |
| Reducing toxic substances in products and materials | By 2014 or earlier:<br>To phase out priority substances in identified products as a first choice or if not possible to achieve maximum recovery for re-use and;<br>Where identified products containing these priority substances require disposal as a last resort, the permitted 'leachability' of the substances will be reduced to the levels that are permitted for inert waste. |
| Reducing litter and illegal dumping | Reduce total volume and tonnages of litter reported annually.<br>Reduce the total tonnages of illegally dumped material reported by regulatory agencies and RID squads annually. |

The project would assist SHOROC councils achieve the increased recovery and usage rates mentioned above. Resource recovery activities currently provided by SHOROC councils from kerbside collections include:

- Kerbside collection of dry recyclables; and

- Kerbside collection of garden wastes.

Table 5.2 lists the historic waste generation and recycling performance rates for the SHOROC councils and the SHOROC region as a whole, based on recent waste audits.

**Table 5.2 Waste generation and recycling rates in SHOROC in 2007-2008**

| Municipal kerbside collections | Mosman | Manly | Warringah | Pittwater | SHOROC |
|---|---|---|---|---|---|
| Residual waste (tonnes) | 6,195 | 6,954 | 26,000 | 11,255 | 50,404 |
| Recyclables (tonnes) | 4,452 | 6,214 | 18,500 | 9,388 | 38,554 |
| Garden organics (tonnes) | 1,068 | 1,637 | 7,500 | 2,191 | 12,396 |
| Clean-up (tonnes) | 366 | 846 | 4,500 | 1,073 | 6,785 |
| Resource recovery rate | 46% | 50% | 46% | 48% | 47% |
| Waste generated (kg/person) | 418 | 399 | 389 | 422 | 400 |

Source: EC Sustainable (2007)

Table 5.2 shows that a total of around 108,000 tonnes of waste or 400 kg per person was generated in the SHOROC region in 2007-08 and of this approximately 51,000 (47%) was recovered. At current generation rates, to achieve the State Government target of 66% resource recovery for the municipal sector, the SHOROC councils would need to recover a further 21,000 tonnes per annum.

Furthermore, waste audits undertaken in 2007 (EC Sustainable 2007) identified that across the SHOROC region, the mixed residual waste bins contained:

- 44% (or 22,000 tonnes) of food or garden organics; and
- 22% (or 11,000 tonnes) of dry recyclables.

This data indicates that further recovery of approximately two thirds of the materials contained in these two streams would be required to enable SHOROC councils attain the 66% recovery rate (WARRS 2007) from kerbside collections.

The project is consistent with the WARRS 2007 as it is built around the diversion of a high level of food waste from kerbside collected mixed residual waste to the kerbside collected food and garden waste. Once attendant bin system changes and associated community participation is engaged the project would deliver the NSW Government's target of 66% resource recovery from the municipal sector for SHOROC.

### Sydney Metropolitan Strategy 2005

The Sydney Metropolitan Strategy ('City of Cities: A Plan for Sydney's Future') was released in 2005. The strategy is a broad framework to facilitate and manage growth and development over 25 years.

One of the aims of the strategy is to reduce the amount of waste produced by Sydney:

> *'4. Protect the environment*
>
> *Protect Sydney's unique environmental setting and reduce the city's use of natural resources and production of waste.'*

The project is consistent with the aims of the Sydney Metropolitan Strategy 2005 as it incorporates layout and design features which minimise environmental impacts and protect the environment. These include:

- Locating the project adjacent to an existing resource recovery centre;
- Designing the building and infrastructure layouts to avoid significant vegetation losses;
- Designing buildings to sit at a low elevation to minimise amenity impacts on neighbours; and
- Enclosing processing activities within buildings to minimise litter, noise and odour.

## 5.2 Regional drivers

### 5.2.1 SHOROC collaboration

The four SHOROC councils have a long history of collaboration and cooperation on many fronts, including initiatives targeting the environment.

The councils have a strong and transparent financial relationship through their collaborative business activity at the Kimbriki Resource Recovery Centre, a business that turns over in excess of $17 million per annum on behalf of the four councils. In recent years, the councils have collectively acquired neighbouring properties to the Kimbriki Resource Recovery Centre to improve buffer distances and to establish collective financial reserves against long term closure and post-closure costs.

In 2009 the four councils signed off on a Shareholders agreement which dictates their relationship with the proponent as well as signing off on a Waste Services Agreement guaranteeing the supply of waste to the Kimbriki Resource Recovery Centre. These two documents legally bind the four Councils to the project and the proponent as well as signifying their commitment to a regional approach to waste management.

### 5.2.2 SHOROC Sustainable waste management strategy

Having determined a preferred option for future resource recovery and waste management for the region (as discussed in section 5.5.1), the SHOROC councils requested that the proponent prepare a business plan and a specific business case for the preferred option of managing waste and resource recovery for the SHOROC region at the Kimbriki Resource Recovery Centre.

These plans have then set the scene for the councils to develop their internal waste management and resource recovery strategies. To this end the councils have:

- Worked towards synchronising collection contracts across the region;
- Rolled out common collection systems and bin configurations across the region;
- Developed and distributed common-theme waste education material to the communities; and
- Agreed to contract the proponent as the resource recovery and waste processing service provider for the four councils.

The overall strategy has been shaped by the collective efforts of the proponent and the SHOROC councils. It would involve the introduction of waste processing at the Kimbriki

Resource Recovery Centre. This would increase the level of resource recovery from the municipal sector, and stabilise residual wastes to render them suitable for disposal at the existing landfill.

The strategy aims to deliver long-term surety to the SHOROC councils and their communities; high-level resource recovery; and an extended life for the landfill at the Kimbriki Resource Recovery Centre.

## 5.3 The proponent's objectives and drivers

The proponent aims to be a leader in waste management education and practice, through the use of innovative technologies and management systems that maximise resource recovery. The proponent's focus is to divert waste from landfill in line with State Government waste targets and SHOROC waste management objectives.

The proponent has developed a set of strategic goals listed below:

- Goal 1 *Lead the way:* Identify for its customers and shareholders future business opportunities and ensure the delivery of proven, equitable and sustainable solutions based on technology, facilities and operations that are managed efficiently and effectively under the principles of best practice, while providing for innovation in service delivery, continuous improvement and the protection of the local environment.
- Goal 2 *Community endorsement:* Ensure a high level of community and stakeholder understanding, trust, engagement, participation, acceptance and support for current and future operations allowing for continued operations and the development of the business through the adoption of open and transparent community and stakeholder communication and education practices.
- Goal 3 *Focus on resource recovery:* The continued evaluation of all incoming waste streams with respect to the potential for extended resource extraction and the development of quality assured products for sustainable high value end markets and applications while ensuring that there is no environmental or public health related harm caused from the end use of the recovered products.
- Goal 4 *Landfill airspace preservation:* Ensure that all current and future operating practices focus on the minimisation of landfill airspace utilisation enabling the proponent to provide for the long-term waste management capacity requirements of future generations.
- Goal 5 *Establish and maintain the team:* Attract, employ, develop, reward and retain the required resource, intellectual property, and skills base to manage and deliver upon all current and future operations, while providing for employee safety, industry know how, succession planning and the future requirements of the business.
- Goal 6 *Create shareholder value:* Maximise and maintain the profitability of all current and future operations providing for increasing shareholder returns while maintaining sufficient working capital within the business to ensure the sustainable delivery of services and operational practices into the future.
- Goal 7 *Focus on business compliance:* Develop, implement and maintain the required systems and procedures to ensure that the proponent's corporate governance, safety, environment, quality assurance, human resource, information, risk, financial and

administration management systems are sufficient for the current and future management, reporting and compliance requirements of the business.

The project meets the proponent's objectives and business strategy.

## 5.4 Project need

The project addresses the need for a disposal solution for residual putrescible waste from the SHOROC region beyond 2014. The need arises from:

- The closure of Belrose landfill in 2014; and
- The limited putrescible landfill capacity remaining in Sydney.

Moreover, the project addresses the need for the disposal solution to be a **local** solution - in order to avoid both the greenhouse gas emissions and the costs associated with the long-haul transport of waste across or outside the Sydney region.

The project also addresses the need to manage the future costs of waste disposal for the SHOROC community responsibly by:

- Avoiding increasing landfilling costs resulting from the POEO Act Section 88 Waste and Environment Levy;
- Reducing potential liabilities from a price on carbon, both from:
- Emissions from landfill (due to pre-stabilisation and increased diversion); and
- Indirect increased fuel costs associated with long-haul transport of waste.

These are described below.

### 5.4.1 Need for a waste management solution beyond 2014

#### Closure of Belrose landfill

Residual putrescible waste collected from within the SHOROC region is currently disposed of to landfill at the Belrose WRC, under an exclusive arrangement between WSN Environmental Solutions (owner of the Belrose WRC) and the SHOROC councils. The contract for this disposal arrangement expires in November 2014 when the landfill is expected to be completely filled. The Belrose WRC will therefore not be in a position to receive and landfill SHOROC kerbside-collected putrescible waste after this time.

#### Limited putrescible landfill capacity in Sydney

The NSW Government is no longer approving development applications for waste disposal within the Sydney basin unless they either have significant pre-treatment in the form of an AWT facility or are for non-putrescible waste only. However there are only a limited number of operating AWT facilities and as a result, existing putrescible landfills are being heavily utilised and putrescible landfill capacity in Sydney is becoming increasingly scarce.

Once the Belrose WRC is closed there will be no licensed facilities for landfilling putrescible wastes within the Sydney Metropolitan Area north of Sydney Harbour/Parramatta River. Jacks Gully landfill at the Macarthur Resource Recovery Park is closed and reserved to accept residuals from the adjacent AWT facility only. The only other major putrescible waste landfills in

Sydney (at Lucas Heights and Eastern Creek) are also scheduled to be closed to general putrescible waste within the next three to five years (Wright Corporate Strategy 2009).

Hence there is a clear need for to develop a facility to manage and dispose of mixed residual waste from the SHOROC region after 2014. The project would address this need.

### 5.4.2 Need for the waste management solution to be a local solution

Outside of the Sydney metropolitan area a large putrescible landfill has been developed south of Sydney at Tarago, near Goulburn in the southern highlands of NSW. It is serviced by an intermodal transfer facility at Clyde. This landfill helps bridge the gap between disposal of kerbside collected mixed residual waste straight to landfill and the development of AWT facilities of sufficient capacity to meet Sydney's putrescible waste treatment needs. It is likely this regional landfill will be one of the last options for disposal of untreated putrescible waste by 2020.

Consequently, if there were no alternative local arrangements for landfill disposal after 2014, mixed residual (putrescible) waste from the SHOROC region would need to be transferred by long-haul vehicles to remote landfills. This would most likely be initially for a short time to Lucas Heights and then to the Clyde intermodal transfer station (and onto Tarago by rail), or to another as yet unknown location.

Transfer of waste long distances generates significant quantities of greenhouse gases. The greenhouse gas emissions assessment for the project (refer chapter 13) demonstrates that for every 10 km (one-way) distance that mixed residual waste from the SHOROC region would need to be transported, an additional 170 tonnes of carbon dioxide equivalents (t $CO_2$-e) of emissions per year would be generated. In addition, there would be significant costs associated with long-haul transport of waste across Sydney or beyond, particularly with the potential introduction of a price on carbon.

To avoid the costs and significant greenhouse gas emissions associated with long-haul transport of waste, there is a clear need for local waste management solutions. The project would address this.

### 5.4.3 Need for responsible management of future waste disposal costs

#### Increasing Waste and Environment Levy costs

The NSW Government, under section 88 of the POEO Act, applies the waste and environment levy to every tonne of waste sent to landfill. This levy increases every year. In 2010-2011 it is $70.30/tonne in the Sydney metropolitan area. It is scheduled to rise each year by $10/tonne plus CPI through to 2015-16. By 2015-16 the cost of the levy will exceed the underlying cost of landfill disposal, more than doubling the cost of landfill disposal by that time.

The levy is designed to encourage resource recovery and recycling of waste. It is generally added to the disposal charges set by landfills. It provides businesses, councils and individuals an incentive to reduce the amount of waste generated, and encourages them to seek alternatives to landfill disposal.

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

#### Potential price on carbon and increasing landfill emissions and transport costs

While the Commonwealth Government's Carbon Pollution Reduction Scheme (CPRS) was not passed by Parliament and the fate of the legislation is uncertain, the Commonwealth Government's position is that the scheme has not been withdrawn. Rather, the scheme is postponed until 2013 when the international position is better known, following the end of the first Kyoto round (2012).

Based on the responses of other countries at that time, the scheme would be reassessed, and the legislation possibly reintroduced. Practically this means that any potential liabilities under the proposed CPRS have been postponed, but not yet removed. Alternatively, there is a possibility that the Commonwealth Government may introduce a different scheme which could also put a price on carbon.

Either way, it is likely that in the future disposal of putrescible waste to landfill will incur additional costs associated with emissions from landfill due. Therefore, there is a need to minimise these potential carbon based costs.

The project would address this need by reducing the amount of waste being disposed of to landfill and stabilising the mixed residual waste prior to landfilling to minimise the greenhouse gas generation potential from landfill degradation.

Furthermore, and as discussed in section 5.4.2, the project would avoid costs associated with long-haul transport of mixed residual waste across Sydney or beyond.

#### Combined impact of increasing costs

The combined impact of these increases is expected to push the cost of on-going landfill disposal of SHOROC's putrescible waste to $300 per tonne by 2014. These costs would continue to rise and become more volatile beyond that time.

This compares to the project's estimated cost of disposal commencing at around $300 per tonne in 2014 but with significant surety and stability on future disposal costs. The final cost would be determined by the technology selected, and the availability of markets for composts and compost-like products.

Hence the project would address the need to manage the future costs of waste disposal for the SHOROC community responsibly.

## 5.5 Alternatives considered and justification of the preferred option

### 5.5.1 Developing options for waste management in the SHOROC region

The SHOROC councils have been actively considering and planning for alternatives to the landfill disposal of waste at the Belrose WRC for at least the last ten years.

In 2006 the SHOROC councils established a set of objectives against which potential options would be considered and rated. The councils sought an objectives based approach to evaluating and selecting a preferred option, and a methodology that could be re-visited at a later date to clarify why particular decisions on alternative options had been pursued.

The objectives the councils sought to satisfy were based on key areas of risk that needed to be managed. The identified risk areas and objective criteria to be satisfied included:

- *Risks* that are posed for SHOROC councils:
  - financial certainty
  - technical certainty in performance
- Constraints on future *flexibility* that might arise:
  - kerbside collection configurations
  - process technology flexibility to adapt to change
- *Carbon* implications of the decision:
  - transport of kerbside wastes for processing and residual wastes for disposal
  - disposal of unstabilised organics to landfill
- Level of *independence* from external third parties:
  - availability of disposal options for residuals
  - price and stability of disposal
- Level of *resource recovery* that the may be achieved:
  - delivering State level waste targets
  - viable markets for products

Options were therefore considered and assessed against the objectives. Alternatives considered included:

- Continuing to use landfill as the main waste management system;
- Alternative waste technologies at sites within and external to the SHOROC region; and
- Potential sites within SHOROC for alternative waste technologies.

The six options that were assessed in detail are listed in Table 5.3.

**Table 5.3 Alternatives considered**

| Option | Description |
|---|---|
| Option 1 | Transfer waste at Belrose Transfer Station and road haul to a landfill at either Eastern Creek or Lucas Heights, until those facilities close (by 2020). |
| Option 2 | Transfer waste at Belrose Transfer Station and road haul to Clyde Intermodal Transfer Station for rail haulage to the landfill at Woodlawn. |
| Option 3 | Transfer waste at Belrose Transfer Station and road haul to Eastern Creek where the UR3R™ AWT facility may be positioned to receive and process the waste. |
| Option 4 | Transfer waste at Belrose Transfer Station and road haul to Lucas Heights where the proposed Ecolibrium™ AWT facility may be positioned to receive and process the waste. |
| Option 5 | Transfer waste at Belrose Transfer Station and road haul to Clyde Intermodal Transfer Station for rail haulage to Woodlawn where a future AWT might be built that could receive and process the waste. |
| Option 6 | Develop AWT facilities within the SHOROC region at the Kimbriki Resource Recovery Centre and manage resource recovery and residual waste disposal entirely within the region. |

The six options were assessed against the objectives from the perspectives of the SHOROC councils and their communities, and the proponent as manager on behalf of the councils. The assessments were undertaken in workshops separately with the proponent's staff and the Board, the SHOROC General Managers, and SHOROC council staff. In addition, a number of briefings and workshops were held with elected representatives from all four councils to ensure that they understood the assessment process and direction of outcomes.

The SHOROC councils considered and eliminated the set of options that involved long-haul transport of unprocessed wastes to distant resource recovery facilities or landfills. The establishment of a local facility to minimise cost and environmental impacts associated with transport was preferred.

Option 6, involving management of resource recovery and residual waste disposal entirely within the region through the development of AWT facilities at the Kimbriki Resource Recovery Centre, was considered the best option to meet the objectives and was selected as the preferred option. This option became the basis for development of the project as described by the environmental assessment.

### 5.5.2 Alternative sites within the SHOROC region

Potential sites where it was likely that consent would be obtained to operate a resource recovery facility and dispose of the waste to landfill were considered. The two sites identified were the within the boundary of the Kimbriki Resource Recovery Centre and at the Belrose WRC. No other sites could be identified.

The SHOROC councils assessed these two sites and selected the site within the Kimbriki Resource Recovery Centre as the preferred location. The following points summarise some of the issues considered by the assessment:

- While the Belrose WRC is suitable for hosting a resource recovery facility, the Belrose WRC is unlikely to have long-term disposal capacity for the residual materials that require landfill disposal. If this location were to be used, residuals would have to be transported to a suitable, but distant, landfill for disposal;
- Siting the facility at Belrose may mean that construction could not commence until after the landfill is completed, delaying implementation of the strategy until at least 2016-2017 or beyond;
- While the Kimbriki Resource Recovery Centre is suitable for hosting a resource recovery facility, the landfill at Kimbriki is not licensed to receive putrescible waste. If this location were to be used, residuals and unsold product materials would need to be stabilised such that they meet disposal criteria for the Kimbriki landfill; and
- Siting the facility at the Kimbriki Resource Recovery Centre would mean that residuals and unsold product materials that do not meet disposal criteria for the Kimbriki landfill would need to be exported to another, most likely, distant landfill for disposal.

In considering the Kimbriki Resource Recovery Centre, several reports prepared on behalf of the SHOROC councils confirmed that it is a suitable location for alternative waste technology and

resource recovery facilities[1]. Further, if the waste materials could be suitably stabilised then these materials could be disposed of to landfill at the Kimbriki Resource Recovery Centre. This would guarantee long-term access to local disposal capacity and remove the need to transport waste out of the region.

In addition, project development could commence without delay, as the SHOROC councils are the managers and custodians of the site and Warringah Council owns the site.

### 5.5.3 Alternative waste processing technologies considered

As described by Wright Corporate Strategy (2010) in Appendix D, at least 17 AWT facilities have been constructed and operated at (or near) commercial scale across Australia over the past 10 years with varying degrees of success in terms of technical or financial performance. The following table summarises some known performance statistics for the two waste streams that facilities are processing source separated organics and mixed residual waste.

**Table 5.4 Alternative technologies considered**

| Facility Technologies | In place | Success | Challenged | Unknown | Failed |
|---|---|---|---|---|---|
| Source Separated Organics: | 8 | 5 | 3 | - | - |
| Anaerobic digestion | 1 | - | 1 | - | - |
| Compost – aerobic tunnel | 3 | 3 | - | - | - |
| Compost – aerobic enclosed windrow | 1 | 1 | - | - | - |
| Compost – aerobic open | 1 | 1 | - | - | - |
| Compost – aerobic enclosed vertical | 1 | - | 1 | - | - |
| Vermiculture | 1 | - | 1 | - | - |
| Mixed Waste: | 13 | 3 | 4 | 4 | 1 |
| Drum + aerobic compost | 5 | - | 2 | 3 | - |
| Autoclave + aerobic compost | 1 | - | 1 | - | - |
| Autoclave + gasification | 1 | - | - | - | 1 |
| Anaerobic - aerobic batch drum | 1 | - | - | 1 | - |
| Anaerobic + aerobic compost | 2 | - | 1 | - | - |
| Shred/sort + aerobic compost | 2 | 2 | - | - | - |
| Shred/sort + RDF | 1 | 1 | - | - | - |

[1] Kimbriki Site Suitability – Part 1 of Kimbriki AWT Review, Wright Corporate Strategy, November 2006

Letter to General Manager Warringah Council, 12 March 2009 re Kimbriki site

Of source separated systems, there are eight operating and six of these have opted for aerobic composting of the organic material. Five systems can be considered to be operating successfully.

Of the mixed waste systems, there are 13 operating and 10 of these have opted for aerobic composting of the organic material. Two systems can be considered to be operating successfully, four are considered to be 'challenged', and four are unknown quantities.

### Objectives for assessment

- On this basis, the proponent and SHOROC councils used the following set of risk-based objectives to assess technology options:
- Proven and reliable technology;
- High potential to produce marketable products in NSW;
- Low technology complexity;
- Low unit cost;
- Low risk of environmental impact;
- Flexibility to adapt to process changes; and
- Flexibility to accommodate in-feed variations.

A summary of the assessment of technology options against these objectives is provided in Figure 5.1.

| Facility Technologies | Proven | Products | Process Flexability | In-Feed Flexability | Technology Complexity | Environmental Impact | Unit Cost |
|---|---|---|---|---|---|---|---|
| *Source Separated Organics:* | | | | | | | |
| Anaerobic digestion | ×× | ✓ | ×× | ×× | ×× | ✓✓ | ×× |
| Compost – aerobic tunnel | ✓✓ | ✓✓ | ✓ | ✓ | ✓✓ | ✓✓ | ✓✓ |
| Compost – aerobic enclosed windrow | ✓✓ | ✓✓ | ✓ | ✓ | ✓✓ | ✓✓ | ✓✓ |
| Compost – aerobic open | ✓✓ | ✓✓ | ✓ | ✓ | ✓✓ | ✓✓ | ✓✓ |
| Compost – aerobic enclosed vertical | × | ✓✓ | × | × | ✓ | ✓✓ | ✓✓ |
| Vermiculture | ✓ | ✓✓ | × | × | ✓ | ✓✓ | ✓✓ |
| *Mixed Waste:* | | | | | | | |
| Drum + aerobic compost | ✓✓ | ✓ | ✓ | ✓ | × | ✓ | × |
| Autoclave + aerobic compost | × | × | ✓ | ✓ | × | × | × |
| Autoclave + gasification | ×× | × | × | × | ×× | × | ×× |
| Anaerobic + aerobic compost | × | × | × | × | × | × | × |
| Shred/sort + aerobic compost | ✓✓ | ✓ | ✓ | ✓ | ✓✓ | ✓ | ✓✓ |

Legend:

| | |
|---|---|
| ✓✓ | Very positive delivery on objective |
| ✓ | Positive delivery on objective |
| - | Neutral relative to objective |
| × | Poor delivery on objective |
| ×× | Very poor delivery on objective |

**Figure 5.1 Summary assessment of waste processing technologies**

From this assessment it was concluded that:

- There is a significantly lower risk profile where source separated organics are collected and processed;
- Aerobic composting of organic waste is the preferred option in Australia, and has been successfully demonstrated for both source separated and mixed waste streams; and
- The most successful mixed waste systems so far involve simplified mechanical pre-treatment followed by aerobic composting of the organic fraction.

This assessment led to the conclusion that enclosed aerated composting should be the focus for beneficial waste processing at the project site, involving the use of a pre-treatment technology that is robust, flexible and reliable.

A key strategic approach to the project was to minimise the risks and costs that arise through mixed waste processing and the challenges of making products. This means introducing source separation at the point of waste generation where feasible, convenient and practicable by commencing separate collections. The use of dedicated processing lines for those organic wastes would allow the RRF to produce high quality composts that do not require regulatory exemption.

This approach would then be coupled with processing of mixed waste, including that collected from those premises where source separation is not feasible. As a result optimal resource recovery, sustainability and economic outcomes would be achieved compared to the 'business as usual' approach of landfill disposal of waste.

### 5.5.4 Alternative layouts

Development of the project description and concept design layout was an iterative process, which included development of feasible layouts to provide sufficient space for operational purposes, roads and turning circles, with consideration given to other engineering and environmental constraints. These constraints included potential technical feasibility, air quality/odour issues, bushfire risks, noise impacts and ecological impacts.

The proponent recognised the importance of retaining as much bushland as possible on the site, and in particular preserving habitat for threatened species. This meant that a layout needed to accommodate ecological constraints identified, without compromising the long term operational needs of the project.

The layout presented in the preliminary environmental assessment has been optimised to better accommodate the constraints identified during the assessment process. The optimised project layout increases the amount of operational space on the site, as well as the area of threatened species habitat retained. The layout also minimises as much as possible the potential impacts of noise and odour on surrounding areas, through:

- Careful location of biofilters (potential odour sources);
- Location of the weighbridge and main access road to the north of the main processing building, to minimise traffic noise on neighbours to the south; and
- Location of the highest noise generating activities as close as possible to embankments.

Figure 5.2 shows a comparison of the layout presented in the preliminary environmental assessment and the optimised project layout.

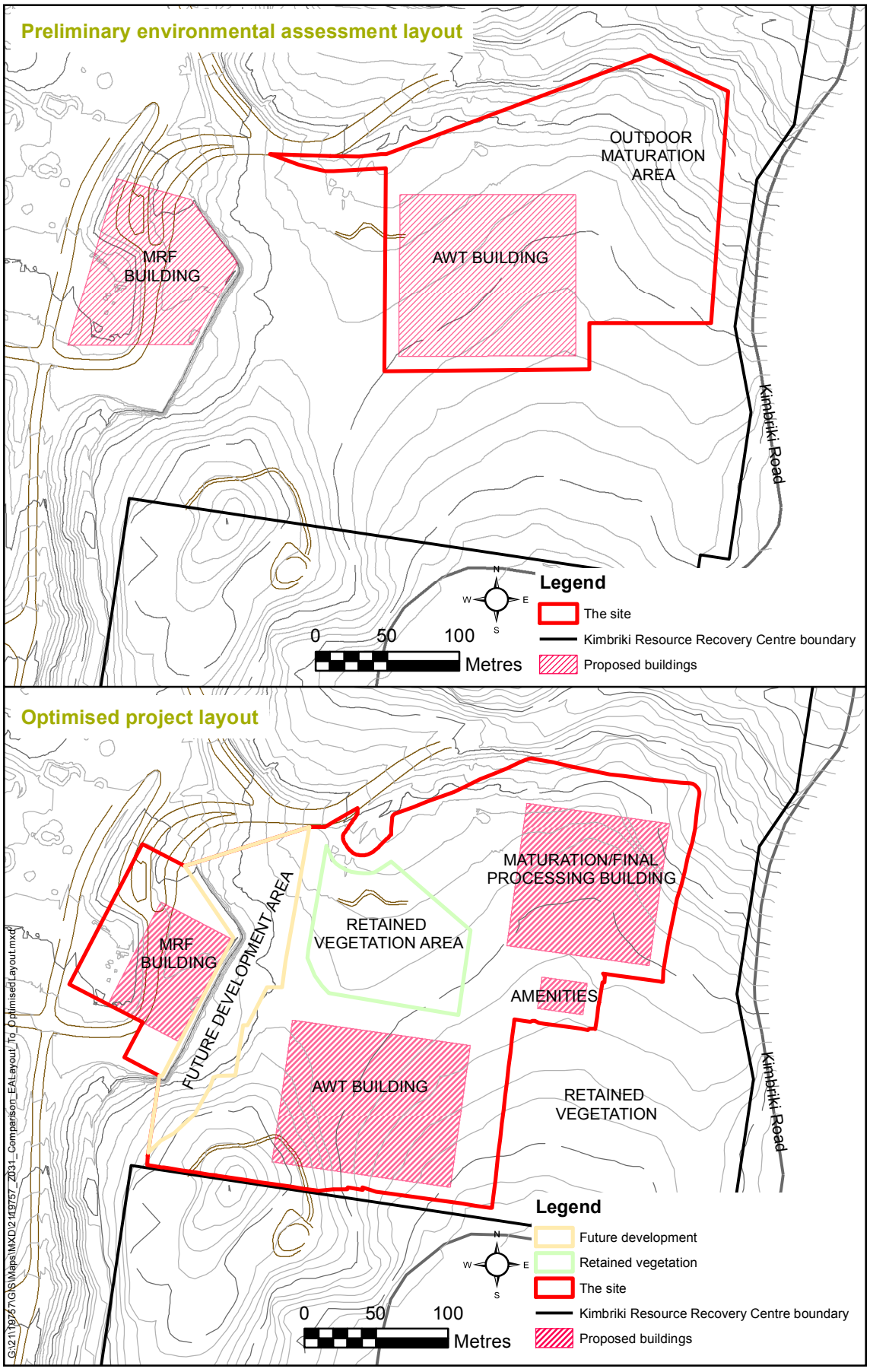



**Figure 5.2 Comparison of preliminary environmental assessment layout and optimised project layout**

### 5.5.5 Justification of the preferred option

In summary, the preferred option (the project for which approval is sought), was selected because it:

- Meets national/state waste management targets;
- Incorporates alternative waste management technologies;
- Allows for waste generated within the SHOROC region to be processed within the region;
- Makes use of an existing waste management centre, complementing and further developing the waste management facilities that already exist at the Kimbriki Resource Recovery Centre; and
- Minimises as much as possible the potential environmental impacts on surrounding areas.

# 6 Project description

*This chapter describes the project, including the:*

- *Site layout and plans for the proposed building works;*
- *Facility processes, including how the various waste streams would be transported to and from the site and treated, stored, used, disposed and handled on site;*
- *Details of process design and other measures that would be incorporated to ensure that the resource recovery facility outputs comply with the DECCW's relevant waste exemptions and pollution control criteria;*
- *Likely classification and quantity of both incoming and outgoing waste streams and product outputs.*

## 6.1 Proposed facilities

The project involves the construction and operation of two facilities, including:

1. A MRF using mechanised equipment and some manual labour to process 60,000 tonnes per year of kerbside collected dry recyclables and self-haul drop-off dry recyclables; and
2. A RRF using materials sorting and recovery equipment and tunnel composting technologies to process 100,000 tonnes per year of kerbside collected mixed residual waste and kerbside collected food and garden wastes.

The MRF would be able to recover dry recyclables like steel, aluminium, paper, cardboard and various plastics like PET and HDPE containers.

The RRF would be able to recover valuable metals, plastics and paper from kerbside recyclables, and produce two types of compost products, including:

1. High grade compost from green waste and food scraps, which could be used for unrestricted markets including agriculture and landscaping; and
2. Lower quality organic product from mixed municipal wastes, which could be suitable for mine rehabilitation or landfill daily cover, or be landfilled as a stabilised solid waste.

The current activities at the Kimbriki Resource Recovery Centre are already significant in their scale and divert around 70% of incoming wastes from landfill, the new facilities would focus on receiving and processing waste types that are not currently recovered at all as well as refining and improving some wastes that are currently received but not processed. The project also includes the following ancillary infrastructure:

- Internal roadways;
- Weighbridge and gatehouse;
- Staff amenities; and
- Staff parking facilities.

### 6.1.1 Site layout

The proponent has developed a master plan for the Kimbriki Resource Recovery Centre that takes into account the final design for the landfill, long-term site access, vehicle management and site logistics. This plan also considers a range of potential future resource recovery activities and examines how the new facilities would most effectively be integrated with the existing facilities and operations and the physical/ environmental attributes of the site.

The project's proposed facilities and site layout are shown in Figure 6.1 and Figure 6.2. These figures show the locations of the two new facilities and associated infrastructure.

The MRF would be located in a single building located to the west of the existing administration building, in the area that is currently being used for the drop off and aggregation of kerbside collected recyclables. The apron for temporary storage and loading of final baled products on the western side of the building would be constructed over previously filled land.

The RRF would comprise two buildings:

- An AWT building; and
- Maturation/final processing building.

These buildings would be located to the south of the site entrance road and east of the proposed MRF building. This area is currently vacant land, which slopes to the southeast and south.

Figure 6.1 and Figure 6.2 also show an area of retained vegetation within the site. This area would be included in the biodiversity offset package/strategy and would remain undeveloped and conserved in perpetuity.

In addition, Figure 6.1 and Figure 6.2 show an area designated for 'future development'. This area would not be developed as part of this project, any future development in that area would be subject to a separate assessment and approvals process.

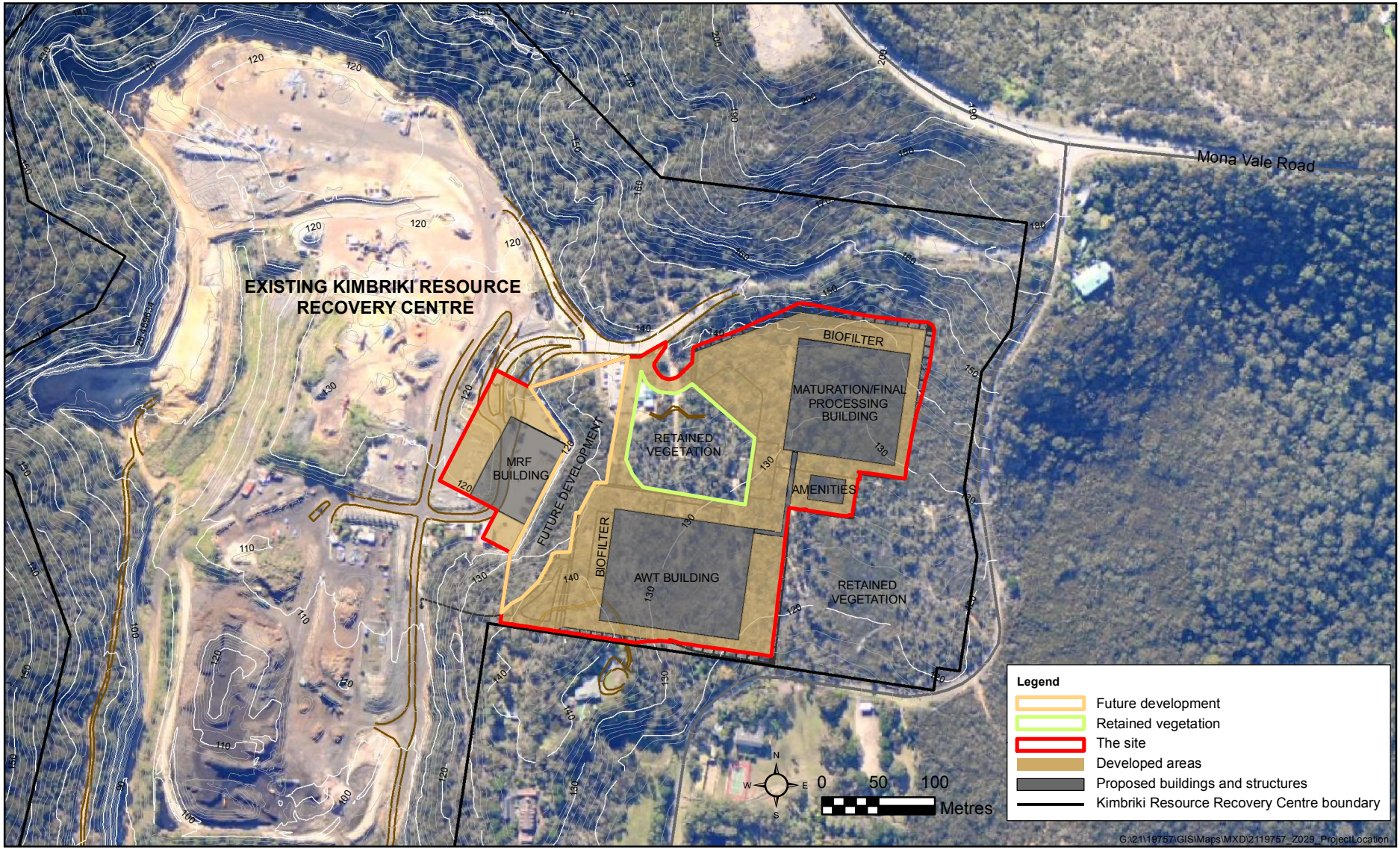



**Figure 6.1 Project location**

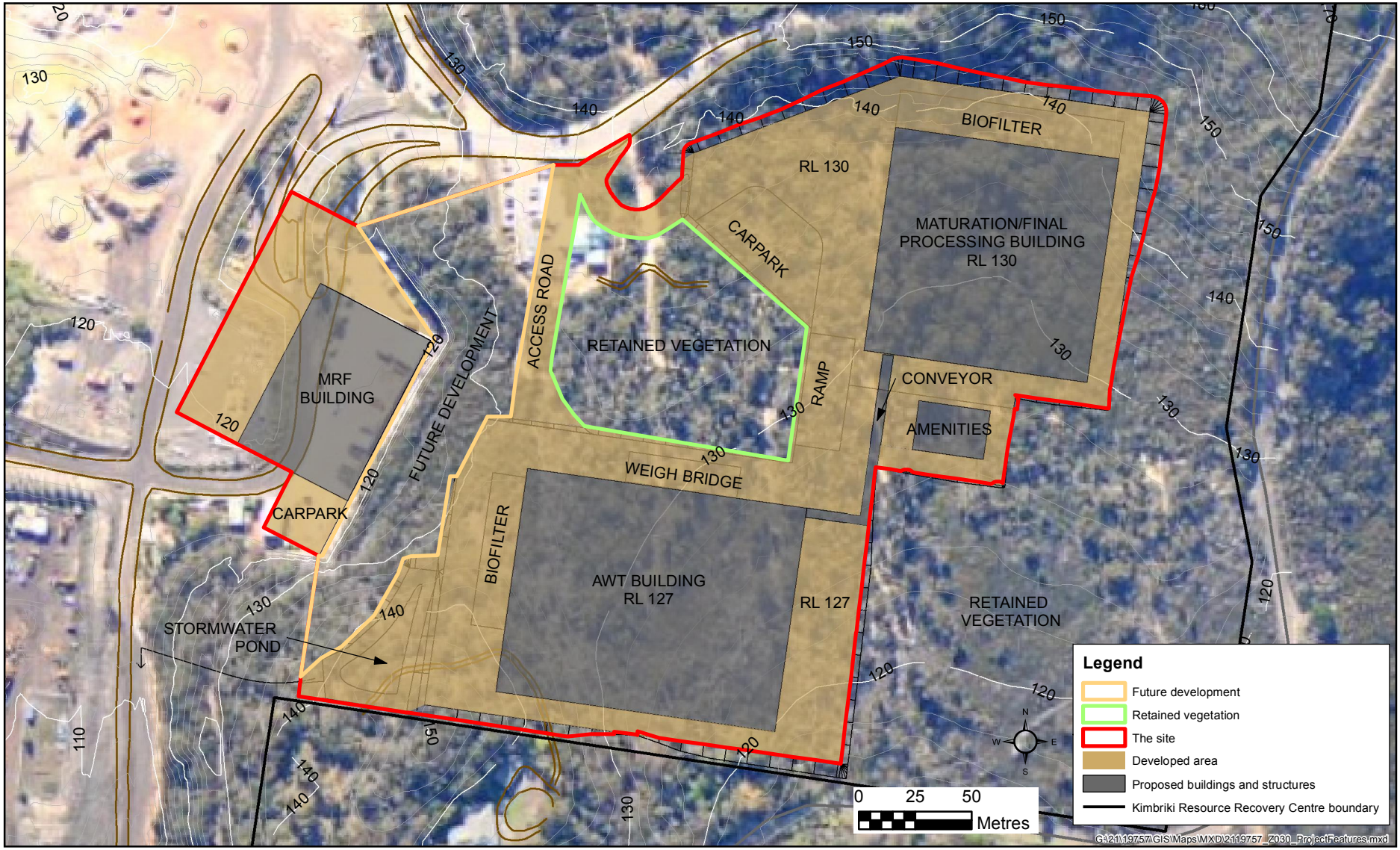



**Figure 6.2 Project features**

### 6.1.2 RRF buildings

The RRF would be comprised of two buildings, an AWT building, and a maturation/final processing building. The use of two separate buildings has been selected due to the sloping topography. Placing the maturation building 3 m higher than the AWT building allows for better integration into the site topography reducing the visual impacts as well as significantly decreasing the amount of excavation and/or filling required.

The buildings and surrounding areas of the facilities would be functional, culturally sensitive and ecologically responsive. They would be specifically designed to engage with the bushland setting, the elements and the overall Kimbriki Resource Recovery Centre. For example the proposed buildings would be architecturally designed so that they are consistent with the sustainability theme of the Kimbriki Resource Recovery Centre and echo the unique natural bushland colours and textures.

The design process would involve collaboration between the successful service provider and the proponent to produce a multidimensional site that minimises visual disturbance, noise intrusion and visible stormwater infrastructure.

The use of recycled materials during construction of the buildings and surrounding areas would be incorporated into the detailed design process. This would display to the greater community the proponent's ongoing commitment to the use of sustainable materials and to reducing environmental impacts.

#### AWT building

The building would be a portal-framed structure approximately 10-12 m in height with a reinforced concrete floor and concrete perimeter walls about 3 m high. It would measure approximately 125 m by 100 m, however the final size and configuration would depend upon the detailed design of the facilities. It is likely that the columns and rafters would be constructed from universal or welded beams, and steel wall sheeting would be used for the roof and wall cladding. The steel cladding would be coloured to blend with the surrounding area. The building would be architecturally designed so that it is consistent with the sustainability theme of the Kimbriki Resource Recovery Centre.

Within the AWT building, there would be a waste receival area, a sorting and processing line, and a number of composting tunnels. It should be noted that the final number of tunnels would be determined depending on their dimensions and the efficiency of the associated aeration systems which would vary depending on the technology employed. However it is anticipated that there would be a maximum of 30 tunnels.

The enclosed composting tunnels would each be self-contained and would comprise an air ducting system, blowers, process water collection and recycling systems, and various process control features (e.g. temperature, pressure and moisture sensors, fan speed regulators etc). Control of these components would be fully automated and utilise existing supervisory control and data acquisition (SCADA) control systems. Photo 6.1 shows a series of photographs of enclosed tunnel composting facilities currently in operation in Australia and overseas.



Composting tunnels at the SAWT facility (SITA), Kemps Creek



Tunnel composting facility (WSN) at the Macarthur Resource Recovery Park, Narellan



Tunnel composting facility - overseas example



Tunnel unloading system – overseas example

**Photo 6.1 Enclosed tunnel composting plants (examples)**

An enclosed biofilter would be located to the west of the AWT building to process odorous air discharged from the composting tunnels which would be vented through stacks, approximately one metre above the roof line. The final dimensions of this biofilter would be determined following the final determination of the number, size and aeration capacity of the composting tunnels and the degree of positive ventilation required in the processing halls.

#### Maturation/final processing building

The maturation/final processing building would use the same type of construction and have the same odour management system as the AWT building. It would also be 10-12 m high, and measure approximately 100 m by 100 m. The final size and configuration would depend upon the detailed design of the facilities with regards to the visual amenity issues discussed above.

### 6.1.3 Odour control systems for the AWT and maturation/final processing buildings

All operations would be undertaken within the enclosed buildings, which would be maintained at negative air pressure. This would prevent the escape of fugitive odours. Air vents in the sides of the buildings would allow fresh air to be continuously drawn into the buildings to replace the volume of air being extracted by electrically driven fans and discharged through the biofilters. The only other openings in the buildings would be high speed roller doors to allow for entry and exit of vehicles delivering wastes and removing finished products or fully matured inert residuals

and a portal to an enclosed conveyor(s) to transfer composted organics from the AWT building to the maturation/final processing building for final maturation.

Photo 6.2 shows an example of high-speed roller doors.



**Photo 6.2 High-speed roller doors (example)**

The extraction fans would run continuously and increase or decrease in velocity as required to maintain the required negative pressure within in the buildings. This pressure gradient would be greater during times of disruption to the building's integrity (i.e. when the roller doors open to allow vehicles to enter or exit) and lower when the building is not in use (i.e. at night or on weekends).

All extracted air from both the composting tunnels and the general building area would be treated prior to discharge, with air from the general areas being drawn from outside then fed through the composting tunnels.

The tunnels would be sealed at all times aside from loading and unloading and both the AWT and maturation/final processing building roller doors would be kept closed as much as possible to minimise the potential for fugitive dust, odour and noise emissions. Since the building would be maintained under negative air pressure conditions the high speed roller doors would only be opened briefly when needed for truck or plant entry or exit, without resulting in adverse odour emissions.

Following processing and tunnel composting the organic fraction would be transferred to the maturation/final processing building for final maturation. This transfer would be carried out by fully enclosed conveyor with the conveyor enclosure being connected at each end to the respective building's negative pressure and associated odour control systems.

*Biofilter design and operation principles*

In order to meet the project odour criteria (as outlined in section 9.1.2), all process air from the RRF would be filtered through biofilters (one per building as seen in Figure 6.2) prior to discharge. The capacity of the biofilter would be established following a determination of the size, type and aeration systems used in the composting tunnels as well as the volume of air to be exchanged from the two buildings. However, to help ensure the biofilters are reliable and capable of handling both the volume and quality of process air being generated, the following principles would inform the detailed biofilter design and operation:

- Biofilters should be enclosed and have discharge stacks to confirm with or exceed the specifications determined by the odour modelling conducted as part of the environmental assessment (refer chapter 9);
- Process air supply to the biofilters should be able to be isolated to allow for changes of media and other maintenance activities that might otherwise impair the biofilters ability to sufficiently reduce odour;
- Biofilters should use use a dual layer design with an open plenum and fixed air grate as per Figure 6.3;
- Media used should be of a sufficiently large particle sizing to minimise blockage and the potential for short circuiting as well as providing a long life cycle prior to needing to be changed;
- During media changes other aeration systems (tunnel ventilation etc) may need to be shut down to minimise process air generation, alternatively a dual biofilter system with two independent beds could be used to ensure treatment capacity during media changes and in the event of short circuits or other media failures during operations; and
- Prior to commencing operation, the RRF operations contractor should be required to demonstrate appropriate operational controls to ensure maintenance and monitoring of the biofilters is of sufficient standard to control odour discharges at a level below the project odour criteria.

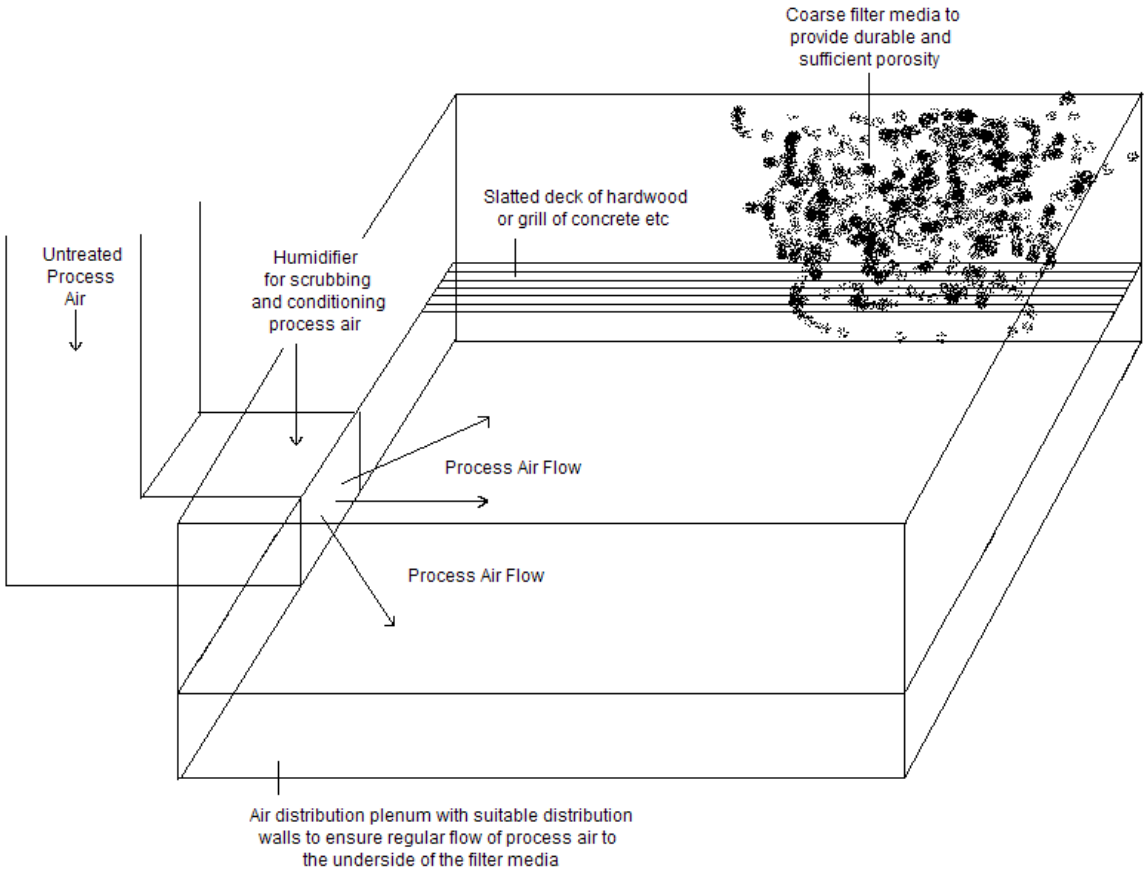



**Figure 6.3 Indicative biofilter design**

*Enclosed conveyor system principles*

The following principles would inform the detailed design and operation of the enclosed conveyors or other enclosed material handling systems to be used to transfer 'in process' materials from the AWT building to the maturation/final processing building:

- Systems for transferring 'in process' material should be fully enclosed to prevent the discharge of odours from materials in transit;
- The positive ventilation systems of each building should not be compromised in any way by these handling systems;
- The systems should be designed in such a manner that they evidence a high degree of reliability and ease of repair, it is suggested the use of well proven equipment with a strong track record for reliability in operation would be favourable;
- The handling systems will have built in redundancy to ensure in the case of repair or breakdown that there is no discharge of nuisance odour above the limits specified in section 9.1.2; and
- The suggested location for these conveyors is shown on Figure 6.2.

The following photos show examples of enclosed conveyor system at overseas facilities.







**Photo 6.3 Conveyor systems (examples)**

Following maturation and refinement there would be an oversized residual fraction which would be returned to the AWT building by either conveyor or tipper truck for re-shredding and composting with fresh incoming materials. This over sized fraction would be fully matured and consist predominantly of large, woody materials and therefore not generate nuisance odour.

### 6.1.4 MRF building

The MRF building would use the same type of construction as the RRF buildings. The building would be enclosed to minimise potential noise and dust emissions, and insulation would be provided on the ceiling and walls of the building to maintain good working temperatures within the building and reduce noise levels outside the building. The building would be approximately 10-12 m high and measure about 80 m long by 55 m wide. The final size and configuration would depend upon the detailed design of the facilities.

### 6.1.5 Odour Control Systems - MRF building

The primary focus for controlling odour emissions from the MRF building is centred on the reception area as the majority of odours arising from the sorting operations are a result of organic waste presented in the form of putrescible contaminants in the waste stream. These would be extracted by manual sorting as the first stage of the sorting process. As a result the reception hall would be fitted with a deodorising misting system and the putrescible

contaminants extracted from the recycling stream delivered on a daily basis to the RRF for treatment to ensure their inert status prior to disposal at the Kimbriki Resource Recovery Centre landfill. This reception area would be fitted with high speed roller doors which would only open to allow entry and exit of delivery vehicles ensuring the most effective operation of the deodorising misting system.

Another potential odour source is from poorly rinsed containers, the primary control mechanism for this is to continue to engage the local community to rinse containers prior to disposal. The recyclables from three of the four Councils (Warringah, Pittwater and Manly) are currently delivered to the Kimbriki Resource Recovery Centre for aggregation and are generally well cleaned and create very little odour. Ongoing education prior to and during the operation of the project by the proponent, SHOROC and the SHOROC councils would ensure the current level of compliance would be maintained or exceeded in the future.

No unprocessed or unsorted materials would be discharged or stored outside the building at any time and air flows within the building would be managed to ensure that appropriate air quality standards required by occupational health and safety regulations are maintained so as to not impact on the health and safety of the staff.

### 6.1.6 Site access and ancillary structures

#### Access and internal roadways and weighbridge

Access to the new facilities would be via a new dedicated sealed road with associated automated weighbridge as shown on Figure 6.2. The road would be aligned approximately north-south and would enable vehicles to turn left from the existing Kimbriki Resource Recovery Centre access road and head south to the AWT building. The maturation/final processing building would also be accessed by this new road. Vehicles would cross the weighbridge and then turn left to head north up a ramp to the upper level and the maturation/final processing building. Staff parking for the RRF would also be accessed in this manner.

The likely traffic flows to and from the RRF buildings is indicated on Figure 6.4.

The new weighbridge would be installed in the position indicated on Figure 6.2 and Figure 6.4. This would facilitate weighing and recording of incoming and outgoing RRF loads.

A new secondary emergency egress road would also be constructed to connect the upper pad (at RL 130) directly to the existing Kimbriki Resource Recovery Centre access road. This secondary road would remain gated and locked during normal operations, but could be opened up in case of emergency (for example bushfire) as an alternative exit route.

#### Offices and amenities

An office and amenities block would be established for staff on the lower level (RL 127), but adjacent to the maturation/final processing building as shown on Figure 6.2. It would include office, lunch room and ablutions facilities.

#### Car parking

A 30 space car park would be constructed (as shown on Figure 6.2) for staff working at the RRF. A pedestrian walkway with appropriate signage would be provided from the car park to the RRF buildings. A second 35 space car park would be constructed next to the MRF building for

staff working at the MRF, visitors, and the three extra staff that would be required for landfilling operations.

During the majority of the construction period, there are expected to be approximately 50 workers, whose cars would be accommodated within the allocated parking areas. Parking for construction workers would be provided at two locations onsite, including in the area of the proposed RRF operational car park on the upper level, and adjacent to the proposed MRF building on the lower level. The construction car parks are expected to provide a combined supply of 65 parking spaces. This includes 30 spaces in the upper car park and 35 spaces in the lower car park.

In order to accommodate the parking demands associated with construction staff during peak events, such as concrete pours, additional temporary parking spaces would be made available to accommodate the demand from up to 100 vehicles.

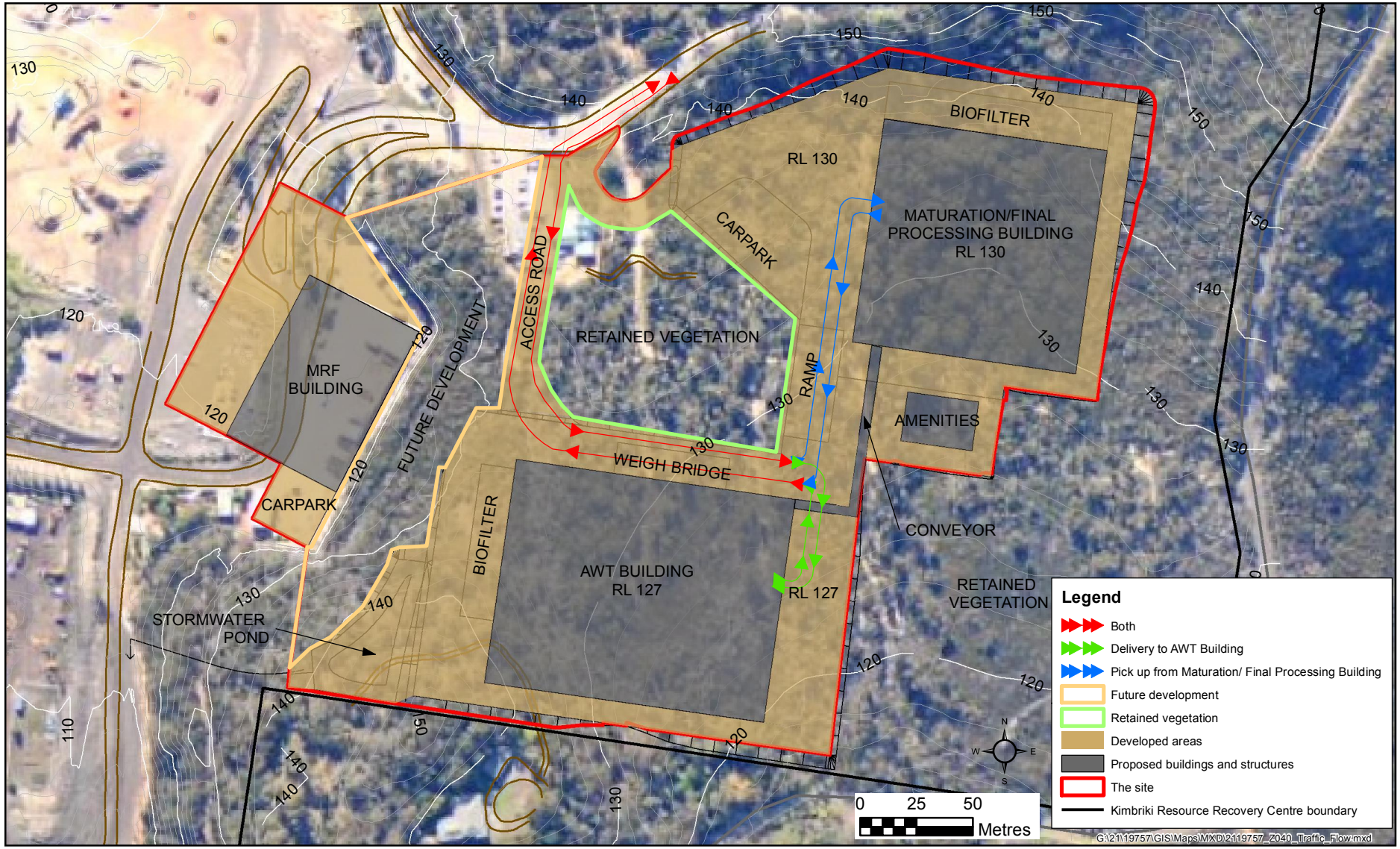



**Figure 6.4 Traffic flow on site**

### Roadwork at the intersection of Mona Vale Road and Kimbriki Road

In September 2009, the RTA published the Mona Vale to *Macquarie Park Corridor Strategy*, which provides an overview of the road transport system from Mona Vale to De Burghs Bridge at Macquarie Park. The review of the corridor strategy document confirms that there are existing traffic operation issues along the whole corridor from Mona Vale to Macquarie Park. There are existing operational issues associated with the intersection of Mona Vale Road and Kimbriki Road, with the functionality of the intersection already compromised during the morning peak.

Until widening of Mona Vale Road to at least two lanes in each direction occurs, short-term measures would need to be implemented to work around capacity constraints and ensure ongoing safety and operation of the intersection of Mona Vale Road and Kimbriki Road.

Therefore to address some of the operational and safety issues at this intersection, it is proposed to redesign the intersection (Figure 6.5) to provide:

- A continuous westbound acceleration lane;
- A painted separation island within the intersection for right turning traffic; and
- An extended right turn bay on Mona Vale Road (line marking adjustment only).

These measures would not require any road widening and therefore would have no impact on the surrounding vegetation.

It is proposed these works are conducted prior to the construction phase of the project and would only be expected to require one to two weeks to finalise. The works involve line marking and some resurfacing of existing pavement and are not expected to disrupt any area outside the current road easement nor disturb any surrounding vegetation. During this time disruption to the amenity of the existing intersection would be minimised by the provision of diversions and other controls deemed appropriate by the RTA.

It is noted that these proposed intersection works would be required to improve the overall safety of the intersection for all vehicles using the Kimbriki Resource Recovery Centre, regardless of any impacts associated with the project.

### Continuous westbound acceleration lane

At the Kimbriki Road intersection, Mona Vale Road has a single lane on the westbound approach which becomes two lanes on the westbound departure immediately west of Kimbriki Road. Due to this configuration, the left turn movement from Kimbriki Road to Mona Vale Road operates as a continuous lane and feeds into the additional departure lane, separate to the through vehicle movement.

Whilst this is how these movements currently operate, the existing linemarking does not adequately reflect this situation. The result is an acceleration lane for westbound traffic turning left from Kimbriki Road into Mona Vale Road that is of sub-standard length to allow adequate acceleration to occur before merging with other westbound traffic on Mona Vale Road. As such, there is an increase in the potential for conflict between the two movements as part of the merge.

In order to formalise the left turn continuous lane, it is proposed to separate the through movement and the left turn movement through adjustments to the linemarking. This allows the left-turn movement to operate without any opposing movements, resulting in minimal delays for this movement. This arrangement would also remove the potential merging conflict between westbound vehicles on Mona Vale Road and vehicles turning left from Kimbriki Road.

### Extension of right-turn bay

The length of the existing right-turn bay on the eastbound approach of Mona Vale Road is approximately 70 m. This is adequate to accommodate the queue lengths for this movement. However, the crash results indicate that there is a crash history on this approach for rear-end crashes within the right-turn bay.

As such, it is proposed to extend the length of this lane up to a length of approximately 100 m. This would provide a longer length that would accommodate deceleration for the avoidance of rear-end crashes where drivers are unable to come to a complete stop within the available length.

The works would involve adjustments to linemarking only and would not require any widening works to be undertaken.

### Linemarking and pavement surfacing

The crash results (refer chapter 11) indicated that there are potential issues with the delineation and pavement surfacing within and in the vicinity of the intersection. This was highlighted by the number of off-road crashes in wet conditions.

To address these issues, it is proposed to undertake improvements to the linemarking at and in the vicinity of the intersection, including provision of a high level of reflectivity so that linemarking is visible to drivers in adverse weather conditions (e.g. wet, dark, etc).

It is also proposed to undertake improvements to pavement skid-resistance at and in the vicinity of the intersection. This would involve the placement of a high skid-resistant surfacing material which would reduce a vehicle stopping distance and provide greater driver control during wet weather.




**Figure 6.5 Proposed Mona Vale Road and Kimbriki Road intersection works**

Source: GTA (2011) Kimbriki Resource Recovery Project – Environmental Assessment: Transport Impact Assessment

### 6.1.7 Utilities and services

**Power**

As mentioned in chapter 4, electricity is supplied in high voltage form to two main sub-stations on the Kimbriki Resource Recovery Centre, which then feeds to low voltage electricity through a network of overhead cables to the remainder of the Kimbriki Resource Recovery Centre. A third substation of 400 kVA capacity is currently being constructed, to service existing site facilities.

However, the technology being used for processing of waste and recyclables within the new site facilities is likely to require significantly more electricity than current site operations, and upgrading of the current electricity supply would be necessary. The following assumptions have been made, in the absence of detailed plant specifications:

- MRF 800 kVA
- AWT building 1056 kVA
- Maturation building 500 kVA
- Amenities block 168 kVA

Total 2524 kVA

Energy Australia has advised that the overall capacity of the current 11 kV high voltage overhead main that enters the Kimbriki Resource Recovery Centre (and currently supplies the two existing substations, and will supply the third substation), would need to be assessed once the actual future loads are known.

If there is sufficient capacity, the existing high voltage overhead wires on poles along the current access road would be augmented to supply the new facilities. Existing high voltage powerlines along Kimbriki Road could also potentially be utilised to supply power to some or all of the new facilities from the south, subject to the capacity of this particular high voltage feeder main. Energy Australia advised that it would prefer to utilise existing high voltage feeder mains where possible.

According to Energy Australia, kiosk type sub-stations would be needed to service the new facilities, rather than pole mounted sub-stations. Standard sizes of kiosk type substations are 400/600/800/1000 kVA and 1500 kVA. Separate sub-stations would likely be provided for each part of the site, depending upon the relative distances from the feeder main to the preferred substation locations and building switchboards, and the capacity of the existing high voltage feeder mains within the Kimbriki Resource Recovery Centre and on Kimbriki Road.

This may mean individual substations for the MRF and the AWT building respectively, and potentially a shared substation for the Maturation building and Amenities block. Standard kiosk type substations would be utilised on site, in preference to customised substations located within each building. The final power supply configuration for the site would not be known until detailed plant specifications are provided by the technology suppler, and an electrical design is prepared as part of the construction works package.



**Photo 6.4 Current overhead electricity supply wires along access road**



**Photo 6.5 Powerlines on Kimbriki Road (south of site)**

### Communications

Communications facilities are available to the existing office complex, including telephone, facsimile and email services. These existing facilities would be extended to service the new buildings.

### Water supply

Rainwater that falls onto the buildings would be collected in tanks alongside or beneath the buildings. After treatment to ensure that it meets health standards, this water would be utilised for truck tailgate washing, hardstand washing and dust suppression. This would minimise the requirements for potable water from the mains for these purposes.

Roof water would also be used to keep the fire fighting water storage tanks above the minimum level required by regulations. The existing potable water connection would be used to provide the minimum volumes needed for fire fighting.

Staff amenities would be supplied by a combination of potable mains water and appropriately treated rain water.

### Wastewater management

To treat wastewater from new staff amenities an onsite aerated wastewater treatment system would be installed which incorporates a disinfection treatment stage and effluent storage. The system would treat the wastewater to a level sufficient to meet legislative requirements for onsite irrigation.

### Stormwater management – operations

Figure 6.6 illustrates a concept design for the operational stormwater management system. The exact stormwater collection system configuration would be determined at the detailed design stage, however the broad principles would be as described below.

Up-gradient runoff that currently enters the site would be diverted past the new site operational areas, and continue its natural flow path. This would provide water necessary to maintain existing ecological systems down gradient of the site. Overflow from roof rainwater tanks would be directed to the retained vegetation areas located to the south-east of the site to supplement these flows.

However, to ensure that the natural flows are replicated as closely as possible, and that retained vegetation areas do not receive significantly more water than they do currently, some roof water would be directed to the existing Kimbriki Resource Recovery Centre stormwater system via the Eastern Drain.

Rain falling directly onto roads and operational areas would be collected in a first flush stormwater pond located in the southwest corner of the site. The pond would be used to capture any pollutants and litter that may be washed into the site stormwater drains and to provide detention capacity during storms and rain events. The pond would overflow to the existing Kimbriki Resource Recovery Centre stormwater system.

Stormwater collection drains along the edges of the platform would collect rainwater that falls upon paved areas and from the AWT building roof (subject to final design). Any water overflowing from the pond would be relatively free of pollutants such as sediments, as it would only be from paved areas or from the roofs of buildings.

The capacity of the eastern sedimentation pond would be upgraded by the proponent to cope with the increased flows associated with the project.

All new developments require onsite stormwater detention capacity. This reduces the hydraulic loading on council stormwater collection systems.

Modelling undertaken (reported in chapter 6) indicates that to meet the Warringah Council requirements, the storage capacity of the existing stormwater management system at Kimbriki Resource Recovery Centre would need to be increased in capacity by almost 2 ML (for a 100 year ARI event). The proponent would upgrade the existing system by this amount plus 10% (for contingency) prior to the commencement of operations.

This upgrade has been anticipated by the proponent, which has allocated $150,000 capital for this purpose to be utilised in the 2012/13 financial years and a further $400,000 in 2014/15. The initial upgrades would be funded by the first amount and would be predominantly aimed at providing additional capacity into the sedimentation holding pond, as well as providing additional settlement ponds along the eastern drain. The second amount is intended to provide additional holding capacity and treatment options for all potential site discharges.

### Stormwater management - construction

Cut-off drains, silt fences and other erosion controls would be used during the construction period to prevent sediments from being carried offsite or into retained vegetation areas. A site

sediment and erosion control plan would be prepared, in accordance with requirements of the Blue Book (*Managing Stormwater: Urban Soils and Construction*, Department of Housing).

Stormwater from the construction areas would be collected in appropriately sized sedimentation basins, and discharged to the existing council stormwater management system. Appropriate erosion and sediment controls would be implemented before any construction commences.

With implementation of appropriate stormwater and erosion controls and mitigation measures, the construction activities associated with the project would not have significant stormwater/erosion impacts.

Proposed water and wastewater management measures for the project are discussed in further detail in chapter 12.

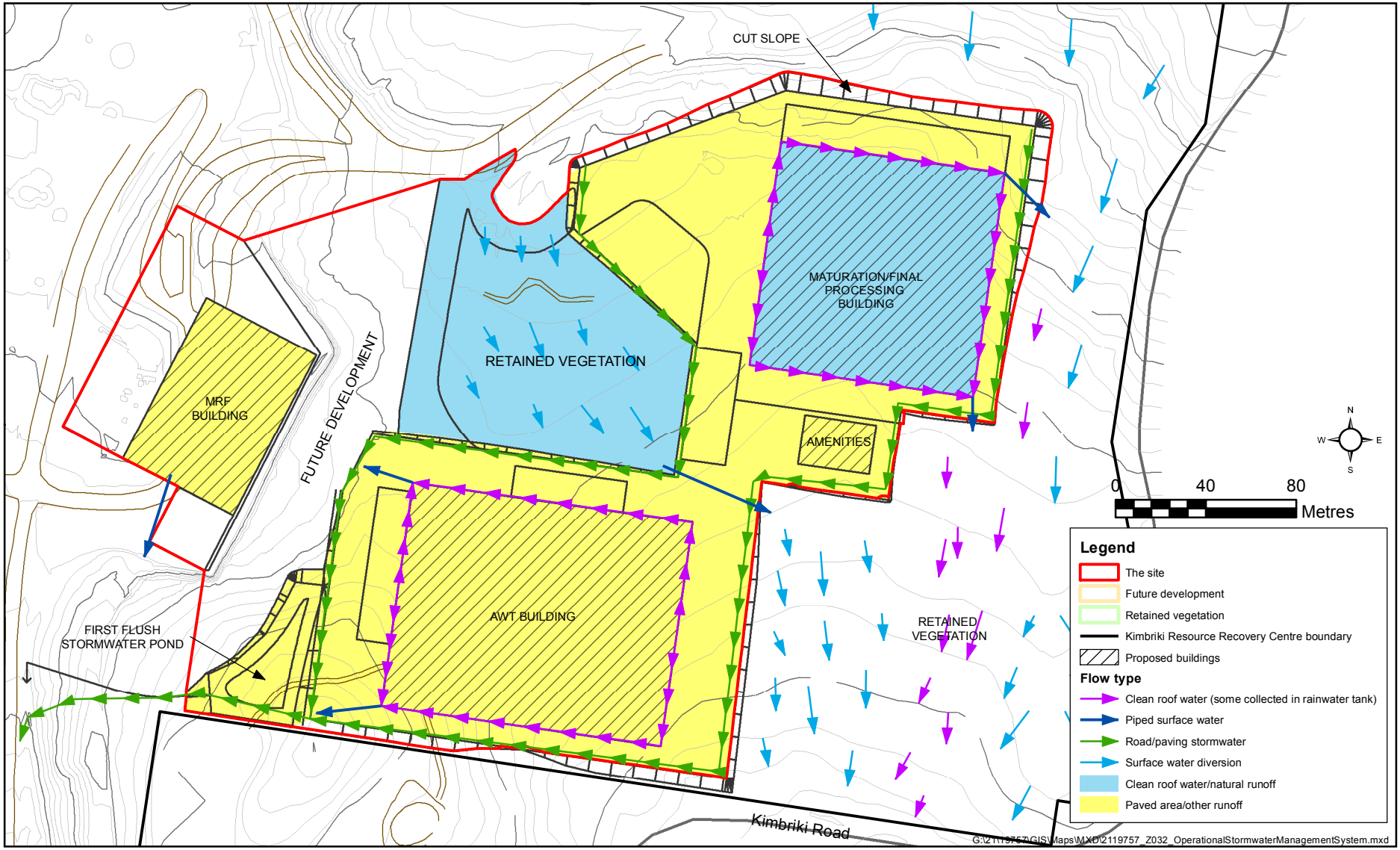



**Figure 6.5 Operational stormwater management system**

### 6.1.8 Hours of operation

It is proposed that the project would receive waste and despatch products between 7 am and 5 pm Monday to Friday all year, including public holidays. Some products, particularly compost, would also be despatched on weekend days during these hours.

This is consistent with the current Kimbriki Resource Recovery Centre operating hours and the existing conditions of consent (refer Appendix O).

Some management and operational personnel would be on site between 6 am and 6 pm on week days. The early morning period, 6 am to 7 am, would be used for preparation and organisation, pre-start checks on equipment and administration. The late afternoon period, 5 pm to 6 pm, would be used for routine maintenance and finalising administrative tasks.

The weekend time would be for dispatch of products, when required some general repairs and maintenance activities and the receival of SHOROC vehicles carrying waste from street litter bin collections. Occasional deliveries of dry recyclables on Saturdays may occur if the drivers run out of time on a weekday. However this would be a rare and infrequent event.

### 6.1.9 Workforce

The construction workforce would vary throughout the construction period depending on the activities underway. Typically, the construction workforce would be up to 50 persons (under normal conditions) and vary up to 100 persons (during busy periods such as concrete pours).

Once fully operational, the project would generate approximately 59 full time permanent jobs.

## 6.2 Resource recovery facility process

The RRF technology would incorporate aerobic tunnel composting for both the kerbside collected food and garden waste and the organic fraction of the kerbside collected mixed residual waste.

Figure 6.7 and Figure 6.8 provide process flow charts of the RRF operations for the food and garden organics and mixed waste streams respectively. The proposed operations of the RRF for both waste streams are discussed in the following sections.

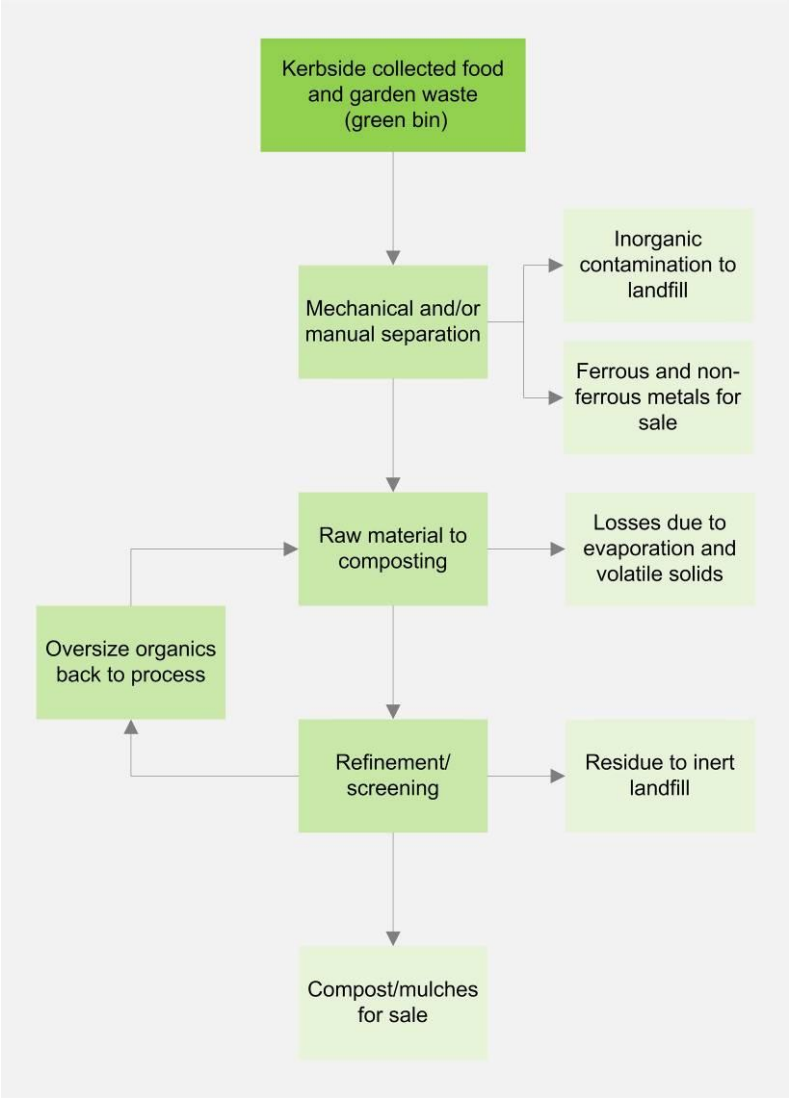



**Figure 6.7 RRF process flow chart – kerbside collected food and garden waste**

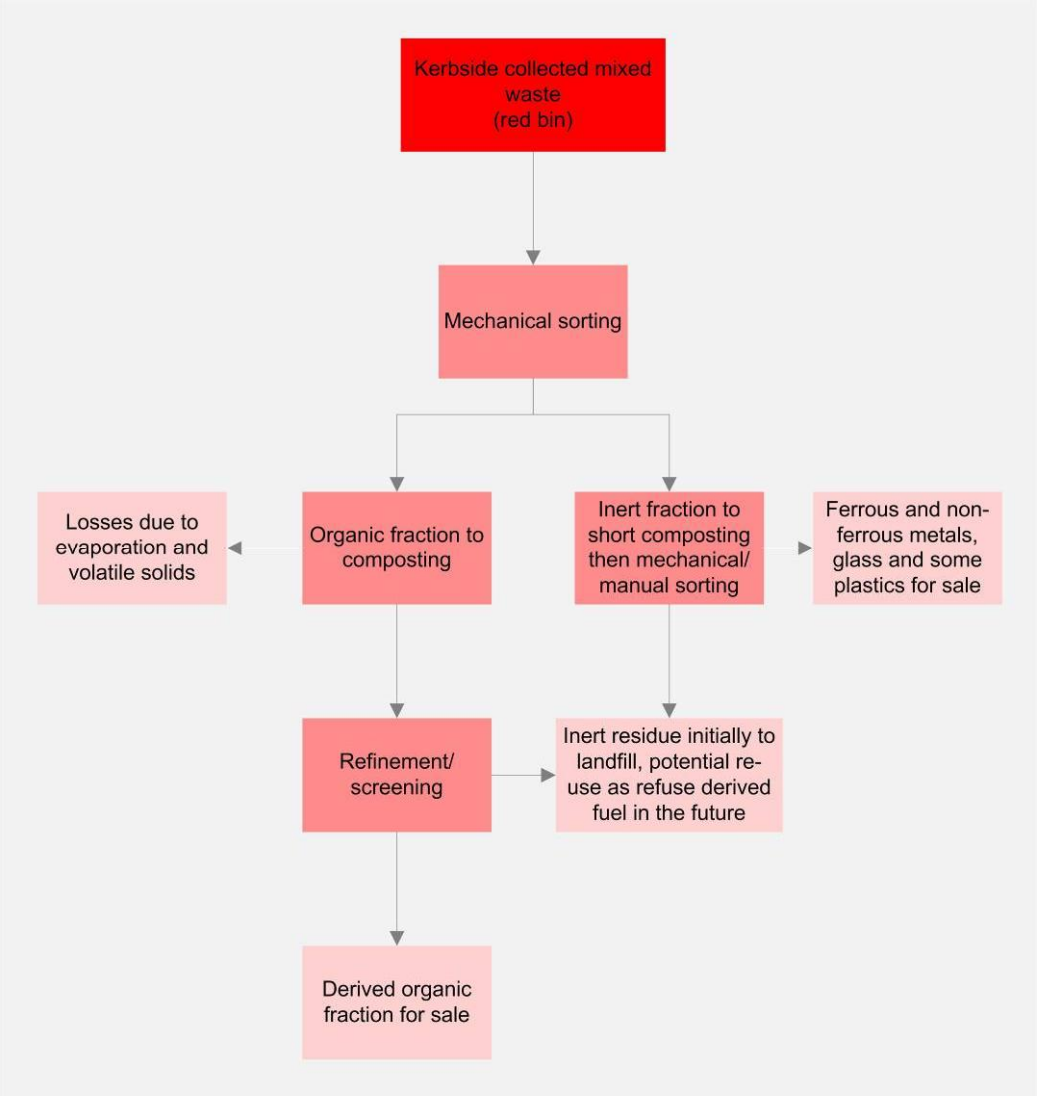



**Figure 6.8 RRF process flow chart – kerbside collected mixed waste**

### 6.2.1 Receival and screening

The kerbside collected food and garden wastes and kerbside collected mixed residual waste streams would be unloaded from incoming waste collection vehicles onto two separate designated receival areas within the AWT building (see Photo 6.6).

The two waste streams would be kept separate throughout processing, maturation and final refinement. Keeping the two streams separate would help ensure that finished compost products from the food and garden wastes are able to meet the DECCW (2008) *Resource Recovery Exemption for Land Application: The food waste compost exemption 2008* (as discussed in section 6.4.3).



**Photo 6.6 Waste drop-off area (example - Ballina baling plant)**

Each waste stream would be visually screened and obvious contaminants, bulky and hazardous items would be removed for disposal either to the Kimbriki Resource Recovery Centre landfill or in the case of hazardous substances, to an appropriately licensed disposal facility offsite. Any wastes disposed to the Kimbriki Resource Recovery Centre landfill would be appropriately treated to ensure it satisfies DECCW (2009) *Waste Classification Guidelines* for 'General Waste (non-putrescible)'.

These items would be removed either by hand or using specialised equipment depending on the size and nature of the item. Photo 6.7 shows examples of specialised equipment that can be used to remove various bulky or unsuitable objects from waste.





**Photo 6.7 Specialised equipment used overseas for removing bulky objects and recovering resources from waste (example)**

The kerbside collected food and garden waste would be sorted by hand to remove inorganic contaminants then shredded coarsely to break up any large items (branches, pieces of timber etc) and transferred using a front end loader (or similar) to the composting tunnels.

The kerbside collected mixed residual waste would be separated into two main fractions, being a fine fraction of predominantly organic material and a coarse fraction of predominantly inorganic material. While the finer details would be determined by the successful tenderer during detailed design, it is likely that the separation would be undertaken using some form of trommel system and bag splitting technology.

Once separated, the organic rich fraction would be mechanically sorted for ferrous and non-ferrous metals, shredded and transferred to the composting tunnels. The division of the mixed waste stream into two fractions with separate processing would improve the likelihood of compost derived from the organic rich fraction meeting the requirements of the DECCW (2010) *The organic outputs from mixed waste exemption 2010* (refer to section 6.4.2 for further details) as well as ensuring the predominantly inorganic fraction is fully stabilised prior to landfilling.

Rear and side loading compactor trucks would separately deliver both kerbside collected food and garden waste and kerbside collected mixed residual waste to the AWT building. Vehicles would be required to be fully within the building and the doors would need to be in the fully closed position before vehicles discharge their loads onto the bunded reception floor.

Following discharge of the waste, the driver would then utilise a high pressure washer to ensure that the tailgate seal and the rear of the truck had been washed clean. This would ensure that no leakage or spillage of waste derived leachate occurs once the empty truck has left the reception building. This high pressure wash down system would also be used to clean the discharge area of the tipping floor between trucks to ensure minimal contamination of the vehicles.

The high pressure wash down system would be supplied by the RRF's own potable rainwater supply or mains potable water. Wastewater generated would be directed to surface drains and incorporated into the process water recycling system for use in enclosed tunnel composting processes.

### 6.2.2 Composting in tunnels

Each tunnel would be self-contained and would comprise an air ducting system, blowers, process water collection and recycling systems, and various process control features (e.g. temperature, pressure and moisture sensors, fan speed regulators etc). The composting process takes in the order of four weeks and during this time the doors would be hermetically sealed to contain any odour and leachate.

After completion of the tunnel composting process the material originating from the food and garden waste and the organic fraction of the mixed residual waste would be transferred to the maturation building and placed into separate windrows to undergo maturation if required prior to final refinement and sale. Alternately the proponent may take the composts produced from the kerbside collected food and garden wastes offsite for further blending and refinement at a suitably licensed location. The inorganic fraction of the mixed waste stream would be landfilled as stabilised waste.

### 6.2.3 Maturation

Composts derived from the kerbside collected food and garden waste may need to be further matured following tunnel composting depending on the available product markets.

Mixed waste derived organics intended for landfill disposal would require sufficient residency time in the tunnels as well as a suitable maturation period to ensure it satisfies DECCW (2009) guidelines to be classified as 'General Waste (non-putrescible)' prior to landfilling.

Maturation would be undertaken entirely within the maturation/final processing building with drains within the building floor collecting the process water for reuse in the tunnel composting process (refer to chapter 12 for further details on process water requirements). This would prevent any process water infiltrating into the surrounding soils or contaminating surface water.

Sections of the floor of the maturation/final processing building may be aerated to help maintain aerobic conditions in the windrows and facilitate the maturation process, alternatively the proponent may utilise a windrow turner or other device to ensure the maturing composts remain aerobic.

### 6.2.4 Blending and refinement

Composts produced from the kerbside collected food and garden wastes would be refined by screening to remove oversized particles, the aperture for this final screening would depend on the intended end use but would generally range between 8 $mm^2$ and 25 $mm^2$. The oversized materials would be either re-shredded and mixed with freshly composted material for further maturation or mixed back in with more incoming food and garden organics waste to be composted again.

The composted organic fraction of the mixed waste stream would also be refined by deck and trommel screening to remove larger particles as well as inert contaminants. Further refinement utilising air and/or ballistic separation is also likely. The larger particles would be returned to the initial processing for shredding and re-composting and the inert contaminants disposed to landfill. The composted and screened organics, known as alternative waste technology derived organic rich fraction or AWTDORF, can be sold for mine site rehabilitation, forestry, non-contact agriculture etc (subject to testing to confirm it meets the requirements of *The organic outputs from mixed waste exemption 2010* (DECCW 2010) - refer to section 6.4.2 for further details).

The mostly inorganic fraction would be further processed using other separation equipment such as magnetic and eddy current separators to recover additional recyclable materials (similar to the MRF separation techniques). Products extracted for recycling would mostly comprise metals. These would then be either baled or loaded onto trucks in bulk for final reprocessing offsite. The remaining residue would then be treated appropriately to ensure its inert status prior to being disposed to landfill.

It is anticipated that finished compost products would be transferred to market by truck and dogs and or semi-trailers. Potential traffic impacts associated with transport of material from the RRF to markets are discussed in chapter 11.

Blending and refinement activities would be undertaken inside the maturation/final processing building or offsite at a suitably licensed location to minimise potential noise emissions.

## 6.3 MRF processing

The kerbside collected dry recyclable waste would be delivered to the MRF by the standard kerbside collection vehicles. These are likely to be a mixture of side loader and rear loader 4 tonne to 8.5 tonne trucks.

The incoming material would be visually inspected to identify and remove any oversize or unsuitable materials before being loaded onto a conveyor leading to the separation equipment.

The design and supply of the materials recovery system and design would be tendered after the project is approved, according to a specification developed by the proponent. The final internal layout and equipment details would be the responsibility of the successful contractor. However it is anticipated that the processing equipment used to separate and sort the waste to recover and aggregate recyclables within the MRF building would include:

- Hoppers, feeders and conveyors;
- Separators (such as magnetic and eddy current separators) screen and trommels;
- Sorting and picking stations;
- Size reduction equipment such as densifiers, flatteners, crushers, granulators or perforators;
- Balers; and
- Storage containers.

Photo 6.8 shows an example of MRF equipment.



**Photo 6.8 MRF equipment at Bywaters, London**

Source: www.bywaterswaste.co.uk

In addition there would be materials handling equipment such as forklifts and/ or skid steer loaders to transfer materials around the facility and load material onto trucks for offsite transfer. Oversize or unsuitable inert material would be temporarily stored within the building and periodically transferred to the landfill for disposal.

Recyclable material separated and recovered in the MRF would then be either compacted into bales or loaded loose onto trucks and exported from the site to markets for final reprocessing/recycling.

It is anticipated that some of the outbound material would be transported using semi-trailers. An assessment of the traffic and transport associated with transport of material is provided in chapter 11.

Figure 6.9 shows a simplified process flow chart of the MRF operations.

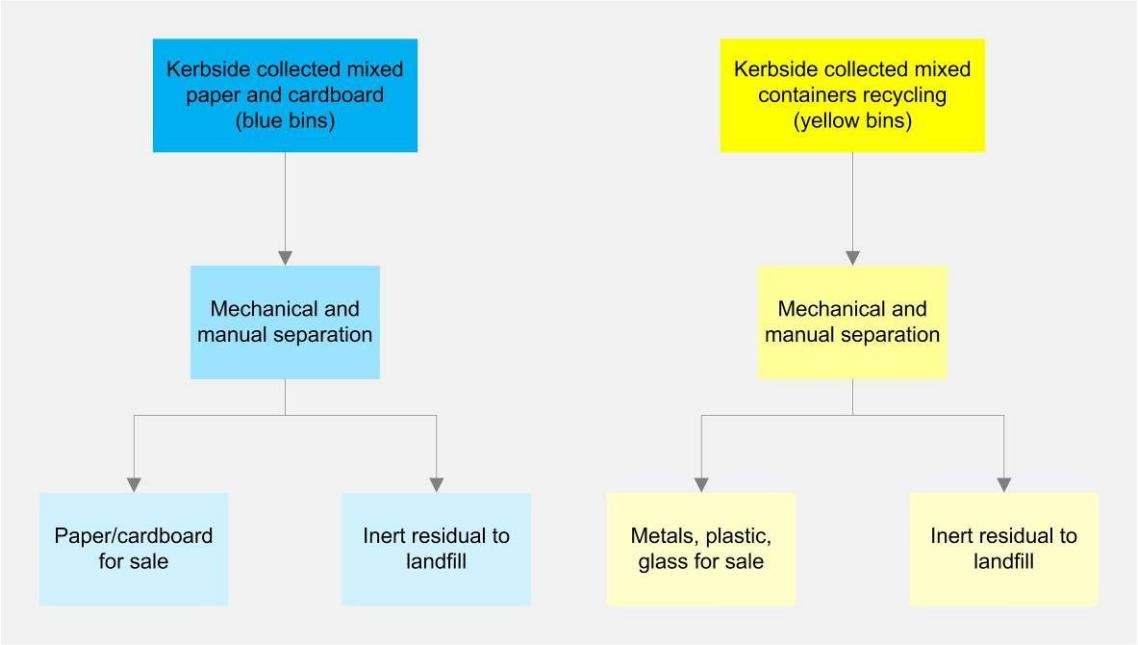



**Figure 6.9 MRF process flow chart**

Photo 6.8 shows an example of recyclable plastics baled after sorting and compaction.



**Photo 6.9 Sorted, compacted and baled recyclable material (example)**

## 6.4 Likely waste streams, classifications and quantities

### 6.4.1 Waste streams – inflows

At full operation, the new facilities would be able to receive and process the three kerbside-collected waste streams from the four SHOROC councils being:

- Kerbside collected source-separated food and garden wastes;
- Kerbside collected mixed residual waste; and
- Kerbside collected dry recyclables.

In addition, it is anticipated that selected wastes from the following sources may also be received and processed:

- SHOROC council wastes from litter bins and street sweepings;
- Source-separated food waste from businesses i.e. from the commercial and industrial (C&I) sector;
- Kerbside collected food and garden wastes from neighbouring councils; and
- Kerbside collected dry recyclables from neighbouring councils.

These additional waste streams would supplement the SHOROC kerbside collected waste and improve the economic viability of the project. The potential additional waste streams would be mostly recovered, with only a very small amount ending up in landfill.

Table 6.1 shows the estimated current and potential incoming waste flows to the Kimbriki Resource Recovery Centre (including the project).

## Table 6.1 Estimated potential waste inflows

| Waste stream | Current (t/yr) | The project (t/yr) | Total (t/yr) |
|---|---|---|---|
| Lead acid batteries | 400 | | 400 |
| Construction and demolition | 70,000 | | 70,000 |
| Mixed waste – non-putrescible | 53,000 | | 53,000 |
| Metals | 4,500 | | 4,500 |
| Virgin excavated natural material (VENM) | 11,000 | | 11,000 |
| Garden waste | 70,000 | -18,560 [2,3] | 51,440 |
| Food and garden waste – commercial and industrial | | 15,000 | 15,000 |
| Food and garden waste – SHOROC | | 26,560 [3] | 26,560 |
| Mixed residual waste – SHOROC | | 52,940 [1] | 47,000 |
| Mixed residual waste – litter bins and sweepings | 1,000 | 5,500 | 5,500 |
| Dry recyclables – SHOROC | 19,000 [4] | 27,200 | 46,200 |
| Dry recyclables – commercial and industrial drop off | 3,000 | 8,900 | 11,900 |
| ***Total Inflows to Kimbriki*** | ***231,900*** | ***117,540*** | ***348,440*** |

Notes:
1. These tonnages include estimates for growth in waste generation
2. The current garden waste tonnes received at the Kimbriki Resource Recovery Centre includes 17,000 tonnes collected at kerbside by the SHOROC councils. This material will be included with the food and garden waste in the future.
3. Approximately 1,560 tonnes of self-haul garden waste from SHOROC residents is expected to be included with the kerbside source-separated food and garden organics in the future.
4. Includes approximately 19,000 tonnes of dry recyclables that commenced delivery to the Kimbriki Resource Recovery Centre in 2010

Wastes that would continue to be managed at the Kimbriki Resource Recovery Centre as per the existing arrangements are:

- Virgin excavated natural material;
- Commercial and self-haul mixed waste (non-putrescible);
- Commercial and self-haul construction and demolition wastes;
- Inert commercial and industrial wastes;
- Metals; and
- Lead-acid batteries.

New waste streams to be received and processed at the RRF would be:

- Kerbside collected mixed residual waste;
- Street litter bins and sweepings; and
- Kerbside collected food and garden waste.

New waste streams to be processed in the MRF would be

- Dry recyclables from domestic kerbside collections; and
- Commercial and domestic self-haul dry recyclables.

It is anticipated that approximately 80% of recyclables processed at the MRF would be collected from the kerbside within the SHOROC councils' areas. The remaining dry recyclable material would be drop-off material from the commercial and industrial sector or households. The material would include paper and cardboard, plastics, ferrous and non-ferrous metals.

Available waste audit data (EC Sustainable 2007) shows that the kerbside mixed residual waste collected within the SHOROC area comprises 38% food, 16% plastic, 11% paper and 6% electrical and computer equipment (see Figure 6.10). SHOROC councils are expected to promote the inclusion of food wastes into their existing garden organics collection service so a proportion of the food waste would be diverted from the mixed residual waste bin to the food and garden waste bin to be processed separately in the RRF.

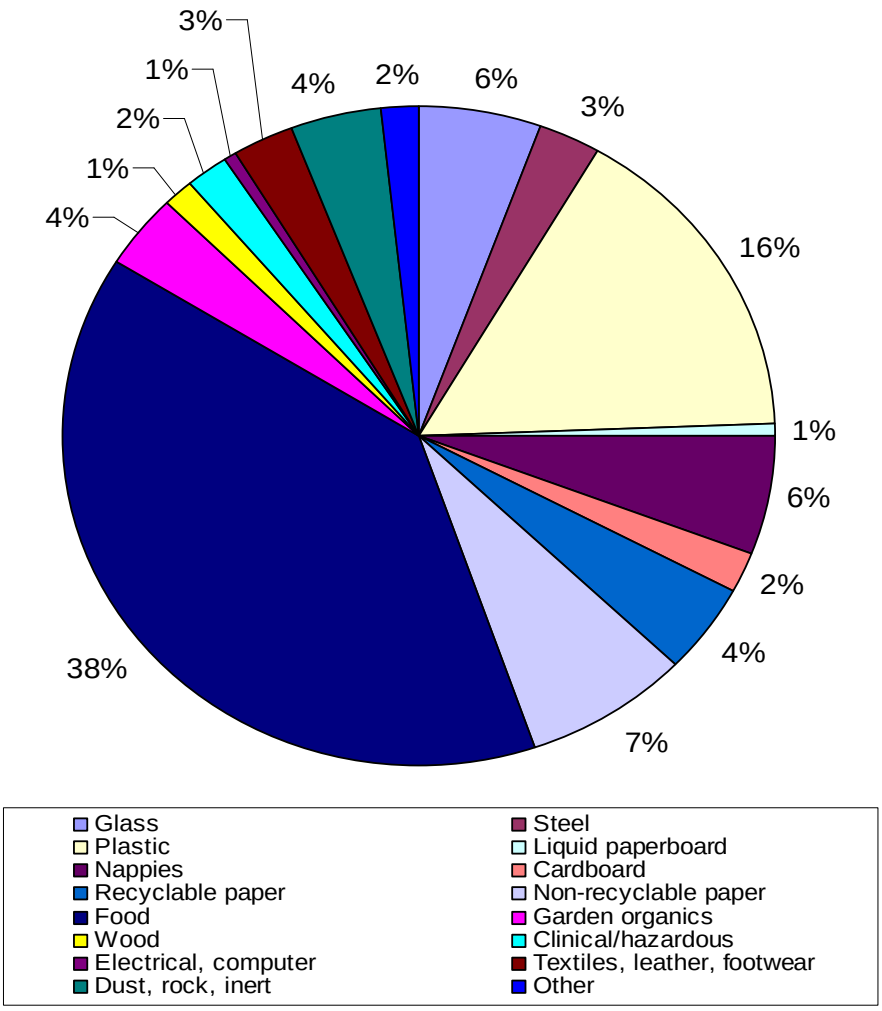



**Figure 6.10 SHOROC councils average mixed residual waste bin composition**

### Waste classification of inflow waste streams

Table 6.2 lists the likely waste classifications of incoming waste streams according to the Waste Classification Guidelines (DECCW, 2009).

**Table 6.2 Likely waste classifications of project inflow waste streams**

| Waste stream | Classification |
|---|---|
| Mixed residual waste – SHOROC | General solid waste (putrescible) |
| Mixed residual waste – litter bins & sweeping | General solid waste (putrescible)<br>General solid waste (non-putrescible) |
| Food and garden waste – other councils | General solid waste (putrescible) |
| Food and garden waste – commercial and industrial | General solid waste (putrescible) |
| Dry recyclables – SHOROC | General solid waste (non-putrescible) |
| Dry recyclables – commercial and industrial and drop-off | General solid waste (non-putrescible) |

### 6.4.2 Product out-flows and markets

The products expected to be derived from the RRF are:

- Recyclables like Ferrous and non-ferrous metals, PET, HDPE and film plastics;
- Composts from kerbside collected food and garden waste; and
- Compost-like products from the organics recovered from the kerbside collected mixed residual waste.

The recyclables would be directed to the MRF for further refinement and aggregation and the various grades of composts would be exported for sale.

Recovered materials from the MRF would be aggregated and baled for export by truck from the site to various markets depending on demand.

The possible outgoing material flows are shown in Table 6.3, with an indication for each stream of existing and new materials being exported from the site.

Overall, there would be an increase in product outflows of around 67,605 tonnes per year over the current level.

**Table 6.3 Estimated product out-flows**

| Waste stream | Current (t/yr) | The project (t/yr) | Total (t/yr) |
|---|---|---|---|
| Sandstone, aggregates, sand and other construction and demolition products | 107,100 | | 107,100 |
| Metals | 4,500 | 1,000 | 5,500 |
| Compost from food and garden waste and mixed residual waste | | 34,105 | 34,105 |
| Compost products from garden waste | 63,000 | | 46,295 |
| Dry recyclables – SHOROC | 17,100 | 24,500 | 41,600 |
| Dry recyclables – commercial and industrial and drop off | 2,700 | 8,000 | 10,700 |
| Lead acid batteries | 400 | | 400 |
| ***Total out flows from Kimbriki*** | ***194,800*** | ***67,605*** | ***245,700*** |

Note: Tonnage inflows, outflows and disposals will not balance due to sandstone excavation from the site, recovery of materials from incoming waste, and evaporation losses from processing organic wastes.

Two types of compost products are anticipated as an output of the RRF:

- Compost from kerbside collected food and garden waste; and
- Lower quality organic product from mixed municipal wastes.

Compost derived from the kerbside collected food and garden wastes that meet the requirements of the DECCW (2008) *Resource Recovery Exemption for Land Application: The food waste compost exemption 2008* would make be suitable for use as a soil conditioner for agricultural and landscaping applications.

Compost derived from the kerbside collected mixed residual wastes that meet the requirements of DECCW Resource Recovery Exemption *The organic outputs from mixed waste exemption 2010* (DECCW 2010) would be suitable for non-contact agriculture and soil rehabilitation.

It is noted that the maximum limit for inert contaminants described in *The organic outputs from mixed waste exemption 2010* (DECCW 2010) are set to certain dates with the final review set for 30 June 2013. The exemption is proposed to be extended beyond this time but the acceptable contaminant levels and suitable end use markets will be set by DECCW at that time.

Figure 6.11 is a flow chart of current waste flows for the Kimbriki Resource Recovery Centre and Figure 6.12 is a flow chart of projected future waste flows once the project is operational.

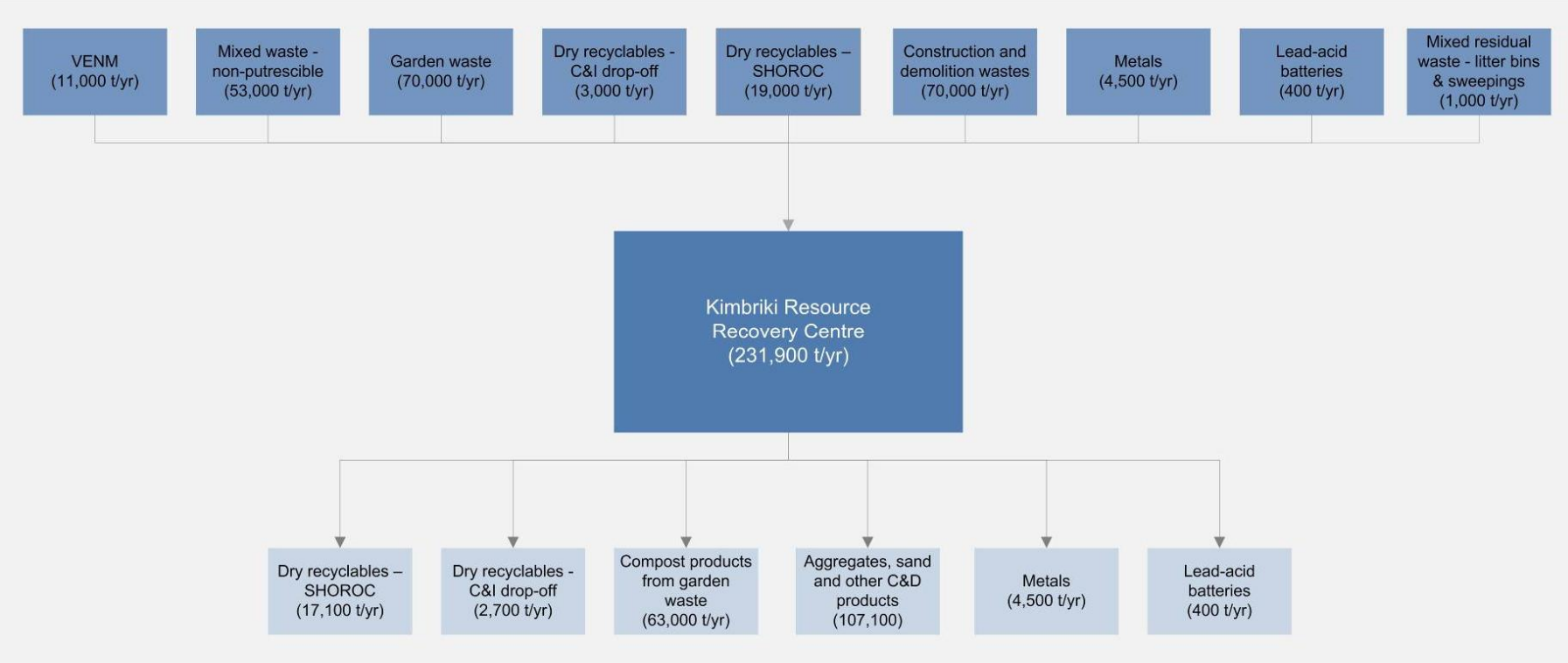



**Figure 6.11 Current waste flows**

Note: C&I – commercial and industrial; VENM – Virgin excavated natural material; C&D – construction and demolition

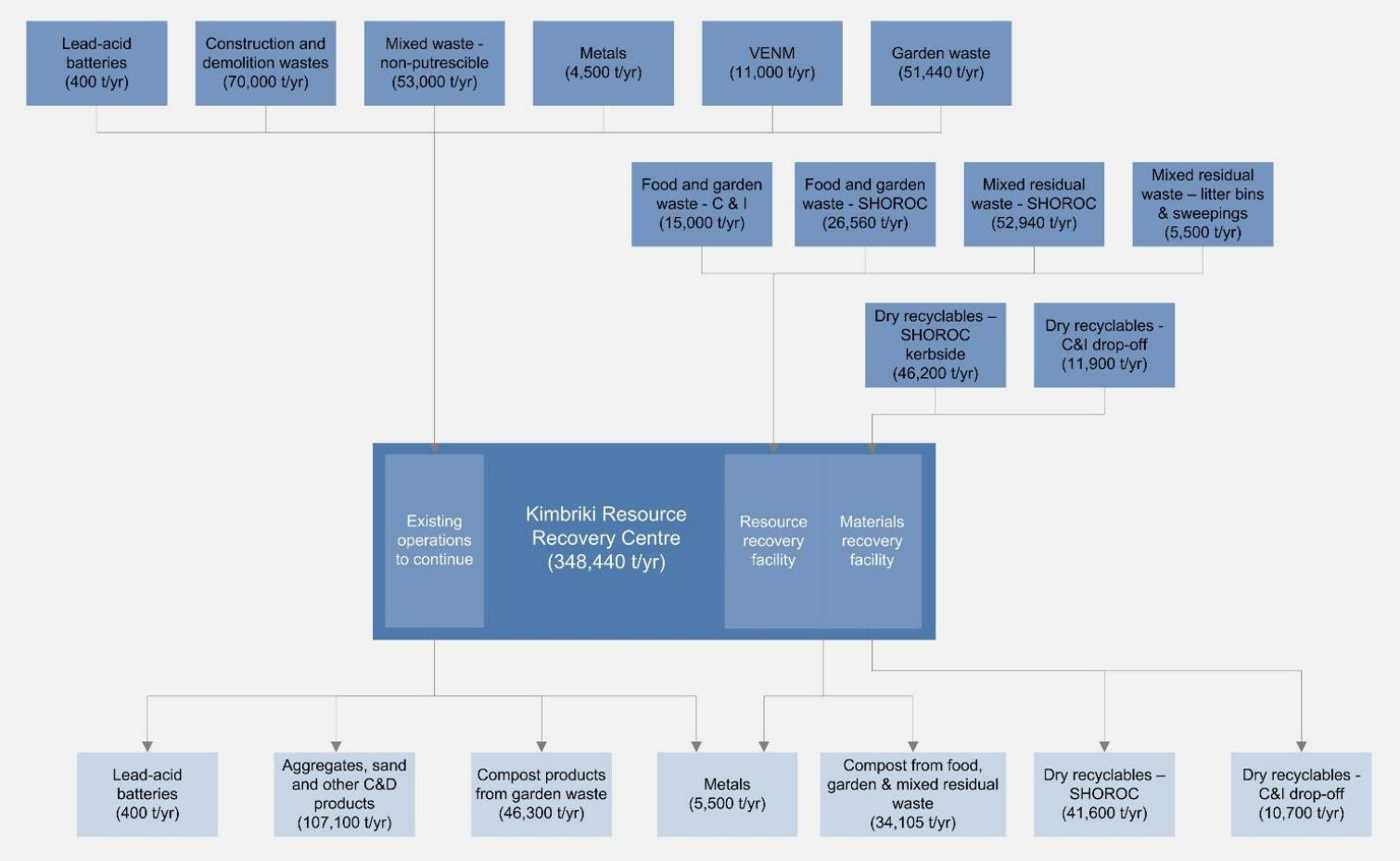



**Figure 6.12 Future waste flows**

Note: C&I – commercial and industrial; VENM – Virgin excavated natural material; C&D – construction and demolition

### 6.4.3 Residuals management

#### RRF residuals

Three potential residual streams are likely to be produced from the RRF:

- At the initial screening as wastes are received, bulky wastes and hazardous wastes would be extracted and despatched to suitable disposal facilities, either at the Kimbriki Resource Recovery Centre or offsite.
- The mixed residual waste oversize fraction, which is largely inorganic, would be screened, air separated and run over magnets and eddy current separators to facilitate recovery of recyclable materials such as plastics and metals. Later the facility may be upgraded to include infrared and optical sorting to extract a fuel substitute. The residual would be treated appropriately to ensure it satisfied DECCW's guidelines for General Waste (non-putrescible) then disposed of to the Kimbriki landfill adjacent to the site.
- Inert contamination separated during compost refinement would be disposed of to the Kimbriki landfill adjacent to the site.

#### MRF residuals

The audited level of contamination in kerbside recyclables within the SHOROC region is low. Recovery rates in the MRF are forecast to be in the order of 90%, when kerbside recyclables are combined with self-haul and commercial recyclables.

It is expected that up to 6,000 tonnes per year of contaminants may be extracted from the dry recyclables stream at the MRF and disposed of at the Kimbriki landfill adjacent to the site. If required this reject material would be stabilised in the RRF prior to disposal at the landfill.

## 6.5 Construction activities and likely staging

Construction activities would take place over a period of approximately 18 months. The exact construction methods and sequence would be determined by the construction contractor; however the following sections provide an overview of indicative construction activities.

### 6.5.1 Preliminaries, site preparation, earthworks and civil infrastructure

The preliminary construction activities are envisaged to be as follows:

- Preparation and approval of a detailed construction environmental management plan;
- Relocation of the current administration office to another location within the Kimbriki Resource Recovery Centre;
- Design and implementation of environmental controls including temporary erosion and sedimentation controls, sedimentation basins and drainage pipes and culverts to enable the basins to drain only treated stormwater to the existing council stormwater system;
- Construction of a site access road for the RRF (upper level) construction site;
- Establishing secure construction office areas/compounds at the upper and lower levels of the site, for the MRF and RRF construction sites respectively;

- Fencing off of retained vegetation areas, to protect them from construction activities; and
- Stripping of shrubs, trees and other vegetation from the upper level of the site (RRF).

Following this site establishment phase, the bulk earthworks phase would commence. This would involve excavation and stockpiling of topsoil from each area. This material would be suitable for future site revegetation works, or for sale to customers. Beneath the topsoil in the upper part of the site are extensive deposits of high quality 'brickies' sand. This is a valuable resource, and it would either be sold to customers, or used for onsite construction purposes to offset/reduce materials needed for construction of the facilities.

Once the topsoils have been removed, ripping and hydraulic hammering of sandstone would be required to create two flat platforms for buildings and ancillary areas. One platform would be at reduced level of RL127 m (for the AWT building), and one at reduced level of RL130 m (for the Maturation building),

These two platforms would be linked by a ramp to enable trucks and front end loaders to travel easily between the two platforms. Using a split level site enables the amount of excavation and refilling of the site to be minimised, and would also minimise the visual impacts of the future buildings.

Based on the current concept design, approximately 220,000 $m^3$ of material would need to be excavated from the site. Approximately 45,000 $m^3$ of this material would be used to fill the lower lying areas of the site to the south-east, after being processed onsite utilising the existing construction and demolition processing equipment. Retaining walls needed for the south eastern edges of the platforms may be able to be constructed from sandstone boulders excavated from the site, subject to engineering requirements.

It has been estimated (based on existing geotechnical information) that the excavated material would comprise approximately 70,000 $m^3$ of topsoil and sand, and 150,000 $m^3$ of sandstone (in-ground volumes).

Excavation of sandstone using ripping and hydraulic hammering techniques would occur for an estimated 22 week period, with the number of machines used and the length of this excavation period subject to the strength of the sandstone and the final detailed design. The majority of the sandstone removal work would involve cutting of less than 5 m depth, according to existing geotechnical information.

Loam, sand and sandstone materials not required immediately for filling or construction purposes would be transported to an intermediate stockpile before being utilised, or despatched offsite if not needed.

### 6.5.2 Building infrastructure

Once excavation is completed in particular areas to finished levels, footings, and drainage and services channels would be excavated. Concrete slabs would then be cast directly onto the sandstone base. In areas where filling is needed, other construction techniques such as piling may be needed to support buildings and floor slabs.

The MRF building, where minimal excavation is required, would likely be constructed whilst excavation is still taking place in the upper part of the site for the other two main buildings. Depending upon the rate of progress of sandstone excavation in the two main excavation areas

(southwest and northeast extremities of the upper part of the site), construction of some sections of the AWT building and the RRF building may commence prior to completion of all excavation activities onsite.

Concrete for the floor slabs and other site uses would most likely be batched offsite. Formwork would be constructed and concrete poured onsite. Structural steelwork and steel cladding would be fabricated offsite and delivered by truck for erection using cranes or other similar equipment.

### 6.5.3 Installation of equipment

Mechanical processing equipment for both the MRF and RRF would be assembled offsite and delivered to the site by truck for installation. It is envisaged that the majority of equipment would be delivered prior to completion of the building roof and wall cladding to allow equipment to be positioned on the concrete slab floors using cranes if necessary.

### 6.5.4 Commissioning

Commissioning of both facilities would be undertaken in two stages:

- Mechanical and electrical commissioning (dry commissioning); and
- Process commissioning (wet commissioning.

The initial phase of commissioning would involve start-up and operation of process and sorting equipment both as individual items of plant and then each facility as a whole. Once dry commissioning has been successfully completed, process (wet) commissioning would commence. Small quantities of the appropriate waste would be introduced to the process lines to test if equipment works correctly. Some minor corrections and adjustments required are carried out at this stage to ensure the equipment is operating effectively and efficiently.

Weighbridge software would also be commissioned at this stage.

### 6.5.5 Other activities

Other construction activities that would be undertaken include:

- Landscaping;
- Installation of lighting;
- Linemarking and sign-posting of roads and new facilities; and
- Other finishing works.

Site roads would be properly surfaced and the weighbridge installed once earthworks are completed.

### 6.5.6 Hours of construction

Construction would take place six days per week as follows:

- Monday to Friday 7 am to 6 pm; and
- Saturday 7 am to 1 pm.

Construction activities are not anticipated to be undertaken on Sundays or public holidays. Construction work may be permitted outside of the hours specified above (work that would not be audible at surrounding residences) subject to consultation with DECCW.

Delivery of plant and equipment may be required outside of the above hours, depending on transport permits required to deliver oversize equipment such as trommels or large conveyors.

# Part C
# Environmental Assessment

# 7 Environmental risk assessment

*This chapter provides a risk assessment of the potential environmental impacts of the project, and identifies the key issues for further assessment as part of the environmental assessment process.*

## 7.1 Risk assessment methodology

The environmental risk assessment was carried out in accordance with AS/NZS ISO 31000:2009, *Risk Management – Principles and Guidelines*. This involves:

- Evaluating likelihood of occurrence;
- Evaluating consequence; and
- Assigning a risk rating.

### 7.1.1 Evaluating likelihood

The likelihood of an impact occurring can be described in terms of probability. Overlaying this is the need to recognise the uncertainty that may be associated with the possible impacts, particularly during the initial risk assessment process. Where there is scientific uncertainty a cautious approach will identify a higher level of risk.

Each identifiable impact can be assigned a likelihood between remote and almost certain. In simplifying the possible impacts for the purpose of a risk assessment an element of subjectivity is introduced. The purpose of the risk assessment is not necessarily to agree on the probability of any particular impact, but to facilitate an understanding of the relative probability of different impacts.

Columns 2 to 4 in Table 7.1 give descriptions that elaborate on the possible likelihood categories. These are presented to help view the impact from different perspectives.

**Table 7.1 Likelihood and probability of occurrence**

| Likelihood | Description | Probability | Community Attitude |
|---|---|---|---|
| Almost Certain | Expected to occur | >85% | Almost everyone affected |
| Likely | Probably will occur | 50-85% | Most people affected |
| Possible | May occur | 21-49% | Many people affected |
| Unlikely | Not expected to occur in most circumstances | 1-20% | Some people affected |
| Remote | May occur in exceptional circumstances | <1% | Few people interested |

### 7.1.2 Evaluating consequence

The consequences of an impact require a degree of subjective assessment as the likely consequences of an impact may consist of several elements.

The elements that have been considered in this risk assessment are described below. Table 7.2 provides a guide to the elements considered when evaluating consequence.

**Table 7.2 Consequences of occurrence**

| Consequence | | Catastrophic | Major | Moderate | Minor | Minimal |
|---|---|---|---|---|---|---|
| Magnitude | Spatial | Whole of Region | The site and surrounding areas | The whole site | A part of the site | A small isolated area |
| | Intensity | Lethal/ extreme.<br>For individuals or communities | Lethal impacts on some species. | Acute/ Moderate.<br>Impact on growth, recruitment or survival rates | Acute impacts on some species. | Chronic/low Level.<br>behavioural, lifespan or condition effect |
| Temporal | Duration | Permanent | Long term effect (multiple generations) | Medium term | Short term impact (single generation) | Single incident.<br>transient event |
| | Timing (periodic events) | Permanent interruption of ecosystem cycle. | Regularly interrupts life cycle. | Interrupts one life cycle. | Occasional interruption of feeding or breeding. | Occurs outside breeding times. |
| Ecological | Values | Wilderness or nationally threatened Species. | Conservation area or listed Species | Native flora or fauna | Parkland | Previously disturbed areas |
| | Sensitivity | Will not recover. | Significant change to ecosystem function | Moderate change to ecosystem function | Will recover with some changes | Will recover completely. |
| Social | Number of People | Loss of life | Large number of people directly impacted. | Several people directly impacted, or many indirectly | Some people directly impacted, or several indirectly | Some people indirectly affected |
| | Heritage Considerations | Major degree of impact on place(s) or object(s) with an exceptional level of significance | Major degree of impact on significant place(s) or object(s) with a high level of significance | Substantial degree of impact on significant place(s) or object(s) | Impact on place(s) or object(s) with limited levels of significance, or, minor impact to significant place(s) or object(s) | Impact on place(s) or object(s) assessed below significance threshold |

| Consequence | | Catastrophic | Major | Moderate | Minor | Minimal |
|---|---|---|---|---|---|---|
| Economic | General | Several million dollars in lost revenue or remediation costs | A million dollars in lost revenue or remediation costs | Half a million dollars in lost revenue or remediation costs | Several thousands of dollars in lost revenue or remediation costs | Minimal losses |
| | Financial/ Business Cost | >$10,000,000 | <$10,000,000 | <1,000,000 | <$100,000 | No Loss |

### 7.1.3 Risk assessment matrix

Based on the assessment of likelihood and consequence (as described above) any foreseeable impact can be assigned a risk rating. An environmental assessment is intended to focus on potentially significant environmental impacts.

The table below is to be read as a matrix, with increased consequence across the top and increased likelihood down the left side. Any potential impacts that fall in the top left should be addressed in detail by the environmental assessment.

**Table 7.3 Risk assessment matrix**

| | Consequence | | | | |
|---|---|---|---|---|---|
| **Likelihood** | Catastrophic | Major | Moderate | Minor | Minimal |
| Almost Certain | Significant | Significant | Very High | High | Medium |
| Likely | Significant | Very High | High | Medium | Low |
| Possible | Very High | High | Medium | Low | Very Low |
| Unlikely | High | Medium | Low | Very Low | Negligible |
| Remote | Medium | Low | Very Low | Negligible | Negligible |

## 7.2 Potential impacts

Table 7.4 shows the results of the environmental risk assessment for the project. This, combined with the Director-General's requirements for the project (which identified key issues for consideration) indicates that the following issues should be addressed in the environmental assessment:

- Biodiversity (flora and fauna impacts);
- Air quality and odour;
- Traffic and transport;
- Soil and water;
- Greenhouse gas;
- Noise;
- Heritage;
- Hazards and bushfire;
- Visual; and
- Socio-economic.

## Table 7.4 Environmental risk assessment

| Issue | Potential impacts | Likelihood | Consequence | Assessed risk level | Comment/response |
|---|---|---|---|---|---|
| Land use and property | Detrimental change to land use of the site or surrounds. | Remote | Minor | Negligible | The project would be located within the Kimbriki Resource Recovery Centre and is consistent with the existing land use/operations of the Kimbriki Resource Recovery Centre.<br>There would be no direct land use impacts on adjoining lands during operation of the project, as the design includes sufficient land to be included within the site for operational purposes.<br>Potential environmental amenity impacts on surrounding land uses are considered separately. |
| Biodiversity | Effects on threatened or vulnerable species through removal of vegetation and destruction of habitat. | Likely | Moderate | High | The project would require a portion of the site to be cleared of vegetation. Some threatened species have been identified on site. Therefore, the project has the potential to impact on biodiversity.<br>Biodiversity was also identified in the Director-Generals requirements as a key issue is therefore considered in the environmental assessment. |
| Air quality and odour | Dust emissions from construction activities and ongoing operations causing nuisance to sensitive receptors.<br>Odour emissions escaping from the tunnels and or buildings at levels that exceed odour limits and affect sensitive receptors. | Likely | Moderate | High | The project includes dust management/mitigation techniques during construction and odour control devices for the composting activities.<br>Odour impacts are a potential risk issue with any waste management project.<br>Air quality and odour was also identified in the Director-Generals requirements as a key issue is therefore considered in the environmental assessment. |

| Issue | Potential impacts | Likelihood | Consequence | Assessed risk level | Comment/response |
|---|---|---|---|---|---|
| Traffic and transport | Increase in heavy and light vehicle traffic to the site leading to traffic impacts on Mona Vale Road. | Possible | Minor | Low | The project would increase heavy and light vehicle traffic to the site, but there would be minimal impact on Mona Vale Road. Most of the trucks that would access the new facilities are already using Mona Vale Road to travel to Belrose landfill.<br><br>A number of measures are proposed to minimise any impacts to traffic flows on Mona Vale Road.<br><br>Traffic was also identified in the Director-Generals requirements as a key issue is therefore considered in the environmental assessment. |
| Soil and water | Disturbance of soils during construction (excavation activities in particular) and hence potential for sediment movement.<br><br>Contamination of surface water or ground water. | Likely | Minor | Medium | There is potential for disturbance of soils, particularly during construction. This would be managed through implementation of a sediment and erosion control plan.<br><br>Waste and recyclables processing activities would be undertaken within enclosed buildings with sealed floors. Hence there is minimal potential for groundwater contamination.<br><br>Runoff from the hardstand areas of the RRF and from the MRF building and surrounding hardstand areas would be directed to the existing eastern drain and treated/managed in the overall Kimbriki Resource Recovery Centre stormwater management system. It would not be directed into retained vegetation areas. However, to ensure that current natural stormwater flows are altered as little as possible, excess roofwater from the new buildings (after rainwater and fire fighting water tanks are filled) would be discharged to the retained vegetation areas. |

| Issue | Potential impacts | Likelihood | Consequence | Assessed risk level | Comment/response |
|---|---|---|---|---|---|
| | | | | | Soil and water is considered a key issue and was also identified in the Director-Generals requirements as a key issue and therefore has been addressed in the environmental assessment. |
| Greenhouse gas | Emissions from fuel use in construction equipment and electricity use, mobile equipment and transport contributing to global warming. | Likely | Minor | High | Potential energy efficiency measures would be incorporated into the design of the new facilities, where practicable. Buildings will be oriented to maximise passive solar design opportunities. Greenhouse gas has been identified as a key issue and was also identified in the Director-General's requirements as a key issue. Hence greenhouse gas impacts have been addressed in the environmental assessment. |
| Noise | Noise emissions from site activities during construction or operation exceed noise limits and affect sensitive receptors. | Possible | Moderate | Medium | Construction activities would generate noise emissions. During operation, plant and equipment would be mostly operated within buildings, but there would be additional traffic noise and some equipment noise from movement of material around the site and transport of incoming waste and outgoing product.<br>Hence there is a potential for noise impacts. This is considered a key issue and was also identified in the Director-General's requirements as a key issue and therefore it has been addressed in the environmental assessment. |
| Cultural heritage | Encounter and disturb items of cultural heritage during construction and operation. | Remote | Minimal | Negligible | Impacts on cultural heritage items are considered unlikely due to the distance of the identified items from the project.<br>However, heritage (including both Aboriginal and Cultural heritage) has been identified in the |

| Issue | Potential impacts | Likelihood | Consequence | Assessed risk level | Comment/response |
|---|---|---|---|---|---|
| | | | | | Director-General's requirements as a key issue. Hence Cultural heritage impacts have been addressed in the environmental assessment. |
| Aboriginal heritage | Disturbance of Aboriginal heritage items during construction. | Unlikely | Minor | Very low | Preliminary Aboriginal heritage assessment was undertaken at the preliminary environmental assessment stage<br><br>Heritage (including both Aboriginal and Cultural heritage) has been identified by the Director-General's requirements as an issue requiring consideration. Hence Aboriginal heritage impacts have been addressed in the environmental assessment. |
| Hazards and bushfire risks | Vulnerability to bushfire. Dangerous goods or hazardous materials. | Unlikely | Moderate | Low | The project has been designed to minimise potential bushfire vulnerability. Minimal dangerous goods and or hazardous materials would be handled as part of the project operations.<br><br>However hazards and fire risks have been identified by the Director-General's requirements as an issues requiring consideration. Hence these have been addressed in the environmental assessment. |
| Visual | Visibility of the proposed new buildings. | Possible | Minimal | Very low | The project is expected to be visible from very few external locations due to set backs, retained vegetation and siting of the new buildings on the site, considering the existing topography and surrounding retained bushland. Some distant views may be possible. Building colours will be selected so that blend into the landscape, and architectural design principles will be used to ensure that the buildings are visually consistent with the surroundings. |

| Issue | Potential impacts | Likelihood | Consequence | Assessed risk level | Comment/response |
|---|---|---|---|---|---|
| | | | | | However, visual amenity has been identified by the Director-General's requirements as an issue requiring consideration and has therefore been addressed in the environmental assessment. |
| Socio-economic | Effects on employment and access to waste and recycling facilities.<br>Cost of infrastructure and operations. | Remote | Minor | Negligible | The project would generate around 59 new jobs during operation and between 80 to 100 jobs during construction.<br>Residents would still have access to the Kimbriki Resource Recovery Centre for waste and recycling, but the proposed new facilities would expand the capacity of the Kimbriki Resource Recovery Centre to recycle more and divert more waste from landfill.<br>This is not considered a key issue, however the Director-General's requirements identify this as an issue requiring consideration and it is therefore addressed in the environmental assessment. |
| Utilities and infrastructure provisions | Utilities demand exceeds supply available and places a burden on existing infrastructure. | Unlikely | Minimal | Negligible | It is expected that there would be no significant impact on utilities and related infrastructure.<br>This is not considered a key issue nor has it been identified as a key issue in the Director-General's requirements. |

# 8 Biodiversity

*The information presented in this chapter is based on the findings of the flora and fauna assessment undertaken by Ecotone Ecological Consultants Pty Ltd and additional work undertaken by GHD on the northern side of Mona Vale Road. The flora and fauna assessment report is included in Appendix E of this environmental assessment.*

## 8.1 Methodology

### 8.1.1 Kimbriki Resource Recovery Centre and site ecological assessment

The assessment methodology consisted of:

- A review of literature and existing data on flora and fauna in the region;
- Field surveys; and
- Impact assessment.

The survey methodology generally followed the recommended draft flora survey guidelines of DECCW (2004). The methods employed were tailored to the habitat types and site characteristics of the study area.

Targeted flora field surveys were undertaken within the naturally vegetated parts of the entire Kimbriki Resource Recovery Centre (referred to as the study area for the purposes of this chapter), around the perimeter of the disturbed area. The land area directly affected by the project (the site) was examined in most detail. Following a general site inspection on 24 September 2009, flora field surveys were undertaken on 2 and 20-22 October 2009 throughout all parts of the study area where natural vegetation occurred (disturbed or undisturbed).

The flora survey methodology involved three components:

- Traverses were undertaken on foot comprising non-linear transects and random meanders within the naturally vegetated parts of the study area;
- A total of eleven 400 $m^2$ flora quadrats (20 x 20 m or 40 x 10 m in narrow linear stands) were undertaken at representative points throughout the study area; and
- A targeted search was undertaken in areas of potentially suitable habitat for any rare or threatened flora species that had been previously recorded in the study area and regarded as having at least a moderate likelihood of occurring within the site.

A habitat assessment and fauna survey was undertaken across the study area, including the site, from 21-25 September 2009. The type and condition of potential habitats for fauna species was investigated and recorded, this included identification of specific habitat resources (e.g. tree-hollows, exfoliating rock and mistletoe), vegetation composition, structure and condition at all strata levels, topographic features, water sources and levels of disturbance. A koala habitat assessment under SEPP 44 was also undertaken.

Fauna surveys included live trap lines (including Elliott traps on both ground and tree and cage traps), harp (bat) trapping, diurnal bird transects, diurnal reptile searches, nocturnal amphibian

searches, spotlighting, nocturnal owl call playback, and an anabat micro-bat echolocation survey.

### 8.1.2 Mona Vale Road works targeted investigation

As described in section 6.1.6, a number of minor amendments to the existing Intersection of Mona Vale Road and Kimbriki Road are proposed to address some of the operational and safety issues at this intersection.

DSEWPC requested additional information in regards to the EPBC Act Referral for the project. Its request noted that two threatened flora species have been recorded in the vicinity of the intersection of Mona Vale Road and Kimbriki Road. These include *Micromyrtus minutiflora* and the only known population of Angus' Onion Orchid (*Microtis angusii*). While the works proposed at the intersection are wholly within the existing road, potential indirect impacts to these species need to be considered.

DECCW advised that the *Micromyrtus minutiflora* is likely to be a misidentification. However, the following tasks were undertaken by GHD to provide additional information on the *Microtis angusii*:

- Review of NSW Wildlife Atlas records, DECCW and DSEWPC threatened species profiles and other information relating to these species;
- Consultation with environmental officers from Warringah Council regarding the population of *Microtis angusii*;
- Site inspection to ascertain site characteristics and flora survey to clarify presence/absence and/or likely occurrence of *Micromyrtus minutiflora*;
- Mapping of locations of these threatened flora with respect to the intersection; and
- Preparation of a report to DSEWPC, including methods, results, and assessment of likely direct and indirect impacts on *Microtis angusii* and *Micromyrtus minutiflora* (as relevant).

## 8.2 Existing environment

### 8.2.1 General description

The study area comprises moderately disturbed land, as well as areas of relatively undisturbed bushland in good condition. There is a grid of vehicle tracks and also walking tracks through the bushland between the administration buildings and Kimbriki Road. The remaining bushland areas appear to be mainly intact, with little weed encroachment.

Significant features in the vicinity of the site include minor rock outcrops at the northern end of the site, patches of relatively intact sclerophyll bushland providing habitat for a range of flora and fauna species, and the drainage line with small areas of swampy habitat.

Further information on the site environment is provided in section 4.2.

### 8.2.2 Potential threatened species and endangered ecological communities to be assessed – the site

The following listed species and ecological communities were known or considered to have potential to occur within the site. These formed the potential subject species for the impact assessment. Detailed species lists are located in Appendix E.

#### Flora

##### *Listed threatened species*

One threatened flora species is known to occur within the site:

- *Tetratheca glandulosa* - glandular pink-bell (Listed as vulnerable by the TSC Act and EPBC Act).

Potentially suitable habitat was considered to be available for a number of additional listed species. However, none were recorded during the thorough field surveys (including a seasonal targeted survey for *Acacia bynoeana*) and it is therefore concluded that they are unlikely to occur.

##### *Threatened ecological communities*

No threatened ecological communities listed under legislation are considered to occur within the site.

##### *Non-listed rare or locally significant species*

Twenty flora species listed on the Rare or Threatened Australian Plants (ROTAP) list developed by the CSIRO have been previously recorded in the study area. These species are not listed under any legislation. However, impacts on these species should be given due consideration as a part of the overall biodiversity impact assessment.

Of these, two species are known to occur within or immediately adjacent to the site:

- *Boronia serrulata* - rose boronia; and
- *Eucalyptus luehmanniana* - yellow top mallee ash.

Of the remainder, nine are considered to have a small potential to occur within the site, but were not recorded during field surveys. In the unlikely event that any do occur, it is considered likely that these would be restricted to the proposed offset areas. Appendix E provides details of these species.

##### *Non-listed locally significant ecological communities*

One vegetation community recorded within the site is considered to have local conservation significance:

- Community 4 - Yellow-top Ash Mallee (R – rare in Australia).

#### Fauna

No threatened fauna species have been recorded within the site, however some have potential to forage or shelter within the habitat available. Details of species with the potential to occur within the site are listed in Appendix E.

### 8.2.3 Potential threatened species and endangered ecological communities to be assessed – the vicinity of the intersection of Mona Vale Road and Kimbriki Road

As mentioned in section 8.1.2, DSEWPC advised that two listed threatened flora species have been recorded in the vicinity of the intersection of Mona Vale Road and Kimbriki Road. These include *Micromyrtus minutiflora* and the only known population of *Microtis angusii*. Both of these species are listed as endangered under both the TSC Act and EPBC Act.

### 8.2.4 Field survey results – the site

A summary of the results of field surveys on the site is provided below. Survey results for other areas of the Kimbriki Resource Recovery Centre are provided in Appendix E.

#### Flora

*Vegetation communities*

Four vegetation communities were identified within the site:

- Scribbly Gum / Red Bloodwood Woodland (naturally occurring community);
- Leptospermum / Scrub She-oak / Banksia Scrub/Heath (naturally occurring community);
- Yellow-top Ash Mallee (naturally occurring community); and
- Highly Disturbed / Highly Modified / Weedy Areas (derived or artificial communities).

The location of the vegetation communities are shown in Figure 8.1. Detailed descriptions of these communities can be found in Appendix E.

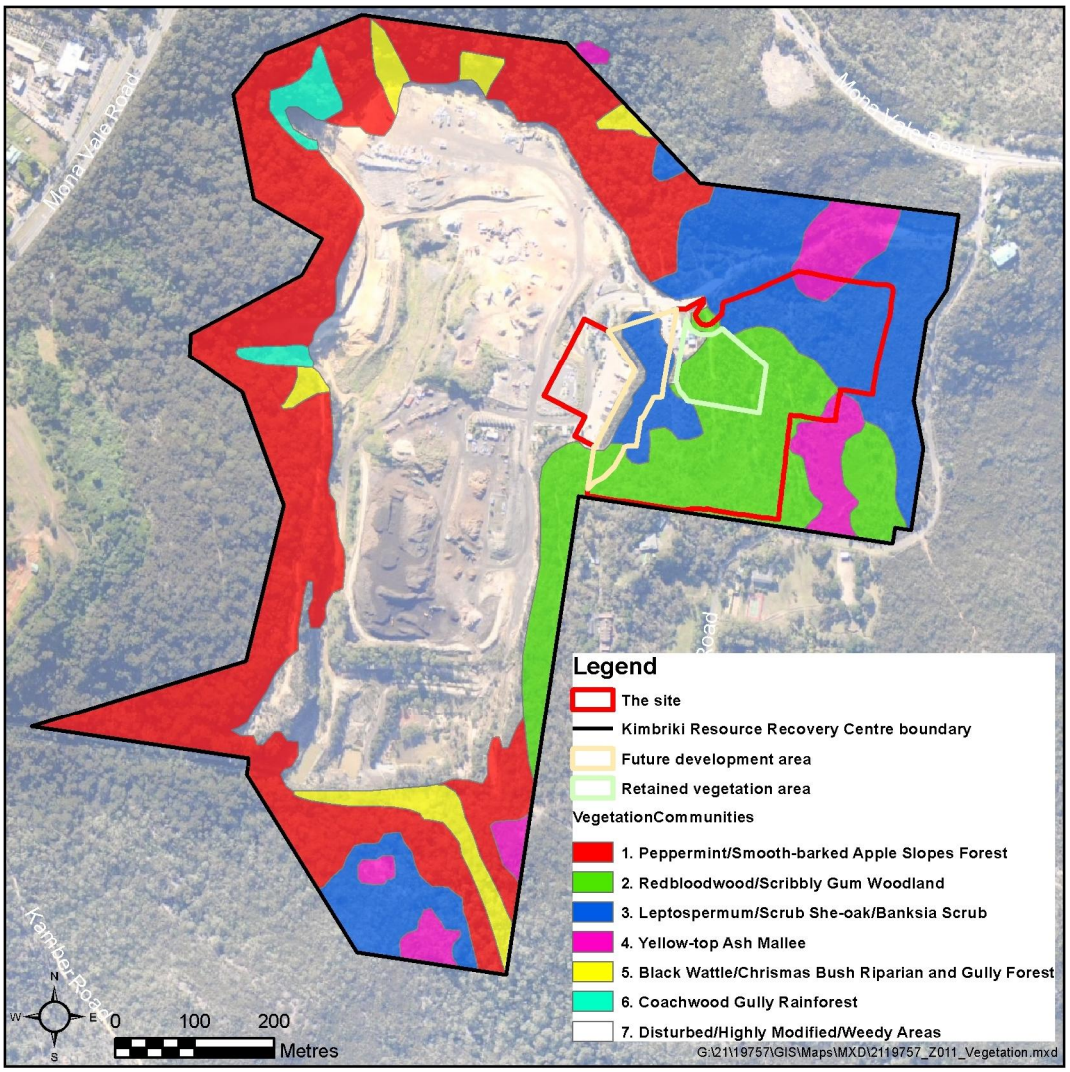



**Figure 8.1 Vegetation communities**

*Groundwater dependent ecosystems*

Groundwater dependent ecosystems are defined in the NSW State Groundwater Dependent Ecosystems Policy as 'ecosystems which have their species composition and their natural ecological processes determined by groundwater' (DLWC 2002). The only ecosystem within the site that could be considered to be 'groundwater dependent' according to the definitions in the policy and identification advice is a small swampy area south of the proposed amenities building.

*Threatened or significant flora species*

Three rare or threatened flora species were recorded within or in the immediate vicinity of the site. These, together with their conservation status, are:

- *Tetratheca glandulosa* (listed as vulnerable by the TSC Act and EPBC Act);
- *Eucalyptus luehmanniana* (ROTAP); and
- *Boronia serrulata* (ROTAP).

Of the above species only the *Tetratheca glandulosa* is listed under legislation (TSC Act and EPBC Act). *Tetratheca glandulosa* was found to be restricted to two separate patches in the approximate centre of the site (refer Figure 8.2). Figure 8.2 also shows the location of the potential habitat of *Tetratheca glandulosa* in relation to the site.

Within the site, there appears to be only a small population with 20 plants recorded. However, these plants were distributed over a relatively wide area (covering an estimated habitat area of approximately 1.9 ha), including potentially suitable habitat between and slightly beyond the locations of recorded plants. It is possible that due to a recent fire in the area and generally dry spring conditions, fewer plants were recorded than are actually present, and that more plants would have been recorded during a good season. It is not unusual for the species to be recorded in small numbers at any one site.

*Eucalyptus luehmanniana* was widespread and abundant in the area surrounding the site. Within the site, the species occurred as one large patch and three smaller ones (see Figure 8.2).

Only two individual plants of *Boronia serrulata* were detected, to the north of the main access road into the Kimbriki Resource Recovery Centre. These two plants are well outside the site.

*Endangered or significant ecological communities*

No threatened ecological communities listed by the TSC Act or EPBC Act were identified.

One vegetation community occurring on site is classified by Smith and Smith (2005) as 'Rare in Australia' - Yellow-top Mallee Ash. This community occurs in several parts of the site. Patches of the community within the site appear to be associated with the edges of the drainage line that runs through the site. An area of impeded drainage on more level land in the central part of this drainage line has resulted in the formation of a small patch of swampy ground characterised by sedges and rushes.

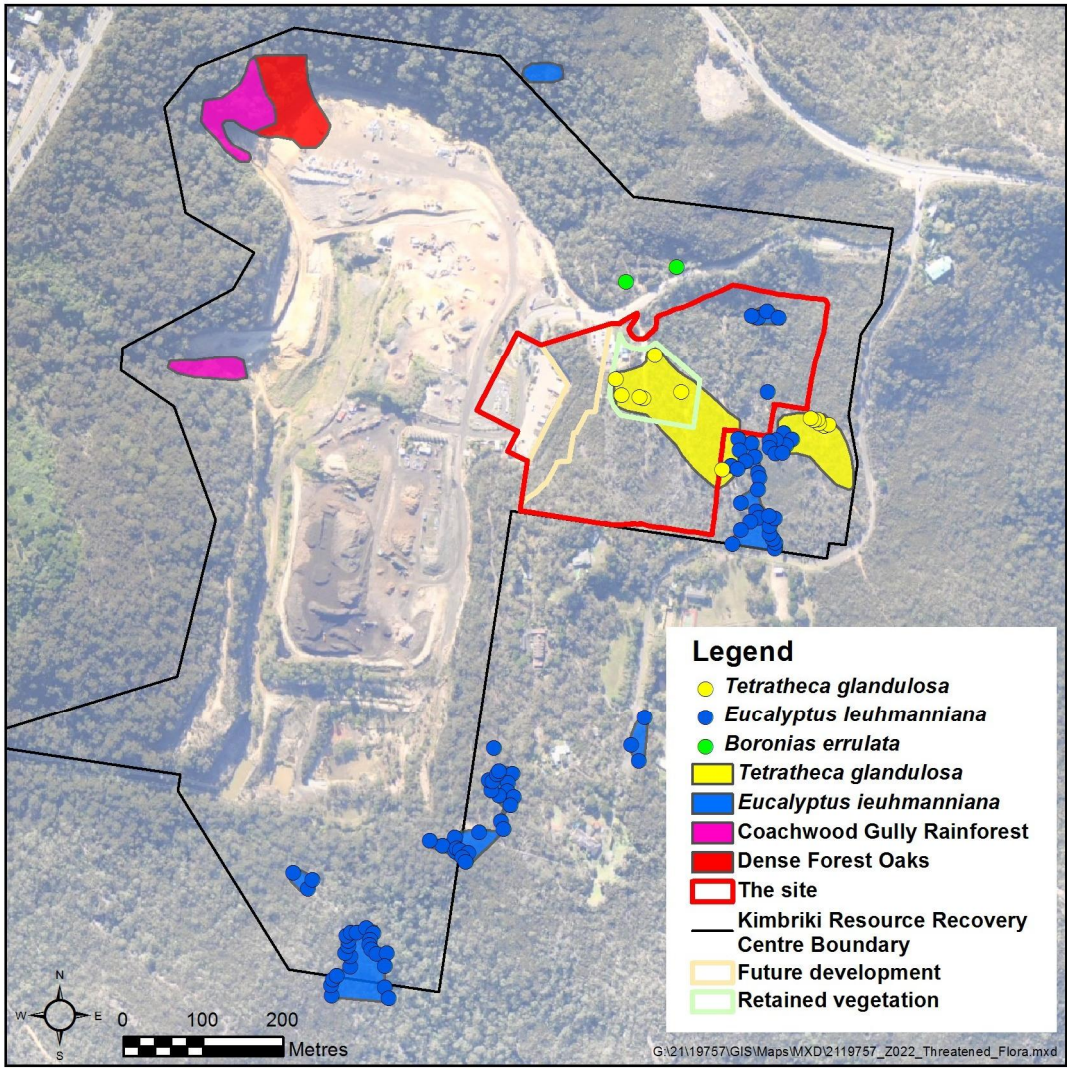



**Figure 8.2 Significant flora and vegetation communities**

*Overall significance of vegetation*

Apart from being habitat for threatened species or significant vegetation communities, the main ecological function of the vegetation is as part of a wider corridor that provides connectivity with adjoining offsite vegetation, both for the movement of fauna and for the exchange of genetic material between native flora species. It also provides a refuge for flora and fauna that would tend to reduce the risk of local populations becoming locally extinct.

### Fauna

Significant fauna habitat and species are shown on Figure 8.3.

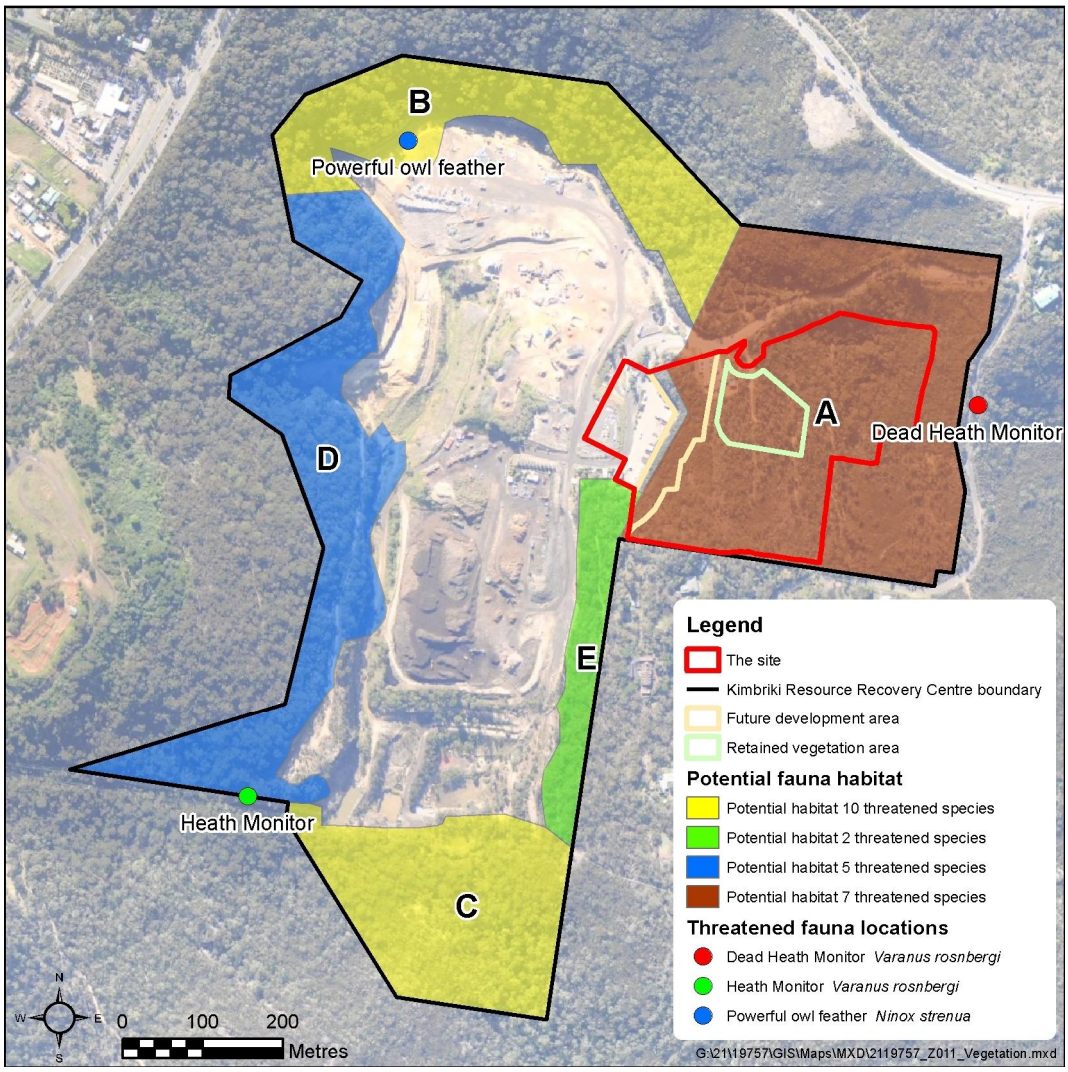



**Figure 8.3 Significant fauna habitat and species**

*Fauna Habitats*

The main habitat features within the study area are:

- Bushland areas (open and closed forest);
- Open areas mostly cleared;
- Tree-hollows;
- Ponds and drainage lines; and
- Rock outcrops.

All these features, except ponds, are found within the site.

These features provide habitat for a diverse range of vertebrate fauna, including several threatened species recorded in the study area or known from the locality (see below). A more detailed discussion of fauna habitat features is provided in Appendix E.

*Fauna diversity*

A total of 34 fauna species were recorded on the site, including:

- 23 birds;
- 6 mammals;
- 3 frogs; and
- 2 reptiles.

*Threatened fauna species*

No threatened species were recorded on the site. Two threatened species were recorded in the study area:

- Heath monitor (*Varanus rosenbergi*) – This species was identified along the southern boundary of the Kimbriki Resource Recovery Centre during field surveys. A second specimen was recorded as road kill on Kimbriki Road immediately east of the study area.
- Powerful owl (*Ninox strenua*) – A feather of this species was found in the coachwood gully rainforest located in the northwestern end of the study area. This area is considered likely to be used by local powerful owls as it supports high quality habitat for the species.

*Migratory species*

No migratory species were recorded on the site, however one species, the black-faced monarch, was recorded at the southern end of the study area.

### 8.2.5 Consultation and field survey results – the vicinity of the intersection of Mona Vale Road and Kimbriki Road

GHD's ecologist consulted with the Biodiversity Officer at Warringah Council regarding *Microtis angusii*. Warringah Council provided extensive information on the population that occurs near the intersection of Mona Vale Road and Kimbriki Road. *Microtis angusii* occurs above ground between April and December, and was therefore not located during the field survey. However one population is known to occur in two areas near Mona Vale Road.

In addition, GHD's ecologist consulted with the Threatened Species Officer with DECCW regarding the two threatened flora species. He noted that the record of *Micromyrtus minutiflora* is likely to be erroneous as it is well outside the known distribution of the species (see Appendix H for more detail), and as such is no longer on the publicly accessible Atlas of NSW Wildlife maintained by DECCW.

## 8.3 Impact assessment

The footprint of the project has been carefully selected to minimise the direct and indirect impacts on biodiversity of the locality, particularly in relation to threatened species and endangered ecological communities. Although the project would result in the removal of vegetation, an offset strategy has been developed to offset these impacts. Therefore, it is considered that significant impacts on the biodiversity of the area are unlikely. A summary of the results of the impact assessment is provided below.

### 8.3.1 Flora

#### Direct impacts

A total of approximately 5.75 ha of native vegetation would be removed by the project, of which 0.76 ha represents significant flora habitat comprising 0.56 ha of *Tetratheca glandulosa* and 0.2 ha of *Eucalyptus luehmanniana* habitat.

The vegetation that would be removed is summarised in Table 8.1.

**Table 8.1 Summary of vegetation to be removed**

| Vegetation category | Area (ha) / no of plants removed by project |
|---|---|
| *Tetratheca glandulosa* – habitat area | 0.56 |
| *Eucalyptus luehmanniana* – habitat area | 0.20 |
| Red Bloodwood / Scribbly Gum Forest | 2.80 |
| Scrub community | 2.19 |
| **Total** | **5.75** |

The project would remove 0.56 ha out of 1.88 ha (29.5%) of potential habitat for the vulnerable species *Tetratheca glandulosa* in one discrete area from the western habitat patch. This removal would be likely to include one and possibly two of the 20 known plants of the species. The eastern patch for the species would not be directly affected. The removal of native vegetation would split the western habitat patch for the species into two areas (0.67 ha and 0.11 ha) and leave the eastern habitat patch (0.54 ha).

Potential impacts as a result of the loss of *Eucalyptus luehmanniana* (yellow-top mallee ash) are minimised, as the species is common within and beyond the study area.

The removal of all categories of native vegetation habitat would be compensated by the protection and management of formal offset areas (refer section 8.4.1) both in the immediate vicinity of the site and in bushland areas of the wider Kimbriki Resource Recovery Centre.

#### Indirect impacts

Potential indirect impacts on flora include:

- Hydrological changes - potential increases or reductions in runoff, particularly into the small swampy area within the yellow-top mallee ash community and possible changes to the water table due to the cut and fill batters;
- Shading from buildings;
- Altered wind profiles;
- Dust; and
- Any runoff of nutrients and chemical pollutants from the facilities.

The potential for indirect hydrological impacts would be mitigated through the design of the project, and the implementation of mitigation measures, including onsite treatment and

controlled discharge of stormwater and wastewater. Further information is provided in chapter 12.

Hydrological modelling indicates that the proposed offset areas can be supplied with approximately the same quantity of clean water that they currently receive. Because the roof areas of the project buildings would collect more water than the offset areas currently receive, any excess roof water would be diverted to the overall Kimbriki Resource Recovery Centre stormwater system. Therefore, the moisture status of the soil in the offset areas should not change significantly overall and the habitat should remain suitable for the continued health of the plants in the offset areas. These measures would also ensure minimal impact on a small groundwater dependent ecosystem located to the south of the site.

The potential for overshadowing impacts and altered wind profiles resulting from the project are considered to be minimal as the buildings would be relatively low and well separated.

#### *Microtis angusii* in the vicinity of the intersection of Mona Vale Road and Kimbriki Road

The proposed roadworks would be undertaken in the vicinity of the *Microtis angusii* population. The roadworks would not involve any additional areas of bitumen, and would be limited to painting new lines and resurfacing the existing road surface.

The additional assessment of impacts undertaken for the DSEWPC Referral concluded that with implementation of a management strategy and mitigation measures (refer section 8.4) during works at the intersection of Mona Vale Road and Kimbriki Road, impacts to the *Microtis angusii* would be minimal.

The severity of impacts on *Microtis angusii* has also been considered through the preparation of assessments of significance under both the EPBC Act and Part 3A of the EP&A Act.. The conclusion of these assessments was that the project is unlikely to result in a significant impact on the existing population of *Microtis angusii*.

### 8.3.2 Fauna

As noted above, the project would result in a total loss of 5.75 ha of habitat. The survey results show that small mammals (brown antechinus, bush rat and long-nosed bandicoot), are common within the site. Although there would be a reduction in habitat, known populations of these species would still exist within the surrounding bushland.

Given the large areas of similar bushland available within surrounding bushland areas including the adjacent Garigal and Ku-ring-gai Chase National Parks, together with the proposed offset strategy, it is unlikely that the project would result in a significant reduction to local populations of fauna known or likely to occur on the site.

#### Koala habitat assessment under SEPP 44

A koala habitat assessment was undertaken in accordance with SEPP 44. It was concluded that whilst the vegetation on the site represented potential koala habitat, it did not represent 'core' habitat as no evidence of koalas could be found and there are no recent records within 2 km of the site. A koala plan of management under SEPP 44 is not required.

### Groundwater dependent ecosystems

Only one small swampy area in the drainage line south of the proposed amenities building was considered to be consistent with the definition of a groundwater dependent ecosystem according to the State Groundwater Dependent Ecosystem Policy. This area would be retained and protected in a managed offset area as part of the proposed offset strategy, and appropriate management of the hydrology of the site would ensure its continued functioning and health as a groundwater dependent ecosystem.

As illustrated in Figure 6.6, up-gradient overland flow runoff that currently enters the site would be diverted past the new operational areas and continue its natural flow path. To supplement these flows, overflow from roof rainwater tanks would also be directed to the retained vegetation areas to the south of the site. This would provide water necessary to maintain the existing ground water ecological system in the drainage line south of the site.

## 8.3.3 Threatened species

### Part 3A assessment of impact for threatened flora and endangered ecological communities

A part 3A assessment of impact for threatened flora and endangered ecological communities is located in Appendix E. A summary of the results of this assessment is provided below.

The project would impact on the listed threatened flora species *Tetratheca glandulosa* by directly removing up to approximately 10% of known plants and approximately 30% of potential habitat area from a small population of the species within the site. The project is not expected to have a significant impact on the local population of the species, as the remaining areas of habitat for *Tetratheca glandulosa* would be protected, managed and monitored in perpetuity in defined offset areas as part of the proposed offset strategy. Additionally, at least one further occurrence of the species is known to occur directly to the north of the site, as well as numerous records of the species occurring within a 2 km radius of the site.

No endangered populations or threatened ecological communities listed by the TSC Act would be affected by the project.

### Part 3A assessment of impact for threatened fauna

There is the potential for vegetation clearance to impact on sedentary terrestrial species, particularly the heath monitor, as well as the southern brown bandicoot, eastern pygmy possum, and giant burrowing frog (should they occur). Although potentially occurring in the study area, the red-crowned toadlet is unlikely to occur on the site as the habitat is marginal. For the remaining species, the main impact of the project would be a loss of potential foraging habitat within a much larger home range.

Given the presence of large areas of similar habitat within surrounding bushland, including Ku-ring-gai Chase and Garigal National Parks, and the offset strategy proposed as part of the project, it is considered unlikely that the loss of habitat would result in loss of a local population of any threatened species.

The Part 3A assessment concluded that the project would maintain or improve biodiversity values, as it would avoid sensitive habitat where possible and would offset loss of habitat. A

detailed consideration of the Part 3A threatened species assessment key thresholds is included in Appendix E.

### Impacts on EBPC Act matters of national environmental significance

The project would have a minor direct impact on one vulnerable flora species listed by the EPBC Act - *Tetratheca glandulosa*. The potential impacts have been discussed above.

The project would result in the loss of potential habitat for two endangered species (southern brown bandicoot and spotted-tailed quoll), two vulnerable species (giant burrowing frog and grey-headed flying-fox), and at least one migratory species (black-faced monarch) listed in the schedules of the EPBC Act. None of these species were recorded on the site, although the black-faced monarch was recorded in the south of the study area.

With regards to the southern brown bandicoot, habitat lost as a result of the project represents 0.2% of available habitat within the area. The status of this species south of Mona Vale Road is unknown. Genetic studies indicate that some inbreeding depression has occurred in the Garigal National Park population and therefore when habitat fragmentation, frequent fire and lack of fox control are taken into account, this population may already be at a high risk of extinction (DEC 2006). Given the large areas of similar habitat surrounding the site, the apparent small population size and lack of any records of the species within 2 km of the site, it is possible that this endangered species does not occur on the site.

The spotted-tailed quoll has a low potential to forage in the area, although individuals could be attracted to the land fill operations in a search for food scraps. As this species is known to forage over a large home range, the loss of marginal habitat is not considered to be significant for the long term survival of the species.

The giant burrowing frog has some potential to forage or shelter within the site, however suitable breeding habitat does not occur within the site. There is some potential for indirect impacts on breeding habitat as a result of changes to water flows and quality downstream of the site. As large areas of similar habitat surrounds the site it is unlikely that significant impacts on this species would occur, provided that appropriate mitigation measures are implemented with regards to water quality and flow regimes (refer chapter 12).

There would be some loss of foraging habitat for the grey-headed flying-fox and black-faced monarch, however neither species are expected to breed on the site. Given the large areas of similar habitat surrounding the site and the nomadic/migratory nature of the species, it is unlikely that significant impacts would occur.

Even though no significant impacts have been predicted, there would be a direct impact on species listed by the EPBC Act (impact on *Tetratheca glandulosa* and loss of potential habitat for the endangered southern brown bandicoot). As a result, a referral has been submitted to the Commonwealth DSEWPC.

## 8.4 Mitigation measures

The hierarchy of avoid, mitigate and then offset principles has been adhered. Firstly, the project has been designed to avoid sensitive habitat as far as possible. Secondly, measures have been developed to mitigate potential habitat impacts as a result of uncontrolled runoff and changes to site hydrology. Finally, the unavoidable residual impacts of a relatively small direct loss of

threatened species habitat and native vegetation have been addressed by the proposed offset strategy.

A biodiversity management plan would be prepared in accordance with the Warringah Council guideline (*Guideline for Preparing a Biodiversity Management Plan*) that includes the following mitigation measures to minimise impacts to biodiversity:

- An offset strategy would be implemented as described in section 8.4.1, involving the provision of 14.75 ha of land within the Kimbriki Resource Recovery Centre as vegetation clearing offset areas;
- A vegetation management plan would be prepared for the designated offset areas including consideration of the following:
  - Fencing for the parts of the offset areas adjoining development areas for protection both prior to construction and during operation of the facilities;
  - Weed removal and management protocols to address the risk of weed propagules entering the offset areas from adjoining facilities;
  - Suitable barriers/protocols to prevent exotic plant propagules escaping into bushland offset areas;
  - Periodic ecological burns for offset areas or physical management to maintain the 'openness' of the *Tetratheca glandulosa* offset areas and provide apparent preferred foraging habitat for the southern brown bandicoot;
  - General periodic monitoring of the condition of the offset areas;
  - Monitoring of *Tetratheca glandulosa* population levels annually; and
  - Protocols for prevention of *Phytophthora* introduction.
- A detailed drainage plan would be prepared, to minimise disruptions to natural water flows and control the quality of water runoff into the natural downstream drainage lines and offset areas;
- Batters (cut or fill) would be designed and stabilised or finished with material that minimises disruption to the natural water table and maintains the natural hydrology of the offset areas as far as practicable;
- Vegetation, including trees, would not be pushed or felled into any retained bushland areas during the vegetation removal process; and
- A suitably qualified ecologist/wildlife rescuer would be present during vegetation removal to search for trapped fauna within tree hollows and rescue any injured or displaced fauna.

In relation to the protection of *Microtis angusii*, the following management measures would be implemented for the duration of works at the intersection of Mona Vale Road and Kimbriki Road:

- All staff would be informed of the need to avoid the fenced area and the sign-posted area to avoid accidental trampling of individuals:
- All paints or other chemicals would be stored in bunded areas well away from the orchid population and their use in the immediate vicinity minimised as far as possible;
- Vehicle parking and equipment areas would be located at least 5 m away from the known population areas.

### 8.4.1 Offset strategy

To compensate for the loss of habitat for threatened and significant species and native vegetation generally, an Offsets Strategy has been developed for the site. The selected offset areas would be reserved in perpetuity, physically protected and managed to ensure the long-term survival of native vegetation, including threatened and significant flora, fauna and ecological communities.

The conservation and management of the offset / compensatory threatened plants and habitat is considered to be sufficient and appropriate according to the DECCW guidelines, by reference to the '*Principles for the use of biodiversity offsets in NSW*', as discussed below.

For the purposes of the guidelines, the definition of a biodiversity offset given by DECCW is as follows:

> *'A biodiversity offset is one or more appropriate actions that are put in place to counterbalance specific impacts on biodiversity. Appropriate actions are long-term management activities to improve biodiversity conservation. This can include legal protection of land to ensure security of management actions and remove threats.'*

Individual responses to the 13 principles for offsetting in relation to the proposed offset strategy are given below.

**1. Impacts must be avoided first by using prevention and mitigation measures.**

*Offsets are then used to address remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.*

The project has been designed to avoid impacts on threatened species and native vegetation generally as far as operational requirements for the proposed facility will possibly allow. The project has been modified to reduce impacts on sensitive threatened species habitat. Detailed design of the layout of the various components of the project has reduced the number of individuals of the vulnerable species *Tetratheca glandulosa* to be lost to a maximum of two out of twenty known individuals in the site. The remainder of the population including the bulk of its habitat area would be protected in two managed offset areas in the east and west of the site. Similarly, the project has been designed to maximise the area of occupied habitat for the ROTAP species *Eucalyptus luehmanniana* that will be protected and managed in the offset areas associated with the site and also within the wider Kimbriki Resource Recovery Centre lands generally. Offsets are also provided for the residual impacts, including the unavoidable loss of native vegetation generally that is not listed by legislation and not locally significant.

**2. All regulatory requirements must be met**

*Offsets cannot be used to satisfy approvals or assessments under other legislation, e.g. assessment requirements for Aboriginal heritage sites, pollution or other environmental impacts (unless specifically provided for by legislation or additional approvals).*

The offsets would be provided purely to counterbalance the specific impacts on biodiversity as a result of the project and as assessed under the Part 3A assessment would not be used to satisfy approvals or assessment under any other legislation.

### 3. Offsets must never reward ongoing poor performance

*Offset schemes should not encourage landholders to deliberately degrade or mismanage offset areas in order to increase the value from the offset.*

The offset habitat areas would be set up and managed professionally, including monitoring, the aim being to enhance habitat in the areas by professional weed control and habitat management. The survival and health of the threatened species and vegetation communities within the offset areas would be monitored and assessed periodically according to a full Biodiversity Management Plan to be prepared for the offset areas of the site.

### 4. Offsets will complement other government programs

*A range of tools is required to achieve the NSW Government's conservation objectives, including the establishment and management of new national parks, nature reserves, state conservation areas and regional parks and incentives for private landholders.*

The managed offset areas would be additional to and would complement formal conservation areas (national parks, nature reserves etc.) protecting relevant threatened species and representative vegetation communities in the region.

### 5. Offsets must be underpinned by sound ecological principles

*They must:*

- *include the consideration of structure, function and compositional elements of biodiversity, including threatened species*
- *enhance biodiversity at a range of scales*
- *consider the conservation status of ecological communities*
- *ensure the long-term viability and functionality of biodiversity.*

*Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.*

The offset areas have been specifically chosen to include all the retained areas of occupied and potential habitat for both *Tetratheca glandulosa* and *Eucalyptus luehmanniana* within the Kimbriki Resource Recovery Centre boundary, including patches of disturbed or degraded natural habitat which can be regenerated and enhanced. The structure, function and compositional elements of the offset areas are well matched to the area of occupied habitat that would be lost due to the project, particularly for the threatened and significant species habitat. For *Tetratheca glandulosa* and about half of the *Eucalyptus luehmanniana* offset areas, this habitat adjoins the affected areas and is directly comparable in nature.

The offsets would enhance biodiversity at both the local and regional scales. The conservation status of the ecological communities affected by the project in Warringah local government area is given in Principle 9 below. It should be noted that additional communities not affected by the project will be included in the overall offsets package. One of these communities has a higher conservation status than any of the communities that would be affected.

Full reconstruction of any ecological community would not be attempted for offset purposes, the focus of management actions would be on enhancement of existing habitat. Assisted natural regeneration of native flora including threatened species would be facilitated by targeted management of each offset area according to the known ecological requirements of each species and community. These would be detailed in the Biodiversity Management Plan to be prepared for the site.

**6. Offsets should aim to result in a net improvement in biodiversity over time**

*Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site.*

*Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity (removal of threats), time-lag effects, and the uncertainties and risks associated with actions such as revegetation.*

*Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value and removal of threats by conservation agreements or reservation.*

For all categories of biodiversity loss due to the project, the enhancement of biodiversity would be greater than or at least equal to the loss of each particular category, in terms of the offset ratios proposed. The nominated offset areas would not simply be set aside and legally protected, but an appropriate level of ongoing management would be applied depending on an assessment of the current and anticipated level of future threats and disturbances (both direct and indirect). The level of required management and specific management actions required would be assessed for each offset area individually and incorporated into the Biodiversity Management Plan. No active revegetation or reconstruction of ecological communities would be attempted as part of the management actions. Habitat enhancement would focus on assisted natural regeneration of disturbed or degraded parts of the offset areas, followed by regular monitoring and consequent adjustments to management actions if necessary. An example of habitat enhancement could include spreading a thin layer of fresh natural topsoil from cleared areas of the project of the same vegetation community onto currently bare parts of the offset areas (due to the presence of tracks etc.) thus facilitating regeneration of locally native species (including possibly *Tetratheca glandulosa*) from the native seedbank in the soil.

Additionally, a large area of 'bonus' offset sites would be provided as part of the overall offsets package. These are of vegetation communities that would not be affected by the project, but would substantially contribute to the overall biodiversity and conservation values of the Kimbriki Resource Recovery Centre land. They are intended to provide additional offsets to the clearing of native vegetation in general, in particular native vegetation communities that have no particular listed or recognised conservation significance. These 'bonus' areas satisfy the general principle of offsetting with areas of equal or greater conservation value than those that would be cleared. Specifically, a total area of 5.83 ha of Peppermint / Smooth-barked Apple Forest (no specific conservation significance) and a total of 0.61 ha of Coachwood Gully Forest (Threatened in Warringah) would be protected and enhanced as part of the overall offsets package. Neither of these communities occurs in the site and neither would be adversely affected by the project.

**7. Offsets must be enduring – they must offset the impact of the development for the period that the impact occurs**

*As impacts on biodiversity are likely to be permanent, the offset should also be permanent and secured by a conservation agreement or reservation and management for biodiversity. Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. Offsetting should only proceed if an appropriate legal mechanism or instrument is used to secure the required actions.*

An appropriate legal mechanism to ensure protection of the offset areas in perpetuity would be negotiated with DECCW. See Principle 13.

The areas proposed to be retained in perpetuity as part of the Biodiversity offset strategy are all located within the boundary of the Kimbriki Resource Recovery Centre which is shown in Figure 8.4. As such they are all owned by Warringah Council who has leased the Kimbriki Resource Recovery Centre land to the proponent for the next 54 years. This lease will continue for as long as the landfill remains viable and so may be extended if the life of the landfill continues beyond the current estimation of 54 years. Following final remediation of the closed landfill the entire area including the offsets will revert back to Warringah Council ownership and Warringah Council representatives have indicated they have no future plans for the area beyond some limited passive recreation in some areas outside of the proposed offsets.

The proponent has briefed Warringah Council officers and Councillors on the proposed Biodiversity Offset strategy including the scale and location of the areas to be secured and have commenced investigations with their legal advisors and Warringah Council Officers to determine the most effective legal mechanism to provide security for the maintenance and management of the offset areas from Warringah Council.

The proponent would develop a Biodiversity Offset Area Management Plan which would determine the measures required to adequately maintain the areas (signage, weed encroachment prevention, vermin control etc). This would also enable the proponent to develop an estimate of the management costs to be paid for by the proponent during the life of the landfill. The proponent would also provision during the life of the landfill to manage these costs as part of landfill closure/post closure provisions. The Warringah Council General Manager has indicated an in principle acceptance of the security process proposed and pending confirmation of the appropriate legal mechanism sees no impediment to Warringah Council supporting the security by full Council Resolution (See Appendix P – Letter from General Manager, Warringah Council).

However if due to unforeseen circumstances this security is not able to be provided during the exhibition period proponent would commit to either utilising Biobanking or to purchase land elsewhere to ensure there is land secured in perpetuity to provide the offset ratios proposed in Table 8.2.

**8. Offsets should be agreed prior to the impact occurring.**

*Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal commitments to the offset actions should be entered into prior to the commencement of works under approval.*

Consultation and agreement will be sought from DECCW to ensure that the proposed offset strategy achieves its objectives prior to approval of the impact in the site. Further details of the management actions proposed for the offset areas are set out in Principle 9 below. An appropriate legal mechanism to guarantee protection of the offsets in perpetuity will be negotiated prior to commencement of the project (see Principle 13).

**9. Offsets must be quantifiable - the impacts and benefits must be reliably estimated.**

*Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset. The methodology should include:*

- *the area of impact*
- *the types of ecological communities and habitat/species affected*
- *connectivity with other areas of habitat/corridors*
- *the condition of habitat*
- *the conservation status and/or scarcity/rarity of ecological communities*
- *management actions*
- *level of security afforded to the offset site.*

*The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where:*

- *they protect land with high conservation significance*
- *management actions have greater benefits for biodiversity*
- *the offset areas are not isolated or fragmented*
- *the management for biodiversity is in perpetuity (e.g. secured through a conservation agreement).*

*Management actions must be deliverable and enforceable.*

The offset strategy has sought to ensure a like-for-like or better replacement for the unavoidable loss of threatened species and natural vegetation habitat. The result is that for each individual threatened plant, significant flora species habitat or area of vegetation community lost, the net result would be professional management and ongoing protection of several times or at least greater in effect than the number of plants or habitat area lost.

With reference to the bullet points listed above, the strategy would address (but not necessarily be limited to) the following:

- The total area of impact is 5.75 ha of native vegetation of various community types and conservation status.
- A summary of the various categories of habitat to be removed, compared with those to be retained and managed as offsets within, is provided in Table 8.2.

**Table 8.2 Summary of threatened flora or vegetation categories to be removed compared with those protected as offsets**

| Vegetation category | Area (ha) / no of plants removed by project | Area (ha) / no of plants to be protected | Offset ratio |
|---|---|---|---|
| Tetratheca glandulosa – known plants | 2 plants | 18 plants | 9:1 |
| Tetratheca glandulosa – habitat area | 0.56 | 1.9 | 3.4:1 |
| Eucalyptus luehmanniana – habitat area | 0.20 | 1.48 | 7.4:1 |
| General native vegetation (total), made up of: | 4.99 | 11.37 | 2.3:1 |
| Peppermint / Apple Forest (1) | 0 | 5.83 | Infinite |
| Red Bloodwood / Scribbly Gum Forest (2) | 2.80 | 2.02 | 0.7:1 |
| Leptospermum Scrub community (3) | 2.19 | 2.91 | 1.3:1 |
| Coachwood Gully Rainforest (6) | 0 | 0.61 | Infinite |
| **Total – all vegetation categories** | **5.75** | **14.75** | **2.6:1** |

The locations of proposed offset areas are shown in Figure 8.4. It should be noted that the size and scope of the areas to be offset are currently under negotiation with government agencies, and may therefore vary slightly from those shown in the figure.

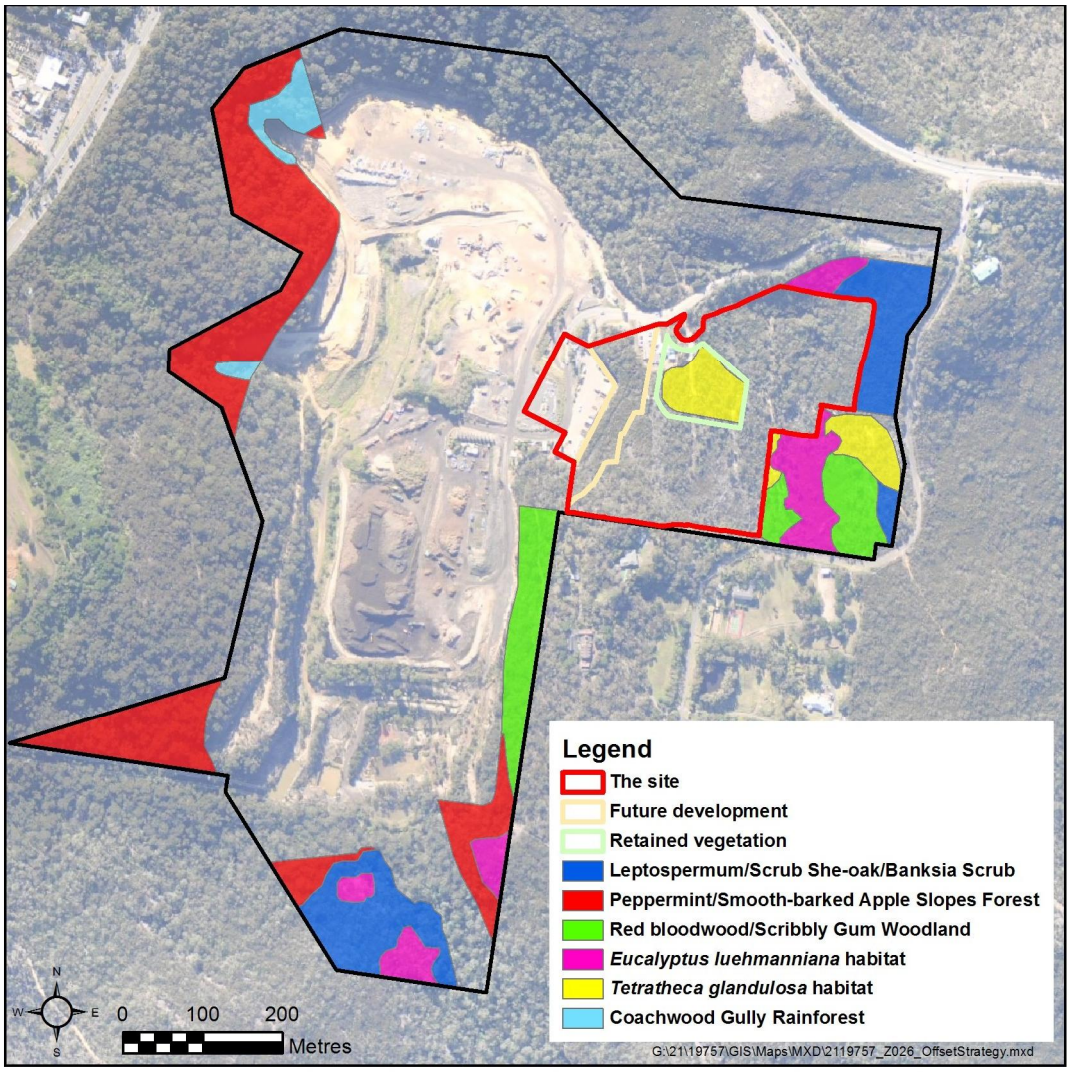



**Figure 8.4 Offset strategy**

- All offset areas would remain connected with adjoining areas of similar habitat, with the exception of the western offset area for *Tetratheca glandulosa* habitat, which would be fragmented and isolated from the other retained part of the population by a connecting component the project. However, the separation between the two areas is only about 35 m and the isolated part contains the majority of known plants (11 of 18) of the retained population in a habitat area of 0.7 ha. There is some scope for this habitat area to expand into minor cleared and disturbed parts of the entire western offset area which totals 0.91 ha.
- The condition of habitat in the proposed offset sites generally consists of intact native vegetation with areas of edge disturbance including noxious and environmental weeds, particularly in the vicinity of the subject site. The condition of different parts of each offset area would be determined in the Biodiversity Management Plan by assessing and mapping the type and extent of weed invasion, physical or chemical disturbances and other potentially threatening processes (current and expected).

- The conservation status and/or scarcity of significant flora species and ecological communities that would be affected is as follows:

**Table 8.3 Conservation status and/or scarcity of significant flora species and ecological communities**

| Species or Community | Conservation Status | | | | | |
|---|---|---|---|---|---|---|
| | Local -Warringah Shire Smith & Smith (2005) | | | NSW | National | |
| | Status | Total Area (ha) | % cleared | TSC Act | EPBC Act | ROTAP (Briggs & Leigh 1996) |
| Tetratheca glandulosa | Locally significant | N/A | N/A | V | V | 2VC- |
| Eucalyptus luehmanniana | Locally significant | N/A | N/A | - | - | 2RCa |
| Community 2: Scribbly Gum / Red Bloodwood | Not significant | 3271 | 36 | - | - | N/A |
| Community 3: Leptospermum / Banksia Scrub/Heath | Not significant | 1123 | 32 | - | - | N/A |
| Community 4: Yellow Top Ash Mallee | Rare in Australia | 207 | 32 | - | - | N/A |

- Additionally, the whole site contains 5.75 ha of potentially suitable habitat for the Vulnerable Heath Monitor and Southern Brown Bandicoot, the former of which has been recorded adjacent to the subject site.
- In order to 'maintain or improve' biodiversity, the offset areas would be managed in such a manner that biodiversity within them would end up in a better condition than if the areas were not offset. Details of specific management measures for the areas would be guided by a formal Biodiversity Management Plan for the offset areas, and would need to be tailored to the requirements of each habitat area. The management requirements are likely to be more stringent at the interface of offset areas with the development areas than in more isolated areas. In particular, offset areas immediately adjoining the project area in the north-eastern part of the study area would be more prone to edge effects than the other offset areas, but many of these such as runoff and hydrology have already been anticipated and mitigated by various measures described above.

  Preparation of a Biodiversity Management Plan would include consideration of at least the following:

  – Physical protection from unauthorised access and site disturbances where appropriate (during both the construction and operation phases) such as fencing, that also allows free movement of threatened fauna;

- Rehabilitation of bare areas, such as the tracks that currently occur within the offset areas south of the project area;
- Assessment and mapping of the extent of weed invasion and development of appropriate site-specific control measures to reduce weeds and prevent further weed invasion, particularly in edge areas and taking into account presence of threatened flora species;
- Management of the fire regime of the offset areas, including the imposition of periodic ecological burns (if required) to ensure suitable habitat is maintained for threatened species known or likely to be present such as *Tetratheca glandulosa* and the southern brown bandicoot; and
- Development and implementation of protocols to prevent the introduction of *Phytophthora cinnamomi* into the offset areas.

A set of indicators would be developed as part of the Biodiversity Management Plan to confirm that the condition of the offset areas is being maintained or improved according to established benchmarks through periodic monitoring. These would include aspects such as:

- Periodic monitoring of the general vegetation condition (quarterly, bi-annually, annually or longer depending on the stage of restoration or vegetation condition) using pro-formas to record maintenance of or improvements in key ecological indicators; for example, ground cover or leaf litter;
- Annual monitoring of the *Tetratheca glandulosa* population number and health during its flowering period; and
- Periodic monitoring of the health and numbers of the *Eucalyptus luehmanniana* population in the offset areas; and
- Recommendations for any adjustments or variations to the management regime in each of the offset areas following each monitoring session to address any problems or unforeseen circumstances.

Provided the monitoring demonstrates a maintenance or improvement of the key indicators towards the pre-determined ecological benchmarks such as those listed above, then it can be concluded that the project in the long term has maintained or improved biodiversity.

- The offset sites would be secured by an appropriate agreement between Council and DECCW (see Principle 13), thus affording the offset areas an appropriate level of long-term security.
- The sites to offset the loss of high conservation habitat (*Tetratheca glandulosa* and *Eucalyptus luehmanniana* habitat) would be located in areas of comparably high conservation significance, whilst the sites to offset common ecological communities would be located in areas of similar or better conservation significance within the Kimbriki site. An effective offset ratio of at least 1:1 for non-listed common vegetation communities would apply (in spite of a slight technical shortfall of 0.7:1 for the Red Bloodwood/Scribbly Gum Woodland as explained in point 10 below). The offset package includes vegetation types that would not be impacted by the project, including one community (Coachwood Gully Forest) of higher conservation status than those that would be cleared.
- The management actions will maximise the benefits to biodiversity by restoring currently degraded habitat and optimising the potential for the survival and continued health of

threatened and significant species populations thus leading to a net improvement in ecological condition.

- With the exception of the western offset habitat patch for *Tetratheca glandulosa* as discussed above, all offset areas are located in areas that are not isolated or fragmented and are well connected with adjoining habitat, in some areas along the boundary with Garigal National Park.
- Management and monitoring will occur for the life of the development, and an appropriate legal mechanism will secure the offsets in perpetuity.

Management actions would be deliverable and enforceable through regular monitoring of the offset sites to assess the health and condition of threatened and rare flora species and habitat, and external independent auditing by an appropriate authority on a periodic basis.

**10. Offsets must be targeted.**

*They must offset impacts on the basis of like-for-like or better conservation outcome. Offsets should be targeted according to biodiversity priorities in the area, based on the conservation status of the ecological community, the presence of threatened species or their habitat, connectivity and the potential to enhance condition by management actions and the removal of threats. Only ecological communities that are equal or greater in conservation status to the type of ecological community lost can be used for offsets. One type of environmental benefit cannot be traded for another: for example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements.*

The net result of the offset strategy would be a like-for-like or better conservation outcome compared to a 'do nothing' option and would improve the overall conservation status of both the affected significant species and the natural vegetation communities in the locality. The greatest offset ratios would apply to the species, species habitat or vegetation communities of greatest regional conservation priority. Hence, the offset ratio for the listed species *Tetratheca glandulosa* is 9:1 in terms of numbers of plants and 3.4:1 in terms of habitat area. In addition to the formally retained and managed offsets of *Tetratheca glandulosa* that would be provided as a component of the project, numerous records of the species (25 within 2 km and 216 within 10 km of the site) occur in the locality according to Atlas records from DECCW. An off-site presence of the species occurs a short distance north of the northern Kimbriki site boundary.

For the ROTAP (nationally significant but unlisted) species *Eucalyptus luehmanniana*, the offset ratio for occupied habitat lost is 7.4:1. For the unlisted vegetation communities impacted, the offset ratios for the two relevant vegetation communities are on average close to 1:1 (0.7:1 for the Red Bloodwood/Scribbly gum Woodland and 1.3:1 for the Leptospermum / Banksia scrub/heath).

The slight shortfall in providing an offset ratio of 1:1 for the Red Bloodwood / Scribbly Gum Woodland (Community 2 - see Table 14) is considered a technical shortfall only. In consideration of the offsets package as a whole, offsetting of vegetation is considered to be balanced and more than adequate.

Firstly, Community 2 is common and abundant locally and regionally. It is not a listed community and not considered to have local conservation significance by Smith and Smith (2005).

Secondly, other vegetation communities included as offsets, particularly the *Eucalyptus luehmanniana* Mallee Woodland (Community 4) is very closely related to Community 2 and in fact consists of practically the same tree layer species and understorey, the key distinction being the presence of Yellow-top Ash (*Eucalyptus luehmanniana*). In other words, Community 4 represents a particular ecological variant of Community 2. If the offset area for Community 4 is added to the offset area for Community 2 (3.5 ha in total), the offset ratio for both together becomes 1.2:1.

Finally, the proponent has undertaken to include substantial areas of vegetation community types that will not be impacted by the project within the offsets package, namely 5.83 ha of Community 1 (Peppermint / Smooth-barked Apple Forest) and 0.61 ha of Community 6 (Coachwood Gully Rainforest). Therefore, the overall offset strategy exceeds the minimum requirements for offsetting.

In effect, for the unlisted vegetation communities impacted, the combined offset ratio is 2.3:1, and one ecological community that contributes to this offset package (Coachwood Gully Forest) is of a higher conservation status than either of the vegetation communities to be impacted.

The offset areas principally for the *Tetratheca glandulosa* habitat in the vicinity of the subject site would be completely enclosed and managed rather than effectively open and accessible as is the case currently. Hence, disturbances such as illegal rubbish and garden waste dumping, vehicle and bike access and other unauthorised human intrusions or damaging/degrading activities would no longer be possible. Furthermore, retaining the status quo with no management could be detrimental to the long-term survival of the local population of *Tetratheca glandulosa*. Without management, it is possible that the population of *Tetratheca glandulosa* could be at risk of extinction in the long term, even if no development occurs, by the growth of dense shrub and ground layer vegetation in the absence of fire and artificial disturbances such as tracks that tend to maintain the habitat in an open condition. *Tetratheca glandulosa* prefers more open habitat. Management could include measures (such as fire or physical measures) that keep the vegetation relatively open thereby optimising the environmental conditions that would promote the continued health of the population.

### 11. Offsets must be located appropriately.

*Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development.*

Areas for the offsets would be located either directly adjoining the areas of habitat that are being removed as a result of the development, or in areas with similar ecological characteristics and will all be provided within the Kimbriki Resource Recovery Centre boundary. All offset areas would be located within 1 km of the site (see Figure 8.4). The offset areas for *Tetratheca glandulosa* and the red bloodwood/scribbly gum community would be located directly adjoining the subject site. Approximately half the area of offsets for the Yellow-top Ash community and the Leptospermum/banksia scrub would be located in areas directly adjoining the site. The remainder of these habitat areas would be located at the southern end of the Kimbriki Resource Recovery Centre.

**12. Offsets must be supplementary.**

*They must be beyond existing requirements and not already funded under another scheme. Areas that have received incentive funds cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, such as national parks, flora reserves and public open space cannot be used as offsets.*

The offset areas would be supplementary and additional to any amelioration measures put in place for any other purposes. They occur exclusively on private land that would otherwise not be formally protected and managed if the project were not to proceed.

**13. Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.**

*Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.*

The offset areas would be legally protected under an appropriate legal mechanism for conservation in perpetuity, the exact terms of which would be negotiated between Warringah Council and DECCW. The offset areas would be monitored regularly according to a timetable to be developed as part of the Biodiversity Management Plan. Monitoring would be most frequent during the early stages of the offset management process, and would progressively decrease in frequency as management actions are confirmed to have been successful. A feedback process would be incorporated into the Management Plan to ensure that unforeseen outcomes or events are addressed, and any changes to the management measures implemented as deemed appropriate. An independent body would be nominated as the responsible authority to audit the works on an established periodic basis to ensure they are successful and resulting in positive biodiversity outcomes.

Given the foregoing considerations arising from the '*Principles for the use of biodiversity offsets in NSW*', it is concluded that the offsets strategy as proposed would result in a 'maintain or improve' outcome with respect to biodiversity in general, and the rare or threatened species *Tetratheca glandulosa* and *Angophora luehmanniana* in particular.

# 9 Air quality and odour

*The information presented in this chapter is based on the findings of an air quality and odour assessment undertaken by PAEHolmes. The air quality and odour report is included in Appendix F of this environmental assessment.*

## 9.1 Air quality goals

### 9.1.1 Dust criteria

Table 9.1 and Table 9.2 summarise the current air quality assessment criteria prescribed by DECCW in their Approved Methods (DEC 2005). Generally, the air quality criteria relate to the total burden of dust in the air and not just the dust from the project. In other words, some consideration of background levels needs to be made when using these criteria to assess impacts.

**Table 9.1 DECCW assessment criteria for particulate matter concentrations**

| Pollutant | Criterion | Average Period | Agency |
|---|---|---|---|
| Total suspended particulate matter (TSP) | 90 µg/m$^3$ | Annual mean | NHMRC |
| Particulate matter < 10 µm ($PM_{10}$) | 50 µg/m$^3$ | 24-hour maximum | DECCW |
| | 30 µg/m$^3$ | Annual mean | DECCW long-term reporting goal |

In addition to health impacts, airborne dust also has the potential to cause nuisance impacts by depositing on surfaces. Table 9.2 shows the maximum acceptable increase in dust deposition over existing dust levels. The criteria for dust deposition levels are set to protect against nuisance impacts (DEC 2005).

**Table 9.2 DECCW assessment criteria for dust deposition**

| Pollutant | Averaging period | Maximum increase in deposited dust level | Maximum total deposited dust level |
|---|---|---|---|
| Deposited dust | Annual | 2 g/m$^2$/month | 4 g/m$^2$/month |

### 9.1.2 Odour criteria

The DECCW framework documents include some recommendations for odour criteria. They have been refined by the DECCW to take account of population density in the area. Table 9.3 lists the odour certainty[2] thresholds, to be exceeded not more than 1% of the time, for different population densities.

[2] In the process of odour measurement, the odour certainty threshold is, by definition, the minimum concentration at which the panellist is certain they can detect the odour.

**Table 9.3 Odour performance criteria for the assessment of odour**

| Population of affected community | Odour performance criteria (nose response odour certainty units at the 99th percentile) |
|---|---|
| Single residence (≤ ~ 2) | 7 |
| ~ 10 | 6 |
| ~ 30 | 5 |
| ~ 125 | 4 |
| ~ 150 | 3 |
| Urban (~ 2000) | 2 |

The criteria assume that 7 odour units (ou) at the 99$^{th}$ percentile would be acceptable to the average person, but as the number of exposed people increases there is a chance that sensitive individuals would be exposed. The criterion of 2 ou at the 99$^{th}$ percentile is considered to be acceptable for the whole population.

Four rural/residential properties are located on the western and northern sides of Kimbriki Road. These properties adjoin the site and are owned by Warringah Council to provide a buffer between the Kimbriki Resource Recovery Centre and the private residences on the southern side of Kimbriki Road.

As shown on Figure 4.5 the three private residences (and the nearest privately owned sensitive receivers) are located on the southern side of Kimbriki Road between approximately 30 m south of the site. Another two privately owned residences are located on the eastern side of Kimbriki Road near the entrance to the Kimbriki Resource Recovery Centre.

There are also more densely populated areas to the north and northwest. The population density in these areas is such that it is considered an urban environment for assessment purposes (as described in Table 9.3). As the existing landfill is immediately adjacent to the project, there is the potential for a cumulative impact. On this basis, the most stringent odour criterion of 2 ou has been applied to the project.

## 9.2 Existing environment

### 9.2.1 Meteorological conditions

Wind speed, wind direction and temperature data were obtained from the Bureau of Meteorology weather station at Terrey Hills. Additional meteorological data (relative humidity, mean sea level pressure and upper air data) were obtained from Sydney Airport (cloud cover) and the Commonwealth Scientific and Industrial Resource Organisation's (CSIRO) model The Air Pollution Model (TAPM).

### Wind speed and direction

Light wind speeds (≤ 2 m/s) are relatively infrequent and occur approximately 15% of the time. Strong winds (≥ 6 m/s) occur approximately 32% of the time. The annual average wind speed for the area is estimated to be approximately 3.4 m/s.

Figure 4.3 shows annual seasonal wind roses for 2009. The wind roses show the frequency of occurrence of winds by direction and strength. On an annual basis, winds are predominantly from the north. Winds from the northeast and southeast are also dominant in summer, while in winter winds are generally from the west and northwest. Winds in autumn and spring are more variable in terms of direction.

### Stability

Atmospheric turbulence is an important factor in plume dispersion. Turbulence acts to increase the cross-sectional area of the plume due to random motions, thus diluting or diffusing a plume.

Frequency distribution data of estimated stability classes indicates that 42.3% of hours are stability class D, which indicates there would be rapid dispersion of odour in this area. However, there is also a significant percentage of F class stability (17.5%), which would result in poor dispersion.

### Mixing height

Mixing height is the height to which the air is mixed by turbulence and is variable in space and time. The meteorological dataset developed for the air quality assessment indicates that average mixing heights during the night and early morning hours are generally lower than 300 m, increasing after sunrise to an average maximum of just over 1500 m by mid-afternoon in response to convective mixing from solar heating of the earth's surface.

## 9.2.2 Existing dust deposition

While there is no EPL requirement for it, the proponent has collected air quality data from five dust deposition gauge monitoring sites in the vicinity of the site for approximately five years. However, the measurements from 2008 and 2009 are irregular and less than 6 months of data is available in each of those years.

A summary of the results from 2005, 2006 and 2007 is provided in Table 9.4 and the locations of the monitoring sites are shown in Figure 4.9.

**Table 9.4 Annual average dust deposition results (g/m$^2$/month)**

| Year | Gauge 1 | Gauge 2 | Gauge 3 | Gauge 4 | Gauge 5 |
|---|---|---|---|---|---|
| 2005 | 2.0 | 1.8 | 2.1 | 2.1 | 2.3 |
| 2006 | 1.6 | 1.9 | 2.1 | 2.2 | 2.7 |
| 2007 | 1.2 | 1.5 | 1.8 | 2.5 | 2.4 |

It can be seen from this table that there were no exceedances of the DECCW criterion for dust of 4 g/m$^2$/month (as listed in Table 9.2). It should also be noted that these measurements were taken during periods when there was considerable activity at the Kimbriki Resource Recovery

Centre, such as haulage of material on unsealed roads, crushing, dumping and stockpiling of material, as well as large exposed areas subject to wind erosion. Despite this considerable activity onsite, the proponent is able to reduce dust impacts through implementation of extensive dust control measures such as water spraying.

### 9.2.3 Existing odour environment

Figure 9.1 shows the predicted 99th percentile odour concentration contours (1 hour averaging time) for the existing Kimbriki Resource Recovery Centre landfill only and locations of nearby residences (sensitive receivers). This figure shows that the odour concentration is less than 2 ou at nearby residences. Figure 4.5 provides land ownership details for the nearby residences shown.

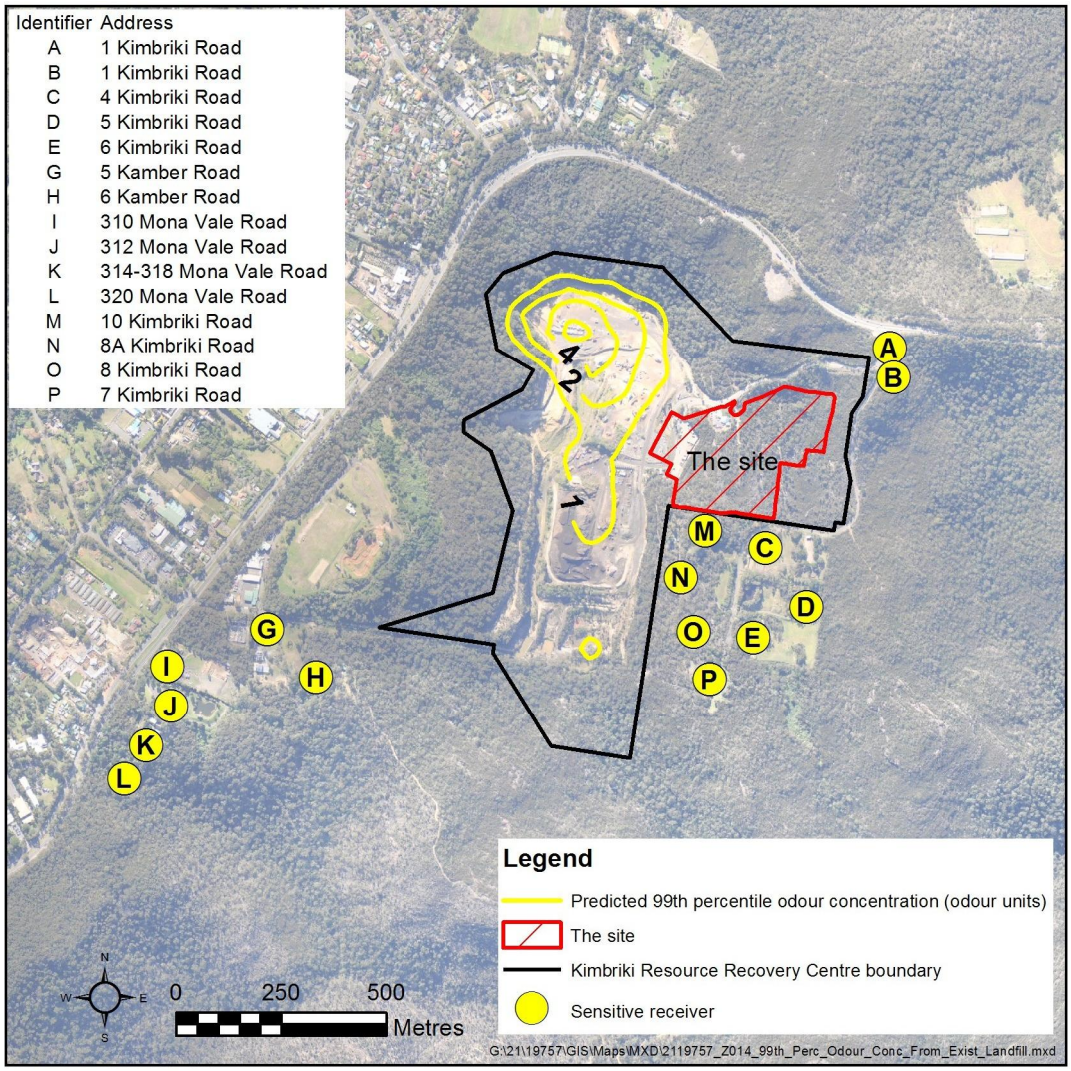



**Figure 9.1 Predicted 99th percentile odour concentration due to emissions from the existing landfill**

Table 9.5 shows the emission rates used for modelling the odour concentration due to emissions from the existing landfill operations.

**Table 9.5 Odour emission rates for landfill operations**

| Source | Emission rate ($ou.m^3/m^2/s$) | Area ($m^3$) | Total emissions ($ou.m^3/s$) |
|---|---|---|---|
| Intermediate cover | 0.084 [1] | 20,000 | 1,680 |
| Leachate area | 0.1 | 600 | 60 |
| Capped areas [2] | 0.004 | 18,000 | 72 |

Notes:
1. This value is likely to be much lower given the non-putrescible nature of the material. However it will provide a conservative assessment.
2. Based on emission rates used for the Elizabeth Drive, Kemps Creek SITA AWT odour assessment (HAS 2007) for capped areas.

The proponent ensures that odour is minimised at the landfill through the emplacement of 150 mm of cover material at the end of each working day and an intermediate cover of 300 mm for areas not to be filled for more than three months as per EPA Environmental Guidelines for Solid Waste Landfills.

## 9.3 Methodology

The odour assessment was undertaken in accordance with the *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW* (DECC 2005) and the technical framework and notes for the *Assessment and Management of Odour from Stationary Sources in NSW (*DECC 2006). A computer based dispersion model, CALPUFF, was used to model the potential air quality impacts of the proposal.

A number of different operating scenarios were modelled for the project including two scenarios considered for the design of the biofilters. These were:

3. Scenario 1 – each biofilter is enclosed and vented via a single stack on each roof; and
4. Scenario 2 – each biofilter is open, but covered with a roof for weather protection.

This was done to ensure that the selected odour control design would meet the air quality goals. The results of the selected biofilter design (Scenario 1) for the project are presented in this chapter. The results of odour modelling for the alternative Scenario 2 are available in Appendix F.

## 9.4 Odour control

### 9.4.1 Design features

As described in chapter 6, the RRF buildings would incorporate the following design features to reduce the potential for air quality impacts, particularly the escape of dust and fugitive odours:

- The proposed composting tunnels, control equipment and receiving area would be housed within a fully enclosed building, which would be maintained at negative air pressure;
- Air vents in the sides of the buildings would allow fresh air to be drawn in to replace the volume of air being extracted by electrically driven fans. These fans would run continuously to maintain the buildings at negative pressure;

- The buildings would be fitted with doors, which would be kept closed as much as possible;
- Deodorising technology (such as a biofilter or odour scrubber) would be installed to treat the air collected from the buildings before it is released to the atmosphere; and
- The biofilters would be enclosed and vented through a stack one metre above the roof line to disperse any odour such that air quality goals for odour can be met.

Furthermore, both biofilters have been carefully located to minimise potential odour impacts, considering the site topography and meteorology.

The MRF building would be fitted with a misting system for dust suppression to minimise potential dust impacts.

These design features have been incorporated into the air quality and odour modelling.

### 9.4.2 Management protocols and procedures

Management protocols and procedures would be developed to minimise both point source and fugitive emissions, including the development of an odour management plan. This is described in section 9.6.2.

### 9.4.3 Specifications of odour scrubbing technology

Deodorising technology (such as a biofilter or odour scrubber) would be installed to treat the air collected from the general area of each building before it is released to the atmosphere. A large biofilter would be used to treat air from the composting tunnels. A different section of the same biofilter may be used to treat less odorous air from the general waste handling, processing and receival areas.

The biofilters would be located to the west of the AWT building and to the north of the maturation/final processing building, as shown on Figure 6.2.

Table 9.6 and Table 9.7 show the biofilter parameters and stack design parameters used for the odour modelling.

**Table 9.6 Biofilter parameters**

| Source | Odour concentration[3] (ou) | Flow rate ($m^3/s$) | Total emissions ($ou.m^3/s$) |
|---|---|---|---|
| Biofilter at AWT building | 300 | 55[4] | 16,500 |
| Biofilter at maturation/final processing building | 300 | 83[5] | 24,900 |

[3] Based on values used for the Elizabeth Drive facilty (Homes Air Sciences 2007) which is very similar to this project

[4] Based on a flow rate of 200,000 $m^3/h$

[5] Based on an air exchange rate of 300,000 $m^3/h$ (equivalent to the volume of 3 maturation/final processing buildings)

**Table 9.7 Stack parameters**

| Parameter | AWT building | Maturation/final processing building |
|---|---|---|
| Building height | 11 m | 11 m |
| Stack height (above roof line) | 1 m | 1 m |
| Exit temperature | 35 °C | 30 °C |
| Exit velocity | 11.2 m/s | 16.9 m/s |
| Stack diameter | 2.5 m | 2.5 m |
| Building dimensions | 125 m x 100 m | 100 m x 100 m |
| Building downwash algorithm | PRIME | PRIME |

Specifications provided to prospective equipment suppliers would dictate the technical and environmental performance the equipment would be expected to meet, based on the proponent's operational requirements and the conditions of consent for the project.

### 9.4.4 Odour from runoff

All processing activities would be undertaken within enclosed buildings with drains within the floors to collect the process water for reuse in the tunnel composting process. This would prevent leachate runoff outside of the buildings and minimise any potential odour from run-off.

### 9.4.5 Details of how negative pressure would be maintained

Air vents in the sides of the building would allow fresh air to be continuously drawn into the building to replace the volume of air being extracted by electrically driven fans and discharged through the biofilters.

These fans would run continuously and increase or decrease in velocity as required to maintain the required negative pressure. This pressure gradient would be greater during times of disruption to the building's integrity (i.e. when the roller doors open to allow vehicles to enter or exit) and lower when the building is not in use (i.e. at night or on weekends).

All extracted air from both the composting tunnels and the general building area would be treated prior to discharge, with air from the general areas being drawn from outside then fed through the composting tunnels before being discharged through the biofilter system. The building doors would be kept closed as much as possible to minimise the potential for fugitive dust, odour and noise emissions.

Since the building would be maintained under negative air pressure conditions, doors would be able to be opened briefly when needed for truck or plant entry or exit, without resulting in adverse odour emissions. The use of high speed roller doors would be stipulated to minimise the time required for vehicle entry and exit and an air curtain would provide additional protection as well as serving as a back-up in case of mechanical failure or damage to the access doors.

### 9.4.6 Storage of waste outside

Material would be periodically moved between the AWT building (following completion of the tunnel composting process) to the maturation/final processing building. However no waste from the RRF would be stored outside of the AWT or maturation/final processing buildings.

At the MRF building, oversize or unsuitable material would be temporarily stored inside the building and periodically transferred to the landfill for disposal. Under normal operating conditions the majority of the separated and recovered dry recyclables from the MRF building would be stored inside the building prior to export from the site to market. From time to time, it may be required to temporarily store dry recyclables in containers or as bales outside the MRF building in a bunded hardstand area. Any temporary outdoor storage of recovered dry recyclables is not expected to have any odour or dust impacts.

### 9.4.7 Proposed length of time for maturation

Composts derived from kerbside collected food and garden waste and produced in the composting tunnels for sale may need to be further matured depending on the available product markets. Sections of the floor of the maturation/final processing building may be aerated to help maintain aerobic conditions in the windrows and facilitate the maturation process, alternatively the proponent may use a windrow turner or other device to ensure the maturing composts remain aerobic.

The length of time for maturation of composts intended for sale will depend on the end users requirements but is likely to be in the order of two to four weeks.

Mixed waste derived organics intended for landfill disposal would require further residency time in the tunnels as well as further maturation to ensure they satisfy DECCW (2009) guidelines to be classified as ‘General Waste (non-putrescible)’. The minimum residency time in the tunnels is expected to be four weeks and the additional maturation requirement is expected to be no less than an additional four weeks. Following this the mixed waste derived organics would be subjected to a suitable testing regime and if it does not meet the guidelines will be required to be re-processed and re-tested again before being allowed to be disposed of to landfill at the adjacent landfill.

## 9.5 Impact assessment

### 9.5.1 Construction

The main potential source of dust would be that generated during construction of the facility, mainly as a result of earthworks. There are a number of activities involved in this process but the main sources would be the use of equipment such as excavators, front-end loaders and dump trucks, as well as wind erosion from exposed areas. The use of a water cart onsite during the construction phase would reduce these emissions significantly.

Potential emissions have been estimated based on the anticipated construction activities and equipment. The estimated emissions from earthworks and other activities are summarised in Table 9.8.

**Table 9.8 Estimated emissions due to earthworks at the site**

| Source/Activity | Intensity | Emission factor[6] | Total emission |
|---|---|---|---|
| Excavators on material | 532,800 t | 0.0022 kg/t | 1,170 kg |
| Front-end loaders moving material | 532,800 t | 0.0022 kg/t | 1,170 kg |
| Haulage | 532,800 t | 0.0139 kg/t[7] | 7,405 kg |
| Wind erosion | 4 ha | 0.4 kg/ha/h | 5,915 kg |
| **Total (over a 22 week period)** | | | **15,660 kg** |

These emissions estimates were then used to model potential dust impacts resulting from construction activities. The results of the dust modelling are present in Table 9.9. It should be noted that in dust modelling the total dust emissions over the 22 week excavation period were assumed to continue throughout the year in calculating annual average predictions. Therefore dust predictions from the modelling are highly conservative.

The results show that the maximum 24-hour average $PM_{10}$ concentration is predicted to be 8.2 $\mu g/m^3$ at Receiver A. This is well below the DECCW criterion of 50 $\mu g/m^3$. All annual averages are also predicted to be well below their respective criteria, even with the conservative assumptions that earthworks activities continue for a 12 month period.

**Table 9.9 Predicted dust concentrations and deposition rates at the nearest private residences**

| Receiver | Maximum 24-hour average $PM_{10}$ ($\mu g/m^3$) | Annual average $PM_{10}$ ($\mu g/m^3$) | Annual average TSP ($\mu g/m^3$) | Annual average deposition ($g/m^2$/month) |
|---|---|---|---|---|
| A | 8.2 | 0.6 | 1.0 | 0.3 |
| B | 7.8 | 0.9 | 1.5 | 0.5 |
| C | 4.9 | 1.0 | 1.9 | 0.5 |
| D | 2.5 | 0.4 | 0.7 | 0.2 |
| E | 2.0 | 0.3 | 0.6 | 0.1 |
| H | 1.7 | 0.1 | 0.1 | < 0.1 |
| G | 1.3 | 0.1 | 0.1 | < 0.1 |
| I | 1.0 | 0.1 | 0.1 | < 0.1 |
| J | 1.0 | 0.1 | 0.1 | < 0.1 |
| K | 1.0 | 0.1 | 0.1 | < 0.1 |
| L | 1.0 | < 0.1 | 0.1 | < 0.1 |

[6] Using equations from US EPA 1995 and updates.

[7] This assumes a truck capacity of about 36 t, travelling approximately 500 m on unsealed/watered roads.

### 9.5.2 Operation

Odour would be the main potential impact during operation.

Figure 9.2 shows the predicted 99th percentile odour levels (1 hour averaging time) for the project, assuming that air from both buildings would be treated via enclosed biofilters with single stacks. It can be seen that the 2 ou contour does not extend to any of the nearest residences and therefore complies with the DECCW criterion.

When comparing this to the results for the landfill alone (Figure 9.2), it can be seen that the existing landfill is the dominant source of potential impacts at the Kimbriki Resource Recovery Centre, according to the modelling.

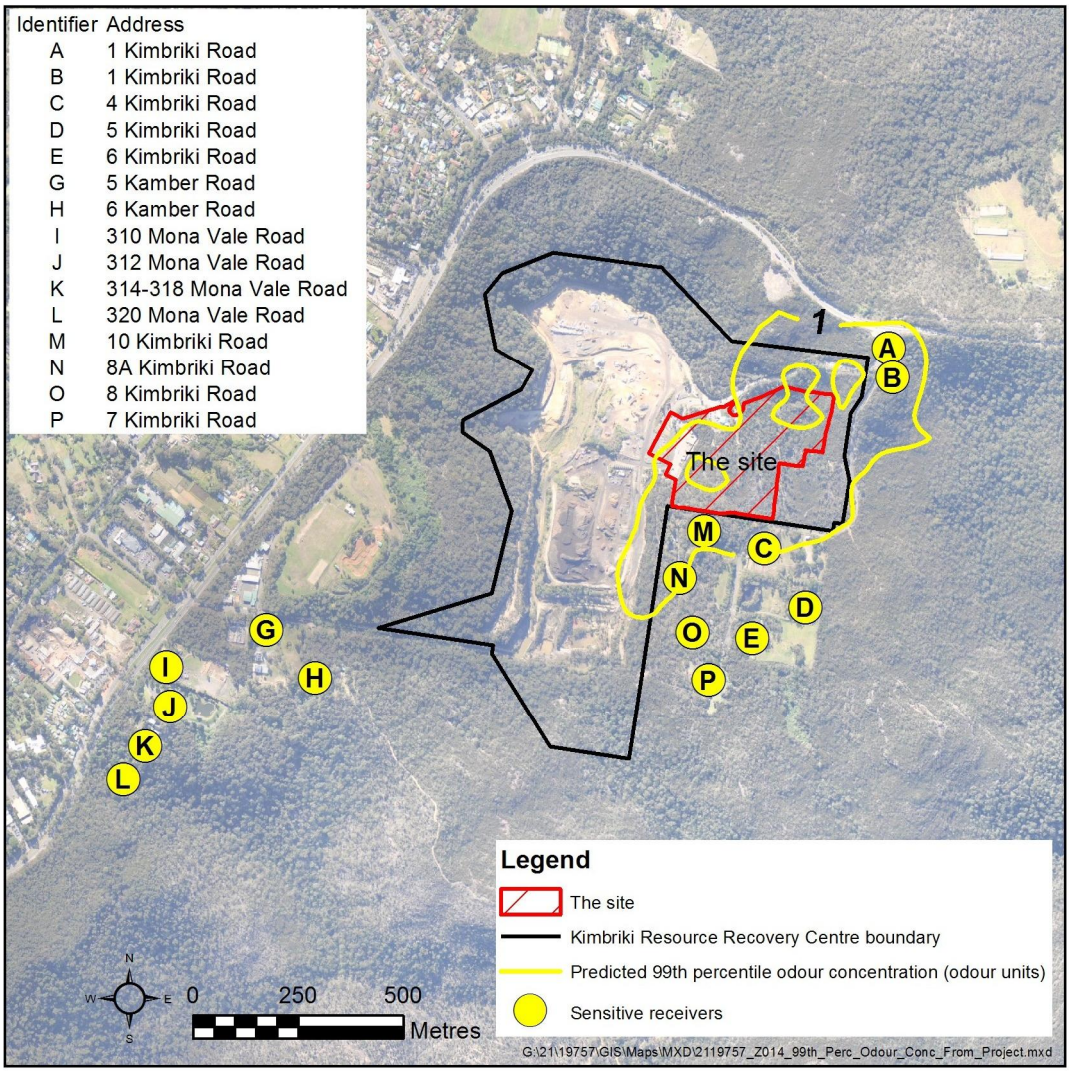



**Figure 9.2 Predicted 99th percentile odour concentration due to emissions from the project**

### 9.5.3 Cumulative impacts

#### Construction

Dust deposition data shows that existing dust levels at the dust gauges most representative of the nearest residences have been 2 g/m$^2$/month or less since 2005. Adding predicted dust levels of 0.5 g/m$^2$/month or less to this background estimate of dust deposition indicates that the project would not cause an exceedance of the DECCW dust deposition criterion of 4 g/m$^2$/month.

Cumulative impacts for $PM_{10}$ and TSP are more difficult to determine since there is no background monitoring data for these parameters. However, given that the conservative predictions for these concentrations are extremely low, and that the construction of the project is likely to be the main source of airborne dust during that time, it is more than likely that this construction would not cause either the 24-hour or annual criteria to be exceeded.

#### Operation

The key odour source from existing operations is the landfill (refer section 9.2.3).

Modelling results for the cumulative impact of both the landfill and the project for each of the nearest residences are shown in Figure 9.3 and listed in Table 9.10. It can be seen that the odour level at the nearest residences would comply with the 99$^{th}$ percentile 2 ou criterion. It should be noted that the results have been rounded to the nearest whole number.

**Table 9.10 Predicted cumulative 99$^{th}$ percentile odour concentrations at the nearest residences**

| Receiver | The project alone (ou) | Cumulative impact (ou) |
|---|---|---|
| A | 2 | 2 |
| B | 2 | 2 |
| C | 2 | 2 |
| D | 1 | 1 |
| E | 1 | 1 |
| H | 1 | 1 |
| G | 1 | 1 |
| I | 1 | 1 |
| J | 1 | 1 |
| K | 1 | 1 |
| L | 1 | 1 |

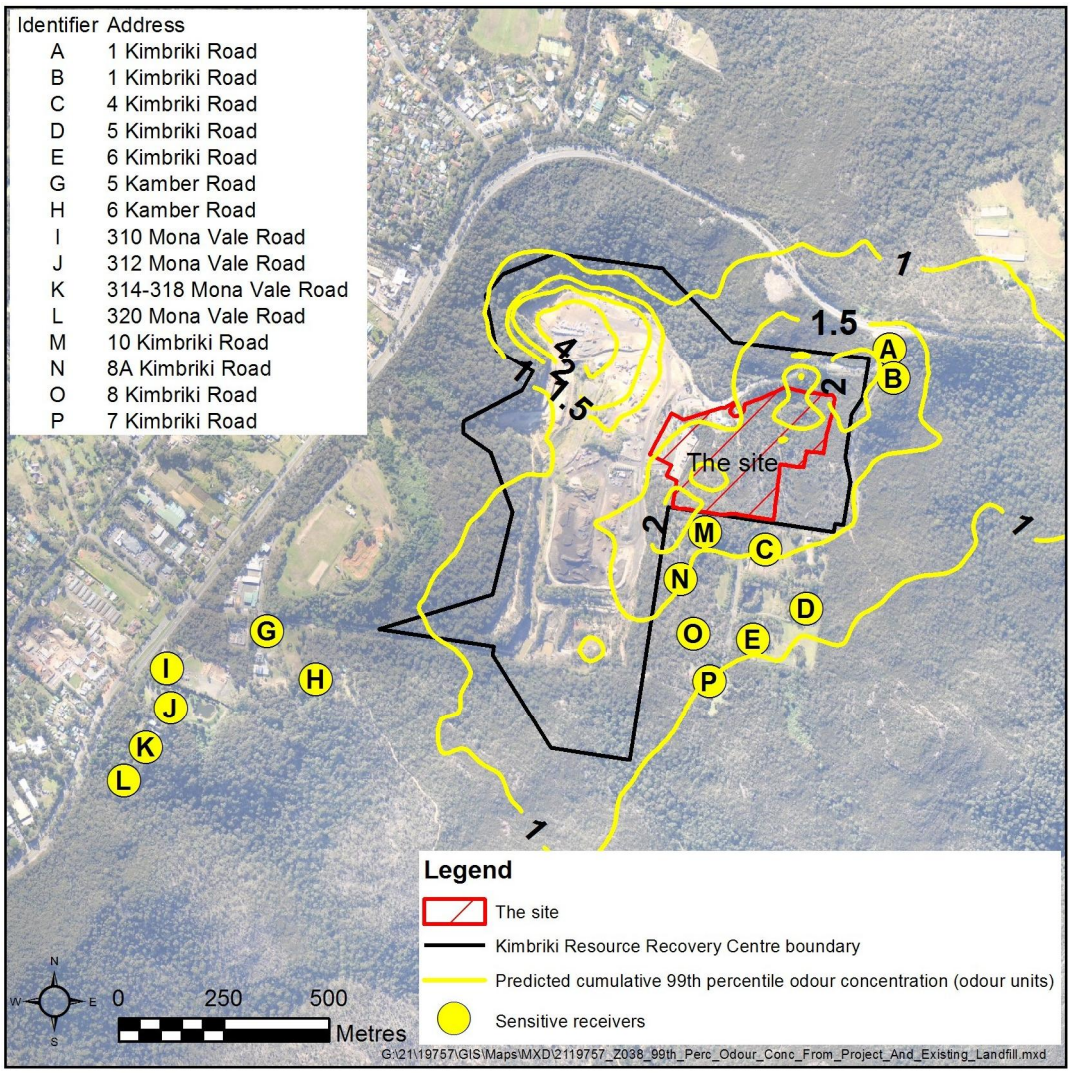



**Figure 9.3 Predicted cumulative 99th percentile odour concentration due to combined emissions from the project and the existing landfill**

## 9.6 Mitigation measures

### 9.6.1 Construction

A dust management plan would be prepared as part of the construction environmental management plan detailing measures for the control of dust generation, including:

- Site management measures to limit dust emissions from work sites, including:
  - Managing stockpiles to suppress dust emissions;
  - Watering of unsealed haul roads and disturbed surfaces (including construction areas);
  - Restricting the size of disturbed surfaces as much as practicable;
  - Prevention of truck over-loading and covering dusty loads; and

- Vehicle movement controls, particularly entrance to and exit from construction work sites (and washing down trucks before they leave the site – if necessary).

- When conditions are excessively dusty and the dust emissions criteria from operations cannot be maintained, then all dust generating activities must cease until dust suppression can be adequately carried out; and
- Dust monitoring would be undertaken during construction. Monitoring would comply with the DECC (2007) *Approved Methods for the Sampling and Analysis for Air Pollutants in NSW*.

### 9.6.2 Operation

The specifications provided to prospective equipment suppliers would dictate the technical and environmental performance the equipment would be expected to meet, based on the proponent's operational requirements and the conditions of consent for the project.

Measures to reduce odour are already incorporated into the design of the facility and have been included in the odour modelling. Given the results of atmospheric dispersion modelling, it is anticipated that no additional mitigation measures from an air quality perspective would be required.

Odour management principles considered in the design of the facility would minimise the potential for these fugitive emissions to be generated.

An odour management plan would be prepared as part of the operation environmental management plan detailing measures for the control of odour generation. Management practices may include:

- Minimising outdoor handling of materials;
- Traffic management procedure to co-ordinate the delivery schedule and avoid a queue of the incoming or outgoing trucks outside the building for extended periods of time;
- Spill management procedures to include immediate cleanup of any spill/leakage from the incoming and outgoing trucks;
- Maintaining an odour complaint logbook and in the event of a complaint immediately investigate any unusual odour sources (including spill or leakage in the traffic areas) within the Kimbriki Resource Recovery Centre boundary and take appropriate action to eliminate these;
- Real-time processing of odourous feedstock material and no stockpiling of raw materials for more than a day under normal operating conditions;
- Managing stockpiles to facilitate natural ventilation to prevent anaerobic zones;
- Air management system to ensure buildings are under slight negative pressure; and
- Installation of additional air curtains above each fast speed door entrance to reduce emissions as trucks enter and leave the building.

# 10 Noise

*The information presented in this chapter is based on the findings of the noise assessment undertaken by GHD. The noise assessment report is included in Appendix G of this environmental assessment.*

## 10.1 Methodology

The noise assessment involved the following tasks:

- Identifying noise sensitive receivers;
- Background noise monitoring undertaken for one week between 14 and 20 July 2010 at two residential locations considered to be representative of the existing ambient noise environment;
- Attended noise monitoring to supplement background noise monitoring and assess existing noise levels;
- Establishing operational and construction noise criteria based on DECCW guidelines and the results of noise monitoring;
- Assessing potential construction, operation and traffic noise impacts, by:
  - noise modelling to predict the potential for impacts at sensitive receivers;
  - assessing predicted impacts against noise criteria; and
  - considering relevant DECCW guidelines including the *Interim Construction Noise Guideline* (2009b), *Industrial Noise Policy* (2000), and *Environmental Criteria for Road Traffic Noise* (1999).
- Provide recommended mitigation and management measures to minimise potential impacts.

## 10.2 Existing environment

### 10.2.1 Noise sensitive receivers

The site, sensitive receivers (addresses) and monitoring locations are shown in Figure 10.1.

Background noise monitoring took place at two locations (1 and 4 Kimbriki Road) that were considered to be a good representation of the existing ambient noise environment and identified as being a safe and secure place for equipment to minimise the risk of theft or vandalism.

The noise loggers were programmed to accumulate $L_{A90}$, $L_{A10,}$ $L_{Aeq}$ and $L_{Amax}$ noise levels continuously over sampling periods of 15 minutes for the entire monitoring period. Further information on the monitoring undertaken and detailed results are provided in Appendix G.

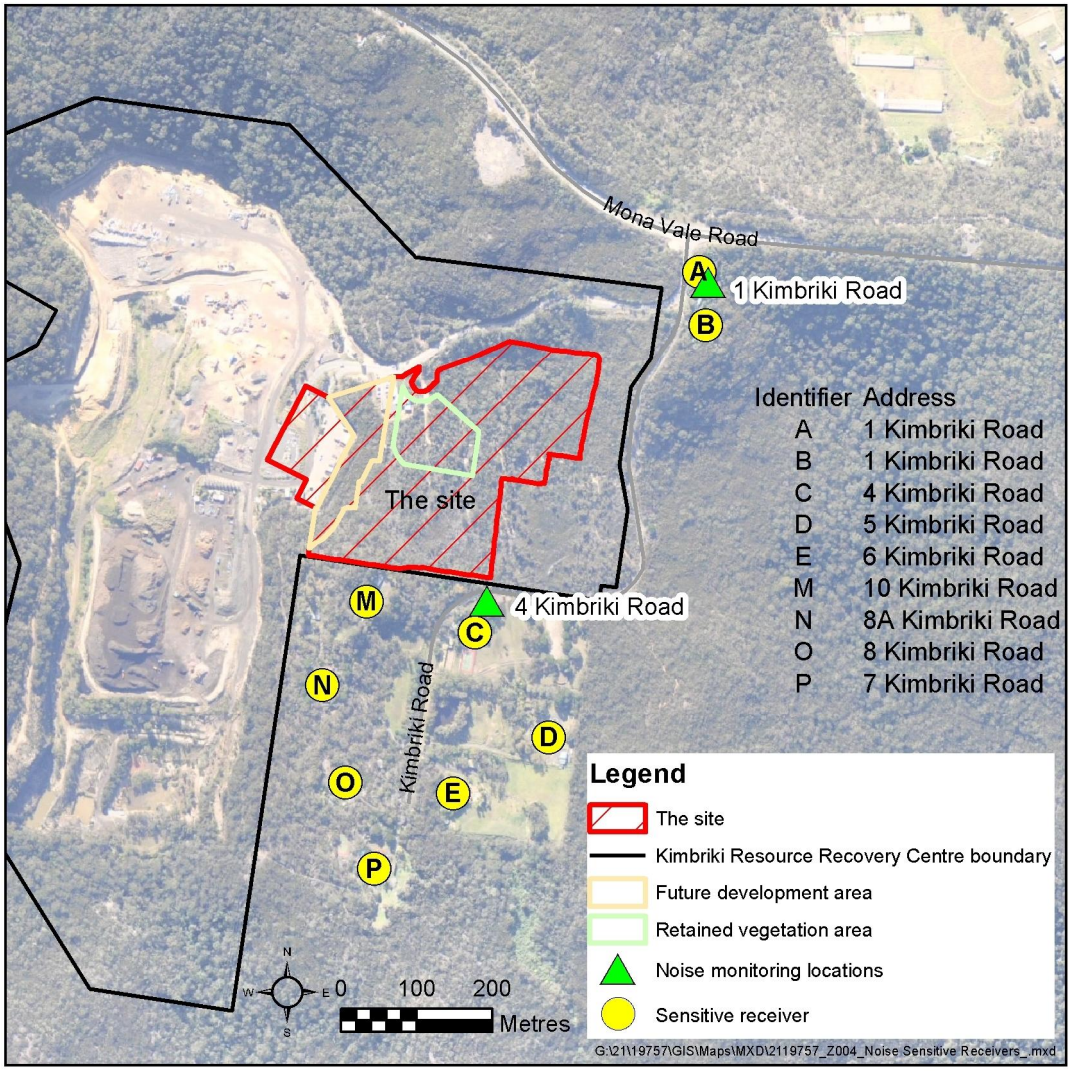



**Figure 10.1 Noise sensitive receivers and monitoring locations**

### 10.2.2 Summary of background noise monitoring results

A summary of the calculated rating background level (RBL) $L_{A90(period)}$ and $L_{Aeq(period)}$ noise monitoring results are shown in Table 10.1 for each monitoring location.

**Table 10.1 Noise monitoring results**

| Receiver | $L_{A90}$ RBL noise levels (dB(A)) | | | $L_{Aeq}$ ambient noise levels (dB(A)) | | |
|---|---|---|---|---|---|---|
| | Day | Evening | Night | Day | Evening | Night |
| A | 50 | 42 | 29 | 64 | 60 | 55 |
| C | 33 | 34 | 28 | 50 | 45 | 41 |

The results of noise monitoring indicated the following:

- During the day, the ambient noise environment at residences adjacent to Mona Vale Road is dominated by road traffic noise, and activities at the Kimbriki Resource Recovery Centre are not audible;
- During the day, residences south of the site are exposed to some noise from the Kimbriki Resource Recovery Centre, and noise from road traffic; and
- During the night, road traffic noise levels are low, there are no activities at the Kimbriki Resource Recovery Centre therefore no noise is received, and background noise levels are low.

## 10.3 Noise criteria

### 10.3.1 Construction noise considerations

The *Interim Construction Noise Guideline* provides guidance for assessing and controlling the noise impact from construction sites. This guideline involves the following:

#### Recommended hours of construction

The recommended standard construction hours are:

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- Sundays and public holidays: no work permitted

#### Construction outside the recommended standard hours

The five categories of works that might be undertaken outside the recommended standard hours are:

- Delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads;
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm;
- Maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours;
- Public infrastructure works that shorten the length of the project and are supported by the affected community; and
- Works where a proponent demonstrates and justifies a need to operate outside the recommended standard hours.

#### Noise management goals

People's reaction to noise from construction will depend on the time of day that works are undertaken. Residents are usually most annoyed by work at night-time as it has the potential to disturb sleep.

The management levels for noise at residences are listed below and described in Table 10.2. Restrictions to the hours of construction may apply to activities that generate noise at residences

above the 'highly noise affected' noise management level. The RBL is used when determining the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period. The term RBL is described in detail in the *NSW Industrial Noise Policy* (DECCW 2000).

- Activities during recommended standard hours:
  - The 'noise affected' management level ($L_{Aeq(15min)}$) is the RBL plus 10 dB(A)
  - The 'highly noise affected' management level is 75 dB(A)
- Activities outside recommended standard hours:
  - The noise affected management level is the RBL plus 5 dB(A)

**Table 10.2 Noise at residences using quantitative assessment, Interim Construction Noise Guideline**

| Time of day | Management level $L_{Aeq(15min)}$ | Explanation and approach |
|---|---|---|
| Recommended standard construction hours | Noise affected - RBL plus 10 dB(A) | The noise affected level represents the level above which there may be some community reaction to noise.<br>Where the predicted or measured $L_{Aeq(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details. |
| | Highly noise affected - 75 dB(A) | The highly noise affected level represents the level above which there may be strong community reaction to noise.<br>Where noise is above this level, the relevant consent, determining or regulatory authority may require respite periods by restricting the hours that the very noisy activities can occur, taking into account:<br>1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences<br>2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |
| Outside recommended hours | Noise affected - RBL plus 5 dB(A) | A strong justification would typically be required for works outside the recommended standard hours.<br>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. |

### 10.3.2 Project specific construction noise goals

Table 10.3 provides project specific construction noise goals at the surrounding residential receivers based on the *Interim Construction Noise Guideline* (DECCW 2009a).

**Table 10.3 Construction noise goals**

| Time of day | Residences | RBL $L_{A90(period)}$ | Management level $L_{Aeq(15min)}$ | |
|---|---|---|---|---|
| Recommended standard hours | Residences adjacent to Mona Vale Road | 50 dB(A) | Noise affected | 60 dB(A) |
| | | | Highly noise affected | 75 dB(A) |
| | Residences south of the site | 33 db(A) | Noise affected | 43 dB(A) |
| | | | Highly noise affected | 75 dB(A) |
| Outside recommended hours | All residences | 28 to 29 dB(A) | Noise affected | 35 dB(A) |

### 10.3.3 Existing operation noise considerations

#### Criteria specified by the environmental protection licence

EPL 13091 specifies the following noise limits for waste disposal and extraction activities:

- L6.1 - Noise from the premises must not exceed an $L_{A10(15min)}$ noise emission criterion of 45dB(A).
- L6.2 - Noise from the premises is to be measured at any point within one metre of the nearest affected residence or other noise sensitive areas to determine compliance with Condition L6.1. 5 dB(A) must be added if the noise is tonal or impulsive in character.

Section 10 of the *Industrial Noise Policy* (DECCW 2000) states that for existing industrial premises:

> *'The project specific noise levels should not be applied as mandatory noise limits. The project specific noise levels supply the initial target levels and drive the process of assessing all feasible and reasonable control measures.'*

Project specific noise criteria would be set at the current EPL noise limit. The criteria would apply to the combined noise output from the existing Kimbriki Resource Recovery Centre and proposed operations. Note that the project may still require a new EPL and the noise limits would be determined by the regulatory authority.

#### Industrial Noise Policy

The *Industrial Noise Policy* (DECCW 2000) provides guidance on the assessment of operational noise impacts. The guidelines include both intrusive and amenity criteria that are designed to

protect receivers from noise significantly louder than the background level and to limit the total noise level from all sources near a receiver.

*Intrusive criteria*

The intrusive criteria are determined by a 5 decibels addition to the measured (or adopted) background level with a minimum of 35 dB(A). The Industrial Noise Policy recommends that the intrusive noise criteria for the evening period should not exceed the daytime period and the night-time period should not exceed the evening period. The intrusive noise criteria are only applicable to residential receivers.

*Amenity criteria*

The amenity criteria are determined based on the overall acoustic characteristics of the receiver area, the receiver type and the existing level of noise excluding other noises that are uncharacteristic of the usual noise environment.

Residential receiver areas are characterised into 'urban', 'suburban', 'rural' or other categories based on land uses, the existing level of noise from industry, commerce, and road traffic. With consideration to the Industrial Noise Policy's 'Noise Amenity Area' classification, the residential receivers have been classified as 'suburban'.

For residences adjacent to Mona Vale Road the high traffic noise criteria has been used to replace the amenity criteria since traffic noise has been identified as the dominant noise source onsite and the measured traffic noise level is more than 10 dB(A) above the acceptable noise level for the area.

### 10.3.4 Project specific operation noise levels

The project specific noise levels reflect the most stringent noise level requirements derived from the intrusive and amenity criteria. The environmental protection licence has also been considered for establishing day-time operation noise criteria.

For residential receivers the noise criteria are provided in Table 10.4. The criteria would apply to the combined noise output from the project and the Kimbriki Resource Recovery Centre.

For recreational areas the amenity criteria for passive recreation is $L_{Aeq(Day)}$ 50 dB(A). These criteria would apply at the National Park boundary during the day-time period when the reserve is in use.

**Table 10.4 Operation noise criteria (dB(A))**

| Residences | Criteria | Day (7 am-6 pm) | Evening (6 pm-10 pm) | Night (10 pm-7 am) |
|---|---|---|---|---|
| Residences south of the site | Rating background level, $L_{A90(Period)}$ | 33 | 34 | 28 |
| | Existing level of industrial noise; $L_{Aeq(Period)}$ | 35 to 43 | - | - |
| | Intrusiveness criteria, $L_{Aeq(15min)}$ | 38 | 39 | 35 |
| | Amenity criteria (suburban), $L_{Aeq(Period)}$ | 55 | 45 | 40 |

| Residences | Criteria | Day (7 am-6 pm) | Evening (6 pm-10 pm) | Night (10 pm-7 am) |
|---|---|---|---|---|
| | DECCW EPL noise limit (L13091) | 45 $L_{A10(15min)}$ | - | - |
| | **Project specific criteria** | **43 $L_{Aeq(15min)}$** | **39 $L_{Aeq(15min)}$** | **35 $L_{Aeq(15min)}$** |
| Residences adjacent to Mona Vale Road | Rating background level, $L_{A90(Period)}$ | 50 | 42 | 29 |
| | Existing level of traffic noise; $L_{Aeq(Period)}$ | 64 | 60 | 55 |
| | Intrusiveness criteria, $L_{Aeq(15min)}$ | 55 | 47 | 35 |
| | Amenity criteria (road traffic noise), $L_{Aeq(Period)}$ | 54 | 50 | 45 |
| | DECCW EPL noise limit (L13091) | 45 $L_{A10(15min)}$ | - | - |
| | **Project specific criteria** | **43 $L_{Aeq(15min)}$** | **43 $L_{Aeq(15min)}$** | **35 $L_{Aeq(15min)}$** |

### 10.3.5 Traffic noise criteria

The *Environmental Criteria for Road Traffic Noise* (DECCW 1999) provides recommended road traffic noise criteria for various types of road and land use developments. Mona Vale Road is identified an arterial road. Kimbriki Road is a local road. Recommended criteria are shown in Table 10.5.

**Table 10.5 Traffic noise criteria**

| Type of development | Criteria | Where criteria are already exceeded |
|---|---|---|
| Land use developments with potential to create additional traffic on arterial roads (Mona Vale Road) | Day ($L_{Aeq(15hour)}$) - 60 dB(A)<br>Night ($L_{Aeq(9hour)}$) - 55 dB(A) | In all cases, traffic arising from the development should not lead to an increase in existing noise levels by more than 2 dB. |
| Land use developments with potential to create additional traffic on local roads (Kimbriki Road) | Day ($L_{Aeq(15hour)}$) - 65 dB(A)<br>Night ($L_{Aeq(9hour)}$) - 50 dB(A) | In all cases, traffic arising from the development should not lead to an increase in existing noise levels by more than 2 dB. |

## 10.4 Impact assessment

### 10.4.1 Construction noise

#### Noise modelling

A quantitative assessment of construction noise was undertaken with consideration to the *Interim Construction Noise Guideline* (DECCW 2009a).

The construction noise assessment involved consideration of the construction program and likely construction activities (as outlined in section 6.5). The equipment anticipated to be used onsite and estimated noise levels (based on AS 2436 -2010) are outlined in Table 10.6. Acoustic modelling was undertaken using CadnaA v4.0 to predict the propagation of construction noise.

**Table 10.6 Construction equipment and noise levels**

| Equipment | Noise level, dB(A) at 10 m |
|---|---|
| Dump truck | 89 |
| Excavator | 79 |
| FEL | 85 |
| Grader | 82 |
| Roller / compactors | 85 |
| Asphalt machines | 80 |
| Crane | 77 |
| Forklift | 78 |

### Summary of construction noise modelling results

A summary of the results is provided below and in Table 10.7. Full results are tabulated in Appendix G.

The results of the assessment indicated that:

- The noise affected management level is predicted to be achieved at residences on Mona Vale Road.
- The noise affected management level is predicted to be exceeded at residences south of the site for the majority of the construction period.

Background noise levels during the day-time period at residences south of the site are 33 dB(A) therefore the INCG noise affected management level which represents the point above which there may be some community reaction to noise is 43 dB(A). Since the noise affected management level is exceeded at some residences there may be some construction noise impacts that need to be managed. However the impacts are not anticipated to be high since the 'highly noise affected' management level of 75 dB(A) is not predicted to be exceeded at any residence during the construction period. Moderate construction noise impacts are commonly associated with construction projects where residences are in close proximity.

To manage noise impacts the mitigation measures detailed in section 10.5 would be implemented to reduce the level of impact. The details of all construction noise mitigation and management measures will be included in a construction noise management plan, which will be prepared prior to the commencement of construction. In accordance with the ICNG requirements, this will include informing all residents to the south of the project of the nature of the works, the expected noise levels, duration of construction period and site contact details.

Table 10.7 Predicted construction noise levels (dB(A))

| Receiver | Criteria | Predicted noise levels | Predicted maximum exceedence |
|---|---|---|---|
| A | 60 | 36 – 51 | - |
| B | 60 | 44 – 58 | - |
| C | 43 | 43 – 58 | 15 |
| D | 43 | 46 – 61 | 18 |
| E | 43 | 45 – 59 | 16 |
| M | 43 | 52 – 66 | 13 |
| N | 43 | 46 – 60 | 17 |
| O | 43 | 45 – 59 | 16 |
| P | 43 | 44 – 58 | 15 |
| National Park Reserve | 60 | 50 – 64 | 4 |

### 10.4.2 Operation

#### Project design features

The buildings and project operation would incorporate the following features and measures to reduce the potential for noise impacts:

- All doors on the AWT building (except the front end loader access door) would be kept closed when they are not being used. Automatic doors would be installed;
- Building insulation would be installed in the AWT and MRF buildings;
- Tunnel ventilation and biofilter fans would be located inside the AWT and maturation/final processing buildings;
- Tunnel ventilation and biofilter fans would be selected so that an internal noise level of 80 dB(A) is achieved. The internal noise level would be checked for compliance upon commissioning;
- The AWT and maturation/final processing building design would incorporate acoustic air intake louvers on the northern side of buildings; and
- A low noise front end loader with broadband reversing alarm would be used between the maturation/final processing building and the AWT building.

#### Noise modelling

Acoustic noise modelling of operation noise was undertaken using CadnaA v4.0 to predict noise emissions as a result of the project. Noise modelling assumptions are detailed in Appendix G.

The results of the modelling, indicating the predicted noise levels at the surrounding noise sensitive receivers, are summarised in Table 10.8 and Table 10.9 for day time and night time

operations respectively. The receiver was modelled 30 m from the residence in the direction of the site. The predicted noise levels are for the combined operation of the project and existing operations at the Kimbriki Resource Recovery Centre. These levels were modelled after consulting with industry and obtaining a list of tested readings from inside and outside similar RRF and MRF operations. In both cases the figures obtained were a result of accredited noise surveys from activities using very similar wastes in buildings of a very similar design to the proposed RRF and MRF. Therefore, the results are considered to be representative of the potential levels of operation noise.

Specifically, during the day time operations a conservative assumption has been made that the maturation/final processing and AWT buildings have an internal sound pressure level of 85 dB(A). The internal noise level would likely be lower than this as it should not be exceeded due to OH&S requirements. However, this level has been used for conservatism. An internal noise level of 93 dB(A) for the MRF building has been assumed in the modelling, which is based on measurement data obtained from a similar MRF.

During the night time operations, it has been assumed that up to 30 tunnel ventilation fans and 2 biofilter fans would operate inside the AWT building. Similarly, it has been assumed that 2 biofilter fans would operate inside the maturation/final processing building. It is assumed that the night time internal noise level inside the AWT and maturation/final processing buildings would be 80 dB(A). During the night time period all AWT and maturation/final processing building doors are assumed to be closed.

Receivers are shown in Figure 10.1. The predicted noise level contours are shown in Figure 10.2 to Figure 10.5, indicating the potential noise impacts of the project.

**Table 10.8 Predicted day time operational noise levels (dB(A))**

| Receiver | Criteria | Existing Kimbriki Resource Recovery Centre | The project | Combined total |
|---|---|---|---|---|
| A | 43 | 31 | 34 | 36 |
| B | 43 | 32 | 39 | 40 |
| C | 43 | 26 | 40 | 41 |
| D | 43 | 26 | 41 | 41 |
| E | 43 | 23 | 37 | 37 |
| M | 43 | 35 | 42 | 43 |
| N | 43 | 33 | 35 | 37 |
| O | 43 | 31 | 32 | 35 |
| P | 43 | 29 | 32 | 34 |
| National Park Reserve | 50 | 27 | 44 | 44 |

Table 10.9 Predicted night time noise levels (dB(A))

| Receiver | Criteria | Night time noise level |
|---|---|---|
| A | 35 | 22 |
| B | 35 | 26 |
| C | 35 | 30 |
| D | 35 | 27 |
| E | 35 | 25 |
| M | 35 | 33 |
| N | 35 | 26 |
| O | 35 | 23 |
| P | 35 | 22 |

### Summary of operation noise modelling results

The results of operational noise modelling indicate that project specific noise goals would be achieved both during day time operations and at night at all nearby sensitive receivers, assuming the design measures listed above are incorporated in the project design and operation.

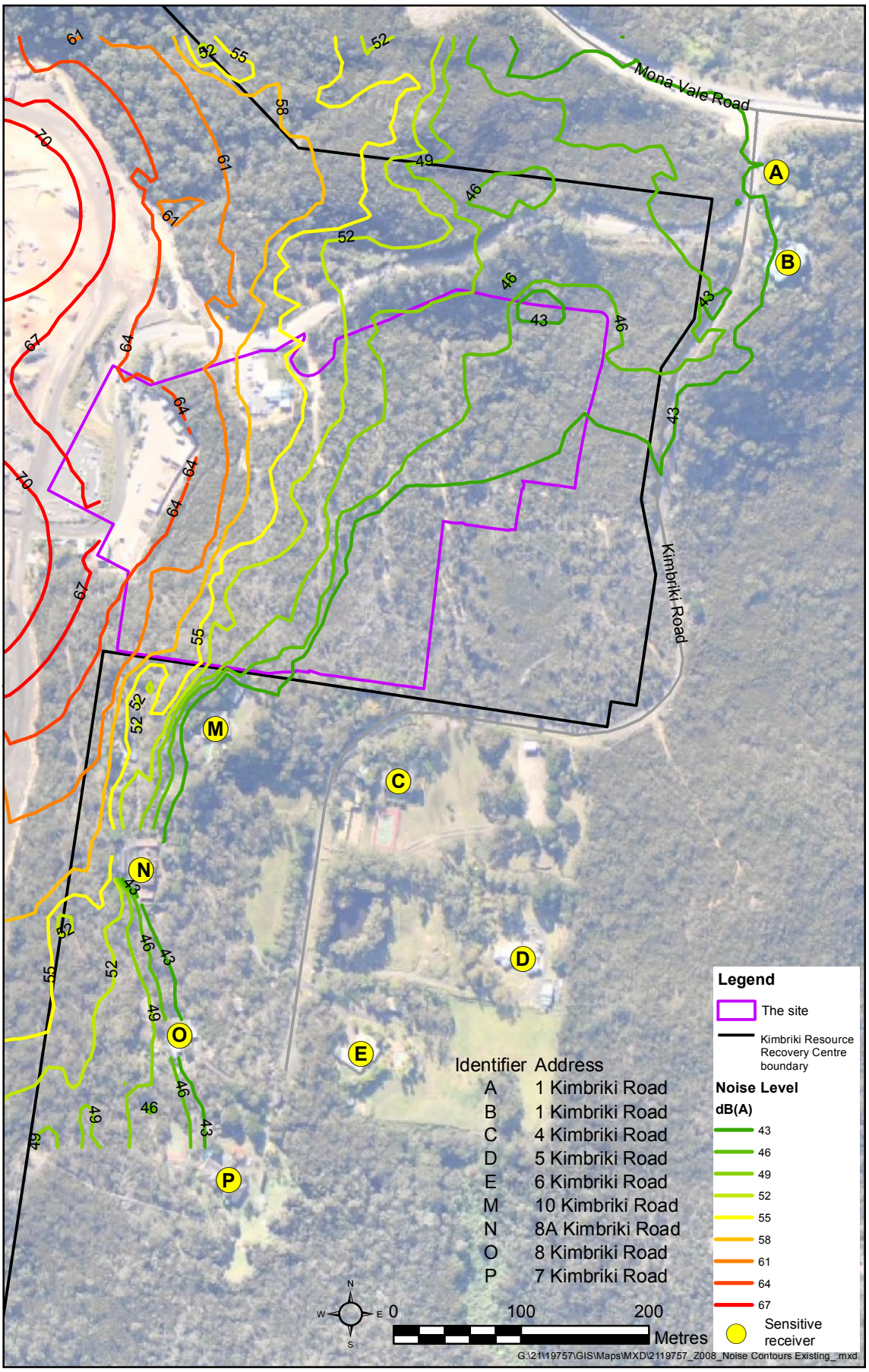
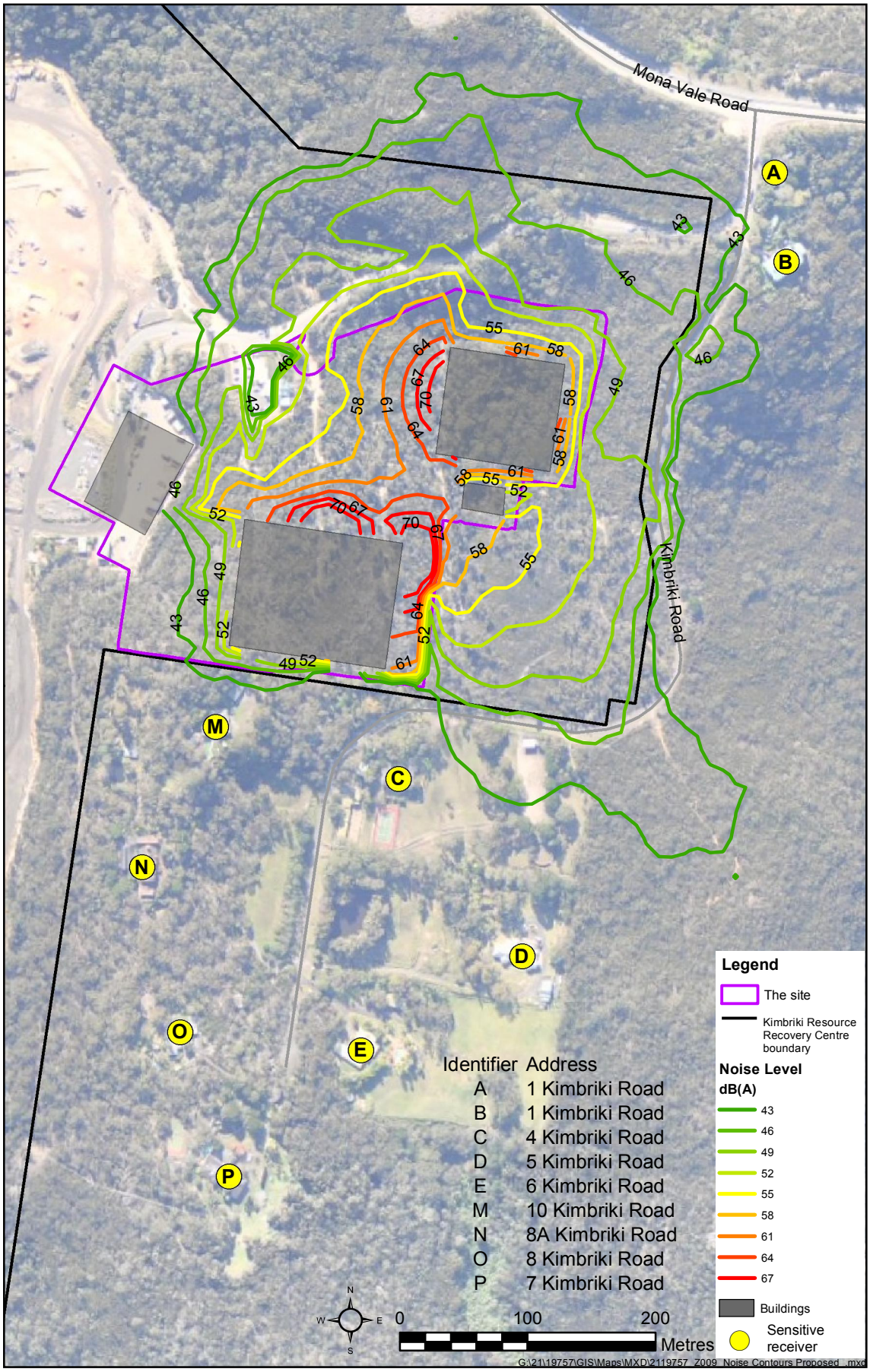



**Figure 10-2 Predicted noise levels - existing operations**




Legend

**Figure 10-3 Predicted noise levels - operations**

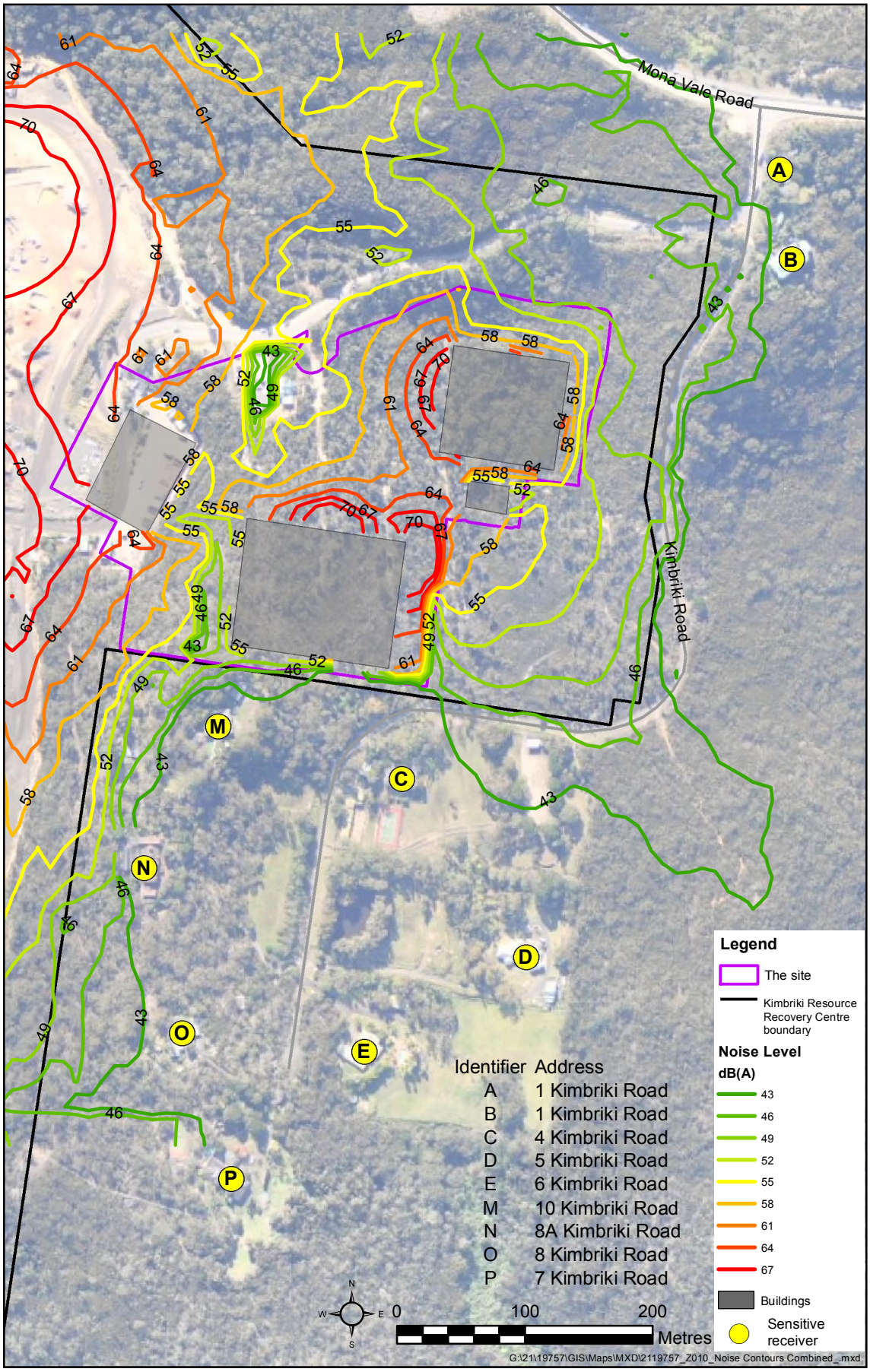



**Figure 10-4 Day time predicted noise levels - existing and proposed operations**

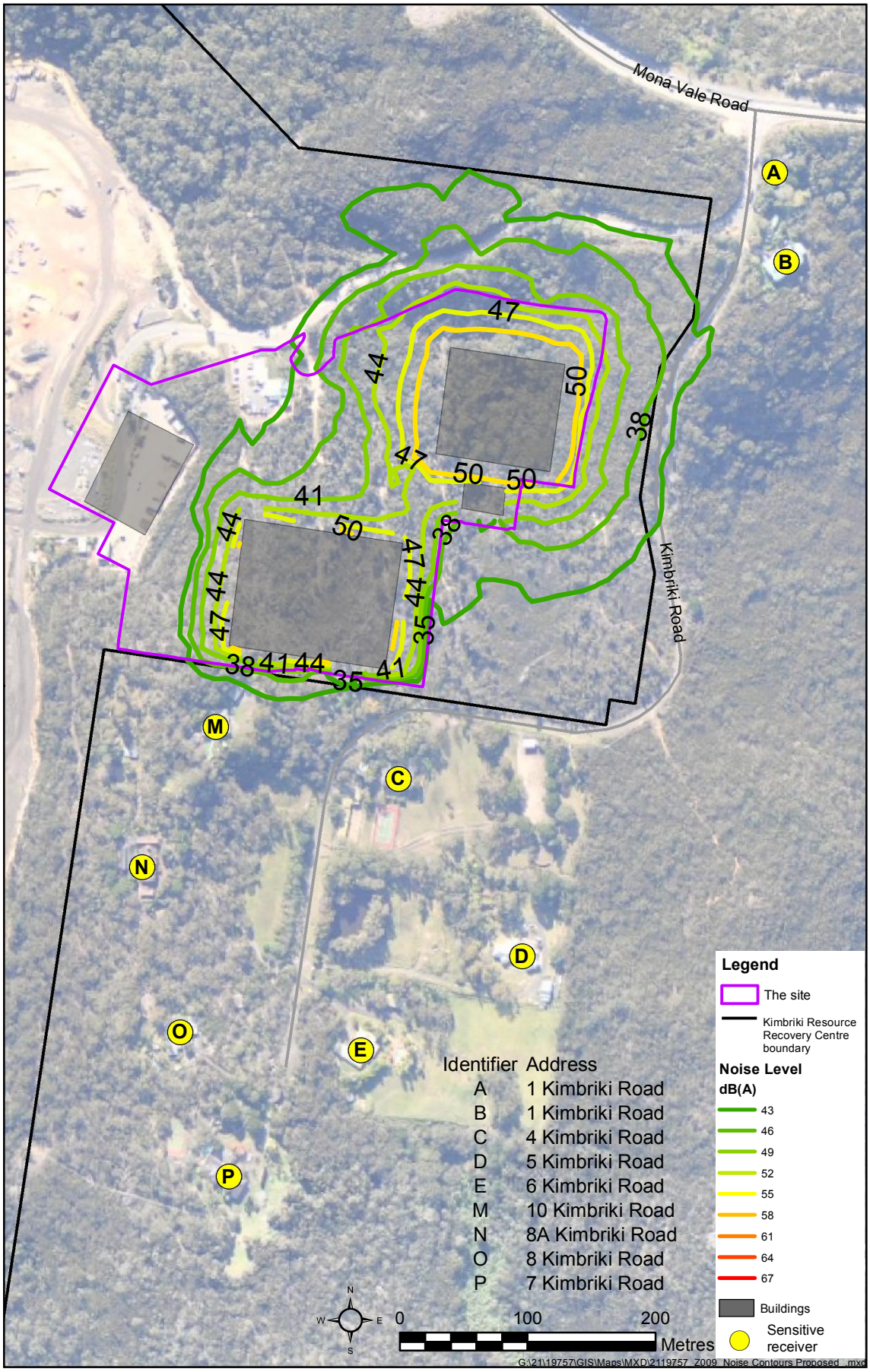



**Figure 10-5 Night time predicted noise noise levels - proposed operations**

### 10.4.3 Operation traffic noise

#### Potential impacts

The two residences adjacent to Mona Vale Road are dominated by road traffic noise from Mona Vale Road and exposed to noise from traffic entering the Kimbriki Resource Recovery Centre from Kimbriki Road. The impact of additional traffic generation from the project has been assessed for these residences.

The residences to the south of the site are not located on the site access route and not exposed to significant levels of existing road traffic noise. Therefore, the potential impacts on these residences were not been assessed.

#### Modelling

The modelling undertaken considered the traffic predictions made by the traffic impact assessment, as outlined in chapter 11 and Appendix H.

The modelling indicated that the increase in traffic noise emissions on Kimbriki Road as a result of additional construction and operational traffic generation would be less than 2 dB(A). The increase in traffic noise emissions on Mona Vale Road is not anticipated to be significant (at less than 1 dB(A)).

The predicted increases in traffic noise emissions as a result of the project are shown in Table 10.10.

**Table 10.10 Predicted traffic noise emission increase**

| Road | Noise emission level increase (dB(A)) |
|---|---|
| Mona Vale Road | 0.3 |
| Kimbriki Road | 1.8 |

#### Summary of traffic noise modelling results

The results of the traffic noise assessment indicate that there should not be any significant traffic noise impacts at surrounding sensitive receivers.

## 10.5 Mitigation measures

### 10.5.1 Construction

A construction noise management plan would be prepared as part of the construction environmental management plan to detail how construction impacts would be minimised and managed. The following measures would be included:

- All mobile equipment would be selected to minimise noise emissions and appropriately maintained to ensure excessive noise is not generated;

- To reduce the annoyance associated with reversing alarms, broadband reversing alarms (audible movement alarms) would be used for all site equipment, subject to a safety risk assessment to determine whether this is acceptable;
- General construction activities would be limited to the recommended construction hours where feasible and reasonable; and
- All nearby residents would be informed of the nature of the works, the expected noise levels, duration of construction and contact details.

### 10.5.2 Operation

The specifications provided to prospective equipment suppliers would dictate the technical and environmental performance the equipment would be expected to meet, based on the proponent's operational requirements and the conditions of consent for the project.

Measures to reduce noise are already incorporated into the design of the facility and have been included in the noise modelling. Given the results of modelling, it is anticipated that no additional mitigation measures from noise impact perspective would be required.

A noise management plan would be prepared as part of the operation environmental management plan detailing measures for the control of noise. Management practices may include:

- All doors on the buildings (except the front end loader access door) would be kept closed when they are not being used;
- A low noise front end loader with broadband reversing alarm would be selected for operation between buildings; and
- Monitoring of noise levels would be undertaken and any noise complaints would be handled according to the procedures set out in the operation environmental management plan.

# 11 Traffic and transport

*The information presented in this chapter is based on the findings of the traffic impact assessment undertaken by GTA Consultants. The full report is included in Appendix H of this environmental assessment.*

## 11.1 Existing environment

### 11.1.1 Existing road network

Access to the site is via Kimbriki Road, which intersects with Mona Vale Road.

#### Mona Vale Road

Mona Vale Road is classified as a State Road and is under the care and control of the RTA. The classified road network showing the State and Regional road network is shown on Figure 11.1. To the east of the Kimbriki Road intersection, Mona Vale Road has an undivided carriageway with one lane in each direction. To the west of the Kimbriki Road intersection, Mona Vale Road is also undivided but with two westbound lanes and one eastbound lane.

Mona Vale Road in the vicinity of Kimbriki Road carries approximately 36,000 vehicles per day and has a level of service of E[8] during the peak periods (RTA 2009). This suggests that the road's capacity has been reached and expansion or other action may be required.

The results of counts undertaken for the eastbound and westbound directions along Mona Vale Road are shown in Figures 3.3 and 3.4 in Appendix H. These figures show the fluctuations in traffic along the road during the week, with the morning and afternoon peaks clearly identifiable. On a Saturday, the traffic flow on Mona Vale Road typically has a flat peak between 10 am and 6 pm in the westbound direction with a 12 pm peak in the eastbound direction.

The posted speed limit in the vicinity of Kimbriki Road is 70 km/h. Lane widths at Kimbriki Road are below the desired width of 3.5 m, with the width of the shoulders also below the preferred width for sealed shoulders of 2 m.

RTA (2009) forecasts (based on no expansion of the road network) suggest that approximately 56,000[9] vehicles would use the section of Mona Vale Road located in the vicinity of Kimbriki Road in 2026. Based on no expansion of the road network, these vehicle numbers would result in a level of service of F, which means the road would exceed its capacity during the peak periods.

Mona Vale Road also performs the function of a regional bicycle route, with on-road bicycle shoulders provided along the majority of its length.

[8] Based on a volume to capacity ratio (VCR) of 1.1

[9] Forecasts for the year 2026 (based on no expansion of the road network)

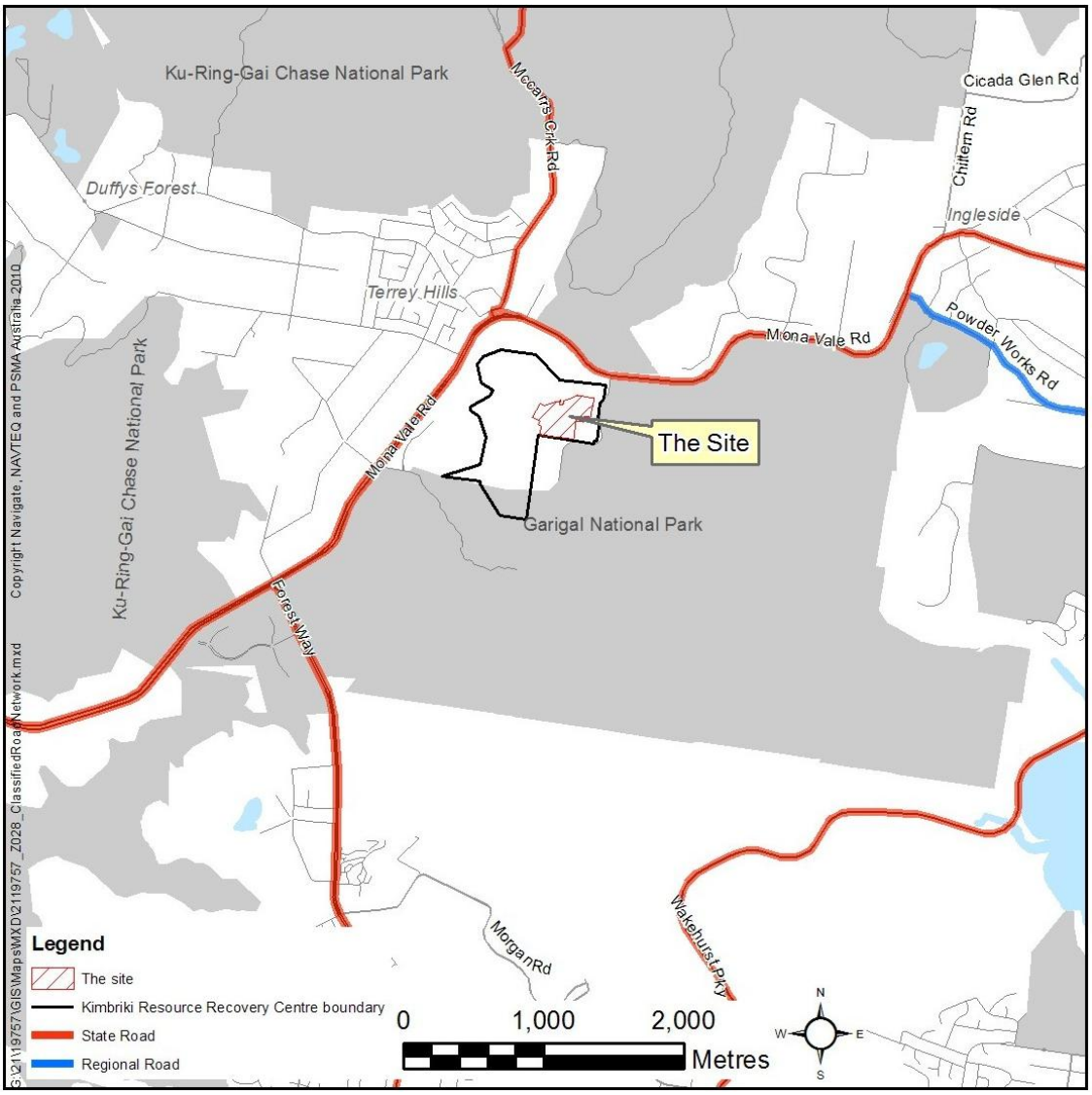



**Figure 11.1 Classified road network**

### Kimbriki Road

Kimbriki Road is classified as a local road and is under the care and control of Warringah Council. Kimbriki Road has an undivided carriageway with one lane in each direction. It mainly serves as an access road to the Kimbriki Waste and Recycling Centre. Kimbriki Road carries approximately 2,000 vehicles per day[10].

The results of counts undertaken for the eastbound and westbound directions along Kimbriki Road are shown in Figures 3.5 to 3.6 in Appendix H. These figures show that traffic flow along Kimbriki Road does not vary significantly between during the week and on Saturdays, with the peak flow occurring during the lunchtime period with similar levels of traffic flow.

[10] Based on 24 hour/7 day traffic counts undertaken by GTA Consultants in November 2009

### Mona Vale to Macquarie Park Corridor Strategy

The Mona Vale Road to Macquarie Park Corridor Strategy (RTA 2009) confirms that there are wider traffic operation issues along the whole corridor from Mona Vale to Macquarie Park, suggesting that there are already capacity issues associated with existing operation. The two-lane section east of McCarrs Creek Road in the vicinity of Kimbriki Road has a volume to capacity ratio (VCR) of 1.1, and suggests that the road's capacity has been reached and expansion or other action is required.

The short-term (i.e. 2009-2014) priority for the RTA is to commence planning to enhance capacity and efficiency for light and heavy vehicles in the single lane sections between Ingleside and Terrey Hills, including the identification of corridor requirements.

## 11.1.2 Peak hour vehicle movements

Traffic movement counts were undertaken at the intersection of Mona Vale Road and Kimbriki Road on Thursday 26 November 2009, a typical weekday, and Saturday 28 November 2009. Data was collected during the AM (7 am to 9 am), midday (12 pm to 2 pm) and PM (4 pm to 6 pm) peak periods. Table 11.1 outlines the results of the traffic movement counts at the Kimbriki Road intersection.

**Table 11.1 Peak hour vehicle movements**

| Movement | Weekday | | | Saturday | | |
|---|---|---|---|---|---|---|
| | AM | Midday | PM | AM | Midday | PM |
| Mona Vale Road Eastbound | 1084 | 962 | 1576 | 897 | 1308 | 1083 |
| Mona Vale Road Westbound | 1774 | 962 | 1339 | 837 | 1113 | 1347 |
| Mona Vale Road (eastbound) right into Kimbriki Road | 41 | 44 | 47 | 45 | 78 | 31 |
| Mona Vale Road (westbound) left into Kimbriki Road | 36 | 54 | 42 | 39 | 42 | 44 |
| Left out at Kimbriki Road | 36 | 64 | 67 | 45 | 67 | 31 |
| Right out at Kimbriki Road | 23 | 38 | 45 | 26 | 60 | 45 |

## 11.1.3 Intersection operation

Table 11.2 outlines the existing operational performance of each movement at the intersection of Mona Vale Road and Kimbriki Road for the three peak periods on a Thursday and Saturday.

In summary, the intersection operates satisfactorily with a level of service between A and C for most movements. The exception to this is the weekday AM peak period, where the right-turn movement into Kimbriki Road and right-turn movement out of Kimbriki Road both operate at a level of service of F (i.e. extra capacity is required). However, whilst delays are encountered, relatively short queues are experienced (approximately four vehicles).

**Table 11.2 Existing intersection performance**

| Movement | | Weekday | | | Saturday | | |
|---|---|---|---|---|---|---|---|
| | | AM | Midday | PM | AM | Midday | PM |
| Mona Vale Road Eastbound | Delay (sec) | 0 | 0 | 0 | 0 | 0 | 0 |
| | LOS | A | A | A | A | A | A |
| Mona Vale Road Westbound | Delay (sec) | 0 | 0 | 0 | 0 | 0 | 0 |
| | LOS | A | A | A | A | A | A |
| Mona Vale Road (eastbound) right into Kimbriki Road | Delay (sec) | 89.6 | 16.0 | 20.3 | 13.4 | 16.5 | 21.4 |
| | LOS | F | B | B | A | B | B |
| Mona Vale Road (westbound) left into Kimbriki Road | Delay (sec) | 9.2 | 8.9 | 8.7 | 8.8 | 8.7 | 8.7 |
| | LOS | A | A | A | A | A | A |
| Left out at Kimbriki Road | Delay (sec) | 6.1 | 5.7 | 5.6 | 5.7 | 5.7 | 5.6 |
| | LOS | N/A* | N/A* | N/A* | N/A* | N/A* | N/A* |
| Right out at Kimbriki Road | Delay (sec) | 72.2 | 17.7 | 28.8 | 16.6 | 22.5 | 30.7 |
| | LOS | F | B | C | B | B | C |

Note: * Continuous movement

To address some of the existing operational and safety issues at the intersection of Mona Vale Road and Kimbriki Road, it is proposed to redesign the intersection to allow a continuous westbound acceleration lane, a painted separation island within the intersection for right turning traffic; and an extended right turn bay on Mona Vale Road (line marking adjustment only). This is described in detail in chapter 6.

### Crash history

Crash data was sourced from the RTA for the most recent five-year period (2005 to 2009, inclusive) for the intersection of Mona Vale Road and Kimbriki Road, including within 200 m of the intersection. A summary of the crash history is as follows, full details are provided in Appendix H:

- There were a total of 15 crashes reported, including four casualty crashes and 11 non-casualty crashes. There were no fatal crashes reported.
- Seven crashes involved a light truck, with five of the seven crashes involving the truck as the first impact vehicle.
- Fourteen of the crashes occurred on a weekday, with only one recorded on a weekend.
- There were 11 two-vehicle crashes and four single-vehicle crashes.
- Eight crashes occurred in the wet, whilst seven crashes occurred during dry conditions.
- Speeding was noted as a factor for two of the crashes, whilst fatigue was noted as a factor for one of the crashes.

The breakdown of crashes by DCA (Definitions for Coding Accidents) codes is provided in Table 11.3.

**Table 11.3 Summary of Crashes by DCA Code**

| DCA Code | No. of Crashes |
|---|---|
| 104 – Intersection, vehicles from adjacent approaches | 2 |
| 201 – Head-on (not overtaking) | 1 |
| 202 – Opposing vehicles, turning at intersection | 1 |
| 301 – Rear-end | 7 |
| 703 & 704 – Off-road on straight, hit object | 2 |
| 803 & 804 – Off-road on curve, hit object | 2 |
| **Total** | **15** |

Detailed review of the crash findings highlights the following:

1. There was one location which had more than one crash type at the same location, which was a rear-end crash type on the eastbound approach to the intersection. The results indicate that these crashes occurred within the right-turn bay, and that both crashes resulted in injury.
2. Three crashes involved right-turning vehicles either turning into or out of Kimbriki Road. This data could reflect the difficulty in finding an appropriate gap in the westbound travel lane of Mona Vale Road, which was identified through intersection analysis. It is noted that these crashes occurred at different times of the day – 7.15 am, 2.55 pm and 1.45 pm – with all occurring outside of the peak hours.
3. A rear-end crash occurred approximately 100 m east of the intersection in the eastbound departure lanes in the vicinity of the merge of the through lane and the right-turn 'Seagull' lane. The layout of this merge could have contributed to the crash.
4. A rear-end crash occurred approximately 80 m east of the intersection in the westbound approach lanes in the vicinity of the start of the left turn slip lane into Kimbriki Road.
5. All of the four single-vehicle crashes occurred during wet conditions. The three single-vehicle crashes that occurred on Mona Vale Road occurred between 6.00 am and 7.15 am, where it was dark as well as wet. This could suggest issues associated with driving conditions during wet and dark conditions, including lack of lighting and inadequate reflectivity of linemarking and signage. It is noted that these crashes occurred to the east and west of Kimbriki Road, including two crashes located 50 m east of Kimbriki Road and one crash located 60 m west of Kimbriki Road.
6. There were a total of four casualty crashes at this location. This includes:
   - Two rear-end crashes which occurred in the eastbound approach right-turn bay at the intersection.
   - An off-path on straight and impact with an object crash occurred in the eastbound departure lane of Mona Vale Road approximately 50 m east of Kimbriki Road.

An off-path on curve and impact with an object crash occurred on the northbound approach to Kimbriki Road approximately 75 m south of Mona Vale Road.

## 11.2 Impact assessment

### 11.2.1 Construction

#### Traffic generation

Traffic generation as a result of construction would generally be limited to movements of construction workers and delivery of material and equipment. All vehicles would access the site via Kimbriki Road. Off-street parking would be provided on site for 80 construction worker vehicles.

The peak number of daily vehicle movements during the construction period is estimated to be around 180 movements, or 90 trucks per day on a weekday; and around 90 movements, or 45 trucks per day on a Saturday. This would occur for the first (approximately) 10 months of the project, during the excavation stage of construction (which lasts approximately 22 weeks), with some overlap with the civil construction stage.

As well as the truck movements, there would also be an increase in light vehicle movements associated with staff. Typically the construction workforce of up to 80-100 persons (at peak times) and less at other times would arrive at the site by car due to the lack of nearby public transport services to suit construction hours. As such, there could be as many as 200 additional daily movements occurring due to staff arrivals and departures during peak times of specific activities, with up to 100 daily movements expected during the majority of the project construction period.

The peak daily volume of 180 movements per day, plus staff movements, was used to estimate the peak number of additional vehicles accessing the site during the AM, midday and PM peak hours on a weekday and Saturday. A number of assumptions were used to estimate the hourly vehicle movements during the peak periods, which are detailed in section 4.2 of Appendix H. This included the assumption that approximately 60% of workers would enter and leave the site outside the peak hour on a weekday.

The estimated additional site-generated traffic volumes (vehicles per hour) during construction in the AM, midday and PM peak hours on a weekday and Saturday are provided in Table 11.4.

**Table 11.4 Estimated additional site-generated traffic volumes during construction – vehicles per hour**

| Component (weekday) | Weekday AM | | Weekday Midday | | Weekday PM | |
|---|---|---|---|---|---|---|
| | In | Out | In | Out | In | Out |
| Construction worker (light vehicle) traffic (vehicles/hr) | 20 | 0 | 0 | 0 | 0 | 20 |
| Heavy vehicle traffic (vehicles/hr) | 9 | 8 | 9 | 9 | 8 | 9 |
| Total (vehicles/hr) | *29* | *8* | *9* | *9* | *8* | *29* |
| **Component (Saturday)** | **Saturday AM** | | **Saturday Midday** | | **Saturday PM** | |
| | In | Out | In | Out | In | Out |
| Construction worker (light vehicle) traffic (vehicles/hr) | 20 | 0 | 0 | 80 | 0 | 0 |
| Heavy vehicle traffic (vehicles/hr) | 9 | 8 | 9 | 9 | 0 | 0 |
| Total (vehicles/hr) | *29* | *8* | *9* | *89* | *0* | *0* |

### Intersection performance

Table 11.5 outlines the expected operational performance of each movement at the intersection of Mona Vale Road and Kimbriki Road during construction, taking into account the introduction of construction vehicles (both heavy and light vehicles).

As shown in Table 11.5, the intersection is expected to operate satisfactorily (at a level of service of A, B or C) during all peak periods with the exception of the weekday AM peak in which the right-turn movement out of Kimbriki Road and the right–turn movement into Kimbriki Road both operate at a level of service of F. During these periods, these two movements are predicted to have an average delay of 76.6 and 258 seconds, respectively. The right–turn movement into Kimbriki Road is greater than 1.0, which indicates that the capacity is being exceeded. This is reflected in the very high average delay of more than four minutes.

The results indicate that the capacity of the movement is being exceeded by one car. It is important to note that the intersection does not currently operate with a satisfactory level of service (in terms of vehicle delays), and that the project would not significantly worsen the current situation. However, there is an opportunity to improve the safety of the intersection through this project, by undertaking physical works, and introducing specific operational procedures for the morning peak, when right-turn movements are difficult.

**Table 11.5 Intersection performance during construction**

| Movement | | Weekday | | | Saturday | | |
|---|---|---|---|---|---|---|---|
| | | AM | Midday | PM | AM | Midday | PM |
| Mona Vale Road Eastbound | Delay (sec) | 0 | 0 | 0 | 0 | 0 | 0 |
| | LOS | A | A | A | A | A | A |
| Mona Vale Road Westbound | Delay (sec) | 0 | 0 | 0 | 0 | 0 | 0 |
| | LOS | A | A | A | A | A | A |
| Mona Vale Road (eastbound) right into Kimbriki Road | Delay (sec) | 258.2 | 19.5 | 25.9 | 15.7 | 19.7 | 21.4 |
| | LOS | F | B | B | A | B | B |
| Mona Vale Road (westbound) left into Kimbriki Road | Delay (sec) | 9.1 | 8.9 | 8.7 | 8.8 | 8.7 | 8.7 |
| | LOS | A | A | A | A | A | A |
| Left out at Kimbriki Road | Delay (sec) | 6.4 | 6.4 | 5.9 | 5.9 | 5.8 | 5.6 |
| | LOS | N/A* | N/A* | N/A* | N/A* | N/A* | N/A* |
| Right out at Kimbriki Road | Delay (sec) | 76.6 | 17.9 | 29.9 | 16.8 | 24.2 | 30.7 |
| | LOS | F | B | C | B | B | C |

Note: * Continuous movement

#### Parking

During the majority of the construction period, there are expected to be approximately 50 workers.

Parking for construction workers would be provided at two locations onsite, including in the area of the proposed RRF operational car park on the upper level, and adjacent to the proposed MRF building on the lower level. The construction car parks are expected to provide a combined supply of 65 parking spaces. This includes 30 spaces in the upper car park and 35 spaces in the lower car park. This would accommodate the expected parking requirements during the majority of construction activities.

In order to accommodate the parking demands associated with construction staff during peak events, such as concrete pours, additional temporary parking spaces would be made available to accommodate the demand from up to 100 vehicles.

### 11.2.2 Operation

#### Traffic generation

The transport of additional waste materials as a result of the project is estimated to generate a net increase of up to 145 truck movements and 141 light vehicle movements per day. This equates to a total daily increase in traffic volumes along Mona Vale Road of 0.8%, based on the existing daily volume of approximately 36,000 vehicles per day.

The project is predicted to result in a total of 79,087 vehicle movements per year once operational. This figure includes 38,385 heavy vehicles and 40,702 light vehicles.

The increase in traffic is expected to occur mainly on weekdays with a small proportion, mostly light vehicles, on Saturdays and Sundays. These predicted traffic generation figures include an allowance for traffic that would be generated due to closure of the Belrose landfill and therefore redirection of waste collection vehicles that once travelled to the Belrose landfill to the Kimbriki Resource Recovery Centre.

### Intersection performance

Table 11.6 summarises the expected operational performance of each movement at the intersection of Mona Vale Road and Kimbriki Road during operation, with the introduction of additional vehicles trips for the operational phase of the project.

As shown in Table 11.6, the intersection is expected to operate satisfactorily (i.e. have a level of service of A, B or C) during all peak periods with the exception of the weekday AM peak in which the right–turn movement out of Kimbriki Road and the right turn movement into Kimbriki Road are predicted to operate unsatisfactorily (i.e. a level of service of F). These two movements are predicted to have an average delay of 118.5 and 149.9 seconds, respectively.

It is important to note that the intersection does not currently operate with a satisfactory level of service (in terms of vehicle delays), and that the project would not significantly worsen the current situation. However, there is an opportunity to improve the safety of the intersection through this project, by undertaking physical works, and introducing specific operational procedures for the morning peak, when right-turn movements can be difficult.

**Table 11.6 Intersection performance during operation**

| Movement | | Weekday | | | Saturday | | |
|---|---|---|---|---|---|---|---|
| | | AM | Midday | PM | AM | Midday | PM |
| Mona Vale Road Eastbound | Delay (sec) | 0 | 0 | 0 | 0 | 0 | 0 |
| | LOS | A | A | A | A | A | A |
| Mona Vale Road Westbound | Delay (sec) | 0 | 0 | 0 | 0 | 0 | 0 |
| | LOS | A | A | A | A | A | A |
| Mona Vale Road (eastbound) right into Kimbriki Road | Delay (sec) | 149.9 | 18.1 | 20.8 | 13.8 | 17.1 | 21.5 |
| | LOS | F | B | B | A | B | B |
| Mona Vale Road (westbound) left into Kimbriki Road | Delay (sec) | 9.3 | 9.1 | 8.8 | 8.9 | 8.8 | 8.8 |
| | LOS | A | A | A | A | A | A |
| Left out at Kimbriki Road | Delay (sec) | 6.3 | 5.9 | 5.6 | 5.7 | 5.7 | 5.6 |
| | LOS | N/A* | N/A* | N/A* | N/A* | N/A* | N/A* |
| Right out at Kimbriki Road | Delay (sec) | 118.5 | 19.3 | 30.1 | 8.9 | 22.6 | 31.9 |
| | LOS | F | B | C | A | B | C |

Note: * Continuous movement

### Cyclists

Operation of the project is not expected to impact cyclists travelling along Mona Vale Road.

### Safety

Measures to address the safety issues identified in the crash analysis have been considered within the proposed intersection improvement works, described in detail in section 6.1.6. In particular, measures have been proposed to address the key issues in the following ways:

- Extension of the length of the right-turn bay on Mona Vale Road to accommodate deceleration and queuing. This could address the existing crash history in this lane for rear-end crashes.
- Improvements to linemarking and provision of pavement skid-resistant surfacing to address the issue of run-off road crashes during wet conditions. This would also assist in reducing the potential for head-on crashes due to encroachment into opposing lanes.
- Provision of 'Trucks Turning' warning signage (Sign No. W5-205) on the Mona Vale Road approaches to Kimbriki Road to alert drivers to the turning movements at the intersection.

These measures should help improve existing safety at the intersection of Kimbriki Road and Mona Vale Road and thereby future intersection safety with implementation of the project.

### Car parking

Division 5 of the Warringah LEP 2000 – Traffic, Access and Carparking – outlines the required car parking provisions for developments within the Warringah local government area. It states that adequate off-street car parking is to be provided within the subject property boundaries having regard to:

- The land use;
- The hours of operation;
- The availability of public transport;
- The availability of alternative carparking;
- The need for parking facilities for courier vehicles; and
- Delivery/service vehicles and bicycles.

There are expected to be up to 59 new staff associated with the proposed site operations as follows:

- 26 at the AWT and maturation/final processing buildings;
- 30 at the MRF; and
- 3 additional at the landfill.

It is assumed that all staff would arrive by private vehicle, which would equate to a staff parking requirement of approximately 59 spaces. There would also be onsite parking provision for visitors to the site, as well as some spaces to allow the storage of equipment or site vehicles. A minimum of four spaces would be provided for these activities. This equates to an overall onsite parking requirement of 63 spaces.

A 30 space car park would be constructed for staff working at the RRF on the upper level. A pedestrian walkway with appropriate signage would be provided from the car park to the RRF buildings. A second 35 space car park would be constructed next to the MRF building for staff working at the MRF, visitors, and the three extra staff that would be required for landfilling operations. Therefore a total of 65 spaces would be provided, which is greater than the recommended provision of 63 spaces. The final car park designs would be confirmed during the detailed design stage of the project.

Based on the above, the proposed parking provision is adequate for the project.

## 11.3 Mitigation measures

### 11.3.1 Construction

To minimise the impacts of the project during the construction phase on the intersection of Mona Vale Road and Kimbriki Road, construction related vehicles arriving during the AM weekday peak would be managed by:

- Implementing a right-turn ban for construction related vehicles only from Kimbriki Road between 7:00 am to 9:00 am on weekdays;
- As far as possible, scheduling deliveries of construction materials outside the AM peak; and
- Encouraging car-pooling, minibuses and other means to limit the number of construction worker vehicles entering the site during the AM peak.

Consideration would also be given to providing 'Trucks Turning' warning signage (Sign No. W5-205) on the Mona Vale Road approaches to Kimbriki Road.

### 11.3.2 Operation

To overcome the capacity issues for the right-turn movements into and out of Kimbriki Road, with consideration for road safety, and to minimise the impacts of the project during the operational phase on the intersection of Mona Vale Road and Kimbriki Road, the following restrictions on traffic movements would be implemented during the AM weekday peak period:

- Implementing a right-turn ban from Kimbriki Road between 7 am and 9 am on weekdays, which would permit left turns only during this period;
- Encouraging trucks to arrive at the Kimbriki Resource Recovery Centre from the east; and
- Encouraging trucks to arrive after 9 am.

It should be noted that it is unlikely that kerbside waste and recyclable collection vehicles would be seeking to enter the site until well after the morning peak due to the nature of their work schedules. Workers would typically commence collection work at 6 am and would take at least approximately four hours to fill the vehicle before arriving at the site to discharge their loads.

Based on this work schedule, it is also expected that the collection vehicles they would have been onsite, discharged their loads and exited the site well before prior to the afternoon peak at 4 pm. Staff commencing work at 6 am would also arrive before the morning peak and would have finished their afternoon shift prior to 4 pm.

A small number of staff would arrive at 9 am and leave around 5 pm, but this would be no more than 20% of the total workforce. This has been taken into account in the traffic modelling.

In addition:

- The proponent would ensure that the layout of the proposed car parking areas, including driveways, aisle widths, grades, parking bay dimensions, sight distance requirements and turn paths is designed in accordance with AS 2890.1-2004 and AS 2890.2-2002 during the detailed design phase;
- Car parking areas and entry/exit points would be clearly delineated through line marking and signage to manage any potential conflicts with heavy vehicles onsite;
- The proponent would continue to liaise with the Roads and Traffic Authority regarding the intersection layout and control at Mona Vale Road and Kimbriki Road;
- The proponent would work with the Roads and Traffic Authority in order to implement the proposed safety improvements at the intersection of Mona Vale Road and Kimbriki Road. This would include:
  - Provision of detailed design plans for RTA review and approval;
  - Preparation of appropriate documentation and acquisition of the required approvals for undertaking works on a State Road;
  - Preparation of Construction Traffic Management Plans for RTA review and approval; and
  - Ensuring that works are constructed in accordance with RTA specifications.

# 12 Soil and water

This chapter provides information on the existing soil and water environment of the site, and provides information on potential impacts on this environment. It includes a water balance for the project, wastewater predictions and management measures, other potential soil and water impacts, and proposed management measures.

## 12.1 Existing environment

### 12.1.1 Hydrology and regional water quality

The Kimbriki Resource Recovery Centre is located in the upper reaches of Deep Creek, a tributary of the Narrabeen Lagoon catchment, immediately upgradient of Garigal National Park. Water that flows onto the site drains to the south east, into the rural residential land, rather than into the park itself.

Figure 12.1 shows the locations of waterways and riparian land on and adjacent to the site, according to the Creek Management Study prepared by Montgomery Watson Harza (MWH) in March 2004.




**Figure 12.1 Existing waterways and riparian land (MWH 2004)**

According to this study, these drainage lines begin within the site, and continue southwards to the national park, through the residential area. The MWH study also indicates that the Deep Creek sub-catchment (within Warringah) is approximately 1360 ha, and the majority of the sub-catchment is contained within Garigal National Park. The Deep Creek tributaries below the south-western boundary of Garigal National Park are reported to be in the best overall condition of any of the creeks within the study area, and all ecological and landscape indicators are considered to be of very high value, due to the retention of natural catchment land uses and the extensive natural bushland setting.

However, further investigations (including a site visit) undertaken as part of the environmental assessment indicated that water drains in a southerly direction across the site via overland flow and that a defined drainage line actually commences downgradient of the site (refer section 12.2 for details).

### 12.1.2 Site drainage

As described in chapter 4, surface water at the Kimbriki Resource Recovery Centre is mainly managed by means of a system of cut-off drains, to ensure that clean runoff entering the centre is intercepted to prevent it from becoming contaminated by waste materials and recycling operations. Surface water runoff from the interim capped and revegetated landfill area is collected by two perimeter drains (the Eastern Drain and the Western Drain). These drains terminate in sedimentation dams near the southern boundary of the site.

Natural runoff within the area of the site proposed for the RRF generally flows in a southerly direction. This area is located within a separate sub-catchment, east of the currently used areas within the Kimbriki Resource Recovery Centre. Runoff from the site generally flows in a south westerly direction. This area is located within the main site catchment. No defined streams are present within the site, however, minor localised drainage lines are evident to the south of the site, as discussed above.

### 12.1.3 Existing water supply and wastewater management

The Kimbriki Resource Recovery Centre is currently supplied with pressurised water from the mains supply, which is only used for amenities. This water is supplemented by rain (tank) water onsite. Water intensive applications, including dust suppression and gardens, are supplied by water obtained from sedimentation basins onsite. Wastewater is managed with an onsite septic system, which is pumped out regularly.

### 12.1.4 Surface water quality

Monitoring of surface water within the Kimbriki Resource Recovery Centre is conducted on a quarterly basis in accordance with the requirements of EPLs 13090 and 13091. Figure 4.8 in chapter 4 shows the locations of surface water monitoring points and ground water monitoring bores that are referenced in EPL 13091.

Clause L3 of EPL13091 outlines the following concentration limits for surface water discharges from the Kimbriki Resource Recovery Centre, due to a rainfall event of 5-year Average Return Interval 24-hour storm event or less:

- pH 6.8 to 8.5;

- Total suspended solids 50 mg/L;
- Biochemical oxygen demand 20 mg/L; and
- Nitrogen (ammonia) 1 mg/L.

There are no limits specified in EPL 13091 for any other analytes/potential contaminants that are required to be monitored in the licence.

Recent results (June 2010) for surface water locations within the existing Eastern and Western cut off drains and sedimentation dams are summarised in Table 12.1. They indicate that these limits are being achieved in offsite surface water discharges.

**Table 12.1 Surface Water Monitoring results for June 2010 (selected locations only)**

| Site Number | | SW 1 | SW 2 | SW 4 | SW 5 | SW 9 |
|---|---|---|---|---|---|---|
| EPA Reference | | EPA 13 | EPA 11 | EPA 14 | EPA 9 | EPA 8 |
| Analyte | Units | | | | | |
| Conductivity | µS/cm | 351 | 350 | 351 | 613 | 227 |
| Dissolved Oxygen | mg/L | 11.6 | 11.6 | 11.6 | 11.7 | 11.8 |
| Faecal Coliforms | cfu/100 mL | 220 | 30 | 180 | <10 | 30 |
| Nitrogen (Ammonia) | mg/L | 0 | 0 | 0.02 | 0.41 | 0.7 |
| pH | | 7 | 7.1 | 7.1 | 3.5 | 7.1 |
| Potassium | mg/L | 2 | 2 | 2.2 | 3.2 | 3.3 |
| Redox potential | mV | 166 | 171 | 179 | 319 | 215 |
| Total Dissolved Solids - TDS | mg/L | 237 | 312 | 216 | 172 | 137 |
| Total Organic Carbon - TOC | mg/L | 5.4 | <5 | <5 | 7 | 5.8 |
| BOD | mg/L | 2 | 2 | NA | NA | NA |
| Total Suspended Solids - TSS | mg/L | 6 | <5 | NA | NA | NA |

### 12.1.5 Groundwater levels and quality

As part of a geotechnical investigation by Amaral (2006) for the project, two groundwater monitoring bores were installed in the area proposed for the RRF (refer Appendix I). No stabilised groundwater level was recorded during the field work, although the water level in the first bore drilled was measured at a depth of 25.5 m.

Figure 4.8 in chapter 4 shows the locations of ground water monitoring bores that are referenced in EPL 13091.

Monitoring of groundwater quality within the Kimbriki Resource Recovery Centre is conducted on a quarterly basis in accordance with the requirements of EPLs 13090 and 13091. Table 12.2

provides groundwater monitoring results from June 2010 from locations that are relevant to the site. This includes bore EPA 1, which was installed in 2006 but is not covered by the licence monitoring requirements.

The results obtained are typical for groundwater extracted from a sandstone environment - fresh water that is slightly acidic with low concentrations of sodium and other ions, and a slight presence of ammonia, most likely derived from natural sources.

**Table 12.2 Groundwater monitoring results (selected locations only)**

| Site Number | | MB 1 | MB 4 | AWT 1 |
|---|---|---|---|---|
| EPA Reference | | EPA 16 | EPA 19 | |
| Analyte | Units | | | |
| Alkalinity ($CaCO_3$) | mg/L | 39 | 70 | 23 |
| Calcium | mg/L | 8.6 | 20.2 | 3.6 |
| Chloride | mg/L | 87 | 165 | 51 |
| Magnesium | mg/L | 7.9 | 8.4 | 4.5 |
| Nitrogen (Ammonia) | mg/L | 0.59 | 4.24 | 0.07 |
| pH | | 6.3 | 6 | 6.3 |
| Potassium | mg/L | 1.8 | 28.6 | 0.9 |
| Sodium | mg/L | 31.6 | 46.1 | 18.7 |
| Sulphate | mg/L | <2 | 20 | 3 |
| Total Dissolved Solids - TDS | mg/L | 232 | 356 | 131 |
| Total Organic Carbon - TOC | mg/L | 13 | 20 | 9.5 |

### 12.1.6 Soil environment and site condition

The Kimbriki Resource Recovery Centre is underlain by the Hawkesbury Sandstone formation, which is a massive sedimentary formation varying in thickness from 60 m to 270 m. The formation consists of essentially near-horizontal sandstone beds with occasional discontinuous lenses, and interbeds of shale and unconsolidated weathered materials.

Beneath the area for the proposed RRF, the strata are predominantly sandstone with individual beds commonly up to 2 m in thickness, and occasionally thicker.

This sandstone is typically weathered for the first 2 m to 3 m, with the weathered material principally silty fine sand. Observations from drilling of groundwater monitoring bores at the site indicated that these extensive deep beds of sandstone were essentially impervious.

The location of the proposed MRF is within an already cleared and disturbed area. This building would be underlain by concrete poured directly onto excavated sandstone, with the western section of the apron (but not the building) extending over previously landfilled wastes previously placed on the essentially impervious sandstone bedrock.

## 12.2 Riparian zones assessment

During consultation with agencies, it was noted that according to the mapping of creeks and riparian zones undertaken by the Warringah Creek Management Study (MWH 2004), the footprint of the project extends into a defined riparian zone and creek. If development is undertaken near a river, lake or estuary, a controlled activity approval under the *Water Management Act 2000* is normally required. However as noted in chapter 2, this approval would not be required if the Minister for Planning grants project approval to carry out the project under Part 3A of the EP&A Act.

A review of the 1:25,000 topographic maps does not indicate the presence of a drainage line within the site, therefore a site inspection was undertaken to assess the site in accordance with the *Water Management Act 2000*.

Photo 12.1 to Photo 12.10 show photographs taken from the site inspection. The locations of each photo are shown on Figure 12.2.



**Photo 12.1 Drainage line photo - Location A**



**Photo 12.2 Drainage line photo - Location B**



**Photo 12.3 Drainage line photo - Location C**



**Photo 12.4 Drainage line photo - Location D**



Photo 12.5 Drainage line photo - Location E



Photo 12.6 Drainage line photo - Location F



Photo 12.7 Drainage line photo - Location G



Photo 12.8 Drainage line photo - Location H



Photo 12.9 Drainage line photo - Location I



Photo 12.10 Drainage line photo - Location J

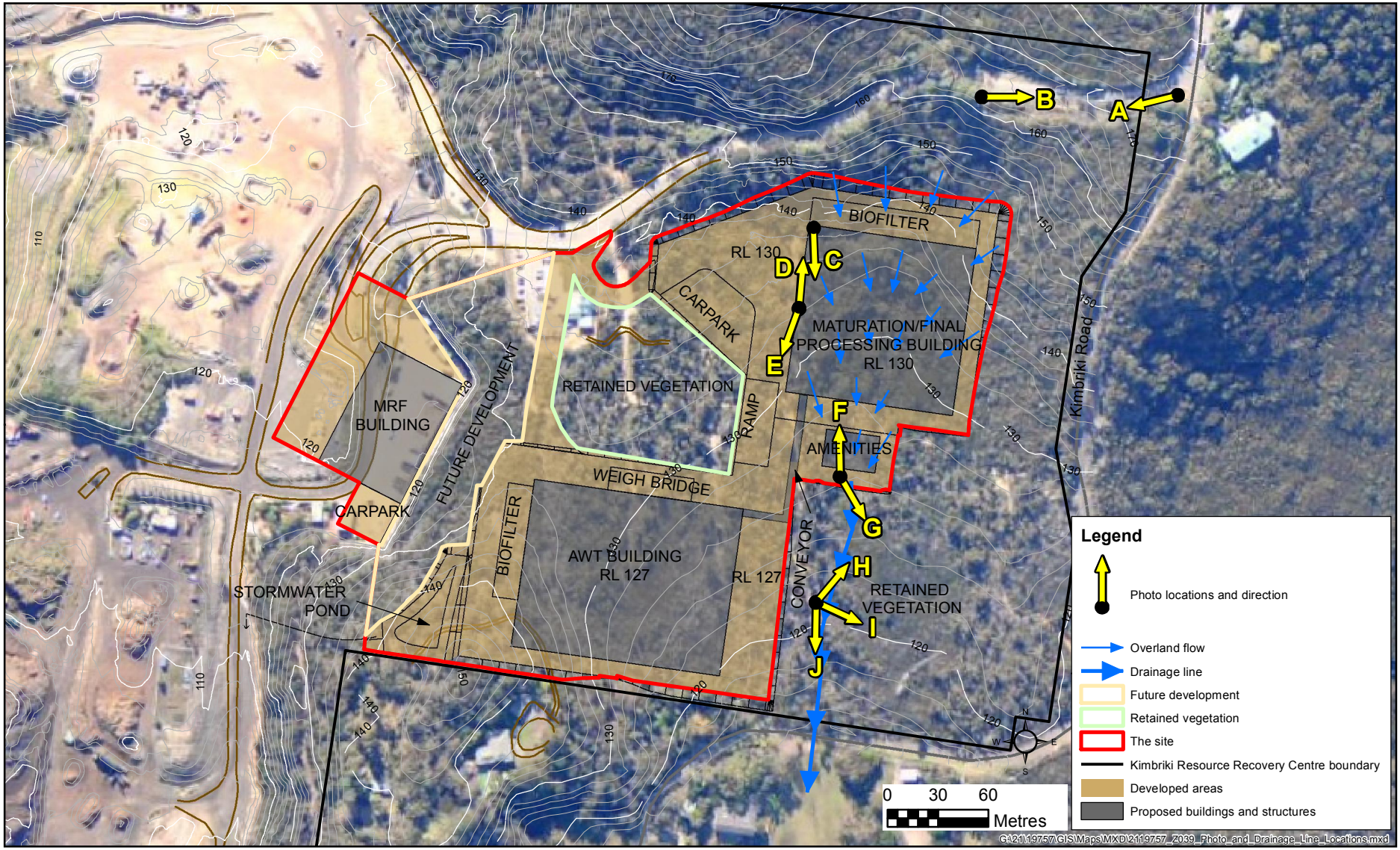



**Figure 12.2 Drainage line photo locations**

The site inspection indicated that water drains in a southerly direction across the site via overland flow and that a defined drainage line commences downgradient of the site.

According to the *Water Management Act 2000*, a river includes:

> *(a) any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved, and*
>
> *(b) any tributary, branch or other watercourse into or from which a watercourse referred to in paragraph (a) flows, and (c) anything declared by the regulations to be a river,*
>
> *but does not include anything declared by the regulations not to be a river.*

The first indication of a 'defined channel' or the 'head waters' of a drainage line is the presence of *Gahnia spp* (see Photo 12.7) establishing in a minor depression in the proposed retained vegetation area to the south east of the site. From this point on the depressions become more distinct before crossing the Kimbriki Resource Recovery Centre boundary. The drainage line could be considered a 'first order stream' under the *Water Management Act 2000* down gradient of the Kimbriki Resource Recovery Centre boundary.

As the drainage line within the site comprises overland flow and is not a 'defined channel', it is concluded that no river as defined under the *Water Management Act 2000* occurs on the site.

The construction of the proposed maturation/final processing building and amenities building over the existing drainage flow path that feeds the swampy area and down stream channel would alter the natural flow path. In order to address this, the project has been designed to divert up-gradient overland flow runoff past the buildings/platform and direct it towards the downstream channel. In addition, overflow from roof rainwater tanks would also be directed to this area to ensure that natural flows down-gradient of the site are replicated as closely as possible.

It is noted that one small swampy area considered to be consistent with the definition of a groundwater dependent ecosystem exists in the drainage line to the south of the proposed amenities building (downstream and outside the foot print of the project). An assessment of the potential impacts of the project on this groundwater dependent ecosystem is provided in section 8.3.2.

## 12.3 Proposed water management system

### 12.3.1 Stormwater collection during operations

Rain falling directly onto roads and operational areas would be collected in a first flush stormwater pond located in the southwest corner of the site, and pond overflows would drain to the existing eastern drain, which would transfer this water to the existing eastern sedimentation pond for treatment.

Stormwater collection drains along the edges of the platform would prevent rain water that falls onto paved operational areas from entering the retained vegetation areas. Figure 6.6 illustrates a concept design for the stormwater drainage system for the site. Up gradient runoff that currently enters the site would be diverted past the new operational areas, and this would continue to provide water necessary to maintain existing ecological systems downgradient (to the south) of the site.

### 12.3.2 Water usage on site

Rainwater that falls onto the buildings within the site would be collected in rainwater tanks and used for process applications such as floor washing. This would minimise the requirements for potable mains water.

Material recovery operations in the MRF, and possibly within the AWT building (subject to the technology requirements), would also potentially require water for dust suppression. This would be dispensed by a misting system. The water would be provided from rainwater tanks after being treated to ensure that it meets health standards.

Roof water would also be used to top up fire fighting water storage tanks above the minimum level required by regulations. The existing potable water connection would provide the minimum requirements.

Staff amenities such as drinking water would be supplied by potable mains water. Collected rainwater would be used for amenities. A maximum of 4 kL/day of potable water would be needed to supply the new amenities facilities servicing the two RRF buildings, based on an estimated 29 workers in the RRF buildings over a single shift. The MRF building (located at the lower level) would have its own amenities. These amenities would service 30 workers, which would have a similar level of water demand.

Overflow from the roof water tanks would be directed to the retained vegetation area to the south-east of the site. To ensure that this area does not receive more water than currently, some roof water would be directed to the existing Kimbriki Resource Recovery Centre stormwater system, via the eastern drain.

It is expected that approximately 3.2 kL/day of domestic wastewater would be produced by the new site amenities. A new onsite aerated wastewater treatment system which incorporates a disinfection treatment stage and effluent storage would be installed to treat wastewater from the new staff amenities facilities to a level sufficient to meet legislative requirements, to allow its reuse for irrigation.

The proposed water management system is illustrated Figure 12.3. The water balance for the operation of the project is provided in the following section.

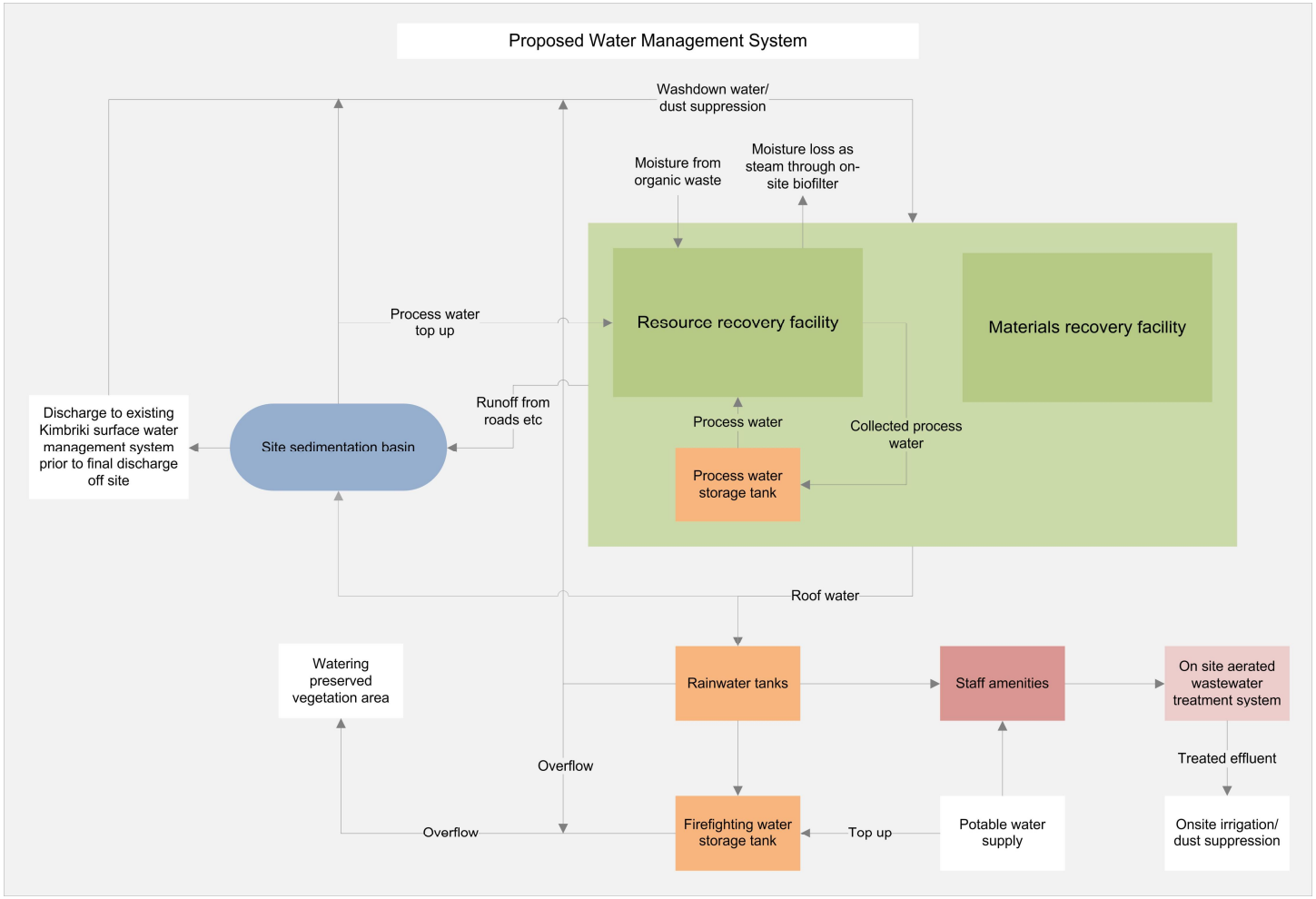



**Figure 12.3 Proposed water management system**

## 12.4 Process water balance

The tunnel composting process would require approximately 35,175 kL of water per year for the tunnel spray system, depending on climatic and input material characteristics. Most of this water would be captured and recycled back into the process (an estimated 34,950 kL per year). Approximately 2,400 kL of water would be lost as steam through the biofilter each year.

To maintain the appropriate moisture levels in the composting process, it is expected that approximately 225 kL per year of make-up water would be required, which would be sourced from the site sedimentation basin/first flush pond.

Table 12.3 outlines the estimated water balance for the tunnel compost process.

**Table 12.3 Estimated tunnel compost process water balance**

| Aspect | Volume (kL/yr) |
|---|---|
| ***Inputs:*** | |
| Moisture in organics | 42,675 |
| Recirculated process water | 34,950 |
| Make up water from stormwater dams | 225 |
| *TOTAL INPUTS* | *77,850* |
| ***Outputs:*** | |
| Moisture lost as steam through biofilter | 2,400 |
| Process water collected (recycled back as tunnel spray water) | 34,950 |
| Moisture in finished compost | 40,500 |
| *TOTAL OUTPUTS* | *77,850* |

Source: M Winser personal correspondence

## 12.5 Construction phase water management

Stormwater from the construction areas would be collected by overland flow and a series of collection drains. The collected sediment and water would be directed into appropriately sized sediment basins to allow for sediment to settle and prevented from entering the retained vegetation areas. Controlled basin release points would be provided to allow water to be released to the Kimbriki Road stormwater system following sufficient settling time.

In order to minimize the volume of water required to be captured within the sediment basins, a series of diversion bunds and drains would be constructed upgradient of the development area. These bunds and drains would divert clean water away from the construction area, preventing as much water as possible from becoming sediment laden.

To minimise the impact of construction works, sediment controls such as cut-off drains, silt fences, hay bales and other erosion controls would be located downgradient of the construction

areas to direct sediment laden water into the sediment basins. Two basin locations were identified:

- An upper basin at the location of the amenities building – the final proposed levels in this area are close to existing ground levels and so would not impact on the primary cutting and filling operations. This basin would be able to collect all surface water generated in areas uphill of RL127, including the road development areas.
- A lower basin at the south east corner of the AWT building platform – this is the lowest point of the construction area and would collect water from the remaining construction areas.

These basins are illustrated in Figure 12.5.

## 12.6 Impact assessment

### 12.6.1 Stormwater/erosion – construction impacts

A model was compiled based on the requirements of the Blue Book (Department of Housing 2004, *Managing Stormwater: Urban Soils and Construction*) to determine the requirements for sediment and water management during the construction of the development. A design rainfall 85$^{th}$ percentile 5 day wet event was used. This is provides a level of protection required for sensitive downstream receptors as required by the Blue Book.

The construction area was divided into two sub-catchments based on the site topography and the location of these basins. The construction area was divided into two sub-catchments, as shown on Figure 12.5:

- Upper catchment area of approximate area 4.5 ha; and
- Lower catchment area of approximate area 1 ha.

Based on intensity frequency duration (IFD) curves generated for Mona Vale, the design rainfall event of 44 mm/h was used to determine the required capacity of the two sediment basins.

An IFD graph was constructed for the site based on a 5 day, 85$^{th}$ percentile storm event. Based on the requirements of the Blue Book (Department of Housing 2004), these basins were sized. Type D soils were assumed, which was a conservative approach.

In undertaking this modeling, the MRF building was not considered as this area lies within the existing site footprint. The existing Kimbriki Resource Recovery Centre infrastructure is assumed to already cater for this area.

**Table 12.4 Sediment basin required capacity**

| Basin | Total catchment area (ha) | Settling zone volume (m$^3$) | Sediment storage volume (m$^3$) | Total basin volume (m$^3$) |
|---|---|---|---|---|
| 1 | 4.5 | 1370 | 685 | 2050 |
| 2 | 0.98 | 300 | 150 | 450 |

Stormwater captured by the sediment basins would only be released to the stormwater system in Kimbriki Road after the storm passes, and sediments would be removed by the settling process in accordance with normal construction requirements.

Implementation of appropriate stormwater and erosion controls and mitigation measures, such as those shown on Figure 12.5, would ensure that the project does not have significant surface water or erosion impacts during its construction phase.

### 12.6.2 Hydrological impacts

A MUSIC model was compiled to simulate the overall stormwater mass balance and rainwater re-use at the site. MUSIC is a software package that simulates hydrology, stormwater quality and the behaviour of water-sensitive urban design measures, such as rainwater storage and re-use.

The objectives of the MUSIC modelling exercise were to:

- Gain an understanding of the stormwater balance at the site;
- Ensure that the project does not adversely impact on drainage, by either significantly increasing or decreasing the stormwater runoff to the retained vegetation immediately downstream of the site; and
- Model the performance of the proposed rainwater harvesting and re-use system for the site.

The site and catchment were divided into appropriate sub-catchments based on the topography and existing and future land use characteristics. Key parameters were determined to represent sub-catchment specific factors, such as rainfall losses, and impervious fraction and sub-catchment areas. These were configured in the model for both the pre-development and post-development site layouts.

Bureau of Meteorology rainfall data from the nearby Duffy's Forrest pluviograph (5 km west-northwest of the site) was used to simulate the site hydrology. The 6-minute rainfall intensity was simulated for approximately five years, the longest available period in the data record.

Rainwater harvesting and reuse was simulated for the MRF and RRF buildings, with rainwater yield determined for a number of storage tank sizes. The following estimated operational requirements for floor washing and other operational uses (such as toilet flushing) were assumed for modelling:

- AWT building – 2 kL/day;
- Maturation/final processing building – 4 kL/day; and
- MRF building – 4 kL/day.

These figures are conservative, and are unlikely to be exceeded.

The results of the hydrological modelling were used to inform the proposed stormwater management strategy for the site and ensure that no adverse impacts are generated in the downstream catchment.

MUSIC modelling showed that rainfall collection from building roof areas would be sufficient to provide water for amenities and washdown of hardstand areas. On this basis, rainwater tank

sizing relationships were determined for the RRF and MRF buildings based on the indicative demands outlined above.

It is noted that the large hardstand and roofed area of the developed site would increase the yearly average volume of runoff compared to existing conditions. It would therefore be necessary to divert stormwater from hardstand areas, and rainwater tank overflow from the RRF into the existing surface water treatment system, to ensure that the volume of runoff that flows to the retained vegetation areas to the south of the site would not be significantly different to conditions prior to constructing the facility.

The amount of runoff currently entering the north-western retained vegetation area has been estimated by modelling to be 1.2 ML/yr. This would not change as the catchment upgradient of this area would not be affected by the project. A culvert or large pipe would be provided under the RRF, to allow runoff from the north western retained vegetation area to follow its natural flow direction, and drain to the south-eastern retained vegetation area. This is illustrated on Figure 12.4.

The amount of runoff that currently enters the south-eastern retained vegetation area has been estimated by MUSIC modelling to be 15 ML/yr. With the conceptual operational stormwater management system and site layout illustrated in Figure 12.4, the annual overland water flow to the south eastern retained vegetation area would increase to 16.4 ML/yr, an increase of less than 10%.

Runoff volumes that enter both of the retained vegetation areas would therefore be maintained at approximately the same as current levels. Maintaining approximately the same hydrological regime as the existing situation would minimise the potential impacts on surface and groundwater dependent ecosystems in the retained vegetation areas within and beyond the site. This is discussed in chapter 8.

The additional volume of stormwater entering the eastern drain and the existing eastern sedimentation dam is expected to increase by approximately 30 ML/yr.

### 12.6.3 On site stormwater detention requirements

All new developments require onsite stormwater detention capacity. This reduces the hydraulic loading on council stormwater collection systems.

Warringah Council's *On-site Stormwater Detention Technical Specification* (September 2007) outlines requirements for the design of onsite stormwater detention facilities for new developments in this local government area. The specification states that the permissible site discharge (PSD) is to be determined such that the runoff from the total site after the development is not to exceed the runoff from the total site prior to the development, for all storm durations for the 5-year, 20-year and 100-year Average Return Interval (ARI) storm events.

A site catchment was defined based upon 2 m topographical contour mapping from the NSW Department of Lands, and from design plans of the proposed site layout. The existing site and proposed development were divided into sub-catchments based on topography and land-use, and appropriate sub-catchment properties were determined such as hydraulic roughness, slope and area.

A RAFTS hydrological model was then configured to represent these sub-catchments with regional rainfall intensity-frequency-duration parameters adopted in accordance with Australian Rainfall and Runoff (Engineers Australia 2001).

The existing conditions hydrological model was simulated for a range of events including all durations of the 5-year, 20-year and 100-year ARI design storms. This allowed determination of the existing site runoff rates and required detention storage requirements for these ARIs.

On-site detention storage requirements were calculated using the model that would meet the PSD for the 5-year, 20-year and 100-year ARI design storm events. The resulting PSDs for the project are as shown in Table 12.5.

**Table 12.5 Results of hydrological investigation**

| Average recurrence interval (years) | Permissible site discharge ($m^3/s$) | Required storage volume ($m^3$) |
|---|---|---|
| 5 | 0.77 | 1600 |
| 20 | 1.24 | 1850 |
| 100 | 1.91 | 1950 |

They indicate that to meet the Warringah Council requirements, the storage capacity of the existing stormwater management system at Kimbriki Resource Recovery Centre would need to be increased in capacity by almost 2 ML (for a 100 year ARI event). The proponent would upgrade the existing system by this amount plus 10% (for contingency) prior to the commencement of operations.

### 12.6.4 Water quality

Clause L3 of the Environmental Protection Licence for the existing facility (EPL13091) outlines concentration limits for surface water discharges from the Kimbriki Resource Recovery Centre. These concentration limits apply to any discharge occurring due to a rainfall event over and above the 5-year ARI 24-hour storm event. From the RAFTS modelling, the total volume of this stormwater event has been calculated to be approximately 10.5 ML.

As mentioned in chapter 4, water collected from roads and paved areas would be directed to a first flush stormwater pond located in the southwest corner of the site. The pond would be used to capture any pollutants and litter that may be washed into the site stormwater drains and to provide detention capacity during storms and rain events. The pond would overflow to the existing Kimbriki Resource Recovery Centre stormwater system.

Sealing of all operational areas and perimeter drains would minimise the amount of sediments collected in this surface water. Stormwater collection drains along the edges of the platform would collect rainwater that falls upon paved areas, and water from the AWT building roof (subject to final design). Thus any water overflowing from the pond would be relatively free of pollutants such as sediments, as it would only be from paved areas or from the roofs of buildings.

The capacity of the Kimbriki Resource Recovery Centre stormwater treatment system would be upgraded by the proponent to cope with the increased flows associated with the project, which have been estimated through MUSIC modelling to be approximately 33 ML/yr. This would ensure that existing surface water quality would not be adversely impacted by the project.

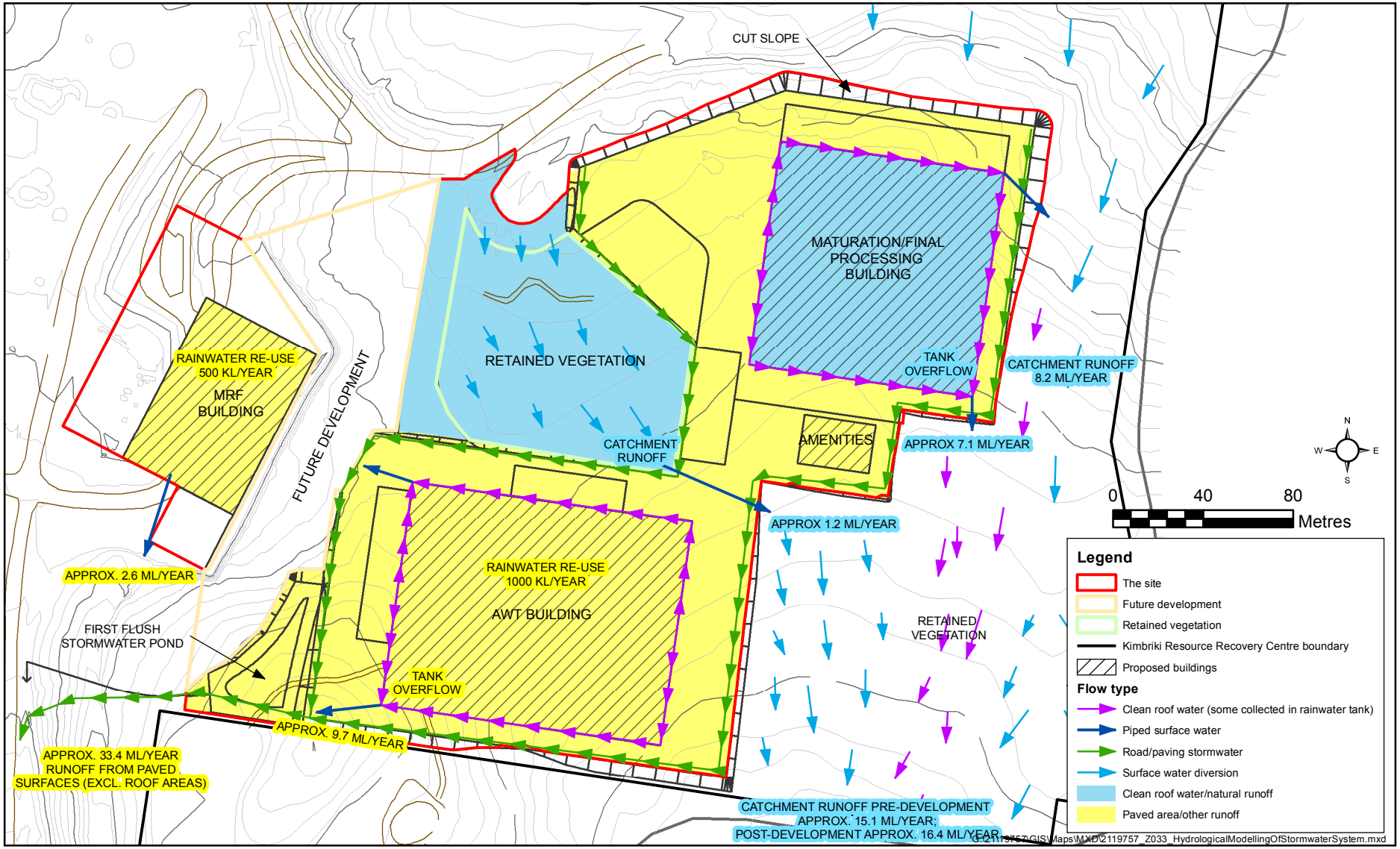



**Figure 12.4 Hydrological modelling of stormwater system**

### 12.6.5 Groundwater impacts

There are no existing groundwater extraction bores at the Kimbriki Resource Recovery Centre. No groundwater extraction would be required for the project.

All activities would take place on a sealed concrete slabs, so there is no potential for contaminated water to enter the water table.

Approximately 50% of the current site groundwater recharge area would be sealed (refer Figure 12.4) and this would potentially reduce future groundwater recharge levels. However, the shallow depth of soil over most of the site and the site geology (sandy shallow soil overlying sandstone) suggests that there is currently little absorption of groundwater into the water table, especially in the upper parts of the site. Sealing of these areas is therefore unlikely to affect groundwater recharge levels.

The retained vegetation areas (which represent approximately 50% of the area to be developed on the eastern side of the site would continue to be potential groundwater recharge areas. Roof water that is directed to these retained vegetation areas, and direct run on (in the north-western and south-eastern areas) would potentially still enter the water table through cracks in the sandstone. Therefore, it is concluded that the impacts on groundwater would not be significant.

### 12.6.6 Flooding

As the site is much higher than the existing eastern drain, and water from upgradient catchments would be diverted around the site, flooding is unlikely.

### 12.6.7 Soils

Large quantities of soil and rock would be removed from the site, and filling of some areas of the south eastern corner would be necessary. This would reshape the existing site topography. Apart from the soils within the development area being impacted by excavation and refilling, there would be no impacts on other soils in the local area.

### 12.6.8 Salinity

The site is not located in an area of salinity hazard. Process water from the tunnel composting would be recirculated back into the process and would not be irrigated. As such the project is not expected to have any impacts on local salinity.

### 12.6.9 Contamination

The RRF buildings would be constructed on areas of the site that are currently vacant land, and have no history of contamination. The MRF building would be constructed in an existing operational area, currently the site of the recycling consolidation building, and household recycling area.

This hardstand area has been used for the drop-off and dispatch of recyclables since its initial excavation in the early 1990s. It has not been used for any other activity and is therefore unlikely to be contaminated. The roads and external paved areas associated with the MRF may extend over previously landfilled areas. However, piling of any concrete slabs would ensure that

the amount of landfilled waste disturbed is minimised. Any waste excavated would be relocated to the existing landfill.

Operation of the project would not result in contamination of the site. Any chemicals used on site (such as disinfectants) would be used in very small quantities within buildings. There is no possibility that soils beneath the site would become contaminated, as all buildings would be on concrete slabs and not in contact with the underlying soils. As all stormwater from the site that falls on roads and paved areas would be collected, and directed to the eastern drain, soils down gradient of the site would be protected from potential contamination.

### 12.6.10 Acid sulphate soil

According to the Australian Soil Resource Information System National Acid Sulphate Soils maps, the site is located in an area with extremely low probability of acid sulphate soils. The project is therefore unlikely to have any acid sulphate soils impacts.

## 12.7 Mitigation measures

### 12.7.1 Construction

The proponent would implement all practicable measures to minimise soil erosion and discharge of sediments from the site.

A site sediment and erosion control plan would be prepared, in accordance with requirements of the Blue Book (Department of Housing 2004). This includes erosion and sediment controls to prevent sediments from being carried into stormwater systems, including cut-off drains, silt fences and other erosion controls. These controls would be implemented before any construction commences.

The erosion and sediment control plan prepared as part of the construction environmental management plan would ensure that:

- Sediment and erosion control measures, such as sediment fences, are installed and maintained;
- Stockpiles are stabilised and remain covered and appropriate sediment and erosion control measures are installed downgradient of all stockpiles; and
- Spill kits are made available to construction vehicles.

The construction environmental management plan would also set out procedures for the management of accidental spills to minimise potential contamination during construction.

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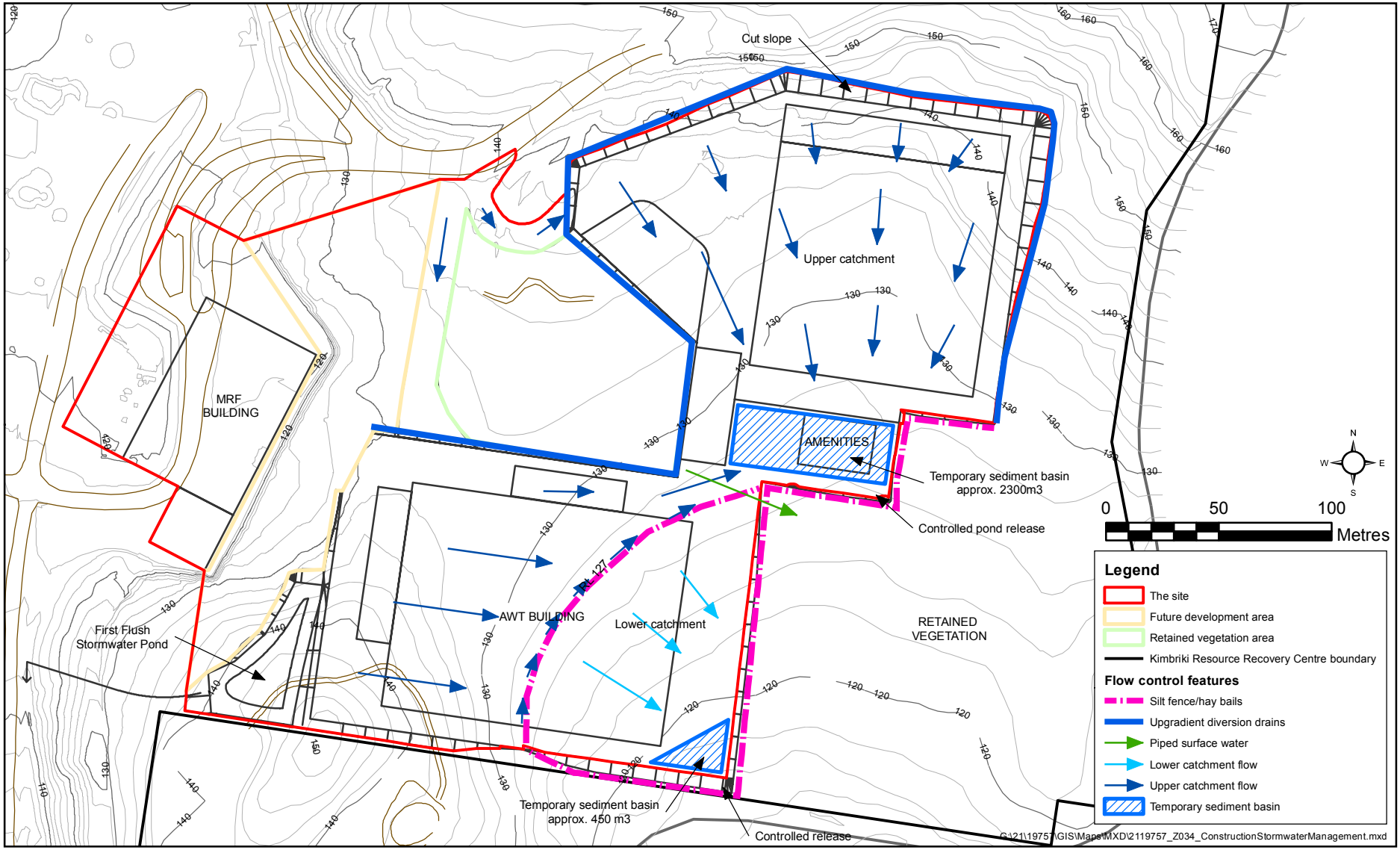



**Figure 12.5 Construction stormwater management system**

### 12.7.2 Operation

The design of the stormwater management system as outlined would minimise the potential for impacts on surface water, nearby creeks and on groundwater. An operational environmental management plan would be prepared for the project that incorporates all these measures.

# 13 Greenhouse gas

*This information presented in this section is based on the findings of the greenhouse gas assessment undertaken by GHD. The full report is included in Appendix K of this environmental assessment.*

## 13.1 Methodology

The greenhouse gas assessment was conducted in accordance with the general principles of:

- The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard developed by the World Business Council for Sustainable Development, March 2004;
- The Commonwealth Department of Climate Change and Energy Efficiency (DCCEE) National Greenhouse Accounts (NGA) Factors, July 2010; and
- The DCCEE (2010c) National Greenhouse and Energy Reporting System Guidelines.

The scope and methodology for conducting the assessment was based on the Director-General's requirements for the project. These included a requirement for assessment of scope 1, 2 and 3 emissions. As a result, the emissions sources considered included:

- Emissions from fuel use associated with preparation and construction at the site;
- Diesel usage for delivery of construction materials to the site;
- Electricity for construction site sheds;
- Key construction materials;
- Diesel usage by mobile equipment during operation of the MRF and RRF;
- Electricity for operation of the MRF and RRF;
- Diesel usage for waste collection and transport and export of product and recyclables to market;
- Fuel use (petrol) for light vehicles (employee trips and self-haul drop off of waste);
- Diesel usage for landfill operations and for transfer of residuals from both the MRF and RRF to the Kimbriki Resource Recovery Centre landfill adjacent to the site;
- Emissions from the composting process in the RRF; and
- Landfill gas emissions from landfilling of residuals from the RRF (stabilised waste).

### 13.1.1 Emission scopes

Emissions are separated into Scopes 1, 2 and 3, in accordance with the Greenhouse Gas Protocol for the project. Scope 1, 2 and 3 emissions have been considered in the assessment, in accordance with the Director General's Requirements for the project. These scopes are defined as follows:

- Scope 1: Direct greenhouse gas emissions from sources falling within the operational boundary of the assessment, from sources that are owned and/or operated by the

organisation in question. Scope 1 emissions include direct carbon dioxide emissions from the combustion of stationary or transportation fuels (natural gas, coal, petrol and diesel) in boilers, furnaces, vehicles etc, and fugitive emissions of greenhouse gases from chemical processes, such as wastewater treatment and some product manufacturing. In relation to this project, Scope 1 emissions include emissions from fuel use associated with preparation and construction at the site, mobile equipment during operation of the MRF, RRF and transfer and landfilling of residuals, emissions from landfill and emissions from the compost process.

- Scope 2: Indirect greenhouse gas emissions associated with purchased electricity, heat or steam. These emissions physically occur at the facility where the electricity, heat or steam is generated. In relation to the project, Scope 2 emissions include electricity for site sheds during construction and electricity for operation of the MRF and RRF.
- Scope 3: All other indirect greenhouse gas emissions associated with the activities considered in the assessment. These emissions occur from sources not owned or controlled by the company. In relation to this project, Scope 3 emissions include those associated with production of raw materials, transport and contractor owned vehicles, waste disposal, product usage and the extraction and processing of fuels.

## 13.2 Existing environment

### 13.2.1 National and state greenhouse gas emissions

The latest overview of greenhouse gas emissions estimates for Australia was published by the DCCEE in May 2010 (DCCEE 2010b). The annual estimates for the four quarters to June quarter 2009 are summarised in Table 13.1. This summary does not include emissions associated with land use, land use change and forestry.

**Table 13.1 2008 Australian greenhouse gas emissions estimate**

| Category | Emissions (Mt $CO_2$-e) | Percentage of total (%) |
|---|---|---|
| Energy – Electricity | 202 | 38 |
| Energy – Stationary energy excluding electricity | 89 | 17 |
| Energy – Transport | 79 | 15 |
| Energy – Fugitive emissions | 41 | 8 |
| Industrial processes | 27 | 5 |
| Waste | 15 | 3 |
| Agriculture | 84 | 16 |
| **Inventory Total** | **537** | **100** |

Source: DCCEE (2010b)

The latest summary of NSW greenhouse gas emissions was produced in 2010 for the 2008 inventory year. This summary is shown in Table 13.2 below.

**Table 13.2 2008 Annual NSW greenhouse gas emissions estimate**

| Category | Emissions (Mt $CO_2$-e) | Percentage of total (%) |
|---|---|---|
| Energy | 123 | 75 |
| Industrial processes | 12 | 7 |
| Waste | 5 | 3 |
| Agriculture | 17 | 10 |
| Land use, land use change and forestry | 8 | 5 |
| **Inventory total** | **165** | **100** |

Source: DCCEE (2010a)

### 13.2.2 Kimbriki Resource Recovery Centre current emissions

The following table shows estimated annual emissions from current operations at the Kimbriki Resource Recovery Centre (diesel in mobile equipment, electricity consumption and landfill emissions only). This does not include any transport emissions associated with waste deliveries or offsite transfer of recyclables.

**Table 13.3 Current annual emissions from the Kimbriki Resource Recovery Centre**

| Emissions source | Quantity consumed | Scope 1 emissions (t $CO_2$-e/yr) | Scope 2 emissions (t $CO_2$-e/yr) | Scope 3 emissions (t $CO_2$-e/yr) | Total emissions (t $CO_2$-e/yr) |
|---|---|---|---|---|---|
| Diesel in mobile equipment | 110 kL | 296 | 0 | 23 | 318 |
| Emissions from landfill | | 56,178 | 0 | 0 | 56,178 |
| Electricity consumption | 175 MWh | 0 | 158 | 30 | 188 |
| **Totals** | | **56,474** | **158** | **53** | **56,684** |

Note: Emissions from landfill in the table above were estimated by Golder Associates (2009) using National Greenhouse and Energy Reporting (NGER) Method 1.

## 13.3 Modelling and results

The estimated Scope 1, 2 and 3 emissions associated with the construction of the project are listed in Table 13.4. Details of assumptions for modelling are provided in Appendix K.

### Table 13.4 Construction Scope 1, 2 and 3 emissions

| Emissions source | Quantity consumed | Scope 1 emissions (t $CO_2$-e) | Scope 2 emissions (t $CO_2$-e) | Scope 3 emissions (t $CO_2$-e) |
|---|---|---|---|---|
| Diesel use in construction equipment | 1400 kL | 3,780 | 0 | 290 |
| Electricity for site sheds | 110 MWh | 0 | 100 | 20 |
| Construction materials | 40,000 t | 0 | 0 | 12,510 |
| Construction deliveries and transport | 340 kL | 0 | 0 | 990 |
| **Subtotal*** | | **3,780** | **100** | **13,810** |
| **Total construction Scope 1, 2 and 3 emissions (t CO2-e)** | | | **17,690** | |

*Note: Figures in table may not sum exactly to total value due to rounding.

The annual Scope 1, 2 and 3 emissions associated with operation of the project are listed in Table 13.5.

### Table 13.5 Annual operational Scope 1, 2 and 3 emissions

| Emissions source | Quantity consumed annually | Scope 1 emissions (t CO2-e/yr) | Scope 2 emissions (t CO2-e/yr) | Scope 3 emissions (t $CO_2$-e/yr) |
|---|---|---|---|---|
| Diesel in mobile equipment | 90 kL | 240 | 0 | 20 |
| Residual waste transfer, placement and compaction | 190 kL | 510 | 0 | 40 |
| Emissions from landfill | 37,895 t | 13,350 | 0 | 0 |
| Electricity consumption | 2.5 GWh | 0 | 2,270 | 430 |
| Heavy vehicle transport emissions (diesel) | 520 kL | 0 | 0 | 1,510 |
| Light vehicle (petrol) emissions | 100 kL | 0 | 0 | 260 |
| Compost emissions | 100,000 t | 20 | 0 | 0 |
| **Subtotal*** | | **15,120** | **2,270** | **2,260** |
| **Total operation Scope 1, 2 and 3 emissions (t $CO_2$-e/yr)** | | | **19,650** | |

*Note: Figures in table may not sum exactly to total value due to rounding.

The results from the greenhouse assessment are summarised Table 13.6.

The total Scope 1, 2 and 3 emissions during construction amount to 17,690 t $CO_2$-e or 590 t $CO_2$-e per annum assuming a design life of 30 years. Total annual emissions during operation amounts to 19,650 t $CO_2$-e. The estimated annual emissions from the project is 20,240 t $CO_2$-e (assuming a design life of 30 years).

**Table 13.6 Greenhouse assessment summary**

| Greenhouse indicator | Note | Value | Units |
|---|---|---|---|
| Net annual emissions | 1 | | |
| ◗ Scope 1 | | 15,246 | t $CO_2$-e/yr |
| ◗ Scope 2 | | 2,273 | t $CO_2$-e/yr |
| ◗ Scope 3 | | 2,720 | t $CO_2$-e/yr |
| **Total** | | **20,240** | **t $CO_2$-e/yr** |
| Greenhouse intensity of the project (Scopes 1, 2 and 3) | 2 | 0.13 | t $CO_2$-e/t waste |
| Total annual NSW emissions | 3 | 165 | Mt $CO_2$-e/yr |

Notes:
1. Refer to section 13.1.1 for definitions of reporting scopes. A detailed emissions inventory can be found in the greenhouse gas assessment report (Appendix K)
2. Greenhouse intensity based on annual Scope 1, 2 and 3 emissions (excluding annualised decommissioning emissions).
3. Total annual NSW emissions based on DCCEE (2010a)

### 13.3.1 Greenhouse intensity

The emissions intensity for construction and operation of the project is 0.13 t $CO_2$-e/t waste processed, including the Scope 1, 2 and 3 emissions considered in the assessment.

### 13.3.2 Potential Impacts

Considering Scope 1, 2 and 3 emissions, the project is expected to generate 20,240 t $CO_2$-e/y of greenhouse gas emissions. The total annual NSW emissions for 2008 were 165 Mt $CO_2$-e (DCCEE 2010a). Hence, the estimated annual Scope 1, 2 and 3 emissions from the project would equate to approximately 0.01 % of the state's total emissions.

Implementation of the project would result in diversion of a significant quantity of waste, including organic waste (from source separation of some food and garden organics), from landfill. This waste would otherwise have contributed to landfill gas generation.

Furthermore, the mixed residual waste from the SHOROC region would undergo stabilisation through the tunnel composting process, significantly reducing the methane generating potential of the waste once it is landfilled. Greenhouse gas savings in terms of avoided transport emissions (to remote landfills), as well as savings due to the recovery of recyclable materials such as steel, plastics and glass would also be delivered by the project.

An assessment was undertaken to compare landfill gas emissions from three alternative scenarios against the emissions predicted to be generated by the project (scenario 4). In each of the alternative scenarios (1, 2, and 3), the mixed waste from SHOROC council collections would be landfilled without resource recovery or stabilisation of the organic component. A description of the scenarios (including the project) is provided below:

- Scenario 1 – there is no source separation of food waste via a separate food and garden organics collection. All the mixed waste (58,440 tonnes per year) is landfilled without any processing or stabilisation. The landfill has no gas capture system, or the system is ineffective.

- Scenario 2 – there is no source separation of food waste via a separate food and garden organics collection. All the mixed waste (58,440 tonnes per year) is landfilled without processing or stabilisation. The landfill has a gas collection (and flaring) system which is achieving a 75% capture rate, which is the maximum recovery level considered likely to be achieved by most landfills.
- Scenario 3 – there is source separation of food waste into a separate food and garden organics collection and the amount of waste being disposed to landfill reduces to 37,895 tonnes per year. However the waste does not undergo any processing prior to landfilling. The landfill has no gas capture system, or the system is ineffective.
- Scenario 4 (the project) - there is source separation of food waste into a separate food and garden organics collection and the amount of waste being disposed to landfill reduces to 37,895 tonnes per year. The waste is processed first through an aerobic tunnel composting system which stabilises the waste, achieving a 60% reduction in methane generation potential.

Estimates were calculated using Method 1 of the NGER Measurement Technical Guidelines (2010), and the results are shown in Table 13.7.

**Table 13.7 Results of NGER model for methane emissions**

| Scenarios | 1. All incoming mixed waste straight to landfill | 2. All incoming mixed waste straight to landfill (with 75% capture) | 3. Residual – no stabilisation | 4. Residual – stabilised (the project) |
|---|---|---|---|---|
| tonnes to landfill per year | 58,440 | 58,440 | 37,895 | 37,895 |
| Maximum emission rate (2040) | | | | |
| tonnes $CH_4$ | 2,420 | 610 | 1,480 | 590 |
| $m^3$/hr | 160 | 110 | 250 | 100 |
| tonnes $CO_2$-e | 50,860 | 12,720 | 31,100 | 12,420 |
| Total emissions (100 yrs) | | | | |
| tonnes $CH_4$ | 81,100 | 20,270 | 51,260 | 20,500 |
| $m^3$/hr | 13,700 | 3,410 | 8,630 | 3,450 |
| tonnes $CO_2$-e | 1,702,800 | 425,690 | 1,076,500 | 430,580 |
| Average annual emissions rate (100 yrs / 30) | | | | |
| tonnes $CH_4$ | 2,700 | 680 | 1,710 | 680 |
| $m^3$/hr | 460 | 110 | 290 | 120 |
| tonnes $CO_2$-e | 56,800 | 14,190 | 35,900 | 14,350 |

Table 13.7 shows that the wastes landfilled over 30 years of operation of the project (stabilised residuals) would generate approximately 430,580 t $CO_2$-e over 100 years.

Averaged over the design life (30 years), the project would generate 14,350 t $CO_2$-e per year of landfill emissions. The modelling indicates that the greenhouse gas emissions associated with the project (from landfilled waste and processing equipment energy use) are comparable with Scenario 2 - landfilling of mixed waste with 75% gas capture.

However, this does not take into account the emissions associated with avoided transport emissions (to remote landfills), as well as greenhouse gas savings due to the recovery of recyclable materials such as steel, plastics and glass versus use of virgin materials.

All alternative scenarios would also require further transport of the mixed waste materials. It is estimated that for every 10 km (one-way, or 20 km return) distance the 58,440 tonnes per year of mixed waste would be required to be transported, an additional 168 t $CO_2$-e per year of greenhouse gas emissions would be generated. For a 100 km round trip to one of the existing Sydney landfills, 840 tonnes t $CO_2$-e per year of greenhouse gas emissions would be generated.

Golder Associates (2009) estimated that, under the NGER Method 1 assessment, the Kimbriki landfill emitted up to 56,178 t $CO_2$-e in 2009/10. GHD's modelling has indicated that landfilling of the stabilised residual waste from the MRF and RRF could increase cumulative landfill gas emissions to 70,600 t $CO_2$-e per year, based on this Method 1 assessment.

It should be noted that during the same study Golder also determined a much lower emissions figure of 2,320 t $CO_2$-e by direct measurement. The proponent has discussed the inconsistency between these two figures with DCCEE, and has advised GHD that DCCEE has conceded that the Method 1 estimate provides a conservative (high) figure, especially in the case of landfills that receive large amounts of inert wastes such as the Kimbriki Resource Recovery Centre, and that direct measurement is likely to give a more realistic (lower) result in such cases.

## 13.4 Mitigation measures

During operation, the project would consume approximately 2.5 GWh of electricity annually (by both the MRF and RRF). During detailed design of the facilities, it may be possible to integrate additional energy efficiency measures to reduce consumption of electricity. For example:

- Wide-panel skylights would be considered for installation on the roof of the buildings to maximise use of natural lighting;
- A variety of efficient lighting alternatives, including fluorescent lamp options would be considered;
- Where feasible and cost-effective, energy efficient lamp and lighting control technologies would be considered in amenities blocks;
- The amenities block would require air-conditioning / heating and components to be installed outside the building would be located in shady areas, or provided with artificial shading to improve efficiency with which heat is rejected from the building; and
- Passive cooling arrangements would be used for the MRF and RRF buildings in order reduce overall heat load rather than installation of an air conditioning system.

Where practicable, energy efficiency would be considered in the selection of equipment during the detailed design stage.

The most significant contribution of greenhouse gas emissions from the project would come from the degradation of waste in landfill (approximately 73% of the operational emissions).

Although the level of landfill gas generation is relatively low and not sufficient for commercially viable recovery and energy (electricity) generation, installation of a gas collection and recovery system with a gas collection efficiency of 75% at the Kimbriki Resource Recovery Centre would reduce the landfill gas emissions from the stabilised residual waste from an average of 14,350 t $CO_2$-e per year over the design life to approximately 3,600 t $CO_2$-e per year.

This would be substantially less than the emissions associated with modelled Scenario 2- landfilling of mixed waste with 75% gas capture (14,190 t $CO_2$-e per year).

It should be noted however that the volumes discussed above are based on a Method 1 assessment of emissions. This methodology has been questioned by both industry and DCCEE and is currently undergoing review. Prior to an emissions trading system or carbon tax being implemented by the Commonwealth Government, the current emissions estimation methodologies will need to be reviewed and approved.

If at this time the standardised direct measurement method (Method 4) for landfill gas estimation is not approved by DCCEE the proponent may consider some form of gas extraction system to manage potential liabilities.

Installation of a gas collection system at the landfill would not only mitigate greenhouse gas emissions impacts from this residual waste from the RRF process, but would also reduce the landfill gas emissions from wastes already landfilled at the Kimbriki Resource Recovery Centre. Gas recovery of 75% would reduce the landfill's potential cumulative gas emissions rate of 70,600 t $CO_2$-e to 53,000 t $CO_2$-e and hence reduce any potential financial liabilities under a CPRS scheme.

# 14 Heritage

## 14.1 Aboriginal heritage

*The information presented in this section is based on the findings of archaeological investigations conducted by Archaeological Surveys & Reports Pty Ltd. The full report is included in Appendix L of this environmental assessment.*

### 14.1.1 Assessment methodology

The heritage assessment was prepared in accordance with the requirements of the relevant statutory authorities and included:

- Consultation with the local Aboriginal community, in accordance with the draft *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005);
- Search of the DECCW Aboriginal Heritage Information Management System (AHIMS) database, to determine the location and nature of any Aboriginal heritage sites recorded within, or in the vicinity of the site;
- Review of relevant previous archaeological reports specific to the site, to determine the extent of past archaeological research in the region;
- Review of relevant contextual environmental information and previous land use history;
- Site survey, undertaken on 30 September 2009, to allow identification and assessment of any archaeological material; and
- Preparation of the heritage assessment report (refer Appendix L).

### 14.1.2 Existing environment

The site is located on the Hawkesbury Sandstone geological unit which contains very little stone that might be knapped into tools or weapons. As a result, any stone artefacts that might be present would have been sourced from a material found elsewhere.

However, surface exposures of Hawkesbury Sandstone frequently include outcropping 'platforms' that provided ideal surfaces for engraving; and where the exposures occur in the vicinity of water they frequently exhibit axe-grinding grooves. Numerous engraving sites have been recorded in the Kuring-gai Chase and Garigal National Parks, and both parks also contain many shelters in which there are both painted 'pictures' and occupation deposits. However, the site does not contain shelving sandstone surfaces, shelters or overhangs.

### 14.1.3 Impact assessment

Consultation undertaken as part of the Aboriginal heritage investigation and assessment is described in section 3.3.

#### AHIMS search

The AHIMS search found that 20 sites had been recorded in the 16 $km^2$ area surrounding the site. A copy of the results of the search is provided in Appendix L. While several of the listed

sites occur on the plateau surrounding the site, none occur within the site and immediate surrounds.

Of the 20 sites listed, 14 were rock engravings (two of which also contain axe-grinding grooves), and six were shelters containing 'art.

#### Previous investigations

Archaeological Services undertook an intensive investigation of the Kimbriki Resource Recovery Centre in 1993 as part of preparation of an Environmental Impact Statement for present and future operations. This investigation found no rock surfaces suitable for engraving, or shelters suitable either as shelter or containing surfaces suitable for rendering paintings, stencils or drawings. It also indicated that no Aboriginal sites had been found in the survey area.

Another unrelated investigation in 1992 by Gunn (cited in the Archaeological Services study) stated that 31 Aboriginal sites had been recorded in the Garigal National Park which is to south of the site. It also stated that 215 Aboriginal sites had been recorded in the Kuring-gai Chase National Park, adding that 'the area south of Kimbriki is currently one of the most carefully surveyed areas within the Garigal National Park'.

Another inspection was undertaken in March 2009 by the Aboriginal Heritage Office of a proposed drainage line along the 140 m contour at the Kimbriki Resource Recovery Centre. The investigation stated that 'overhangs below this were inspected and found to have little potential for art or archaeological deposit. A copy of this investigation is included in Appendix L.

#### Field survey

The field survey took place on 30th September 2009 in dry, sunny conditions, in light ideal for observing any artefactual material present and observable. No sites of Indigenous origin or places of potential archaeological interest (PADS – potential archaeological deposits) were identified during the site survey.

#### Assessment conclusion

The assessment concludes that the absence of Aboriginal sites is considered to be representative of the current situation and that there are no constraints to the project on archaeological grounds.

### 14.1.4 Mitigation measures

The following general mitigation measures are recommended.

- If any Aboriginal cultural objects are uncovered during construction, all works would cease and a suitably qualified archaeologist and Aboriginal community representatives would be contacted to determine the significance of the object(s) and appropriate management responses.
- If human remains were located during construction, all works would cease in the vicinity of the site and the NSW Police, the Aboriginal community and DECCW notified.

## 14.2 Cultural heritage

### 14.2.1 Existing environment

A search was undertaken for any items listed on national, state or local heritage registers and inventories. The following listed items were identified:

- The Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves, are located approximately to the north of the site on the northern side of Mona Vale Road. These are listed on the National Heritage List and the Register of the National Estate.
- Tumbledown Dick Road Cutting is located approximately 170 m to the north of the site on the northern side of Mona Vale Road. This item is listed on the Register of the National Estate

The assessment did not identify any items or places of historic heritage value within the site.

### 14.2.2 Impact assessment

It is considered unlikely that the project would impacts on the listed items as a result of the distance of the identified items from the site.

The movement of construction vehicles adjacent to the listed road cutting could have the potential to impact on the cutting. However, existing traffic movements along Mona Vale Road, in particularly heavy vehicles, are already high. As a result, the potential for impacts as a result of the movement of construction vehicles is considered to be unlikely.

### 14.2.3 Mitigation measures

As no impacts are anticipated, no mitigation measures are recommended.

# 15 Hazards and fire risks

*The information presented in this chapter is based on the findings of the hazard analysis undertaken by GHD. It also provides an assessment of potential bushfire risks based on the bushfire constraints analysis undertaken by GHD. The full reports are included in Appendix M and N of this environmental assessment.*

## 15.1 Hazard analysis

### 15.1.1 Methodology

The hazard analysis was prepared consistent with the requirements of SEPP 33 and the publications Hazardous Industry Planning Advisory Paper No. 6 'Guidelines for Hazard Analysis' (HIPAP 6) and HIPAP No. 4 'Risk Criteria for land Use Safety Planning'.

The analysis was prepared to show that any residual risk levels are acceptable in relation to the surrounding land use, and that potential risks would be appropriately managed. This has been done by:

- Identifying intrinsic hazards and abnormal operating conditions that could give rise to hazards;
- Identifying the range of safeguards;
- Assessing the risks by determining the probability (likelihood) and consequence (effects) of hazardous events for people, the surrounding land uses and environment; and
- Identifying approaches to reduce the risks by elimination, minimisation and/or incorporation of additional protective measures.

### 15.1.2 Preliminary risk screening

In accordance with the requirements of SEPP 33, a preliminary risk screening of the project was undertaken. The need for a preliminary hazard analysis (PHA) is determined by the results of the preliminary risk screening. The methodology for risk screening is outlined in the Department of Planning (1994) guideline *Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines*. The guidelines provide a risk screening procedure based on the quantity of dangerous goods to be used by a project and the distance these materials are stored from a site's boundary.

According to SEPP 33, if any of the screening thresholds are exceeded then the proposed development should be considered potentially hazardous and a PHA is required. Also, if the quantities are close to the screening threshold values and the development site is near a sensitive receiver then the proposed development is also considered to be potentially hazardous and a PHA is required.

The results of the preliminary risk screening indicated that a PHA is not required, as all materials, including transportation frequencies, do not exceed the respective thresholds, and the project is not considered potentially hazardous. However, to demonstrate that potential hazards

have been considered and control measures put in place, a hazard identification process was completed (refer section 15.1.3).

### 15.1.3 Hazard identification

Hazard identification represents a Level 1 or qualitative risk assessment and involves documenting all possible events that could lead to a hazardous incident. It is a systematic process listing potential causes and consequences (in qualitative terms). Reference is also made to proposed operational and organisational safeguards that would prevent such hazardous events from occurring, or should they occur, that would mitigate the impact on the plant, its equipment, people and the surrounding environment. This process enables the establishment, at least in principle, of the adequacy and relevancy of proposed safeguards.

The aim of the hazard identification study process is to highlight any residual risks associated with the interaction of the project with the surrounding environment. A range of possible hazard scenarios was developed but a consequence and likelihood assessment was not completed as none of the hazardous scenarios were considered credible for offsite impact. The results of this hazard identification process are provided in Table 15.1.

**Table 15.1 Hazard identification**

| Hazard Scenario | Causes | Consequences | Recommended Safeguards |
|---|---|---|---|
| Hazardous waste | Hazardous waste enters project and reacts with other materials | Generation of toxic fumes<br>Personnel exposure to toxic substances | Hazardous materials sorting and screening<br>Operational procedures for management of hazardous waste |
| Hazardous waste | Significant volumes of hazardous material enter the RRF | Generation of toxic fumes.<br>Personnel exposure to toxic substances | Hazardous materials sorting and screening<br>Operational procedures for management of hazardous waste |
| Ignition of incoming materials or finished product. | Stockpiling of incoming material for extended periods<br>Overall power failure or interruption for significant period of time leading to lack of aeration<br>Failure of aeration system for other reasons | Anaerobic decomposition takes place producing methane biogas<br>Potential for destruction of the project | Minimise storage time of incoming materials prior to processing<br>Gas monitoring<br>Fire extinguishers and suppression systems.<br>Install aeration system for maturation building to maintain ventilation and restrict temperature rise of finished product |
| Ignition of flammable materials | Ignition of flammable materials stored onsite e.g. waste paper, cardboard, plastics etc | Fire develops | Operation procedures for storage of materials<br>Designated storage areas<br>Fire detectors<br>Fire extinguishers and suppression systems |

| Hazard Scenario | Causes | Consequences | Recommended Safeguards |
|---|---|---|---|
| Ignition of toxic flammable materials | Ignition of flammable materials stored onsite e.g. waste paper, cardboard, plastics etc | Potential for the generation of toxic fumes | Operation procedures for storage of materials<br>Designated storage areas<br>Fire detectors<br>Fire extinguishers and suppression systems. |
| Operational / mechanical interactions | Failure of machine guarding / working in close proximity to rotating and moving equipment | Personal injury | Machine guarding<br>Operational / maintenance procedures<br>Operator competency |
| Vehicle interactions | Vehicle movements in vicinity of personnel | Personal injury | Traffic management plan including standard traffic rules, signage etc<br>Designated pedestrian areas<br>Driver competency<br>Operational procedures |
| Particulate generation | Aerobic digestion process generates odour and particulates | Personal health issues | Operational procedures<br>Air filtered through biofilter prior to release |
| Confined space incident | Access to tunnels | Possible asphyxiation due to atmospheric conditions within confined space | Operational procedures, including confined space entry permit<br>Operator competency in confined space entry<br>Breathing apparatus<br>Aeration of tunnel prior to entry<br>Gas monitoring |
| Fall from height | Person working at height falls | Personal injury | Operator competency for working at heights<br>Work at heights procedures and work permit<br>Suitable work at heights equipment e.g. fall protection |
| Electrical incident | Exposure to damaged electrical equipment | Electrocution | Design and maintenance of all electrical systems as per legislative requirements<br>Physical protection (cabinets, bollards etc.) around high risk electrical installations |

The hazard identification process did not identify any significant hazards with the potential for offsite impact that would not be suitably controlled.

### 15.1.4 Mitigation measures

Adequate safeguards are required to ensure the risk scenarios that were identified are contained or at least controlled to an acceptable level. All safeguards identified in the hazard identification (Table 15.1) process would be implemented through the development and implementation of a comprehensive safety management system for the operation of the facility.

## 15.2 Bushfire risks

### 15.2.1 Methodology

The bushfire constraints and risk assessment included a desktop assessment, field investigation, analysis and consultation with the NSW Rural Fire service (RFS).

#### Desktop assessment

The desktop assessment included collation and analysis of:

- Bushfire prone land mapping, sourced from Warringah Council;
- Aerial photography sourced from NSW Land and Property Management Authority; and
- Vegetation, physical relief, tenure, roads and other descriptive feature mapping.

#### Field Investigation

A field inspection to assess slope, access and vegetation types was conducted on 19 August 2010 to determine likely constraints. Assessments were conducted within the site and along the boundaries of the site (of which all except the western sections adjoin natural bushland). Vegetation features (type, predominant canopy height, percentage cover and understorey) and slope were noted. The site was also informally traversed as part of the analysis.

#### Analysis

The project is classified an industrial development (Building Code of Australia – Building Class 8) and the objectives, intent, performance criteria and solutions for bush fire protection measures detailed in *Planning for Bushfire Protection* (PBP) (NSW RFS 2006) were applied.

#### Consultation

GHD contacted the NSW RFS (Warringah Pittwater) on 19 August 2010 to confirm whether the site had a specific zoning under the local *Bush Fire Risk Management Plan* (Warringah Pittwater Bush Fire Management Committee, 2010). In addition, general bushfire mitigation options and recommendations were discussed.

### 15.2.2 Existing environment

#### Bushfire prone land

The site is zoned bushfire prone (Vegetation Category One) according to a Bushfire Prone Land map certified by the Commissioner of the NSW RFS for the Warringah local government area. Vegetation within and adjoining the site constitutes a potential bushfire threat, with adjoining lands also classified as bushfire prone or bushfire buffer.

The site does not have a specific zoning under the Bush Fire Risk Management Plan, however land immediately to the north of Kimbriki Resource Recovery Centre is designated as a Strategic Fire Advantage Zone.

#### Vegetation

Vegetation on or within 100 m of the site was determined to be a mix of Dry Sclerophyll Forest – Shrubby subformation and Heathlands (NSW RFS 2010), described as:

- Dry Sclerophyll Forest – Shrubby subformation:
  - Dominated by eucalypts 10-30 m with crowns that touch or overlap;
  - Canopy foliage cover in many areas is 20-50%; and
  - Understorey dominated by shrubs, including banksias.
- Heathlands:
  - Scattered overstorey trees to 2 m; and
  - Understorey predominantly coastal heath, including mallee eucalypts.

The site contains vegetation classified as Vegetation Category 1 according to the bushfire prone land map.

#### Effective slope

Construction of the proposed project would require excavation and filling to create level terrain (to approximately 125 m above sea level (ASL)). The site extends across sloping ground into steeper terrain (a rise from approximately 115 m ASL to 155 m ASL). The northeastern and southwestern portions of the site would be excavated (up to 20 m). The southeastern side would be filled or level with the surrounds.

Effective slope influences fire behaviour for the site, and is used to guide development of asset protection zones.

#### Fire weather

Warringah Council area is within the Greater Sydney Region, and has a fire danger index rating of 100 (NSW RFS 2006).

### 15.2.3 Proposed bushfire protection measures

The project would not change the bushfire hazard, and would increase the provision of services and access within the eastern portion of Kimbriki Resource Recovery Centre.

Development of land classified as bushfire prone land is subject to a number of bushfire related planning controls under the EP&A Act and the *NSW Rural Fires Act 1997*. The specific planning controls are detailed in Planning for Bushfire Protection (NSW RFS 2006) and *Addendum: Appendix 3* of Planning for Bushfire Protection (NSW RFS 2010).

Planning for Bushfire Protection outlines the bush fire planning matters that need to be considered at various stages of the planning and development approval process. It applies to development on land that is classified as 'bush fire prone' on a bush fire prone land map.

The following bushfire protection measures have been developed from the bushfire assessment to assist in minimising potential impacts from bushfire.

### Asset protection zones

An asset protection zone is an area of land, adjacent to a building, in which the bush fire fuel load is managed and maintained to minimise the impact of fire on that asset. The asset protection zone acts as a buffer between an asset and the bush fire hazard.

The recommended asset protection zones (APZs) are detailed in Table 15.1 and are shown on Figure 15.1.

**Table 15.2 Asset protection zone setbacks**

| Boundary | Vegetation class | Effective slope class | APZ for a residence | APZ width for site (actual distance to building) |
|---|---|---|---|---|
| Northern | Scrub | Upslope | 15 m | 10 m (11.4 m to maturation/final processing building) |
| Eastern | Scrub | >0-5º | 15 m | 10 m (10.4 to maturation/final building / 10 m to amenities building / 28.3 to AWT building) |
| South-eastern | Forest | >0-5º | 25 m | 10 m (10 to maturation/final processing building/10 to amenities building) |
| Southern | Forest | >5-10º | 35 m | 10 m (10 to AWT building) |
| Western | Scrub | Upslope | 15 m | 10 m (24.3 to maturation building) |

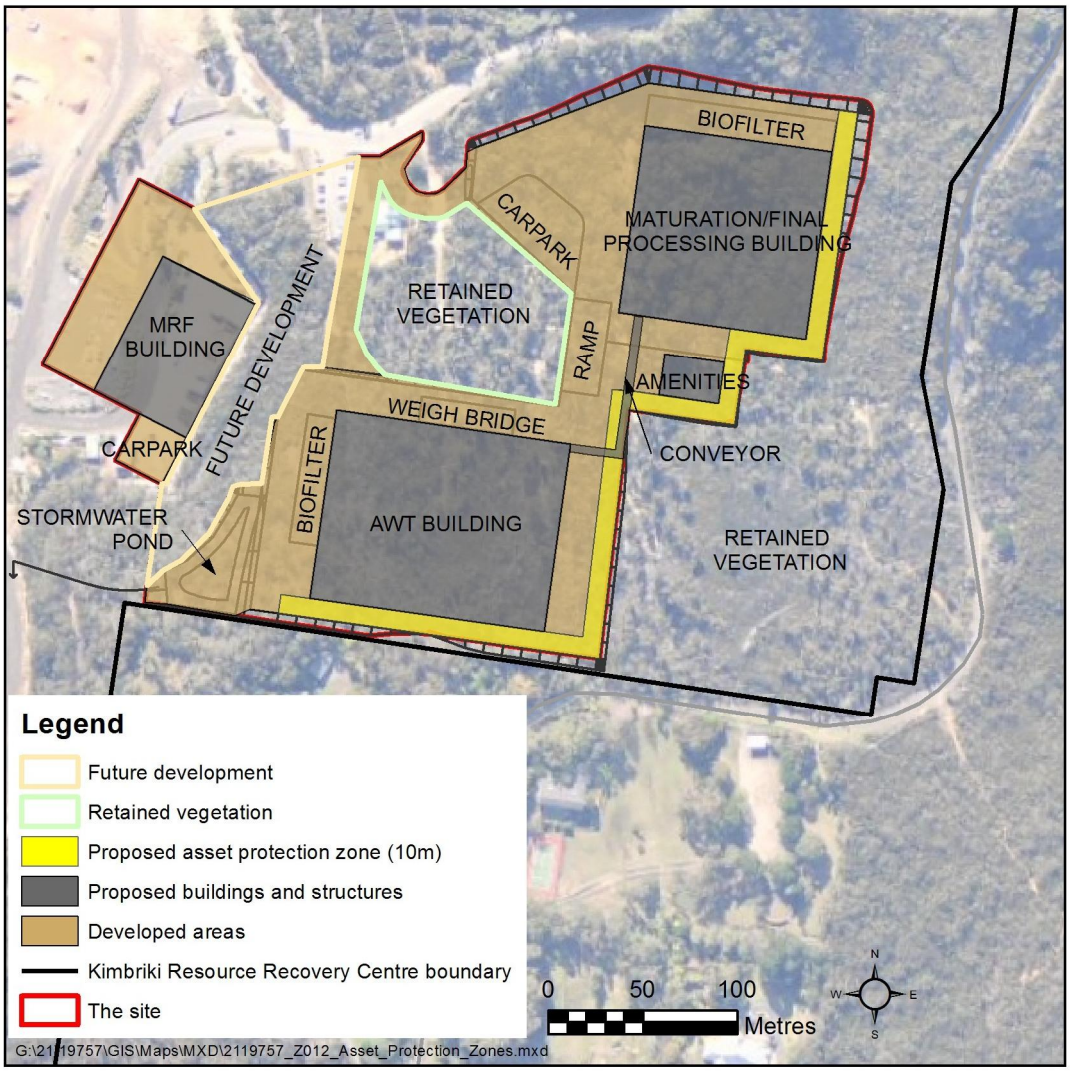



**Figure 15.1 Asset protection zones**

### Access

Access would be via a sealed road leading west from Kimbriki Road into the site. This road is formed to 'Fire Trail – Category 1' standard (BFCC 2003), with a turnaround point available adjacent to the administration office and car park. Internal access throughout the existing operational areas would be of a similar standard and is considered adequate for the provision of fire access, both for existing operations and those outlined in this report.

Two existing gates provide access to informal trails into the south-east portion of the site from Kimbriki Road, and are located along the eastern and southern site boundaries. Vehicular access in and around the proposed buildings would cater for heavy vehicle movements and is considered adequate for the provision of fire access throughout the developed portion of the site.

Natural vegetation adjacent to the car park would be accessible via the proposed road, while Kimbriki Road would provide access to the eastern and southern boundaries of natural vegetation in the south-east portion of the site.

### Services

The project would be serviced by water storage tanks as well as (low pressure) access to mains water supply. Sedimentation basins on the Kimbriki Resource Recovery Centre are accessible to Category 1 fire tankers.

### Construction standard

The project is classified as an industrial development. As an industrial development (Class 5,6,7 and 8), the Building Code of Australia (BCA) bushfire performance requirements as set out in *A3959-2009 – Construction of Buildings in Bushfire Prone Areas* do not apply, however construction provisions related to access and services have been considered.

## 15.2.4 Mitigation measures

The following provides a summary of proposed bush fire protection measures for the site.

- Asset protection zones would be provided as described in section 15.2.3;
- Safe access and egress would be provided via a sealed road leading west from Kimbriki Road and an internal access through operational areas;
- A site management plan detailing bushfire prevention measures would be prepared and implemented during construction and operation, to include the following measures:
  - Work involving risk of ignition would not be carried out during total fire bans;
  - Bushfire suppression equipment would be available onsite;
  - Appropriate storage and maintenance of fuels and other flammable materials;
  - Emergency procedures for people located at the site during the bushfire season would be detailed; and
  - The Local Rural Fire Service Control Centre would be notified of the dates of construction and any dates during which 'hot works' would to be conducted.
- Retained vegetation (outside the identified asset protection zone) and that located within the recommended offset areas would be managed in accordance with the draft *Bush Fire Risk Management Plan* (Warringah Pittwater Bush Fire Management Committee (WPBFMC) 2010).

# 16 Visual amenity

*This chapter provides a visual impact assessment for the project. It assesses the potential visual impacts of the project on the amenity of the surrounding area, and describes the measures that would be implemented to minimise potential visual impacts.*

## 16.1 Assessment methodology

The landscape of an area can be assessed from an appreciation of a combination of natural and cultural features. The interaction of these features with each other produces a unique relationship that can be recognised as the landscape character of the area.

Visual quality assessment is both a qualitative and comparative process. In determining the visual quality of the landscape the following is considered.

- The scenic resources - analysis is undertaken on what elements or landmarks form the key features of the area; and
- The likely number of different viewpoints, and the likely number of viewers that enjoy each viewpoint, the frequency and duration of viewing and the sensitivity of the viewers to change. The viewers and their viewpoints are designated as sensitive visual receivers.

The visual impact assessment involved the following tasks:

- Review background information;
- Define the main study area;
- Define the visual nature of the existing environment and visual quality and the potential significance of the landscape and visual quality;
- Determine the potentially sensitive visual receivers;
- Assess the potential impact of the project on the landscape and visual quality with a focus on the potentially sensitive receivers; and
- Provide recommended mitigation measures.

The study area for the purposes of the visual impact assessment was considered to include the site and its surrounding visual catchment. The surrounding visual catchment can also be described as the zone of potential visual influence, which sets an approximate limit for the visual receptors that have the potential to be impacted by a project. For this assessment, the main zone of visual influence was considered to be approximately 1.5 km from the centre of the site.

## 16.2 Existing environment

### 16.2.1 Existing visual and landscape environment

The Kimbriki Resource Recovery Centre is located on lower lying areas in between higher land with vertical relief to the north and east. The visual character of the centre is dominated by an open cut landscape that is generally devoid of trees in the vicinity of the active areas. The terrain

has been disturbed by the dynamic nature of existing waste management and resource recovery activities.

Natural soil profiles have been altered, while soil profiles in the surrounding area are in their natural condition. There are areas of bare earth within the landscape in the surrounding area, where areas of indigenous trees have been cleared to allow site access and fire breaks.

The character of the landscape surrounding the centre is dominated by tall open woodland where trees are generally in excess of 12 m, as shown in Photo 16.1.




**Photo 16.1 Kimbriki Resource Recovery Centre in the context of surrounding bushland**

There is a variety of different landscape and development types in the surrounding area. The development pattern in the surrounding area consists of a mix of residential and recreation/commercial developments interspersed within the natural environment. The land uses which surround the site are described in section 4.3. The main landscape features are described below.

### 16.2.2 Visual and landscape quality

The following main landscape features or types characterise the landscape in which the site is located:

- Undulating topography with bushland;
- Developed and disturbed areas;
- Open grassed landscapes (mainly in the form of recreation reserves); and

- A road landscape.

The site consists of the first two landscape types. The assessment of the visual quality of these landscape types is summarised in Table 16.1. It is noted that this is purely a subjective assessment to provide an overall appreciation of the context of the site and project.

**Table 16.1 Visual quality assessment of the surrounding environment**

| Landscape type | Visual quality | Description |
|---|---|---|
| Undulating topography with bushland | High | Views of the bushland areas are relatively consistent with a distinctive natural character. There is complexity and interest within this landscape type generated by varying densities of trees. The pattern of trees, their scale and form creates a positive visual feature. There are minimal impacts on visual quality within this landscape type. |
| Developed and disturbed areas | Moderate-low | This landscape type consists of a mix of different forms including residential/suburban development, commercial development and other disturbed areas. The nature or form of the residential development ranges from larger houses on large lots of land scattered in the surrounding bushland (rural residential) to denser suburban development with its associated network of roads and services.<br>Commercial developments are usually of a larger scale, on large lots. They include a visual mix of large buildings, cleared/paved areas, carparking, and product display. |
| Open grassed landscapes | Moderate | These are mainly in the form of parks, sporting and recreation areas (such as the J.J Melbourne Hills Memorial reserve), interspersed with scattered trees, paths, smaller scale buildings and parking. |
| Road landscape | Low | The road landscape of Mona Vale Road runs through these varying landscape types. The road corridor itself is situated in cut and fill embankment largely within the surrounding landscape. |

### 16.2.3 Visibility of the site, potential visual receivers and visual sensitivity

Visual sensitivity is an indication of how significant a change to the existing landscape would be considered by people from different areas within the visual catchment. It is determined by the following factors:

- The type or nature of the viewers – influencing their sensitivity to change. For example, motorists travelling along a busy road would be less concerned about change than residents who look at a view for quiet enjoyment;
- The numbers of viewers; and
- The view composition – influenced by the distance of a development from receivers, whether the site on which the development would be located is central to their views, and the nature of their viewing angle (for example, upward viewing angles can reduce the importance of views as a result of intervening topography and vegetation).

The visibility of the site from locations within its visual catchment is an important factor in determining visual sensitivity and the potential for impacts as a result of the project. The site is

visible (in part) from a limited number of external locations. Viewing locations were identified by an initial desktop assessment using GIS involving review of aerial photography and topography, followed by field verification. Within the visual catchment of the site, the following potential viewing locations were identified and below.

- Kimbriki Resource Recovery Centre;
- JJ Melbourne Memorial Reserve;
- Kimbriki Road;
- Mona Vale Road; and
- Elanora Heights and Belrose.

No potentially significant viewing locations were identified in the Ku-ring-gai National Park. No views to the site were identified from properties on Kamber Road. Photos of views to the site from viewing locations within the main zone of visual influence (the closest viewing locations) are provided below and shown in Figure 16.1.

Photo 16.2 provides a view to the site from the Kimbriki Resource Recovery Centre entrance road looking across the site to distant residences. The balloons denote 2 diagonal corners of the proposed AWT building, including the rear corner nearest Kimbriki Road (double balloons).



**Photo 16.2 View from Kimbriki Resource Recovery Centre entrance road, looking south (Photo No. 1, Figure 16.1)**

The occupiers of one of the houses owned by the SHOROC councils (10 Kimbriki Road) would potentially be able to view the proposed AWT building from the edge of the escarpment near their garden.

It is likely that the occupiers of the privately owned house at 4 Kimbriki Road, directly south of the proposed AWT building, would be able to see the right hand end of the building, plus the retaining wall beneath it. This view would be partially screened by trees.

The existing view at the front of the property from 4 Kimbriki Road to the site is shown in Photo 16.3. The yellow balloon shows the potential height of the finished building.



**Photo 16.3 View towards development area from Kimbriki Road in front of property no. 4 (Photo No. 2, see Figure 16.1)**

Photo 16.4 shows the current view from the south of the site, adjacent to 4 Kimbriki Road



**Photo 16.4 View to the site (current), adjacent to No. 4 Kimbriki Road**

The site would be only visible from the edge/boundary of the J.J Melbourne reserve, as shown in Photo 16.5.



**Photo 16.5 View from edge of JJ Melbourne Hills Memorial Reserve (Photo No. 3 Figure 16.1)**

These viewing locations and other potential visual receivers are listed in Table 16.2, together with a description of the composition of the view towards the site from the location, and a qualitative assessment of the potential importance (significance) of the site to these views/viewers. The assessment of potential visual impacts is particularly important for those viewing locations/receivers where the site has a moderate to high significance in terms of views.

**Table 16.2 Visual receivers, view composition and site significance**

| Viewing location | Main visual receivers | View composition and significance of the site to views | Significance of the site to views |
|---|---|---|---|
| Kimbriki Resource Recovery Centre | Staff and public (customers) | There would be views to the site from within the Kimbriki Resource Recovery Centre. However, the nature of the disturbance to the site would be consistent with existing development at the centre. The project would enhance and further develop the range of waste related facilities at the centre. The visual environment is not a significant feature for users of the site who are visiting (mainly) for the purpose of waste disposal, purchase of recycled product or educational activities. The site's significance to these receivers is therefore considered to be low. | Low |

| Viewing location | Main visual receivers | View composition and significance of the site to views | Significance of the site to views |
|---|---|---|---|
| JJ Melbourne Memorial Reserve | Reserve users | Views into the site are only possible from the edge of the reserve, which limits the visual significance of the site. Views that can be achieved are in the context of the existing site. As this is an active recreation/sporting reserve, views to the surrounding area are not considered to significantly influence the users' experience of the reserve as most users would be focused on their sporting activity. As a result, the site's significance to these receivers is considered to be low. | Low |
| Kimbriki Road | Residents | The perimeter vegetation along Kimbriki Road is on average approximately 12 m high and varies in density. Views into the site from Kimbriki Road are largely screened by existing stands of vegetation. There are two properties along Kimbriki Road that may achieve partial views of some components of the project, through the vegetation. These residents are located closest to the site. Number 10 Kimbriki Road is owned by the SHOROC councils as part of the buffer area. Number 4 Kimbriki Road is privately owned. The proximity of the project to Number 4 Kimbriki Road, and the nature of the topography, on and breaks in the screening vegetation mean that the project would be visible (in part) from this property. The site's significance to these receivers is therefore considered to be moderate to high. | Moderate to high |
| Mona Vale Road | People driving along the road | Views into the site from Mona Vale Road are screened as a result of the topography, distance of views (approximately 300 m) and dense roadside vegetation. Passing motorists may have glimpses of the site where there are gaps in the roadside vegetation, but generally the visual exposure of the site from Mona Vale Road is low. The site's significance to these receivers is therefore considered to be low. | Low |
| Elanora Heights and Belrose | Residents | There are potentially limited distant views into the site from some residences to the south and east of the site in Elanora Heights and Belrose. However, the distance from the site (more than 2 km away) and context of these views (the site is a small feature located in the background) mean that the site's significance to these receivers is considered to be low. | Low |

### 16.2.4 Summary of the significance of the site's existing visual quality and visual absorption capacity

#### Existing visual quality

Generally the site is considered to have a low visual quality as a result of the existing level of disturbance associated with activities at the Kimbriki Resource Recovery Centre.

The visual quality of the surrounding area is considered to be moderate-low towards the east and northeast, where the majority of development is located, and high to the north and south which is dominated by natural bushland in the national parks.

The site adjoins areas already subject to disturbance.

Receivers with direct and close views to the site are few, and are limited to residents along Kimbriki Road who have filtered views to the site, and users of the Kimbriki Resource Recovery Centre. The site is considered to have a moderate to high potential visual significance (and therefore higher potential for impact) for residents located in close proximity to the site, along Kimbriki Road. In particular, it was identified that it would be possible to see the project from 2 and 4 Kimbriki Road. This is considered further by the impact assessment in the following section.

### Visual absorption capacity

Visual absorption capacity is an assessment of the landscape's ability, within a given area, to absorb development without creating a significant change in visual character or scenic quality.

The broader Kimbriki Resource Recovery Centre has extensive cleared areas. Buildings on site are generally well screened by vegetation along Kimbriki Road to the east and existing remnant vegetation between the site and Mona Vale Road to the west.

Given the steep rising topography surrounding the site, the height of existing vegetation cover and the extended distance from public viewing points, and the fact that there are large buildings of a similar scale along Mona Vale Road, the visual absorption capacity of the site is considered to be moderate to high.  In other words, the landscape is considered to have the capacity to absorb the proposed scale of additional development.

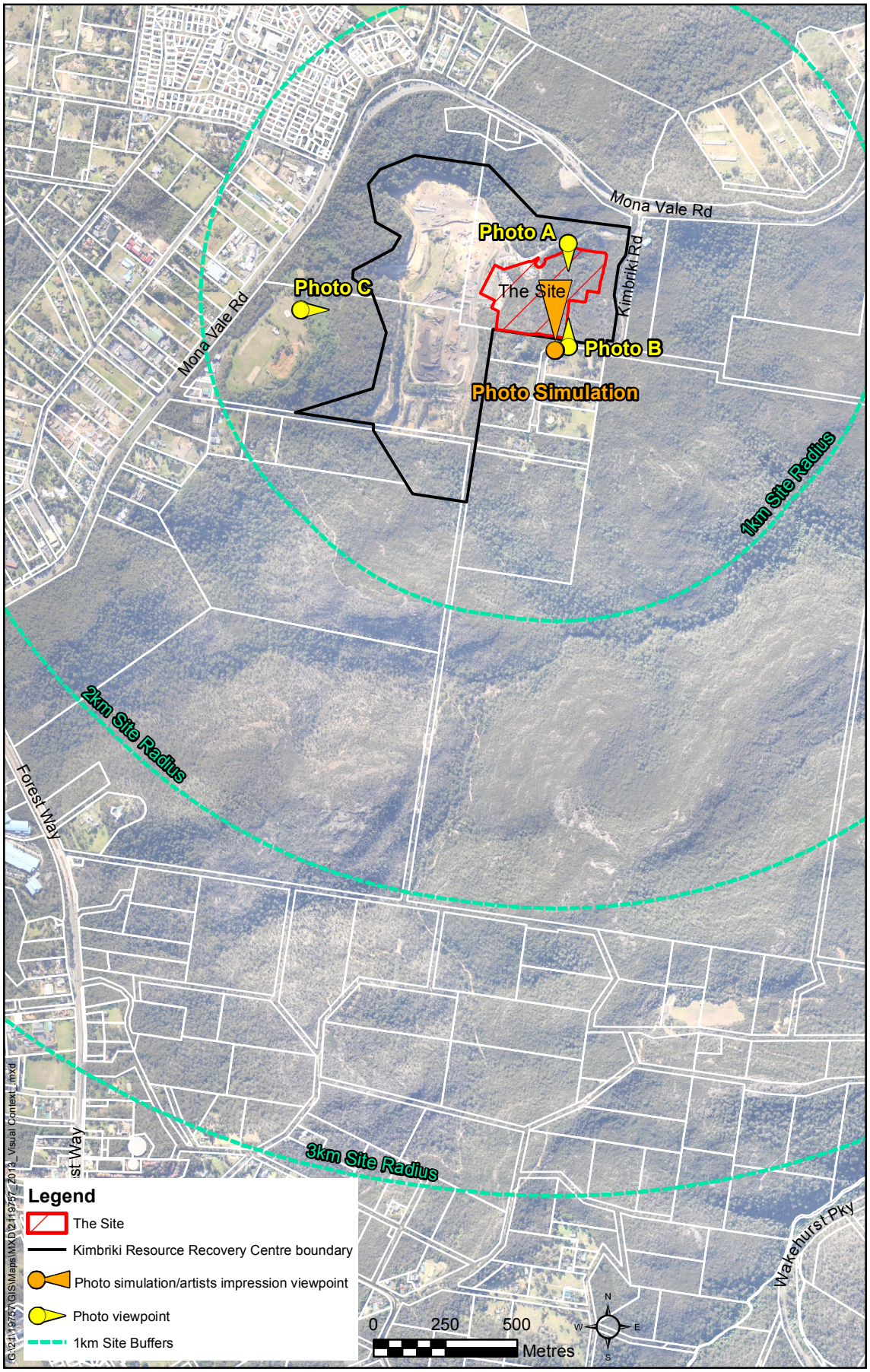



**Figure 16.1 Site viewpoints**

## 16.3 Impact assessment

### 16.3.1 Key visual features of the project and project design features

Key visual features of the project include:

- Buildings:
  - The biofilter stacks would be 1 m above the roof line;
  - The MRF and RRF buildings would be 10-12 m high; and
  - The amenities building would be 3 m high (about the height of a one storey building).
- Roads, parking and paved areas; and
- Landscaping and screening vegetation.

A project layout has been developed that aims to minimise the visibility of buildings from areas external to the site and therefore minimise the potential for visual impacts. Locations chosen for the MRF and RRF buildings follow the existing topography of the site as much as possible, and the site, which is effectively at two 'levels' enables the building elevations to be maintained as low as possible on the site.

### 16.3.2 Construction

Construction of the project would generate visual impacts during the construction period. During construction works, exposed soils would be visible, along with machinery and equipment required for construction, and the buildings under construction. These impacts would be temporary and limited to the construction period.

### 16.3.3 Operation

The project involves development of the site, involving construction of a range of buildings and associated structures, hardstand areas and landscaping. The project would result in a change in the character and appearance of the existing site as it currently is, however the project is considered to be consistent with the nature of development on the wider Kimbriki Resource Recovery Centre.

The potential visual impacts of the project would depend on a number of factors including the final location, design and exterior finishes of the buildings and other structures; the landscaping and screening provided; and the extent of clearing required.

The existing vegetation surrounding the site, including screen planting (at appropriate locations) would help to reduce the potential visual impact of the project in the mid to long term (5 years plus).

An assessment of the main potential visual impacts is provided below with respect to the main viewing locations.

#### Users of Mona Vale Road

As noted above, the main views of the project from the public domain would be from Mona Vale Road. There are sequential views into the site from this road, interrupted to varying degrees by

roadside vegetation and vegetation within the site. However, the upper parts of the new structures would be potentially visible to motorists travelling along the road.

These impacts are not considered to be significant and would be mitigated by landscaping and building design features.

### Residents on Kimbriki Road

Residences along Kimbriki Road to the east of the site are currently not able to view the site, as a result of the topography and the presence of extensive mature vegetation and trees along Kimbriki Road.  This vegetation would not be disturbed by the project.

Photo 16.7 and Photo 16.7 provide artist's impressions of the project from the same view point both before screen planting and after screen planting. The current view is shown in Photo 16.4.



**Photo 16.6 Artist's impression of view to the site, adjacent to No. 4 Kimbriki Road – before screen plantings**



**Photo 16.7 Artist's impression of view to the site, adjacent to No. 4 Kimbriki Road – with screen plantings**

Photo 16.7 shows that the project would be visible to the property at 4 Kimbriki Road, although would be screened to some extent by vegetation.

### J J Melbourne reserve

The site would be only visible from the edge/boundary of the reserve, as shown in Photo 16.5. It is considered that the project would not impact on the experience of users of this reserve.

### Change to visual character of the visual catchment

The project would not markedly change the overall visual character of the visual catchment. The appearance and use of the site would not be markedly different from that other dominant uses within the visual catchment, particularly the existing Kimbriki Resource Recovery Centre and commercial development. The scale and height of the development is similar to other major developments in the catchment.

The project would impact on views from 4 Kimbriki Road. The degree of impact would be influenced by final planting. No significant impacts to other visual receivers are predicted.

### Customers of the Kimbriki Resource Recovery Centre

Landscaping of the surrounding earth embankments and road accesses would help maintain the visual amenity to customers on their way to using the various publicly-accessible areas at the centre. Only delivery trucks and trucks collecting finished product or bulked recyclables would access the proposed new facilities. These areas would only be accessible to the general public as part of guided tours for educational purposes.

## 16.4 Mitigation measures

### Landscaping

- A landscape concept plan would be developed as part of the detailed design of the project;
- Tree planting consistent with the landscape concept plan and the recommendations of the biodiversity assessment would be undertaken to assist in reducing the visual impacts of the project;
- Tree planting would give scale to the building bulk; provide amenity (shade) for employees; and screen unsightly areas, such as stockpiles, car parks and hardstand areas;
- Tree planting would occur on the west and northern sides of the site, and along Kimbriki Road. It is not necessary to screen the proposed development from the road. It would be more appropriate to simulate the natural woodland character and provided a landscape setting for the buildings, by arranging planting in masses that relate to the scale of the building and by using vegetation to provide appropriate views of the main features of the buildings; and
- Tree planting would include native and endemic species to ensure that the existing character is retained.

### Building design features

The detailed design of the project would involve consideration of building materials and treatments to minimise the potential visibility of the project, as described below:

- External building finishes would be chosen to minimise visual impact. Recessive, low-reflectivity finishes that blend with the adjoining bushland would be used. Roof colours and finishes would complement the colour of the building facades and the hues would aim to blend with the colours prevailing in the surrounding landscape;
- Highly reflective surfaces/colours, brightly coloured or strongly contrasting materials, and unpainted metal would be avoided;
- Articulation of building surfaces with bays, wall offsets etc would be considered;
- Any boundary fences, particularly those visible from the public domain, would be simple, non reflective and have a high degree of transparency;
- Car parking areas would be appropriately landscaped incorporating shade trees, and would not be visible from public roads; and
- Signage would comply with relevant standards and follow a consistent style.

# 17 Socio-economic

*This chapter briefly describes the socio-economic environment of the local region. It also outlines potential socio-economic impacts from the project and relevant mitigation measures.*

## 17.1 Key socio-economic characteristics

A summary of key socio-economic indicators is provided below, based on information included in Council community profiles.

### 17.1.1 Warringah local government area

As noted previously, the project would be located within the Warringah local government area. The Warringah local government area is located on Sydney's northern beaches between 10 and 27 km from the Sydney central business district (CBD). The Warringah area is bounded by Cowan Creek in the north, Narrabeen Lagoon and the Pittwater local government area in the north-east, the Tasman Sea in the east, the Manly local government area and Middle Harbour in the south, and the Ku-ring-gai local government area in the west.

Warringah is a mainly residential area, with some smaller rural areas (mainly in the north). There are also industrial and commercial areas. The Warringah local government area is the largest in the SHOROC region. It has a total area of 153 $km^2$, of which a large proportion is National Park, bushland or reserves, including coastal foreshores, beaches and waterways. It also has the highest population. In 2009, the estimated resident population was approximately 144,092 people.

Analysis of household income levels in the Warringah area in 2006 compared to the Sydney Statistical Division shows that there was a larger proportion of high income households (those earning $1700 per week or more) but a smaller proportion of low income households (those earning less than $500 per week). Overall, 36.4% of households earned a high income, and 12.3% were low income households, compared with 29.5% and 16.8% respectively for the Sydney Statistical Division.

Overall, 97.3% of the labour force was employed (64.2% of the population aged 15+), and 2.7% unemployed (1.8% of the population aged 15+), compared with 94.7% and 5.3% respectively for the Sydney Statistical Division.

Analysis of the age structure of Warringah Council area in 2006 compared to the Sydney Statistical Division shows that there was a similar proportion of people in the younger age groups (0 to 17) but a larger proportion of people in the older age groups (60+).

Overall, 23.1% of the population was aged between 0 and 17, and 19.8% were aged 60 years and over, compared with 23.6% and 16.7% respectively for the Sydney Statistical Division.

In 2006, the average household size in the Warringah area was 2.58, which is slightly smaller than the Sydney average of 2.7.

### 17.1.2 Other SHOROC local government areas

#### Pittwater

The Pittwater local government area is also located on Sydney's northern beaches about 26 kilometres from the Sydney CBD. The Pittwater area is bounded by Broken Bay in the north, the Tasman Sea in the east, the Narrabeen Lakes and Deep Creek in the south, and the Warringah local government area in the south and west.

The Pittwater area is mainly residential and national park, with some smaller commercial and light industrial areas. It has a total land area of 125 $km^2$, of which nearly half is national park, bushland or reserves. Non-residential areas are mainly in the north and northwest.

In 2009, the estimated resident population of the Pittwater area was 58,818.

In 2006, 38% of households in the Pittwater area earned a high income, and 10.7% were low income households. 97.3% of the labour force was employed (63.0% of the population aged 15+), and 2.7% unemployed (1.7% of the population aged 15+).

There was a similar proportion of people in the younger age groups (0 to 17) in the Pittwater area, and a larger proportion of people in the older age groups (60+). Overall, 24.3% of the population was aged between 0 and 17, and 20.8% were aged 60 years and over.

The average household size in 2006 was 2.65.

#### Manly

The Manly local government area is located on Sydney's lower northern beaches between 8 and 17 kilometres northeast of the Sydney CBD. The Manly area is bounded by the Warringah local government area, Burnt Bridge Creek and Manly Creek in the north, the Tasman Sea in the east, Sydney Harbour and North Harbour in the south, and Middle Harbour in the west.

The Manly area is a mainly residential area, with some commercial and industrial land use. It encompasses a total land area of approximately 16 $km^2$, including large areas of water frontage and foreshore.

In 2009, the estimated resident population of the Manly area was 40,939.

In 2006, 44% of households earned a high income, and 11.1% were low income households. 97% of the labour force was employed (61.3% of the population aged 15+), and 3.0% unemployed (1.9% of the population aged 15+).

There was a smaller proportion of people in the younger age groups (0 to 17) and a larger proportion of people in the older age groups (60+). Overall, 20.5% of the population was aged between 0 and 17, and 19.1% were aged 60 years and over.

The average household size in 2006 was 2.35.

#### Mosman

The Mosman local government area is located in Sydney's northern suburbs/lower north shore, on the southern side of Middle Harbour, about 6 kilometres from the Sydney CBD. The Mosman area is bounded by the Middle Harbour in the north and north-east, Port Jackson in the east and south, and the North Sydney local government area in the west.

The Mosman area is a mainly residential area, but also has some military use in the eastern section, bushlands and beaches along the harbours, and commercial areas, mainly along Spit and Military Roads. Mosman has a total land area of approximately 9 $km^2$.

In 2009, the estimated resident population of the Mosman area was 28,767.

In 2006, 48.7% of households earned a high income, and 8.5% were low income households. 97.4% of the labour force was employed (61.2% of the population aged 15+), and 2.6% unemployed (1.6% of the population aged 15+).

20.5% of the population was aged between 0 and 17, and 21.0% were aged 60 years and over.

The average household size in 2006 was 2.26.

### 17.1.3 Key economic characteristics of the SHOROC region

Key economic characteristics of the SHOROC region are provided below (SHOROC economic profile, 2010):

- The gross product (local) was $11,333 million in 2009, which was 2.8% of NSW's gross state product (2009);
- The gross product (local) per capita in 2009 was $45,089;
- Retail trade was the largest industry by employment in 2006, employing 14,356 people;
- Property and business services was the largest industry by value added in 2009 ($1,991 million);
- Manufacturing was the largest industry by output in 2009 ($5955 million);
- In 2006, 80,272 people worked in the SHOROC region;
- There were 33,381 registered businesses in 2007;
- The estimated resident population was 272,616 in 2009;
- Population growth was 0.68% per annum over 10 years; and
- In 2010, the unemployment level of residents was 4%, compared to 5.4% in NSW.

## 17.2 Impact assessment – social impacts

### 17.2.1 General impacts

The key potential social impacts that may result from construction and operation of waste infrastructure such as the project include:

- Change in community use of land – development of infrastructure can result in a change in land use that may affect how the community uses the land, or limit future community use of land;
- Employment – there is the potential for employment to be generated during both construction (temporary) and operation (long term positions);

- Amenity – construction and operation of a project can result in impacts to local amenity unless appropriate design and mitigation measures are adopted. In particular, there is the potential for air quality (dust, odour), noise, traffic and visual impacts; and
- Community capacity development – providing opportunities for education and community involvement in the areas of waste reduction, recycling and sustainability.

These potential impacts are considered below in relation to the project.

### 17.2.2 Change in community land use

The project would be located wholly within the Kimbriki Resource Recovery Centre. It would be located on an undeveloped area of land within the centre, and would result in a change in the use of that land. However, the project would complement existing waste related land uses at the centre, and improve opportunities for resource recovery at the centre. The project is consistent with the land use of the Kimbriki Resource Recovery Centre, and would not impact on community use of land either at the site or in the surrounding area.

### 17.2.3 Employment

The project would have positive employment impacts both during construction and operation. During the construction phase of the project the estimated workforce would be 40-50 full time positions and this could increase to 80-100 positions during peak construction periods.

The project would employ up to approximately 59 people when it is operational.

It is expected that the majority of employees would live within the Northern Beaches region, as such, no impacts in terms of service and infrastructure provision (e.g. housing) to service the needs of employees are predicted.

### 17.2.4 Amenity

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

#### Air quality (odour and dust)

Potential air quality impacts were considered by the air quality impact assessment, summarised in chapter 9. The assessment identified that:

- The potential for dust impacts would be managed by the implementation of the construction environmental management plan; and
- With the implementation of the proposed design features, the project would meet air quality (odour) goals during operation. Cumulative odour emissions are also predicted to meet the odour criteria.

#### Noise

Potential noise impacts were considered by the noise impact assessment, summarised in chapter 10. The assessment identified that:

- There may be the potential for some noise impacts during construction at the closest residences, which would need to be managed through the implementation of the construction environmental management plan; and
- With the implementation of the proposed design features, project specific operational noise goals should be achieved.

#### Traffic

Potential traffic impacts were considered by the traffic impact assessment, summarised in chapter 11. The assessment identified that:

- During construction, there would be an increase in traffic along Mona Vale Road. However, Mona Vale Road is a State Road carrying approximately 36,000 vehicles per day. For residents in Terrey Hills near Mona Vale Road the predicted modest increase in traffic would have minor, if any, impact on amenity.
- The main construction impact would be during the weekday morning peak. At this time, the right turn into Kimbriki Road and the right turn out of Kimbriki Road would operate unsatisfactorily. Mitigation measures are recommended in chapter 11 to manage this potential impact.
- During operation, there would be an increase in traffic levels along Mona Vale Road in the vicinity of the project. It should be noted that many of the vehicles that would access the centre are already travelling along Mona Vale Road to the Belrose Waste Management Centre. The main predicted impact would be during the weekday morning peak when the right turn into Kimbriki Road and the right turn out of Kimbriki Road are predicted to operate unsatisfactorily. Mitigation measures are recommended in chapter 11 to manage this potential impact.

#### Visual impacts

Potential visual impacts were considered by the visual impact assessment provided in chapter 16. The main potential impact identified by the assessment is:

- It is likely that the occupiers of 4 Kimbriki Road, located directly south of the site, would be able to see the eastern end of the AWT building, plus the retaining wall beneath it and extending to the east. This view would be partially screened by trees and the landscaping proposed as part of the project.

### 17.2.5 Capacity development and education

The project would provide the SHOROC councils and their local communities with an opportunity to become a part of a local, integrated waste management solution at the Kimbriki Resource Recovery Centre. The proponent currently operates an Eco House and Garden complex which includes a food garden constructed from recycled soils, timbers and mulches. This complex provides a demonstration of the usefulness of source separating organic wastes, worm farms, composting and gardening with recycled organics. The Eco House education centre is constructed from 95% waste derived materials and is used, amongst other purposes, to conduct workshops and other activities to demonstrate ways in which the community can proactively

manage their wastes to maximise resource recovery. The project would complement and further develop the existing resource recovery activities at the centre.

The project would play a role in moving the general community beyond the traditional approach of disposing of waste to landfill. It would assist the community become more aware of waste as a resource and the importance of their role in source separating wastes. This would increase resource recovery and engender a sense of ownership by the community, particularly when it is recognised that the region's wastes are being managed within the region by a new process to maximise recovery and landfill life.

## 17.3 Impact assessment – economic impacts

The main potential economic impacts as a result of the project would be:

- Reducing the cost of waste disposal to the broader community; and
- Reducing costs to local business.

### 17.3.1 Reducing community costs of waste disposal

As noted in section 5.4.3, the increased diversion of waste from landfill would assist SHOROC councils reduce future financial liabilities associated with the waste and environment levy. The project would reduce the volume of waste being disposed of to landfill and therefore reduce the future waste levy payments.

As noted previously, by 2015-16, the cost of the waste and environment levy will exceed the underlying cost of landfill disposal, more than doubling the cost of landfill disposal by that time. In addition, once the Belrose landfill is closed, if no regional option for waste disposal is found, putrescible waste from the SHOROC region would (most likely) need to be transported long distances. The cost of transport would increase as a result of the extended transport distance and the potential introduction of a price for carbon.

The combined impact of these increases is expected to push the cost of on-going landfill disposal of SHOROC's putrescible waste to $300 per tonne by 2014. These costs would continue to rise and become more volatile beyond that time.

This compares to the project's estimated cost of disposal commencing at around $300 per tonne in 2014 but with significant surety and stability on future disposal costs. The final cost would be determined by the technology selected, and the availability of markets for composts and compost-like products.

### 17.3.2 Reducing costs to business

For businesses in the SHOROC region the main benefit of the project would be the opportunity for greater local disposal of a wider range of source-separated wastes. This would result in lower costs of waste disposal and improved resource recovery.

Whilst the proponent does not intend to receive mixed putrescible waste from the local business community, there would be a strong financial incentive for local businesses to implement source separation of organic wastes and deliver that waste stream to the Kimbriki Resource Recovery

Centre. This additional feedstock would supplement the source-separated organics from kerbside collections and boost the productivity and financial viability of the centre.

For businesses that achieve good levels of source separation of organic wastes (such as restaurants, fast food outlets, clubs, hotels etc), the residual waste generated would be less contaminated with food organics. This creates the opportunity for higher levels of recovery of dry recyclables and packaging from this mixed waste than might otherwise be achieved.

It is likely that the total cost of waste disposal would fall even with additional collections for those businesses that introduce source separation and recovery of dry recyclables and packaging. Additional savings would be generated as a result of the materials not being transported out of the region.

## 17.4 Mitigation measures

The following mitigation measures are recommended:

- Ongoing consultation would occur with the local community and other key stakeholders during construction and operation.
- Implementation of measures to minimise the potential for construction and operation impacts on amenity. This would include the measures recommended in sections 9.6, 10.5, 11.3, and 16.4 of the environmental assessment and the development and implementation of construction and operation environmental management plans as outlined in chapter 18.

# Part D
# Project Justification and Conclusions

# 18 Environmental management

*This chapter outlines the requirements for environmental management plans that would be part of the construction and operational phases of the project. A summary of the environmental monitoring requirements and lists of the approvals and licences required are also provided.*

## 18.1 Current approach to environmental management

Management of activities at the Kimbriki Resource Recovery Centre is undertaken in accordance with the URS (2009) *Landfill Environmental Management Plan*. This includes environmental monitoring as outlined in Environment Protection Licences EPL 13090 and EPL 13091. The current monitoring regime is outlined in Table 4.2 in chapter 4.

## 18.2 Proposed environmental management plans

### 18.2.1 General structure and contents

The proponent would prepare two environmental management plans (EMPs) for the project, one covering the construction phase and one covering the operational phase. Each would include:

- Environmental goals and objectives;
- Commonwealth and state statutory requirements including licences and approvals;
- Environmental management procedures including:
  - Safeguards to be implemented;
  - List of actions, timing and responsibilities;
  - Reporting requirements;
  - Specifications incorporating environmental safeguards;
  - Training of personnel (both proponent and contractors) in environmental awareness;
  - Environmental accident and incident reporting requirements;
  - Process surveillance and auditing procedures;
  - Environmental complaint handling procedures;
  - Site management and control procedures.
- Monitoring requirements including a monitoring plan which details location, duration and frequency of monitoring and procedures and conditions to be followed;
- Emergency response including an emergency response plan, consistent with the existing plan for the Kimbriki Resource Recovery Centre, incorporating procedures for fire, pollution incidents and accidents. The plan would detail procedures to be followed, responsibilities, equipment and contact details for responsible site staff and emergency authorities; and
- Review and auditing procedures.

### 18.2.2 Construction environmental management plan

A construction environmental management plan would be prepared by the proponent (or nominated contractor) and implemented in consultation with relevant agencies. A suitably qualified environmental management representative would be appointed to oversee environmental performance during construction of the proposal. The construction environmental management plan would include, but not limited to, measures from the following sub management plans:

- Air quality plan, including:
  - Dust suppression measures;
  - Stockpile covering; and
  - Covering of loads during transportation.
- Waste management plan, including:
  - Wastes generated by the proposal would be classified in accordance with the NSW DECCW (2009) *Waste Classification Guidelines*; and
  - Waste management to be in accordance with the principles embodied in the WARR Act.
- Hazards and risks plan, including:
  - Safe work practices;
  - Emergency contact numbers;
  - Site first aid contact; and
  - Incident reporting procedures.
- Biodiversity management plan, including:
  - Measures identified in section 8.4
- Bushfire plan, including:
  - Measures identified in section 15.2.4
- Water and soil management plan, including:
  - Measures identified in section 12.7
- Noise plan, including:
  - Measures identified in section 10.5
- Traffic plan, including:
  - Measures identified in section 11.3.

### 18.2.3 Operation environmental management plan

An OEMP would be prepared by the proponent and implemented in consultation with relevant agencies, including the Department of Planning and DECCW. The OEMP would be prepared by a suitably qualified environmental management representative and would include, but not limited to, measures from the same sub management plans listed for the CEMP (section 18.2.2) as well as:

- Vegetation management plan (focussing on proposed offset areas), including:

– Measures identified in section 8.4

The OEMP would also include a long-term environmental monitoring program. The monitoring program is summarised below.

## 18.3 Proposed environmental monitoring

Environmental monitoring procedures that would be implemented during construction and operation are outlined in Table 18.1 and Table 18.2.

**Table 18.1 Monitoring requirements during construction**

| Issue | Monitoring |
|---|---|
| Noise | Measure noise levels at the boundary prior to construction, at commencement of construction and monthly during construction. |
| Biodiversity | Monitor the extent of clearing to ensure it is confined to areas in the environmental assessment. |
| | Monitor the impact on groundwater dependent ecosystems. |
| Air quality | Continually monitor dust generation from site (visually) to ensure excessive dust is not being produced and that dust suppression activities are effective. |
| | Monitor dust generation from site by checking readings from existing dust gauges on site - on a monthly basis. |
| Waste | Inspect waste receptacles to ensure they are not overfilled and are being collected regularly. |
| | Monitor waste recycling and disposal procedures to ensure they are being complied with. |
| Water | Review results from surface water sampling undertaken as part of the overall Kimbriki Resource Recovery Centre environmental management. |
| Groundwater | Review groundwater levels and sampling results as part of overall Kimbriki Resource Recovery Centre environmental management. |
| Erosion and sediment control | Prior to commencement of each stage of construction, inspect site to ensure that sediment and control devices are in place. |
| | Inspect sediment control devices to ensure they are installed and operating correctly. Inspect devices particularly during wet weather events to monitor water flows and drainage lines and install new devices as required. |
| Traffic | Inspect trucks to ensure they are not overloaded, adhere to speed limits, cover their loads, correctly licensed and undertake regular inspections and safety checks. |
| | Inspect signs and hazards markers to ensure they are used appropriately, are in place and clearly visible. |

### Table 18.2 Monitoring requirements during operation

| Issue | Monitoring |
|---|---|
| Water | Monitor water in sedimentation dams and receiving waterways on a quarterly basis. Monitor surface water during wet weather events. |
| Air quality | Monitor dust generation from site by checking readings from existing dust gauges. |
| | Monitor odour levels once plant is operating and undertake regular odour patrols in the area. |
| Groundwater | Review groundwater levels and quality sampling results from monitoring as part of overall Kimbriki Resource Recovery Centre environmental management. |
| Noise | Conduct noise monitoring at plant during plant commissioning stage and normal operation. |
| Pest, vermin and weed control | Arrange for inspection on an annual basis by a licensed pest control and ensure adequate control is implemented. Control weeds using an appropriate biodegradable herbicide. |
| Traffic | Ensure vehicles are adhering to speed limits, and weights limits and using defined access roads. |
| Biodiversity | Monitoring of the implementation of the vegetation management plan, as described in section 8.4.1. |
| | Monitor the impact on groundwater dependent ecosystems. |

## 18.4 Proposed environmental reporting

An annual return would be prepared for submission to DECCW. The return would include:

- A statement of compliance with licence conditions;
- Monitoring and complaints summary;
- Any shortcomings in site activities or environmental controls identified in the return would be identified and EMP amended accordingly;
- In addition, incidents causing or threatening material harm to the environment would be reported to the DECCW, in accordance with environmental protection licence conditions.

The reporting requirements are outlined in Table 18.3.

### Table 18.3 Reporting requirements

| Item | Frequency |
|---|---|
| Annual return | Annual |
| Statement of compliance signed by designated representative of operating licensee | Annual |
| Record of complaints | Within 48 hours of receipt of complaint. |

| Item | Frequency |
|---|---|
| Notification of Incident of environmental Harm | Immediate notification through EPA pollution line;<br>Written report required within reasonable time frame of the event occurring. |
| Fire or explosion Incident | Immediate notification through EPA pollution line;<br>Written report as soon as practicable. |
| Fire report | Immediate notification through EPA pollution line;<br>Written report within 7 days of occurrence. |

# 19 Draft Statement of Commitments

Section 75F(6) of the NSW *Environmental Planning and Assessment Act 1979* states that the Director-General may require the proponent to include in an environmental assessment a statement of the commitments the proponent is prepared to make for environmental management and mitigation measures. The Director-General's requirements for the project include the provision of a draft statement of commitments. This section provides the commitments for environmental mitigation, management and monitoring for the project.

The proponent commits to implement the measures outlined in Table 19.1. The recommended content of the construction and operation environmental management plan are outlined in chapter 18 and chapters 8 to 17 in part C of the environmental assessment. Table 19.1 lists those measures that are additional to environmental management measures.

**Table 19.1 Draft commitments**

| Issue | Commitments |
|---|---|
| General management plans | Preparation and implementation of a construction environmental management plan as outlined in section 18.2.2. |
| | Preparation and implementation of an operation environmental management plan as outlined in section 18.2.2. |
| Biodiversity | An offset strategy would be implemented following finalisation of negotiation with government agencies. A Biodiversity Offset Area Management Plan would be prepared for the designated offset area.<br>The selected offset areas would be reserved in perpetuity, physically protected, and managed to ensure the long-term survival of threatened and significant flora, fauna and ecological communities. |
| Air quality and odour | Measures to reduce the potential for air quality impacts would be incorporated into the design of the facility as described in section 9.4.<br>The specifications provided to prospective equipment suppliers would dictate the technical and environmental performance the equipment would be expected to meet, based on the proponent's operational requirements and the conditions of consent for the project.<br>An odour management plan would be prepared as part of the operation environmental management plan detailing measures for the control of odour generation.<br>A dust management plan would be prepared as part of the construction environmental management plan detailing measures for the control of dust generation. |
| Traffic and transport | The proponent would ensure that the layout of the proposed car parking areas, including driveways, aisle widths, grades, parking bay dimensions, sight distance requirements and turn paths is designed in accordance with AS 2890.1-2004 and AS 2890.2-2002 during the detailed design phase.<br>Car parking areas and entry/exit points would be clearly delineated through line marking and signage to ensure smooth, safe traffic flow.<br>The proponent would continue to liaise with the Roads and Traffic Authority regarding the design and upgrading of the Mona Vale Road/Kimbriki Road intersection. |

| Issue | Commitments |
|---|---|
| | To address some of the existing operational and safety issues at the intersection of Mona Vale Road and Kimbriki Road, it is proposed to redesign the intersection to allow a continuous westbound acceleration lane, a painted separation island within the intersection for right turning traffic; and an extended right turn bay on Mona Vale Road (line marking adjustment only).<br><br>The proponent may also introduce specific operational procedures for the morning peak, if construction works or operational requirements of the project impact on right-turn movements into and out of the Kimbriki Resource Recovery Centre.<br><br>A minimum of approximately 80 parking spaces would be provided during construction. Adequate parking spaces for 60 operational staff plus visitors would be provided as part of the design of the project. |
| Soil and water | The proponent would implement measures during construction to minimise soil erosion and discharge of sediments from the site.<br><br>The proponent would upgrade the capacity of the Kimbriki Resource Recovery Centre stormwater treatment system to cope with the increased flows associated with the project to meet current EPL requirements for offsite surface water discharges.<br><br>The design of the operational stormwater management system, as outlined in chapter 12, would minimise the potential for impacts on surface water, nearby creeks and on groundwater. |
| Greenhouse gas | Potential energy efficiency measures including in the areas of lighting, compressed air, ventilation, odour prevention and removal, heating and cooling and process efficiency (as detailed in section 13.4) would be considered in the detailed design phase of the project. |
| Noise | The project would be designed and operated to ensure that noise criteria are not exceeded.<br><br>A construction noise management plan would be prepared as part of the construction environmental management plan to detail how construction noise impacts would be minimised, including the measures identified in section 10.5.1.<br><br>An operational noise management plan would be prepared incorporating the measures for the control of noise identified in section 10.5.2. |
| Heritage | If any Aboriginal cultural objects are uncovered during construction, all works would cease and a suitably qualified archaeologist and Aboriginal community representatives would be contacted to determine the significance of the object(s) and appropriate management responses.<br><br>If human remains were located during construction, all works would cease and the NSW Police, the Aboriginal community and DECCW notified. |
| Hazards | All safeguards identified in the hazard identification process (Table 15.1) would be implemented through the development and implementation of a comprehensive safety management system for the operation of the facility.<br><br>To minimise potential bushfire risk, asset protection zones would be provided and maintained, appropriate construction materials and methods would be used, safe access and egress and an adequate supply of water would be provided: |

| Issue | Commitments |
|---|---|
| Visual | A landscape concept plan would be developed as part of the detailed design of the project. The plan would include tree plantings consistent to assist in reducing visual impacts of the project and include native and endemic species to ensure the existing character is retained.<br><br>The design of the project would involve consideration of building materials and treatments to minimise the potential visibility of the project. Design recommendations provided in section 16.4 would be incorporated into the detailed design of the project where practicable. |
| Socio-economic | The proponent would undertake ongoing consultation with the local community and other key stakeholders during construction and operation. |

# 20 Justification and conclusions

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

- The project is consistent with the objects of the EP&A Act;
- The project is consistent with the strategic direction for waste management in NSW;
- The project meets a need for alternative waste technologies needed to increase resource recovery from municipal waste and divert valuable materials from landfill;
- The project is consistent with the proponent's objectives and drivers;
- The project would enable the SHOROC councils to reduce their long term waste management costs and reduce greenhouse gas emissions associated with landfilling their waste; and
- The project uses proven and affordable technologies that best match the needs of the SHOROC region.

## 20.1 Consistency with the objects of the EP&A Act

### 20.1.1 The principles of ecologically sustainable development

Clause 6 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* lists the principles of ecologically sustainable development as:

a) ***The precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*

   *(i) Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*

   *(ii) An assessment of the risk-weighted consequences of various options.*

*(b)* ***Inter-generational equity**, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*

*(c)* ***Conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.*

*(d)* ***Improved valuation, pricing and incentive mechanisms**, namely, that environmental factors should be included in the valuation of assets and services.*

An assessment of the project against these principles is provided below.

### 20.1.2 Precautionary principle

A range of environmental studies, as described in Part C of this environmental assessment, have been undertaken as part of development of the project and the environmental assessment

process, to ensure that the potential impacts are understood with a high degree of certainty. The assessment of the potential impacts of the project is considered to be consistent with the precautionary principle. It is considered that the assessments that have been undertaken are consistent with accepted scientific and assessment methodologies, and have taken into account relevant statutory and agency requirements.

The project has evolved to avoid impacts where possible and to reflect the findings of the studies undertaken. For example, following the preliminary biodiversity constraints investigation, the RRF layout has been re-designed to avoid more of the potential *tetratheca glandulosa* habitat, while maintaining sufficient space for engineering and operational requirements.

Similarly, consideration of air quality and noise impacts has been given in locating the various components of the facility. The project incorporates design features to reduce the potential for air quality (mainly odour) impacts.

A number of safeguards have also been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the project. No safeguards have been postponed as a result of lack of scientific certainty. The selected construction contractor(s) would be required to prepare a construction environment management plan prior to commencing construction. This requirement would ensure that the project achieves a high-level environmental performance.

### 20.1.3 Principle of intergenerational equity

It is recognised that the construction of the project has the potential to lead to some environmental impacts. This includes some temporary disturbance during construction activities. However, the potential for environmental disturbance as a result of construction has to be balanced against the long-term benefits of providing essential waste management infrastructure for the region and improving resource recovery.

The project would facilitate improved diversion of waste from landfill into a potential use with a higher resource value. This would be achieved thought a combination of improved recycling and processing of food and garden organics. Recovering recyclable materials from a waste stream, that would otherwise have gone to landfill conserves raw material resource such as iron ore, bauxite and fossil fuels (used for production of steel, aluminium and plastics), and saves trees due to recovery of paper and cardboard. This is a direct benefit to future generations.

Recycling also captures the embodied energy contained within the recyclates – significantly reducing the energy demand that would be required to manufacture using virgin materials.

Diversion of food/garden organics as well as paper, cardboard and timber from landfill reduces the potential for methane emissions that would otherwise have been generated from their anaerobic decomposition in landfill. Methane is a potent greenhouse gas with a global warming potential 21 times greater than carbon dioxide. Implementation of the project would reduce the greenhouse gas emissions from the food and garden organics waste stream. This is a direct benefit to future generations.

Production of marketable compost, particularly from the source separated food and garden organics would reduce the need for chemical fertilisers, which improves water quality in rivers and streams. Its use may also improve the water retention ability of soils which reduces the need to water plants/crops. This preserves water resources for future generations.

In addition, the new facilities would improve local employment potential and contribute to economic growth in the local area.

### 20.1.4 Conservation of biological diversity and ecological integrity

A preliminary ecological assessment was undertaken to identify potential biodiversity constraints for consideration during the development of the project layout and concept design. The footprint of the project was then selected to minimise potential direct and indirect impacts on the biodiversity of the locality, especially in relation to threatened species and endangered ecological communities.

An offset strategy was also developed to offset the impacts of vegetation removal as a result of the project. The full ecological assessment prepared for the environmental assessment concluded that significant impacts on the biodiversity of the area are unlikely.

Specifically, this assessment found:

- In terms of the NSW Part 3A Assessment - the project would maintain or improve biodiversity values, given the avoidance of sensitive habitat where possible, the proposed mitigation of potential impacts on sensitive habitats and the recommended offset areas.
- In terms of potential impacts on EPBC Act matters of national environmental significance – although a direct impact on species listed by the EPBC Act would occur (particularly the vulnerable *Tetratheca glandulosa* and potential habitat for the endangered southern brown bandicoot), the assessment concluded that significant impacts on these species would be unlikely.

Therefore it is considered that the project would maintain or improve biological diversity and ecological integrity.

### 20.1.5 Improved valuation and pricing of environmental resources

The assessment has identified the environmental and other consequences of the project and identified mitigation measures where appropriate to manage adverse impacts. The construction and operation of the project would be in accordance with relevant legislation and the construction and operation environmental management plans. Requirements imposed in terms of implementation of these measures would result in an economic cost to the proponent. The implementation of mitigation measures would increase both the capital and operating costs of the project. This signifies that environmental resources have been given appropriate valuation.

The concept design for the project has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the design for the project has been developed with an environmental objective in mind.

The economic costs of the project, including environmental works and management, will be reflected in rates, gate fees and pricing of products (such as compost and recyclables).

## 20.2 Consistency with the strategic direction for waste management

The project would deliver outcomes consistent with national and state legislation and strategies for sustainable waste management. These include the National Waste Policy, the WARRS 2007, and the Sydney Metropolitan Strategy.

The project aligns with the philosophy of viewing waste as a resource – and recovering resources in their highest net resource value state. The recovery of resources in this manner creates value from the waste stream.

The project forms part of an overall strategy for the councils of the SHOROC region to work together collaboratively to increase resource recovery, and provide long-term waste infrastructure for the region.

## 20.3 Meeting the need for alternative waste technologies and the WARRS 2007

The NSW Government has set targets for waste diversion by 2014 (as set out in the WARRS 2007). Recycling of municipal waste is to be increased from a baseline of 26% of waste diverted from landfill, to 66% of waste to be diverted by 2014. However, the total amount of diversion by recovering paper and recyclable containers alone has leveled out. The only way local government can achieve the 66% diversion target is to recover organic components of the waste stream (e.g. food) through an alternative waste management system. This project includes an AWT (enclosed tunnel composting) to recover food and garden organics from the waste stream.

The project is expected to divert approximately:

- 95% of the incoming source separated garden and food organics stream;
- 40% of the incoming mixed waste stream; and
- 90% of the recyclables stream.

It is estimated that overall (at full operation) the project would divert approximately 70% of incoming waste from landfill.

## 20.4 Consistency with the proponent's objectives and strategic drivers

The proponent aims to be a leader in waste management education and practice, through the use of innovative technologies and management systems that maximise resource recovery. The proponent's focus is to divert waste from landfill in line with State Government waste targets and SHOROC waste management objectives.

The project meets the proponent's objectives and business strategy.

The project would assist the proponent in realising its goal of further transforming the Kimbriki Resource Recovery Centre into a model of integrated waste management and resource recovery. The current activities at the centre are already significant in their scale and are effective in diverting waste from landfill. Complementing this, the proposed new facilities would focus on waste types that are unable to be diverted from landfill at the present time. The proposed facilities would also further improve recycling activities, which are being undertaken elsewhere at present.

## 20.5 Proven technologies

The technologies proposed for the project are already operating successfully. Fully functioning tunnel composting technologies have been operating in Australia (e.g. Port Macquarie) for a

number of years. MRF technology is well established and has been used widely for decades successfully to sort and separate kerbside collected recyclables.

## 20.6 Conclusions

This environmental assessment has considered the potential impacts of the project. It has been prepared in accordance with the provisions of Part 3A of the EP&A Act and the requirements of the Director-General of the NSW Department of Planning. The environmental assessment has documented the potential environmental impacts associated with the project, considering both potential positive and negative impacts of the project, and recommending management and mitigation measures to protect the environment where required.

Environmental investigations were undertaken during the preparation of the environmental assessment to assess the potential environmental impacts. These included specialist assessment on issues involving air quality and odour, traffic, noise, greenhouse gas emissions, biodiversity, and heritage.

Overall the project would:

- Divert valuable resources from landfill and permit recovery and recycling of resources from the waste stream;
- Significantly reduce greenhouse gas emissions through:
  - Recovering recyclates such as metals;
  - Avoiding emissions from material that would otherwise be landfilled;
  - Avoiding emissions from long-haul transport of waste by managing waste from the SHOROC region locally; and
- Provide benefits through development of a new industry and new employment opportunities in the SHOROC region.

The project incorporates layout and design features which minimise environmental impacts and protect the environment. These include:

- Locating the project adjacent to an existing resource recovery centre;
- Designing the building and infrastructure layouts to avoid significant vegetation losses;
- Designing buildings to sit at a low elevation to minimise amenity impacts on neighbours; and
- Enclosing processing activities within buildings to minimise litter, noise and odour.

The environmental assessment has examined a number of key issues associated with the project, including identification of potential negative impacts. There are no major environmental issues with this project. The main potential impacts requiring environmental management are:

- Air quality and odour;
- Noise;
- Traffic and transport;
- Surface water;
- Biodiversity; and

- Visual amenity.

The environmental assessment concludes that many of the potential issues identified would be effectively managed through project design features and the recommended offset areas. To manage other issues, and in some cases eliminate them completely, a number of mitigation and management measures (commitments) that would be undertaken are outlined in chapter 18.

Commitments made by the proponent include the preparation of a construction environmental management and operational environmental management plan to ensure that the mitigation and management measures are developed, implemented and monitored. These plans would also ensure compliance with relevant legislation and any conditions of approval.

# Part E
# References, Glossary of Technical Terms, Abbreviations, Units of Measure and the Project Team

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# 22 Glossary of terms

| Term | Definition |
|---|---|
| Alternative waste technology | Technology that diverts waste away from landfill, recovers more resources from the waste stream and minimises the impact on the environment. Provides a more sustainable solution and can include mechanical separation, biological processes, thermal technologies and mechanical biological treatment. |
| Catchment | The area drained by a stream, lake or other body of water. |
| Cumulative impact | A significant impact created by accumulation or successive additions of individual impacts, which may not in themselves be significant. |
| Ecologically sustainable development | Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. |
| Effluent | Liquid industrial waste or wastewater, which may or may not have been passed through a type of purification process. |
| Emission | The release of material into the atmosphere (e.g. gas, noise). |
| Environmental management plan | A document setting out the management, control and monitoring measures to be implemented during construction (a construction environmental management plan) and /or operation (operational environmental management plan) of a development, to avoid or minimise the potential environmental impacts identified during an environmental assessment process. |
| Flora and fauna | Plants and animals. |
| Greenhouse gases | Gases that accumulate within the earth's atmosphere (primarily water vapour, carbon dioxide and methane) and contribute to global climatic change/global warming (the 'greenhouse effect'). |
| Greenhouse gases (Scope 1, 2 and 3) | Scope 1: Direct greenhouse gas emissions from sources falling within the operational boundary of the assessment, from sources that are owned and/or operated by the organisation in question. Scope 1 emissions include direct carbon dioxide emissions from the combustion of stationary or transportation fuels (natural gas, coal, petrol and diesel) in boilers, furnaces, vehicles etc, and fugitive emissions of greenhouse gases from chemical processes, such as wastewater treatment and some product manufacturing.<br>Scope 2: Indirect greenhouse gas emissions associated with purchased electricity, heat or steam. These emissions physically occur at the facility where the electricity, heat or steam is generated.<br>Scope 3: All other indirect greenhouse gas emissions associated with the activities considered in the assessment. These emissions occur from sources not owned or controlled by the company. Scope 3 emissions include those associated with production of purchased materials, transport and contractor owned vehicles, waste disposal, product usage and the extraction and processing of fuels |
| Hydrology | The science dealing with water on the land or under the surface, its properties and distribution. |

| Term | Definition |
|---|---|
| $L_{Aeq}$ | Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring. |
| Material recovery facility | A place where kerbside recyclables are sorted into paper, metals and plastics. |
| Material separation | Separation of a combined waste stream into different materials. |
| Particulate | Small particles, usually occurring in suspension. |
| pH | Measure of acidity (or alkalinity). |
| Project approval | An approval granted under Section 75J of the NSW *Environmental Planning and Assessment Act 1979*. |
| Putrescible | Capable of biological decomposition. |
| Rating background level | The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period. |
| Sewer | A conduit for carrying of wastewater (sewage). |
| SHOROC | The organisation that administers the Shore Regioanl Organisation of Councils. SHOROC is a partnership between the councils that make up the region of the Northern Beaches and Mosman from Bradleys Head to Barrenjoey – Manly, Mosman, Warringah and Pittwater Councils. |
| SHOROC councils | Mosman, Manly, Warringah and Pittwater Councils. The four shareholder councils to Kimbriki Environmental Enterprises. |
| SHOROC region | The four local government areas administered by Mosman, Manly, Warringah and Pittwater Councils. |
| The project | Kimbriki Resource Recovery Project. |
| The proponent | Kimbriki Environmental Enterprises Pty Ltd. |
| Threatened species | Species of animals or plants that are at risk of extinction (also known as 'endangered species') or becoming endangered within the next 25 years ('vulnerable species'), defined by the *Threatened Species Conservation Act 1995.* |
| Water balance | Modelling the use of water in a development. |

# 23 List of abbreviations

| Abbreviation | Name |
|---|---|
| AHD | Australian Height Datum |
| AHIMS | Aboriginal Heritage Information Management System |
| ANL | Australian Native Landscapes |
| APZ | Asset Protection Zone |
| ASL | Above sea level |
| ASR | Archaeological Surveys & Reports Pty Ltd |
| AWT | Alternative Waste Technology |
| AWTDORF | Alternative Waste Technology Derived Organic Rich Fraction |
| BCA | Building Code of Australia |
| BOD | Biological Oxygen Demand |
| CBD | Central Business District |
| C&I | Commercial and Industrial |
| C&D | Construction and Demolition |
| CPRS | Carbon Pollution Reduction Scheme |
| CSIRO | Commonwelath Science and Industry Research Organisation |
| DCCEE | Department of Climate Change and Energy Efficiency (Federal) |
| DECC | NSW Department of Environment and Climate Change (now DECCW) |
| DECCW | NSW Department of Environment and Climate Change and Water (incorporating the former NSW Environment Protection Authority/EPA) |
| DSEWPC | Department of Sustainability, Environment, Water, Population and Communities (Federal) |
| DoL | Department of Lands |
| EMP | Environmental Management Plan |
| EPA | Environment Protection Authority |
| EP&A Act | *Environmental Planning and Assessment Act 1979* |
| EPBC Act | Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* |
| EPL | Environment Protection Licence |
| E-Waste | Electronic waste |
| GHD | GHD Pty Ltd |
| HDPE | High Density Polyethylene |
| HIPAP 6 | Hazardous Industry Planning Advisory Paper No. 6 |
| LALC | Local Aboriginal Land Council |
| LCA | Life Cycle Assessment |
| LEP | Local Environmental Plan |

| Abbreviation | Name |
|---|---|
| LEMP | Landfill Environmental Management Plan |
| LOS | Level of Service |
| MRF | Materials Recovery Facility |
| WRC | Waste and Recycling Centre |
| MWH | Montgomery Watson Harza |
| NES | National Environmental Significance |
| NGA | National Greenhouse Accounts |
| NGER | National Greenhouse and Energy Reporting |
| NHMRC | National Health and Medical Research Council |
| NSW | New South Wales |
| OEMP | Operational Environmental Management Plan |
| PBP | Planning for Bushfire Protection |
| PET | Polyethylene Terephthalate |
| PHA | Preliminary Hazard Analysis |
| POEO Act | *Protection of the Environment Operations Act 1997* |
| RBL | Rating Background Levels |
| RFS | Rural Fire Service |
| RL | Reduced Level |
| ROTAP | Rare or Threatened Australian Plants |
| RRF | Resource Recovery Facility |
| RTA | Roads and Traffic Authority |
| SCADA | Supervisory Control and Data Acquisition |
| SEPP | State Environmental Planning Policy |
| SHOROC | Shore Region of Councils |
| TAPM | The Air Pollution Model |
| TDS | Total Dissolved Solids |
| TOC | Total Organic Carbon |
| TSC Act | *Threatened Species Conservation Act 1995* |
| TSP | Total Suspended Particulates |
| VCR | Volume to Capacity Ratio |
| VENM | Virgin Excavated Natural Materials |
| WARR Act | *Waste Avoidance and Resource Recovery Act* 2001 |
| WARRS | Waste Avoidance and Resource Recovery Strategy |
| WMA | *Water Management Act 2000* |
| WPBFMC | Warringah Pittwater Bush Fire Management Committee |
| WRC | Waste and Recycling Centre |
| WSUD | Water-Sensitive Urban Design |

# 24 Units of measure

| Type | Units | Description |
|---|---|---|
| Length | mm | Millimetres |
| | m | Metres |
| | km | Kilometres |
| | RL | Reduced level |
| Area | $m^2$ | Square metres |
| | ha | Hectares |
| Volume | L | Litres |
| | kL | Kilolitres |
| | v/v | Volume for volume |
| | $m^3$ | Cubic metres |
| Mass | µg | Micrograms |
| | mg | Milligrams |
| | g | Grams |
| | kg | Kilogram |
| | t | Tonnes |
| Noise | dB | Decibel – unit of sound measurement |
| | dB(A) | Unit used to measure 'A-weighted' sound pressure levels |
| | Hz | Hertz – unit used to measure frequency |
| | $L_N$ | Noise exceedance level (N = percentage of sampling period) |
| Time | s | Seconds |
| | h | Hours |
| | yr | Years |
| Odour | ou | Odour units |
| Carbon | $CO_2$-e | Carbon dioxide equivalents |
| Miscellaneous | % | Percentage |
| | $ | Australian dollars |
| | @ | At |
| | ºC | Degrees celsius |
| | º | Degree (angle between slope and horizontal) |
| | pH | Measure of acidity or alkalinity |

# 25 Project team

| Organisation (role) | Team members |
|---|---|
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| Bushfire | Dominic Adshead, Michelle Evans |
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| Water | Andrew Dyer |
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| Greenhouse gas | Anna Montgomery, Andrew Maddocks, Alison Horlyck |
| Design | David Gamble, Alison Horlyck, Adrian Miller |
| Kimbriki Environmental Enterprises | Mark Winser |
| Wright Corporate Strategy (project delivery) | Paul Howlett |
| Ecotone Ecological Consultants (flora and fauna) | Stefan Rose |
| Archaeological Survey and Research (Aboriginal heritage) | John Appleton |
| PAEHolmes (air quality) | Jane Barnett, Aleksander Todoroski |
| KJA (communications/consultation) | Ute Junker, Daphe Sider |
| GTA (traffic) | Danielle Cruickshank, Alan Stewart |
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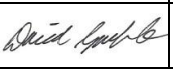
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