Kimbriki Environmental Enterprises

Kimbriki Resource Recovery Project

Preferred Project Report

November 2011

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1. Introduction

1.1 Overview and background

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

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 of the landfill at the Belrose Waste and Recycling Centre in 2014-15.

It involves the construction and operation of two main facilities, including a:

- Materials recovery facility (MRF); and
- Resource recovery facility (RRF).

The Project was declared a Major Project by the State Environment Planning Policy (SEPP) (Major Development) 2005, and therefore requires the approval of the NSW Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The proponent lodged a Major Project Application (Concept 10_0064/Project 10_0065) with the Department of Planning and Infrastructure (DoPI) in early 2010.

An Environmental Assessment (EA) (GHD, Feb 2011) supporting this application was exhibited by DoPI from 23 February to 30 March 2011. During the exhibition period, DoPI received 14 submissions – 4 from government agencies and 10 public submissions. Following the exhibition period an additional 4 submissions were lodged which included 3 individual submissions and 1 submission from a special interest group.

In accordance with clause 75H(6) of the Act, the Director-General of DoPI required KEE to respond to issues raised in the submissions. A Response to Submissions (RTS) document was prepared and lodged with DoPI on 19 May 2011.

In a letter dated 9 September 2011, DoPI acknowledged that significant effort had been made by KEE to accommodate the vulnerable flora species *Tetratheca glandulosa* (listed under the *Threatened Species Conservation Act 1995* (TSC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)) in the design of the project. The project design provided for a retained vegetation island containing *Tetratheca glandulosa* plants.

During the latter stages of DoPI's assessment of the project, a proposed Endangered Ecological Community (EEC) was identified within the site boundary – *Coastal Upland Swamp in the Sydney Basin Bioregion*, listed as a Preliminary Determination by the NSW Scientific Committee on 15 April 2011. This potential EEC is a groundwater dependent community and has the potential to be impacted by changes to hydrological flows as a result of the project.

DoPI undertook further consultation with Warringah Council, NSW Office of Water (NOW) and the Office of Environment and Heritage (OEH) and concluded that there may be greater environmental benefit if the

footprint of the facility was revised to preserve a greater area of potential EEC and maintain natural hydrological flows, as opposed to preserving the island of vegetation.

DoPI therefore requested KEE consider relocating the maturation/final processing building approximately 150 metres to the west. Furthermore DoPI advised that if KEE decided to proceed with the relocation of the maturation building, it would be necessary to verify that the modelling and impact assessment undertaken for key issues associated with the project would be comparable between the existing and revised site layout, or otherwise revise the relevant technical reports.

KEE responded by revising its concept design by moving the maturation/final processing building to the west, to preserve the potential EEC and also maintain hydrological flows. The new layout, which is described in section 2.2, also reduces the area of native vegetation that would be cleared overall.

As a result of the relocation of the maturation/final processing building and change to the project layout, the stormwater management for the project has also been revised. Similarly the biodiversity offset strategy for the project has also been refined.

In addition, the Sydney Regional Development Advisory Committee (SRDAC) made a number of recommendations in its submission for consideration in determination of the project including proposed conditions relating to the intersection design of Mona Vale Road/Kimbriki Road. Following consultation with the NSW Roads and Traffic Authority's (RTA) land use planning section and corridor planning section, a revised intersection design was developed.

This Preferred Project Report provides information on the revised concept design and other modifications that have occurred as a result of discussions with key stakeholders and describes the potential environmental impacts associated with the proposed modifications.

1.2 Structure of report

Modifications to the project compared to the project described in the (GHD 2010) EA are discussed in section 2 and the modified project is described in section 3.

The environmental impacts of these changes to the project are discussed in section 4, which explains what the modifications are and how those modifications would lead to a better environmental outcome.

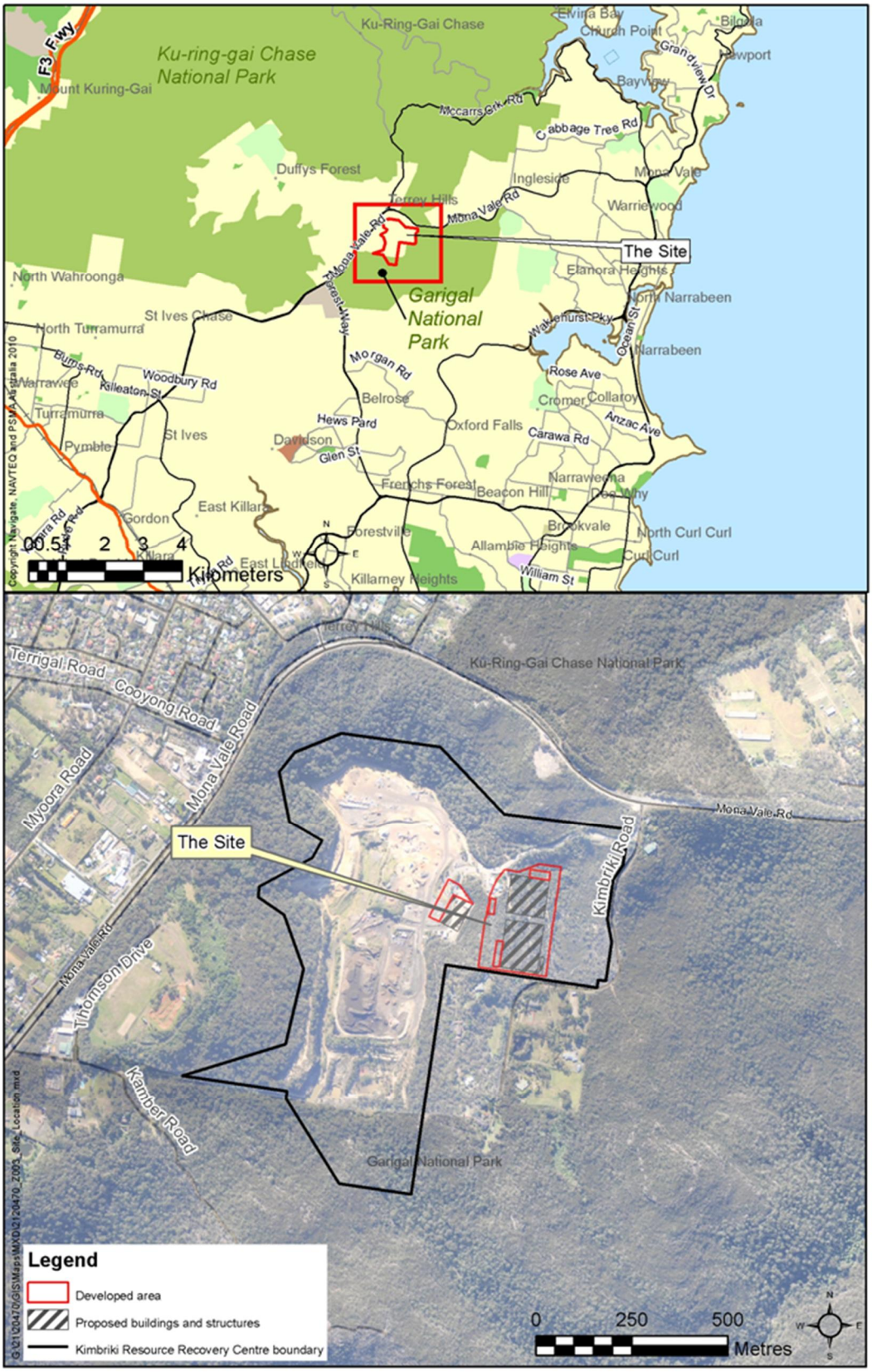


Figure 1.1 Project site setting

2. Modifications Made to the Project

2.1 Overview

The modifications to the project include:

1. Revised site layout and platform;
2. New stormwater management system;
3. Revised offset strategy and supporting restricted activity and revegetation areas; and
4. Modifications to Mona Vale Road and Kimbriki Road intersection concept design.

Each of the modifications is described further in the following sections.

2.2 Revised site layout and platform

As described in section 1.1, the project concept design was revised in response to a specific request by stakeholders made through DoPI. This involved relocating the maturation/final processing building in order to preserve the potential EEC and also better maintain hydrological flows. Other adjustments to the layout were also then required to facilitate the relocation of this building.

The new project site layout is shown in Figure 2.1. The key changes to the layout include:

- Relocation of the maturation/final processing building to the west and slightly south;
- Relocation and shortening of the enclosed conveyor between the two buildings;
- Adjustment to the orientation and aspect ratio of the AWT building to fit the maturation/final processing building adjacent and to the north;
- Incorporation of the amenities block into the AWT building;
- Changes to platform and building reduced levels (RLs) and associated additional ramps to enable circulation around the site;
- Relocation of the AWT car park – to two smaller car parks;
- Adjustment to the site entrance to enable access to the AWT platform via the existing administration building car park;
- Relocation of the emergency access gate;
- Changes to the proposed stormwater management including stormwater pond location(s) (further details provided in section 2.3);

Figure 2.1 Revised project layout

2.3 Stormwater management

In terms of stormwater management, the adjustments made to the platform have resulted in a modified stormwater management system being proposed for the project site. This will result in roof water from the two buildings being directed through rainwater collection tanks so that it can be re-used on site.

Overflows from these tanks will be directed to stormwater detention tanks, and the overflows from these tanks directed to either the existing site stormwater collection system (to the west) or to the retained vegetation areas to the east, to enable post project water flows to closely mimic pre- project flows.

Stormwater from roadways will also pass through these detention tanks, and follow similar routes to the roof water overflows, but will not be discharged into ecologically sensitive areas. The proposed water management system for site operations is shown on Sketch SK114, in the revised water management report in Appendix H. The proposed stormwater management system for project construction is shown as Sketch SK115, in the same report.

2.4 Revised offset strategy and supporting restricted activity and long-term rehabilitation areas

Since the EA, adjustments were made to the formal offsets to incorporate the changes to the site layout (as described in section 2.2 and shown in Figure 2.1).

Some further adjustments were made to the offset strategy to ensure that the offsets were consistent with the original consent (Development Consent 96/371) for the overall Kimbriki site, which defined areas approved for future quarrying and landfilling.

The revised formal offsets associated with the revised site layout are shown as Figure 2.2 and are summarised in Table 2.1 below.

Table 2.1 Formal offsets associated with revised project footprint

Vegetation type	Disturbed area (ha)	Retained area (ha)	Ratio
Black Wattle/Christmas Bush Riparian and Gully Forest	0.02	0.28	14:1
Coachwood Gully Rainforest	0	0.15	infinite
Eucalyptus luehmanniana habitat	0.02	1.52	76:1
Gahnia Swamp	0	0.14	infinite
Leptospermum/Scrub She-oak/Banksia Scrub	0.90	4.66	5.2:1
Peppermint/Smooth-barked Apple Slopes Forest	0	5.00	infinite
Redbloodwood/Scribbly Gum Woodland	3.62	1.79	0.5:1
Sedgeland/ wet heath	0	1.00	infinite
TOTAL	**4.56**	**14.54**	**3.2:1**

The layout proposed in the EA included 5.75 ha of disturbed area, and the offset strategy proposed in the EA included 14.75 ha of plants to be protected (retained), which resulted in an offset ratio of 2.56:1. The modifications to the project have resulted in a reduction in the total area of cleared vegetation and as a result the formal offset ratio has increased from 2.56:1 to 3.2:1.

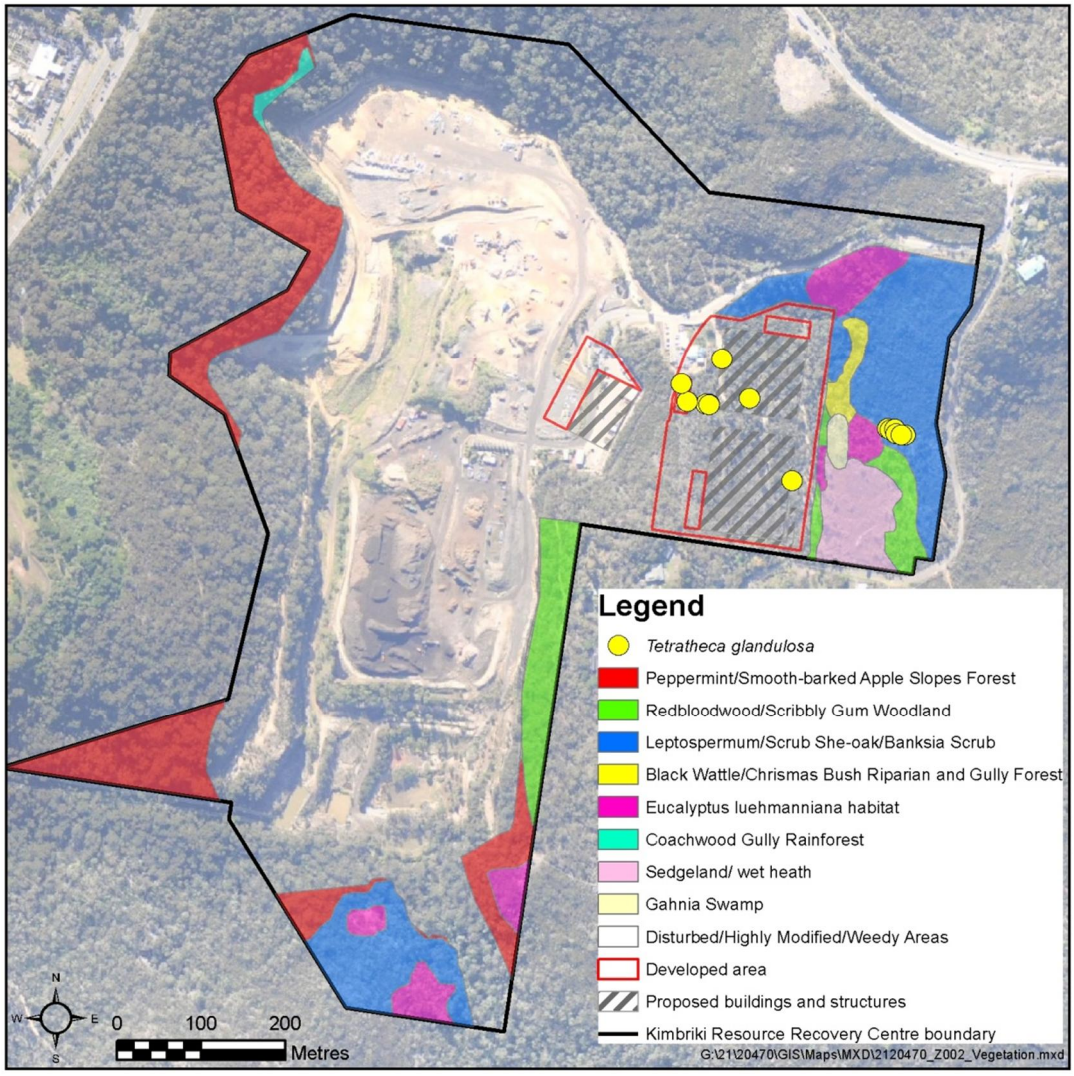


Figure 2.2 Revised formal offsets

Following the EA exhibition period, KEE held discussions with OEH and DoPI regarding the proposed biodiversity offsets for the project. Based on these discussions additional measures were incorporated into the project to further mitigate potential impacts on biodiversity values at the project site. These additional measures included:

- Further areas of restricted activity;
- Project site landscaping;
- Future regeneration of completed landfilling; and
- As far as practicable, inclusion of additional land if the successful contractor/operator were to require less land area to conduct the works.

Figure 2.3 shows the areas of vegetation to be retained under the project (the formal offsets as summarised in Table 2.1) as well as the Restricted Activity Areas. These take into account the revised layout and the areas of the overall site which are currently approved for landfilling purposes, or are to be used for future landfilling under the site Master Plan.

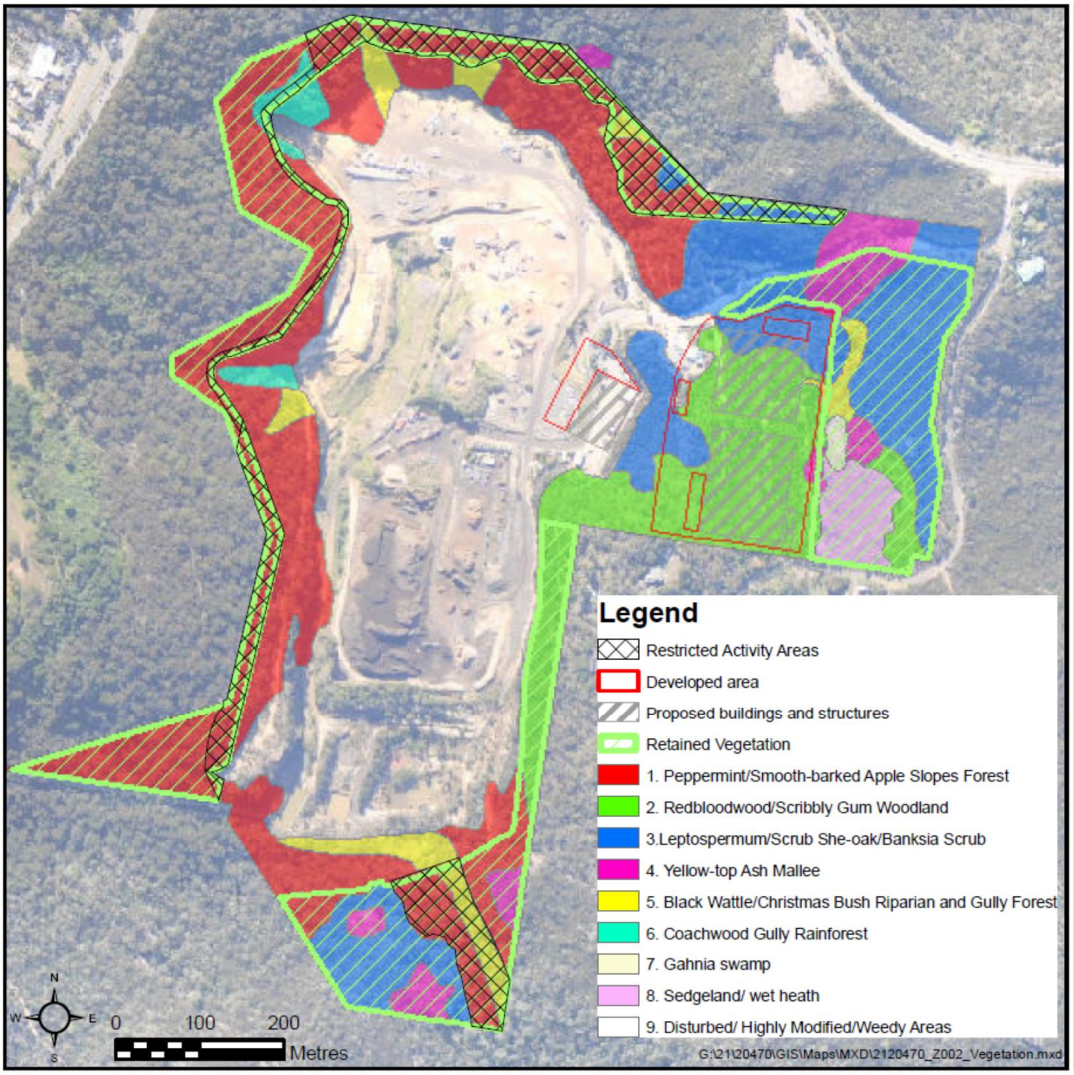


Figure 2.3 Restricted activity areas and retained vegetation

2.5 Mona Vale Road and Kimbriki Road intersection

Following exhibition of the EA the Sydney Regional Development Advisory Committee (SRDAC) made a number of recommendations in its submission for consideration in determination of the project including proposed conditions relating to the intersection design of Mona Vale Road/Kimbriki Road. Following consultation with the NSW Roads and Traffic Authority's (RTA) land use planning section and corridor planning section, a revised intersection design was developed by GTA Consultants.

On 1 July 2011 the RTA agreed to a 250 m length for the westbound acceleration lane and also agreed that there was no need to adjust the length or width of the eastbound acceleration lane. The concept plan for the intersection is provided in Appendix B.

The RTA provided in-principle approval of the proposed intersection design in a letter dated 18 July 2011 (Ref: RDC 10M689b Vol 3 SYD10/01026/02). A copy of the letter is provided in Appendix C.

3. Project Overview

3.1 Overview

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

- A MRF to process 60,000 tonnes per annum of kerbside collected dry recyclables and self-haul drop-off dry recyclables, using a combination of human labour and mechanised equipment. There has been no change to the location and layout of the MRF, other than the location of a car park.
- A RRF using materials sorting and recovery and tunnel composting technologies to process 100,000 tonnes per annum kerbside collected mixed residual waste and kerbside collected food and garden wastes. The RRF incorporates an AWT building and a maturation/final processing building. In the revised layout, the AWT has its orientation altered, and the maturation/final processing building and associated car park areas and weighbridge have been moved to avoid impacts to the groundwater-dependent vegetation community (recently proposed as an endangered ecological community under the NSW *Threatened Species Conservation Act 1995* - TSC Act) and reduce impacts on hydrological flows.

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

- High grade compost from green waste and food scraps, which could be used for landscaping and agriculture; and
- Lower quality organic product from mixed municipal wastes, which could be suitable for rehabilitation or limited agricultural uses.

The project also includes the following ancillary infrastructure:

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

The site layout is shown in Figure 2.1.

3.2 Buildings

AWT building

The building would be a portal-framed structure approximately 10-12 metres in height and measure about 125 m x 100 m with a reinforced concrete floor and concrete perimeter walls about 3 metres high. 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.

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.

MRF building

The MRF building would be constructed with a concrete floor and concrete perimeter walls to a height of 3 metres. The remainder of the walls and roof would be cladded in a colour that blends in with the surrounding area and existing site buildings. It would be architecturally designed so that it is consistent with the sustainability theme of the Kimbriki Resource Recovery Centre.

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.

3.3 Ancillary infrastructure

Access and internal roadways and weighbridge

Access to the new facilities would be via a new dedicated sealed road. The road would enable vehicles to turn left from the existing site access road and head south to the RRF buildings. Staff parking for the RRF would also be accessed in this manner.

A new weighbridge would be installed. This would facilitate weighing and recording of incoming and outgoing RRF loads. The weighbridge would be located between the maturation/final processing building and the AWT building.

Car park

Two car parks would be constructed for staff working at the RRF. A car park would also be constructed next to the MRF building for staff working at the MRF.

3.4 Road works at the intersection of Mona Vale Road and Kimbriki Road

To improve operation and safety at the intersection of Kimbriki Road and Mona Vale Road, some minor amendments to the existing ‘seagull’ intersection are proposed to allow:

- A 250 m long westbound acceleration lane;
- A painted separation island within the seagull intersection for right turning traffic; and
- An extended right turn bay on Mona Vale Road.

The concept plan for the intersection is provided in Appendix B.

3.5 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.

Preliminaries, site preparation, earthworks and civil infrastructure

The preliminary construction activities are:

- Preparation and approval of a detailed construction environmental management plan;
- Relocation of the current administration office to another location on site;
- Design and implementation of environmental controls including temporary erosion and sedimentation controls, stormwater ponds, and drainage pipes to link the development site with the existing site stormwater system;
- Construction of northern maturation site access road and cutting of sandstone in car park area to create a construction office area/compound;
- Removal of shrubs, trees and other vegetation not able to be retained over the broader site;
- Establishment of a construction office; and
- Stripping and stockpiling of topsoil.

Following this, bulk earthworks to prepare the pads for the processing buildings would commence. The majority of excavations and extraction would then be undertaken to prepare the pad for the AWT, maturation/final processing and MRF buildings.

Excavation and extraction techniques including ripping and pushing/hydraulic hammering of sandstone would be employed. Extracted material would be mostly loam, sand and sandstone materials and would be either processed on site utilising the existing construction and demolition processing equipment or transported to an intermediate stockpile before being re-used as fill under the two excavated platforms or despatched off site.

Building infrastructure

Construction of the buildings (from slab pouring to cladding) is expected to take approximately 15-20 weeks, depending on the construction contractor and construction techniques used. An additional 10-15 weeks may be needed to internally fit out each building.

Concrete for the floor slabs and other site uses would be batched off-site. Formwork would be constructed and concrete poured on-site. Structural steelwork and steel cladding would be fabricated off-site and delivered by truck for erection by crane or other similar equipment.

Installation of equipment

Mechanical processing equipment for both the MRF and RRF would be assembled off site 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 to allow equipment to be positioned on the concrete slab floors easily.

Commissioning

Commissioning of both facilities would be undertaken in two stages:

1. Mechanical and electrical commissioning (dry commissioning)
2. 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 would be carried out at this stage as required to ensure the equipment is operating effectively and efficiently.

Weighbridge software would also be commissioned at this stage.

Other activities

Other construction activities that would be undertaken include:

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

The site roads will be properly surfaced and the weighbridge installed once earthworks are completed.

4. Environmental Impacts of Modifications

4.1 Biodiversity

The changed layout will alter potential impacts to threatened biota. This revised layout (Figure 2.1) involves relocating the maturation building to the west of its previous planned location. The revised layout would result in the following:

- 4.56 ha of native vegetation would be cleared (compared to 5.75 ha based on the previous layout);
- 12 of 20 *Tetratheca glandulosa* would be removed (compared to 2 in the previous layout);
- There would be only limited direct impacts to the Coastal Upland Swamp (compared to impacts in the previous layout); and
- Impacts on hydrology would be reduced (compared to the previous layout).

This revised layout would have a number of operational advantages, and is considered to result in better long term biodiversity outcomes than the current layout. This would be achieved by keeping the eastern part of the site free of development, and protecting the Coastal Upland Swamp. The new layout increases the area of retained vegetation associated with the project, preserves the Coastal Upland Swamp, and maintains natural hydrological flows, but leads to the loss of the island of vegetation that was previously proposed for retention to limit impacts to *Tetratheca glandulosa*. This changed layout is preferred by Warringah Council. OEH and DoPI's preliminary view is that this new layout is also preferred, and can be justified by the presence of *Tetratheca glandulosa* in national parks in the area (see letter from DoPI, attached as Appendix A).

The proposed MRF building to the west is located in an already cleared and deeply excavated area and would have negligible direct or indirect impact on biodiversity. Practically all impacts on biodiversity would result from construction of the RRF buildings and associated facilities, including car parks and hardstand areas which are proposed for the naturally vegetated eastern part of the subject site. In all, a total of approximately 4.56 ha of native vegetation would be removed for the project.

Three areas of vegetation within the wider Kimbriki lands are proposed to be retained as an offset. These include vegetation between the RRF and the eastern border, vegetation along the northern and western border, and vegetation in the south of the Kimbriki lands. There is the potential for indirect effects from the proposed development that could impinge on the habitat of the offset areas in the direct vicinity of the subject site. These could include possible shading from buildings, altered wind profiles, dust and the potential for runoff of nutrients and chemical pollutants from the facilities. These indirect impacts would be mitigated by implementation of the stormwater management system, and sedimentation controls during construction and operation. More details are included in the Environmental Assessment (GHD 2010).

Indirect impacts to hydrological flows and groundwater dependent ecosystems have been reduced by moving the RRF buildings away from the drainage line and protecting the Coastal Upland Swamp.

Tetratheca glandulosa

The new layout is likely to lead to the removal of 12 of the 20 plants recorded. The eastern habitat patch for the species would not be directly affected. Eight plants would be retained in this area. Locations of *Tetratheca glandulosa* plants in relation to the proposed layout are shown in Figure 2.2.

The NPWS considers that areas of habitat which contain *Tetratheca glandulosa* populations greater than 100 plants should be considered significant across the species' range. Populations that constitute less than 100 plants may also be significant depending on the subregional distribution of other populations in the locality (NPWS, 2000). The NPWS defines 'local population' for *T. glandulosa* as occurrences of the plant between which it is assumed that there is an exchange of genetic material. In the case of *T. glandulosa*, all individuals occurring within 1 km of the subject site (between which there is likely to be genetic exchange – e.g. pollen exchange) will constitute the 'local population' (NPWS, 2000).

Based on the definition above, the individuals at the site are considered part of the wider population that is likely to include additional individuals. The subpopulation on site consists of 20 known individuals. Records for *Tetratheca glandulosa* within 2 km, 5 km and 8 km from the centre of the Kimbriki site population were obtained by Ecotone Ecological Consultants from the OEH Wildlife Atlas (accessed August 2011) and Warringah Council database records (accessed 30 September 2011).

A minimum of 127 plants[1] were recorded within 2 km of the site (probably all within 1 km of the site). Based on this, the proposal is likely to lead to the loss of about 10% of the local population. Other records are present in the wider locality. These include a minimum of 1002 plants recorded between 2 and 8 km from the site.

Offset Strategy

The offset strategy (described in section 2.4) would involve protecting and managing areas which encompass a substantial portion of natural vegetation within the broader Kimbriki Resource Recovery Centre site. In particular, the offset strategy would address the protection of areas of threatened species habitat (particularly *Tetratheca glandulosa*). It would involve preparation of a site-specific vegetation management plan to ensure that the condition of vegetation in the protected areas is protected and maintained. In order to 'maintain or improve' biodiversity, the offset areas would be managed to ensure that they would end up in a better condition than if the areas were not offset. The management of these the areas would be guided by a formal vegetation management plan, tailored to the requirements of each habitat area. The management requirements are likely to be more stringent at the interface between offset areas and development areas.

The vegetation management plan for the offset areas would include consideration of the following:

- Physical protection from unauthorised access and site disturbances where appropriate (during both the construction and operation phases) 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; and

[1] Most of these records, including one record of 120 plants, are from the last twenty years. Most records do not include details of the number of plants recorded at each location. Therefore, where no estimate of number is given for a particular record, an assumed minimum of one plant has been used to calculate total numbers. Consequently, the numbers of plants given should be considered to be a minimum, with more numbers likely in reality.

- Development and implementation of protocols to prevent the introduction of *Phytophthora cinnamomi*.

A set of indicators would be developed as part of the vegetation 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:

- Periodic monitoring of general vegetation condition (quarterly, bi-annually, annually or longer depending on the stage of restoration or vegetation condition) using pro-formas to record key ecological indicators, for example, ground cover or leaf litter;
- Annual monitoring of the *Tetratheca glandulosa* population number and health during its flowering period;
- 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.

The revised offset area is shown in Figure 2.2. Note that OEH considers this current agreed biodiversity offset sufficient and that the offset would not need to be revised for the changed footprint (see attached email from Julie Currey, OEH, to Christine Chapman, DoPI, in Appendix F).

The revised project was referred to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC) on 18 October 2011. KEE received notification that the Referral Decision was that it was 'not a controlled action' on 11 November 2011 (Appendix G).

4.2 Air quality and odour

The air quality assessment completed for the EA found that the proposed layout was predicted to comply with the OEH odour criterion at all nearby residences. Additional modelling was undertaken for the modified project layout (refer Appendix D). The nearest receptors and all meteorological data and methodologies remain unchanged remain the same as for the original modelling. Similarly estimated emissions for both biofilters and landfill sources are the same as those used for the previous work (refer Table 4.4).

Table 4.1 Estimated odour emission rates

Source	Odour concentration[2] (ou)	Flow rate (m^3/s)	Total emissions ($ou.m^3/s$)
Project site			
Biofilter at AWT building	300	553	16,500
Biofilter at maturation/final processing building	300	834	24,900
Landfill site			
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	0.004	18,000	72

However the locations of the biofilter stacks have changed with the modified layout. All other stack parameters remain unchanged as shown below.

Table 4.2 Proposed 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

The modelling results are presented in Table 4.3 for each of the nearest residences.

[2] Based on values used for the Elizabeth Drive facilty (Homes Air Sciences 2007) which is very similar to this project

[3] Based on a flow rate of 200,000 m^3/h

[4] Based on an air exchange rate of 300,000 m^3/h (equivalent to the volume of 3 maturation/final processing buildings)

Table 4.3 Predicted cumulative 99th percentile odour concentrations at the nearest residences

Receiver	Address	The project alone (ou)	Cumulative impact (ou)
A	1 Kimbriki Road	1	2
B	1 Kimbriki Road	1	1
C	4 Kimbriki Road	2	2
D	5 Kimbriki Road	1	2
E	6 Kimbriki Road	1	2
H	5 Kamber Road	1	1
G	6 Kamber Road	1	1
I	310 Mona Vale Road	1	1
J	312 Mona Vale Road	1	1
K	314-318 Mona Vale Road	1	1
L	320 Mona Vale Road	1	1

It can be seen that the 2 ou (99th percentile) criterion is not predicted to be exceeded at any of the nearest residential receptors as a result of the proposed layout modification. That is, there are no significant changes to the model predictions as a result of the proposed modifications.

4.3 Noise

The operational noise emissions from the project were remodelled (refer Appendix E) based on the modified project layout and concept design, and assuming the following mitigating design measures would be implemented:

- During the day-time period all doors on the maturation and AWT building are kept closed when they are not being used. Automatic doors are installed to ensure this requirement.
- Building insulation is installed in the AWT and MRF buildings.
- Tunnel ventilation and biofilter fans are located inside the AWT and maturation buildings.
- The AWT and maturation building design incorporate acoustic air intake louvres located on the northern side of buildings.
- During the night-time period, all doors on the AWT and maturation buildings are closed.
- The tunnel ventilation and biofilter fans for the AWT and maturation building should be selected so that an internal noise level of 80 dB(A) is achieved. The internal noise level should be checked for compliance upon commissioning.

Predicted noise levels at the surrounding sensitive receivers for the revised concept design are summarised in Table 4.4 and Table 4.5 for day-time and night-time operations respectively.

Table 4.4 Concept Design - Daytime predicted operational noise levels, dB(A)

Receiver	Criteria	Existing Resource Recovery Centre	The project	Combined total
A	43	31	29	33
B	43	32	32	35
C	43	27	34	34
D	43	27	34	35
E	43	23	29	30
M	43	33	39	40
N	43	33	32	36
O	43	31	28	33
P	43	29	27	31
National Park Reserve	50	28	35	36

Table 4.5 Concept Design - Night-time predicted operational noise levels, dB(A)

Receiver	Criteria	Night-time noise level
A	35	22
B	35	26
C	35	28
D	35	26
E	35	23
M	35	34
N	35	27
O	35	23
P	35	22

Based on the revised concept design, the project specific noise criteria are predicted to be achieved during day time operations, and at night. The revised concept design will not alter the magnitude of construction and road traffic impacts. There is likely to be a considerable reduction in the amount of

excavation of sandstone required because the platform level has been raised and there is less intrusion of the platform into elevated areas particularly to the east and south west. This would reduce the length of time where noise impacts would be experienced from excavation works.

Therefore the revised concept design is considered acceptable from an acoustic perspective.

4.4 Traffic and transport

The proposed modifications to the project will not significantly change the traffic generation expected during either construction or operation.

As described in section 2.5, a revised intersection design was developed by GTA Consultants to address some of the recommendations by SRDAC relating to the intersection design of Mona Vale Road/Kimbriki Road. The concept plan for the intersection is provided in Appendix B. It should help improve existing safety at the intersection and thereby future intersection safety with implementation of the project.

The RTA provided in-principle approval of the proposed intersection design in a letter dated 18 July 2011 (Ref: RDC 10M689b Vol 3 SYD10/01026/02). A copy of the letter is provided in Appendix C.

The proponent would ensure that revised parking arrangement associated with the modifications to the site layout would still provide for a minimum of 63 spaces in accordance with the Warringah LEP 2000. The final car park designs would be confirmed during the detailed design stage of the project.

4.5 Water

A revised water management report has been prepared which provides details on the modified proposed site water management system (Appendix H) and provides an assessment of the potential water flow impacts during operation and construction.

The report concludes that modeling of surface water management throughout the operation of the modified project indicates that it would not have significant hydrological impacts, in that post project surface water flows across the site would be similar to current flows.

During the construction phase, clean stormwater diversion measures upstream of the disturbed area sediment laden water would minimize the volume of water affected by construction activities. Any affected water would be directed to a sediment basin of approximately 2,350 m^3 capacity. This would control soil erosion and avoid discharge of sediments from the site in accordance with normal construction project requirements.

Environmental management plans would be prepared for both the construction and operation phases of the project.

4.6 Other issues

4.6.1 Greenhouse gas

The reduction in the amount of excavation of sandstone would reduce the greenhouse gas emissions associated with construction of the project compared to the project as proposed in the EA.

The modifications are not expected to significantly alter the greenhouse gas emissions associated with operation of the project.

4.6.2 Heritage

The Aboriginal heritage assessment conducted for the EA found there were no sites of Aboriginal origin or places of potential archaeological interest. It concluded that there are no constraints to the project on archaeological grounds.

The modifications would not change the potential heritage impacts of the project.

4.6.3 Hazards and fire risks

The modified project incorporates 10 m wide asset protection zones and other recommended bushfire protection measures. Hence, the modifications would not change the potential hazards and fire risks as described in the EA.

4.6.4 Visual aspects

The modified project includes rearrangement of the AWT building and maturation/final processing building. The revised layout presents a more compact foot print, with the two buildings closer together and the overall footprint reduced.

The RL of the two buildings has been raised by three metres, however the retaining wall on the lower (south eastern corner) portion of the site has been retained at its original height. The change in level will not have a significant impact on visual impact of the project, particularly considering the revisions to the overall layout which provides a more consolidated and compact footprint.

5. Conclusion

This Preferred Project Report has described the modifications to the Kimbriki Resource Recovery Project that have been made since exhibition of the EA. The various modifications have resulted from submissions received, consultation undertaken with key stakeholders, and to address specific requests from DoPI.

This Preferred Project Report has also documented the potential environmental impacts associated with the modified project for the key areas of:

- Biodiversity;
- Air quality and odour;
- Noise;
- Traffic and transport; and
- Water.

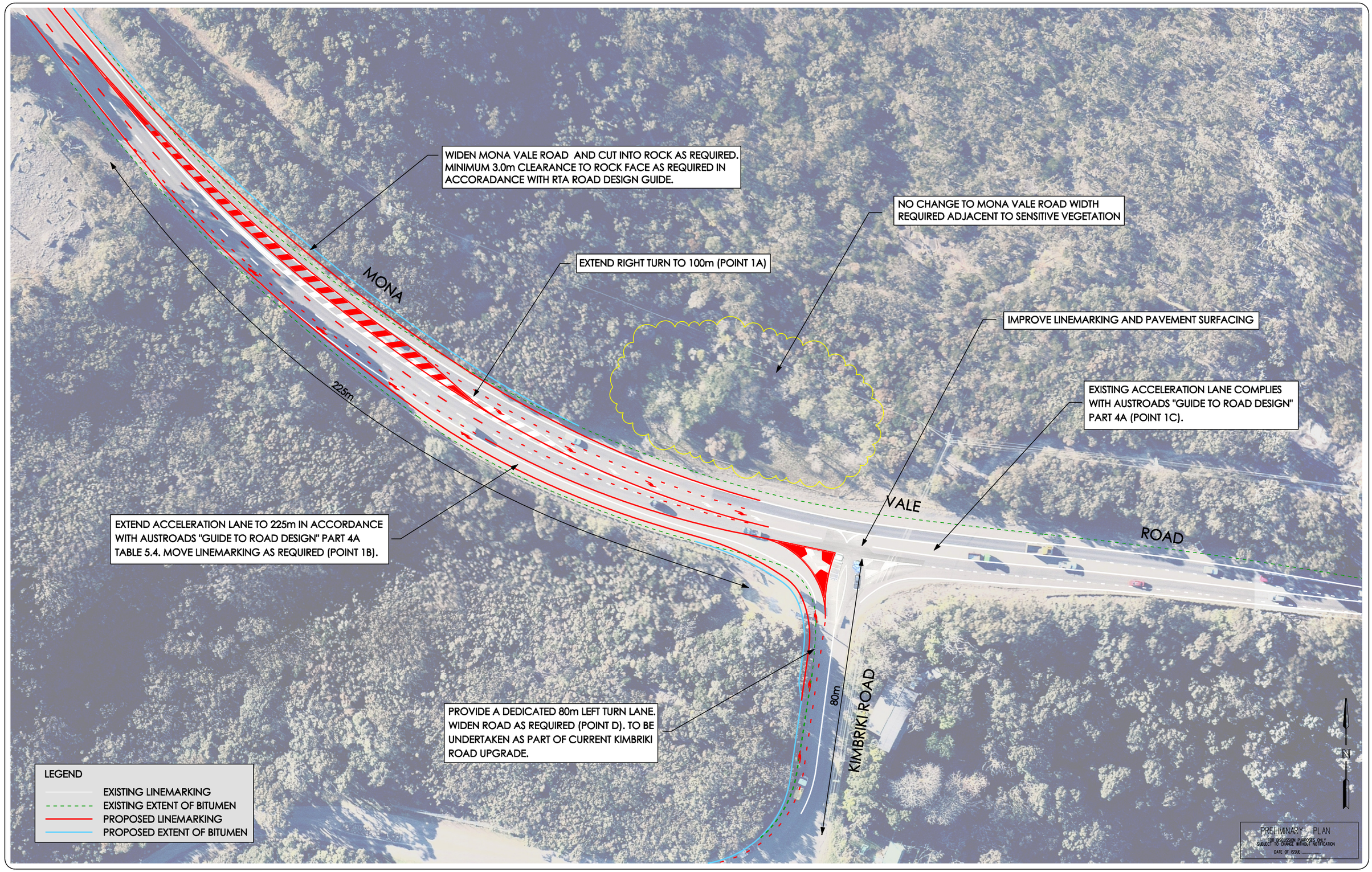
The environmental assessment of the modifications has shown that the modifications will improve the hydrological and biodiversity outcomes and otherwise not significantly change the predicted impacts described in the EA.

Appendix A

DoPI Letter

Appendix B

Mona Vale Road / Kimbriki Road Intersection Concept Layout



AMENDMENTS

ISSUE	DATE	DESCRIPTION	P.M.
P1	24 06 11	INITIAL ISSUE - B L	MH

GENERAL NOTES

1. ALL DIMENSIONS AND RADII ARE IN METRES AND ARE TO THE FACE OF KERB AND CHANNEL.
2. BASE INFORMATION OBTAINED FROM NEARMAP AERIAL PHOTOGRAPHY DATED 16 MAY 2011.
3. GTA CONSULTANTS DOES NOT TAKE ANY RESPONSIBILITY FOR THE ACCURACY OF THE EXISTING CONDITIONS BASE (AERIAL PHOTOGRAPHY) ON WHICH THE SETOUT DETAIL IS BASED. PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE EXISTING CONDITIONS INCLUDING UNDERGROUND SERVICES SHOULD BE VERIFIED ON SITE.
4. MONA VALE ROAD - SPEED ZONE 70KM/H

DESIGNER B L I
DRAWN B L I
DATE 24 JUNE '11
CHECKED M HOULDEN

GTAconsultants
www.gta.com.au
Melbourne 03 9851 9600
Sydney 02 8448 1800
Brisbane 07 3113 5000
Canberra 02 6243 4826
Adelaide 08 8113 5383

CAD FILE No. JS11482-02-P1
SCALE Hor. 0 10 20
Ver.

CLIENT KIMBRIKI ENVIRONMENTAL ENTERPRISES PTY LTD

KIMBRIKI RD FUNCTIONAL DESIGN
MONA VALE ROAD/ KIMBRIKI ROAD
TERREY HILLS

CONCEPT PLAN - OPTION B

DRAWING NO. JS11482-02
ISSUE P1

Appendix C

RTA Letter Providing In-Principle Approval for the Kimbriki Road/Mona Vale Road Intersection Layout

Our Reference:	RDC 10M689b Vol 3 SYD10/01026/02
Your Reference:	MP 10_0065
Contact:	Angela Malloch
Telephone:	8849 2041

NSW GOVERNMENT | Transport Roads & Traffic Authority

GTA Consultants
PO Box 5254
West Chatswood NSW 1515

Attention: Matthew Houlden

KIMBRIKI RESOURCE RECOVERY PROJECT – KIMBRIKI ROAD, TERREY HILLS

Dear Sir/Madam,

Reference is made to your correspondence dated 5 July 2011 with regard to the abovementioned development application, which was referred to the Roads and Traffic Authority (RTA) for in principle support of the layout of Kimbriki Road/Mona Vale Road intersection.

The RTA has reviewed the aaSIDRA analysis and provides in-principle approval to the intersection layout of Kimbriki Road/Mona Vale Road including the following works:

1. Extension of the right turn bay on Mona Vale Road by approximately 30 metres to total 100 metres.
2. Extension of the existing westbound acceleration lane to 250 metres in length.
3. Widening of Kimbriki Road to provide a dedicated left turn lane 80 metres in length and a separate right turn lane.

Should you require any further clarification in relation to this matter, please call the contact officer named at the top of this letter.

Yours faithfully,

O Hodgson

Owen Hodgson
Senior Land Use Planner
Transport Planning, Sydney Region

18 July 2011

Roads and Traffic Authority of New South Wales

LEVEL 11, 27-31 ARGYLE STREET PARRAMATTA NSW 2150
PO BOX 973 PARRAMATTA CBD NSW 2150 DX 28555
www.rta.nsw.gov.au | 13 22 13

Appendix D

Supplementary Air Quality Assessment

Anna Montgomery
GHD – Environmental Engineer
Level 15, 133 Castlereagh St
SYDNEY NSW 2000

17 November 2011

RE: Modification to Proposed Layout for Kimbriki Resource Recovery Centre

Dear Anna,

In January 2011, PAEHolmes completed an air quality assessment for the proposed Kimbriki Resource Recovery Centre (KRRC). That assessment found that the proposed layout was predicted to comply with the NSW Office of Environment and Heritage (OEH) odour criterion at all nearby residences.

Since that time, there has been a revision to the project layout/footprint. These modifications were made in response to consultation with key stakeholders and a request by the Department of Planning and Infrastructure to shift the maturation/final processing building to the west in order to preserve a greater area of potential Endangered Ecological Community and maintain natural hydrological flows.

The purpose of this letter report is to present the results of additional modelling undertaken for the modified layout. The new layout is shown in **Figure 1**, the main differences being the change in alignment of the AWT Building and the movement of the Maturation Building to the west. The nearest receptors remain the same as for the previous modelling, as shown in **Figure 2**.

Two scenarios were investigated in the January 2011 assessment, as follows;

- Scenario 1 – each biofilter is enclosed and vented via a single stack on the roof;
- Scenario 2 – each biofilter is open, but covered with a roof for weather protection.

It was determined that Scenario 2 resulted in exceedances of the odour criterion, even without the landfill sources included, and will therefore not form part of this modified assessment.

All meteorological data and methodologies remain unchanged from the original air quality assessment in January 2011.

PAEHolmes

SYDNEY

Suite 203, Level 2,
Building D
240 Beecroft Road
Epping NSW 2121

Ph: + 61 2 9870 0900
Fax: + 61 2 9870 0999

info@paeholmes.com
www.paeholmes.com

ADELAIDE

BRISBANE

GLADSTONE

MELBOURNE

PERTH

A PEL COMPANY

Queensland Environment Pty Ltd
Trading as PAEHolmes
ABN: 86 127 101 642

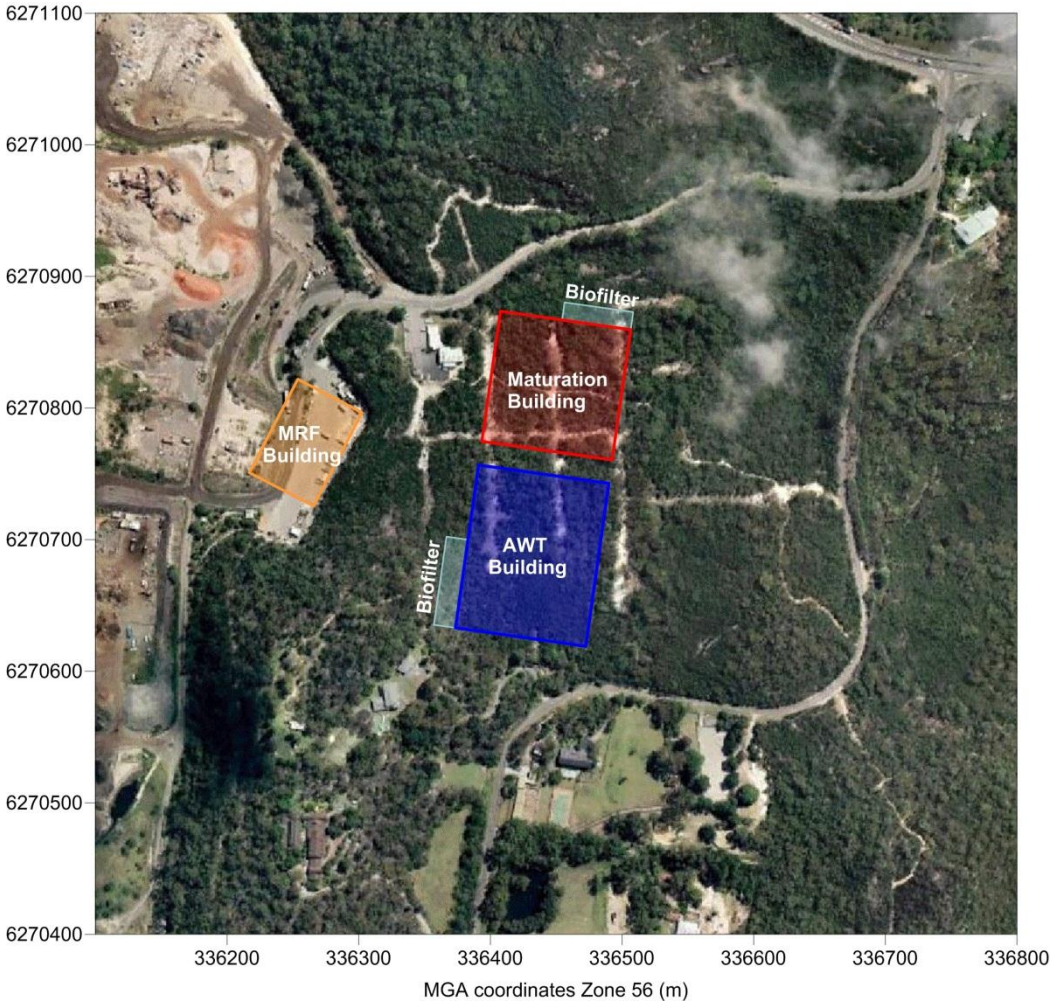


Figure 1: Modified site layout

Figure 2: Location of project area and nearest residences

The estimated emissions for both the biofilters and the landfill sources are the same as those used for the previous work and are listed in **Table 1**. The locations of the biofilter stacks however, have changed with the modified layout. All other stack parameters remain unchanged, as shown in **Table 2**.

Table 1: Estimated odour emission rates

Source	Odour concentration (ou)	Flow rate (m^3/s)	Total emissions ($ou.m^3/s$)
Project site			
Biofilter at AWT	300	55[1]	16,500
Biofilter at maturation building	300	83[2]	24,900
Landfill site			
Source	**Emission rate ($ou.m^3/m^2/s$)**	**Area (m^2)**	**Total emissions ($ou.m^3/s$)**
Intermediate cover	0.084	20,000	1,680
Leachate area	0.1	600	60
Capped areas[3]	0.004	18,000	72

Table 2: Proposed stack parameters for the each scenario

Parameter	AWT building	Maturation 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

[1] *Based on a flow rate of 200,000 m^3 per hour.*

[2] *Based on an air exchange rate of 300,000 m^3 per hour (equivalent to the volume of 3 maturation buildings).*

[3] *Based on emission rates used for the Elizabeth Drive, Kemps Creek SITA AWT odour assessment (**HAS, 2007**).*

The modelling results are presented in **Table 3** for each of the nearest residences.

Table 3: Predicted cumulative 99th percentile odour concentrations at the nearest private residences

ID	Address	Project Alone (ou)	Cumulative Impact (ou)
A	1 Kimbriki Road	1	2
B	1 Kimbriki Road	1	1
C	4 Kimbriki Road	2	2
D	5 Kimbriki Road	1	2
E	6 Kimbriki Road	1	2
G	5 Kamber Road	1	1
H	6 Kamber Road	1	1
I	310 Mona Vale Road	1	1
J	312 Mona Vale Road	1	1
K	314-318 Mona Vale Road	1	1
L	320 Mona Vale Road	1	1

It can be seen in **Table 3** that the 2ou (99th percentile) criterion is not predicted to be exceeded at any of the nearest residential receptors as a result of the proposed layout modification. This is not to say that the odour will never be detected at these receptors, but that it is not predicted to be detected more than 1% of the time (88 hours per year).

It should be noted that the modelling has assumed the biofilters will operate efficiently all the time. A disruption or failure in some part of the system could have the potential to cause odour levels higher than those predicted.

In conclusion, odour concentrations at each of the nearest residences to the proposed Kimbriki RRC, are not predicted to exceed the OEH criterion. There are no significant changes to the model predictions as a result of the proposed layout modification.

I trust this analysis meets your requirements, but please do not hesitate to contact me if you have any further questions.

Kind regards,

Jane Barnett
Senior Scientist
PAEHolmes

Appendix E

Noise Assessment Letter

CLIENTS | PEOPLE | PERFORMANCE

09 November 2011

Mark Winser
Kimbriki Environmental Enterprises
Kimbriki Road, off Mona Vale Road
Ingleside / Terrey Hills NSW

Our ref: 21/19757/175403
Your ref:

Dear Mark

Kimbriki Resource Recovery Project
Noise Assessment Addendum

1 Introduction

Kimbriki Environmental Enterprises Pty Ltd 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.

The project concept design has been revised by moving the maturation/final processing building to the west, in order to preserve the potential Endangered Ecological Community and also maintain hydrological flows.

This letter provides an assessment of the noise impacts associated with the revised concept design.

For consistency and understanding, this addendum letter should be read in conjunction with the original GHD Report, Kimbriki Resource Recovery Project Noise Assessment (January 2011 Revision 1). The original noise assessment contains detailed information relevant to assessment of operational and construction noise.

2 Potential noise impacts

2.1 Operational noise

The operational noise emissions from the project based on the revised concept design have been predicted to assess the operational noise impacts. Acoustic modelling was undertaken using CadnaA v4.1 using the methodology detailed in Section 4 of the original noise assessment report.

The following changes in the concept design have been incorporated in the noise model:

- Relocation of the maturation and AWT building footprints.
- Modification to the site boundary and elevations.
- Incorporation of an enclosed conveyor to transport material from the maturation building to the AWT building. This allows the doors of the maturation and AWT building to remain closed for the majority of the time as a front end loader will not be required to transport materials between buildings.
- Relocation of the onsite traffic routes and weighbridge.

GHD Pty Ltd ABN 39 008 488 373
Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia
T 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Predicted noise levels at the surrounding sensitive receivers for the revised concept design are summarised in Table 2-1 and Table 2-2 for day-time and night-time operations respectively.

Based on the revised concept design, the project specific noise criteria are predicted to be achieved during day time operations, and at night. This assuming that the following mitigation design measures are implemented:

- During the day-time period all doors on the maturation and AWT building are kept closed when they are not being used. Automatic doors are installed to ensure this requirement.
- Building insulation is installed in the AWT and MRF buildings.
- Tunnel ventilation and biofilter fans are located inside the AWT and maturation buildings.
- The AWT and maturation building design incorporate acoustic air intake louvres located on the northern side of buildings.
- During the night-time period, all doors on the AWT and maturation buildings are closed.
- The tunnel ventilation and biofilter fans for the AWT and maturation building should be selected so that an internal noise level of 80 dB(A) is achieved. The internal noise level should be checked for compliance upon commissioning.

Table 2-1 Concept Design - Daytime predicted operational noise levels, dB(A)

Receiver	Criteria	Existing Resource Recovery Centre	The project	Combined Total
A	43	31	29	33
B	43	32	32	35
C	43	27	34	34
D	43	27	34	35
E	43	23	29	30
M	43	33	39	40
N	43	33	32	36
O	43	31	28	33
P	43	29	27	31
National Park Reserve	50	28	35	36

Table 2-2 Concept Design - Night-time predicted operational noise levels, dB(A)

Receiver	Criteria	Night-time noise level
A	35	22
B	35	26
C	35	28
D	35	26
E	35	23
M	35	34
N	35	27
O	35	23
P	35	22

2.2 Construction noise

The construction noise impacts will not significantly vary from the original concept design. The construction noise mitigation measures detailed in the original noise assessment report should be referred.

2.3 Road traffic noise

The road traffic noise impacts will not significantly vary from the original concept design. No significant traffic noise impacts are predicted.

3 Conclusions

Based on the revised concept design, the project specific operational noise criteria are predicted to be achieved during day time operations, and at night. This assuming that the mitigation design measures summarised in Section 2.1 are implemented.

The revised concept design will not alter the construction and road traffic impacts.

Therefore the revised concept design should be considered acceptable from an acoustic perspective.

Yours faithfully
GHD Pty Ltd

Evan Milton
Senior Acoustic Engineer
02 9239 7205

Appendix F

Confirmation from OEH regarding Agreed Offset Strategy

From: aaron.hudson@kimbriki.com on 21/09/2011 01:18:21 PM
Repository: 211975700 Kimbriki EA - Project Management & Meetings

To: david.gamble@ghd.com
cc:
Subject: Fw: Kimbriki Biodiversity Offset

Aaron Hudson0408 408 841Kimbriki Environmental Enterprises Pty Ltd0408 408 841Sent via BlackBerry® from Telstra
From: Currey Julie <Julie.Currey@environment.nsw.gov.au>
Date: Wed, 21 Sep 2011 02:35:27 +0000
To: Christine Chapman<Christine.Chapman@planning.nsw.gov.au>
Cc: Burke Sarah<Sarah.Burke@environment.nsw.gov.au>; Groves Christy<Christy.Groves@environment.nsw.gov.au>; Peter Stephenson<Peter.Stephenson@kimbriki.com>; Aaron Hudson<aaron.hudson@kimbriki.com>
Subject: Kimbriki Biodiversity Offset

Christine,

I had a call from David Gamble today regarding the Kimbriki proposed AWT and biodiversity offset. In particular, David asked:

- The details of the bi-lateral agreement between the State and Commonwealth in relation to approval for destruction of threatened species;
- Whether, if the AWT platform was moved, the bio-banking offset would again need to be redone.

The advice from our experts is as follows:

- The Commonwealth generally takes the advice provided by the State into consideration, but makes its own determination which may or may not be the same. Therefore, if a new application needs to be lodged with the Commonwealth for the Tetratheaca then it may be best to do this before redrafting the detailed plans.
- OEH considers the current agreed biodiversity offset sufficient. In the event that the footprint of the AWT is moved this offset would not need to be revised.

If you have any questions, please don't hesitate to contact me on 9995 5735.

Julie Currey

Unit Head

Waste Operations

Appendix G

DSEWPAC Referral Outcome

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

Mr Peter Cassis
Company Secretary
Kimbriki Environmental Enterprises Pty Ltd
Locked Bag 6
TERRY HILLS NSW 2084

Date: // November 2011
EPBC Ref: 2011/6150
EPBC contact: Mark Jenkins
02 6274 1558
mark.jenkins@environment.gov.au

Dear Mr Cassis

Decision on referral
Kimbriki resource recovery project, Terrey Hills, NSW

This is to advise you of my decision, under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), about the proposed action to undertake the Kimbriki resource recovery project, Terrey Hills, New South Wales.

I have decided that the proposed action is not a controlled action. This means that the proposed action does not require further assessment and approval under the EPBC Act before it can proceed. A copy of the document recording this decision is enclosed. This document will be notified publicly on the Department's website.

Please note that this decision relates only to the specific matters protected under Chapter 4 of the EPBC Act.

This decision does not affect any requirement for separate state or local government environment assessment and approvals of the proposed action.

The Department has an active audit program for proposals that have been referred under the EPBC Act. The audit program aims to ensure that proposals are implemented as planned. You should be aware that your project may be selected for audit by the Department at any time and all related records and documents may be subject to scrutiny. Information about the Department's audit strategy is enclosed.

I have also written to Ms Kristen Crosby, Senior Ecologist, GHD Pty Ltd to advise her of this decision.

If you have any questions about the referral process or this decision, please contact the EPBC project manager and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

Richard McAllister
Assistant Secretary
Environment Assessment Branch

Notification of
REFERRAL DECISION – not controlled action

KIMBRIKI RESOURCE RECOVERY PROJECT, TERREY HILLS, NSW (EPBC 2011/6150)

This decision is made under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Proposed action

person named in the referral	Kimbriki Environmental Enterprises Pty Ltd (ACN 136 789 261)
proposed action	The proposed action, to be undertaken by Kimbriki Environmental Enterprises Pty Ltd is to construct the Kimbriki resource recovery project, Terrey Hills, New South Wales as described in the referral documentation received on 18 October 2011.

Referral decision: Not a controlled action

status of proposed action	The proposed action is not a controlled action.

Person authorised to make decision

Name and position	Richard McAllister Assistant Secretary Environment Assessment Branch
signature	
date of decision	11 November 2011

Appendix H

Water Management Report (Revised)

CLIENTS | PEOPLE | PERFORMANCE

Kimbriki Environmental Enterprises

Kimbriki Resource Recovery Project

Revised Water Management Report

November 2011

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Contents

Table Index

Appendices

1. Introduction

1.1 Purpose of this report

Kimbriki Environmental Enterprises Pty Ltd (KEE) is proposing to construct and operate two purpose-built advanced waste sorting and treatment facilities at the existing Kimbriki Resource Recovery Centre site in Terrey Hills.

Kimbriki Environmental Enterprises is the proponent of the project, and the environmental assessment is being prepared by GHD Pty Ltd (GHD) in accordance with the requirements of Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This report summarises the water modelling work undertaken to assess the potential impacts of operation and construction of the project.

1.2 Project outline

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

- 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 sort and process up to 100,000 tonnes per year of kerbside collected food and garden waste and mixed residual waste. 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.

The project also includes the following ancillary infrastructure:

- internal roadways;
- weighbridge;
- staff amenities and ablutions; and
- staff parking facilities.

1.3 Location of project

The site on which the project would be located (referred to as ‘the site’ for the purposes of this environmental assessment) is within the existing Kimbriki Resource Recovery Centre site in the suburb of Terrey Hills. It is within the Warringah local government area.

The site location is shown in Figure 1.

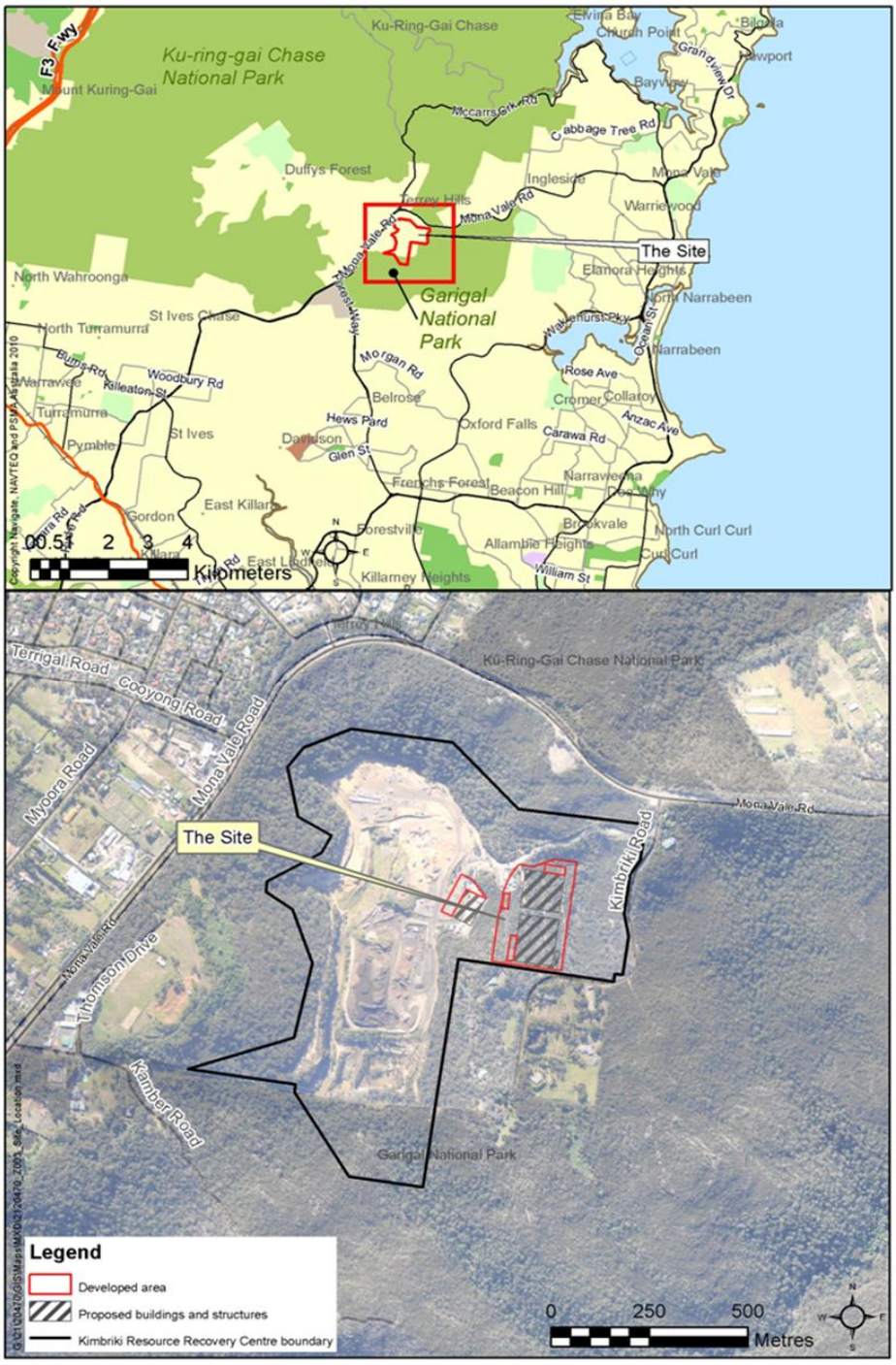


Figure 1 Site Location

It is to be noted that 'the site' referred to in the text below refers only to the proposed AWT and maturation / final processing buildings and surrounding hardstand and related works. The MRF area was not considered to be part of the development area as the existing water management infrastructure already caters for this area.

1.4 Existing Site Conditions

KRRC 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.

Management of surface water at the KRRC occurs through the use of cut-off drains. This system allows for the prevention of contamination of clean water entering the site by waste materials and recycling operations.

Surface water runoff from the interim capped and revegetated landfill area is collected by two perimeter drains. These drains terminate in sedimentation dams near the southern boundary of the site.

Natural runoff within the proposed location for the RRF flows in a southerly direction. This area has its own sub-catchment that is east of the existing areas of KRRC. Runoff from the site flows in a south westerly direction and is located within the main catchment area.

The site has no defined streams, however localised drainage lines are evident to the south of the site.

2. Operational Phase Hydrological Assessment

2.1 General

Management of stormwater will be required during the operation of resource recovery facility. The altered site water management system would aim to provide sufficient runoff to retained vegetation downstream of the site and also to minimise the potential impacts on surface water, nearby creeks and groundwater.

2.2 Proposed site water management system

A concept layout of the stormwater drainage system for the operational phase of the project is shown in SK114. This plan, which aims to minimise the operational impacts of the project, is contained in Appendix A.

2.2.1 Up-gradient diversion

Water that currently falls on the catchment upstream of the development area would be diverted around the development area so that the water quality would not be affected by site operations. This would be achieved by the construction of a series of diversion bunds and drains around the perimeter of the development area.

Much of the water that enters the site would be diverted past the development area, and would continue to provide water necessary to maintain the ecological systems downstream (to the south) of the site.

2.2.2 Site water usage

Rainwater that falls onto the buildings within the site would be used for process applications. This would minimise the requirement for potable mains water. Water would be used in buildings for regular daily wash down of floors.

Material recovery operations in the MRF, and possibly the AWT buildings, would require water for dust suppression. This would be provided through 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 keep the fire fighting water storage tanks above the minimum level required by regulations. The existing potable water connection would be used to top up fire fighting water storage tanks if no other water could be sourced on site (for example from stormwater dams).

Staff amenities would be supplied by the potable mains water, supplemented with roof water. A maximum of 3,600 L/day of potable water is estimated to be needed to supply the new amenities facilities servicing the AWT and maturation/final processing buildings, based on an estimated 29 workers in the AWT and maturation/final processing 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 be a similar level of water demand.

A portion of the overflow from the roof water tanks that is not needed to fill the rainwater or fire water tanks would be directed to the vegetated area located on the southeastern portion of the

site. To ensure that this area does not receive significantly increased runoff, some of the roof water would be directed to the existing eastern drain.

It is expected that around 3,200 L/day of domestic wastewater requiring treatment would be produced by the new site facilities. A new onsite aerated wastewater treatment system would be installed, which incorporates a disinfection treatment stage and effluent storage. The system would treat wastewater from the new staff amenities facilities to a level sufficient to meet legislative requirements, to allow reuse for dust suppression activities and/or irrigation.

2.2.3 Collection

Rain falling directly onto hardstand areas would be considered to be potentially polluted.

Stormwater collection drains along the edges of the platform would be used to prevent rain water falling onto paved operational areas entering the preserved vegetation area in an uncontrolled manner. The drains would be a combination of underground pipes, fed by floor grates, and open channels and swales. Further water would be contributed by the rainwater tank overflows.

The exact configuration of drains would be determined at the detailed design stage of the project, however a possible concept for the stormwater drainage system for the site has been identified in sketch SK114, contained in Appendix A.

2.2.4 Storage and treatment

No stormwater would be discharged from the site without first passing through stormwater detention or rainwater collection tanks. Some of the intercepted stormwater would be directed to the existing stormwater management system within the Kimbriki Resource Recovery Centre site, via the existing eastern drain.

The existing stormwater ponds, located at the southern end of the Kimbriki site, will cater for the MRF building.

2.3 Stormwater modelling

A MUSIC model was compiled to simulate the 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, e.g. rainwater storage and re-use.

2.3.1 Objectives

The objectives of the MUSIC modelling exercise were to:

- Gain an understanding of the stormwater and rainwater balance at the site;
- Ensure that the project does not adversely impact on the receiving environment, 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.

2.3.2 Methodology

The site and catchment were decided based on the topography and existing and future land use characteristics. Key parameters were determined to represent catchment specific factors, such as rainfall losses, impervious fraction and catchment areas, and 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 (approximately 5 km west-northwest of the site) was used to simulate the site hydrology. The 6-minute rainfall intensity was simulated for the longest available period in the data record (approximately five years).

Rainwater harvesting and reuse was simulated for the MRF, AWT and maturation/final processing buildings, with rainwater yield determined for a number of storage tank sizes. The average demand for rainwater reuse was estimated for each tank, based on proposed site usage:

- AWT building – 2 kL/day;
- Maturation/final processing building – 4 kL/day; and
- MRF building – 4 kL/day.

The results of the hydrological modelling were used to develop the proposed stormwater management strategy for the site and ensure that no adverse impacts are generated in the downstream catchment. As mentioned above, rainwater harvesting and reuse is proposed for the three main buildings on the site.

2.3.3 Results

The modelling shows that rainfall on the roof areas is sufficient to supply a significant proportion of the demand for water for toilet flushing and washdown of hardstand areas. On this basis, rainwater tank sizing relationships have been determined for the three buildings based on the indicative demands outlined above.

The large hardstand and roofed area would increase the yearly average volume of runoff at the downstream site boundary by approximately 70% over the existing conditions if discharged directly to the receiving environment. It would therefore be necessary to divert stormwater from hardstand areas, and rainwater tank overflow from the AWT building into the existing stormwater treatment network to the west, to the southern ponds via the existing eastern drain. Under this proposed flow regime, the volume of runoff that would flow to the retained vegetation area to the south east of the site would not be significantly different from existing conditions.

The amount of runoff that currently enters the south-eastern retained vegetation area is 15.1ML/yr. Directing roof water from the maturation / final processing building into the retained vegetation area and directing most of the hardstand as well as the other buildings to the west, results in 15.9ML/yr being discharged into the retained vegetation area following development. The amount of runoff water entering the retained vegetation area in the identified layout is therefore approximately the same as existing flows. This would minimise the potential impacts on surface and groundwater dependent ecosystems in the retained vegetation area within and beyond the site.

It is expected that the roof water is essentially “clean”. The rainwater tank overflow from the maturation / final processing building will be discharged via a distributed system in order to mimic the natural conditions and prevent concentration of flows.

3. Process Water Requirements/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 1 outlines the estimated water balance for the tunnel compost process.

Table 1 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: KEE personal correspondence

The proposed water management system is illustrated in Figure 2. This illustrates the various sources and uses of water on site, including process water makeup, floor washing, dust suppression, fire fighting and amenities.

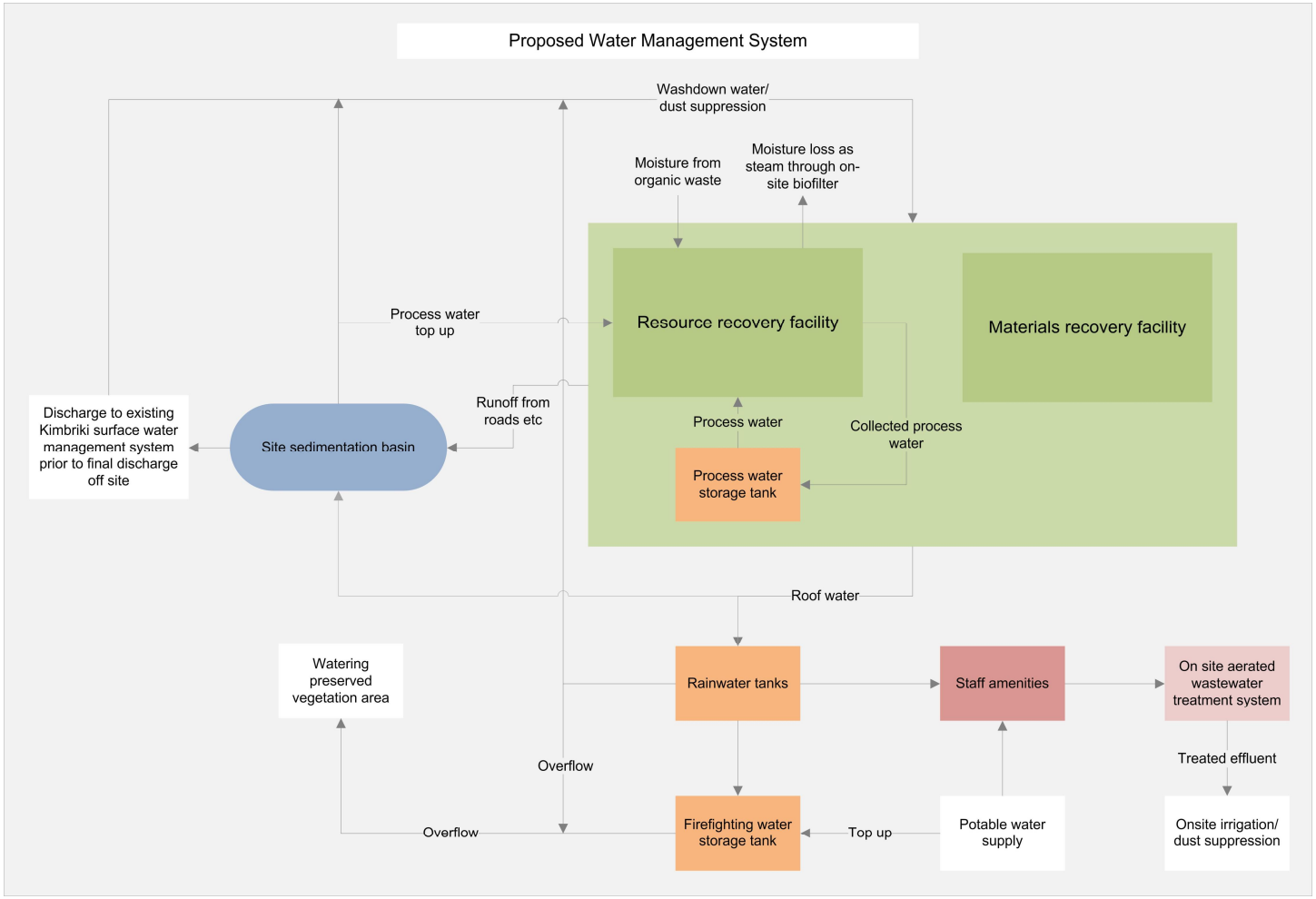


Figure 2 Proposed water management system

4. On-site Detention Assessment

4.1 Design Guidelines for On-site Detention

Warringah Council's *On-site Stormwater Detention Technical Specification* (September 2007) outlines requirements for the design of on-site detention facilities. 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 ARI storm events.'*

On-site detention storage must be provided to attenuate the post-development runoff to meet the PSD.

4.1.1 Hydrological Model Development

The 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 decided based on topography and land-use, and appropriate catchment properties were determined such as hydraulic roughness, slope and area.

4.1.2 A DRAINS hydrological model was then configured to represent the catchment with regional rainfall intensity-frequency-duration parameters adopted in accordance with *Australian Rainfall and Runoff* (2001). Permissible Site Discharge

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 for these ARIs, known as the Permissible Site Discharge (PSD). The PSDs for the subject site are outlined in the table below.

4.1.3 On-site Detention Concept Sizing

Given the PSDs defined above, the post-development hydrological model was simulated to determine the required storage volumes to sufficiently attenuate the site runoff. A linear storage-discharge relationship was assumed for this concept sizing exercise, as this has proven a reliable method for estimation of storage volumes in previous studies and does not require detailed earthworks or outlet design.

On-site detention storage requirements were determined to meet the PSD for the 5-year, 20-year and 100-year ARI design storm events. In addition, a storage volume was determined based on adoption of a three-stage outlet structure to meet the 5-year, 20-year and 100-year PSD.

4.2 Results

The required detention storage volumes to meet the PSD for a range of ARIs are summarised in the table below.

Table 2 Results of Hydrological Investigation

Average Recurrence Interval (years)	Permissible Site Discharge (m^3/s)	Required Storage Volume (m^3)
5	1.17	1,235
20	1.66	1,713
100	2.16	2,300

The storage volumes would be split proportionally to the west and south-east.

4.3 Environmental Protection Licence Requirements

Clause L3 of the Environmental Protection Licence for the existing facility (EPL13090 and 13091) outlines concentration limits for pollutant discharges from the site. These concentration limits do not apply to any discharge occurring due to a rainfall event over and above the 5-year ARI 24-hour storm event.

The total volume of this stormwater event has therefore been calculated to inform the development of any future stormwater detention or treatment facilities. The total volume of the 5-year 24-hour storm runoff is approximately 11,000 m^3.

5. Construction Phase

5.1 General

Control of erosion and sedimentation would be required during the construction period, including temporary works. The proponent would implement all practicable measures to minimise soil erosion and discharge of sediments from the site.

During the construction phase, which is estimated to span 18 months, the primary requirement is to ensure that the appropriate infrastructure is in place to control erosion and sedimentation.

A concept stormwater management plan for erosion and sediment control during construction is shown in SK115, which is contained in Appendix A.

5.2 Site water management

5.2.1 Temporary Basins

Stormwater from the construction areas would be collected by a series of collection drains. The collected sediment and water would be directed into an appropriately sized sediment basin to prevent sediment from entering the retained vegetation areas.

Controlled basin release points would be provided to allow water to be released to the downstream environment following sufficient settling time.

5.2.2 Surface water diversion

In order to minimise the volume of water required to be treated by the stormwater management system, a series of diversion bunds and drains would be constructed around the perimeter of the disturbed area. These bunds and drains would divert clean water away from the construction area, preventing the water from becoming sediment laden.

5.2.3 Sediment control devices

To minimize the impact on areas downstream, sediment controls would be placed at the downstream extent of the construction area to prevent sediments from being carried into the stormwater systems. This may include cut-off drains, silt fences, hay bales or other erosion controls.

5.2.4 Management Plans

A site sediment and erosion control plan for construction works would be prepared, in accordance with requirements of the Blue Book (*Managing Stormwater: Urban Soils and Construction*, Department of Housing). This plan would consider the specific requirements of the proposed construction sequence and methods.

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, with particular attention where the drainage is towards a natural surface water body;

- Stockpiles are stabilised and remain covered and appropriate sediment and erosion control measures are installed down-slope 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.

These controls would be implemented before any construction commences.

In the planning of the works, a staged approach should be considered to minimise the disturbed area and the volumes of sediment laden water that would require collection and treatment.

5.3 Stormwater Modelling

A model was compiled based on the requirements of the Blue Book (*Managing Stormwater: Urban Soils and Construction*, Department of Housing) to determine the requirements for sediment and water storage during the construction of the development.

In undertaking this modeling, the material recovery facility (MRF) building was not considered as this area lies within the existing site footprint. The existing site drainage infrastructure is assumed to already cater for this area.

5.3.1 Objectives

The objectives of this modelling exercise were to:

- Gain an understanding of the stormwater catchment areas and requirements at the site;
- Ensure that infrastructure can be provided during construction to provide the required level of environmental protection for areas immediately downstream of the site; and
- Provide approximate locations and required capacity of temporary basins as required.

5.3.2 Methodology

In order to retain as much native and protected vegetation as possible, a basin location was identified, as shown in SK115, in Appendix A.

- The basin would be 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 construction area.

The construction area is assumed to drain towards the south-east based on the site topography.

An intensity-frequency-duration (IFD) graph was constructed for the site based on a 5 day, 85th percentile storm event. These basins were sized based on the requirements of the Blue Book (*Managing Stormwater: Urban Soils and Construction*, Department of Housing) for sensitive downstream receptors. As the soil types being used for filling works is unknown, a conservative assumption has been taken with modeling assuming Type D soils (worst case scenario).

5.3.3 Results

The construction area was calculated to be 5.2 ha.

Based on IFD curves generated for the site, the design rainfall event of 44 mm/h was used to determine the required capacity of the sediment basin.

Table 3 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	5.2	1,570	785	2,350

The shape and design of the basin must be sympathetic to the requirements of the Blue Book.

With implementation of appropriate stormwater and erosion controls and mitigation measures, the project would not have significant stormwater/erosion impacts during its construction phase.

6. Summary and Conclusions

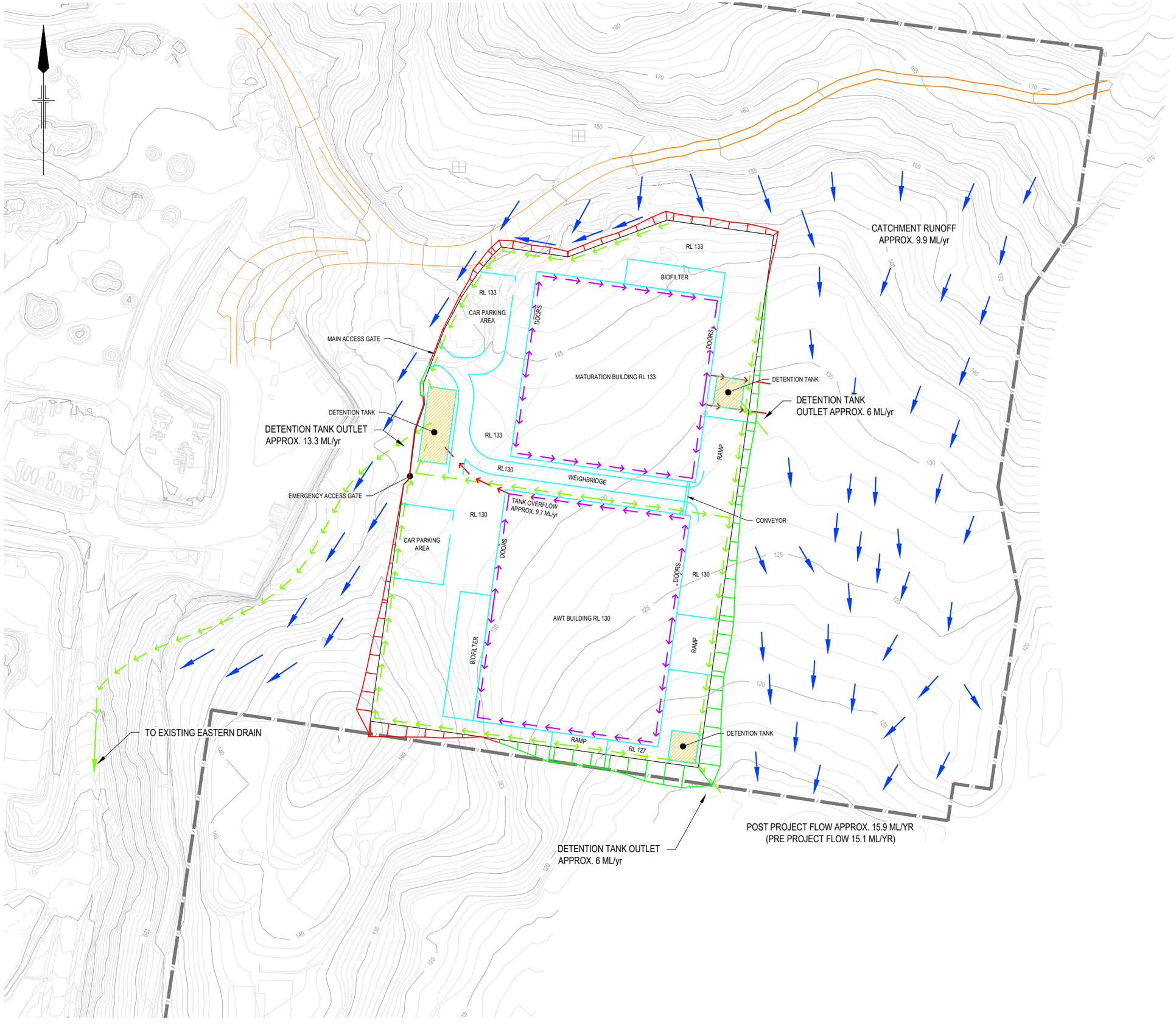
Modeling of surface water management throughout the operation of the proposed Kimbriki Resource Recovery Project indicates that the project would not have significant hydrological impacts, in that post project surface water flows across the site would be similar to current flows.

During the construction phase, clean stormwater diversion measures upstream of the disturbed area sediment laden water would minimize the volume of water affected by construction activities. Any affected water would be directed to a sediment basin of approximately 2,350 m^3 capacity. This would control soil erosion and minimize the discharge of sediments from the site.

Environmental management plans would be prepared for both the construction and operation phases of the project.

Appendix A

Concept Plans



LEGEND

- EXISTING SURFACE
- EXISTING ACCESS TRACK
- KIMBRIKI SITE BOUNDARY
- PROPOSED BUILDING SLAB
- PROPOSED ACCESS ROADS
- PROPOSED CUT BATTER
- PROPOSED FILL BATTER
- ROAD/PAVING STORMWATER
- SURFACE WATER FLOW
- PIPED SURFACE WATER
- CLEAN ROOF WATER (SOME COLLECTED IN RAINWATER TANKS)

NOTES:

1. BASED ON DECEMBER 2009 SURVEY

0 10 20 30 40 50m

SCALE 1:1000 AT ORIGINAL SIZE

PRELIMINARY

C	PLATFORM REVISED	DG	24.11.11
B	REVISED	DG	05.11.10
rev	description	app'd	date

KIMBRIKI ENVIRONMENTAL ENTERPRISES
KIMBRIKI RESOURCE RECOVERY PROJECT

AWT & MRF CONCEPT DESIGN OPERATIONAL STORMWATER PLAN

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scale	1:1000 for A1	job no.	21-19757
date	NOV 2011	rev no.	C

approved (PD) SK114

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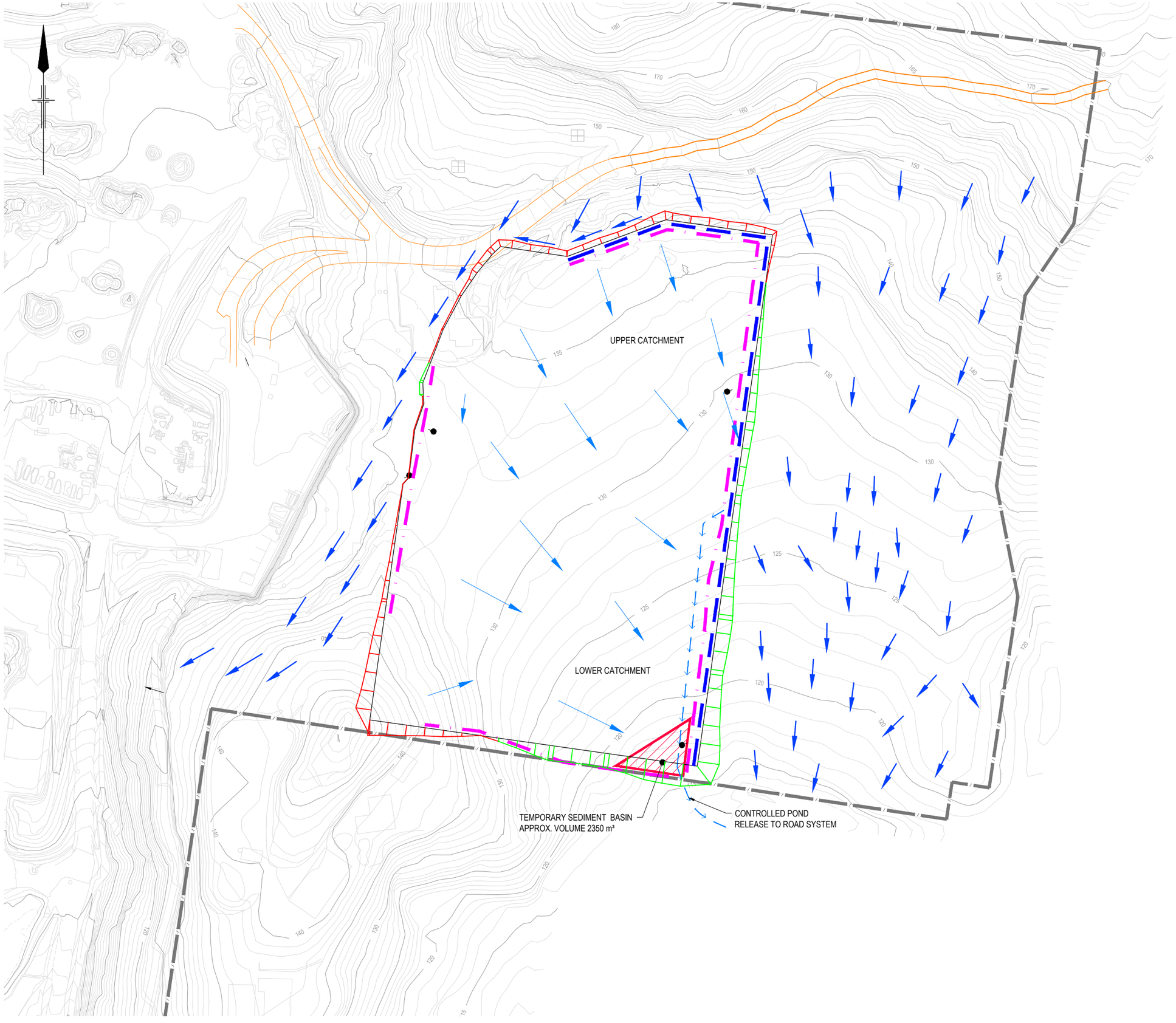

LEGEND

- EXISTING SURFACE
- EXISTING ACCESS TRACK
- KIMBRIKI SITE BOUNDARY
- PROPOSED BUILDING SLAB
- PROPOSED ACCESS ROADS
- PROPOSED CUT BATTER
- PROPOSED FILL BATTER
- TEMPORARY SEDIMENT BASIN
- SURFACE WATER DIVERSION
- SEDIMENT CONTROL DEVICE

NOTES:

1. BASED ON DECEMBER 2009 SURVEY

0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE

PRELIMINARY

rev	description	app'd	date
B	PLATFORM REVISED	DG	24.11.11
A	INITIAL ISSUE	DG	04.11.10

KIMBRIKI ENVIRONMENTAL ENTERPRISES
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CONSTRUCTION STORMATER PLAN

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scale	1:1000 for A1	job no.	21-19757
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approved (PD) SK115

Plot Date: 24 November 2011 - 12:23 PM Plotted by: Alison J Horlyck/Sydney/GHD/AU Cad File No: G:\21\19757\CADD\Drawings\21-19757-SK115.dwg

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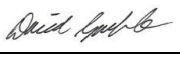
02	T Henderson	D Gamble		D Gamble		25/11/11

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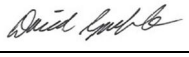
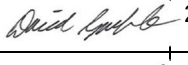
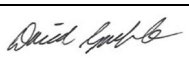
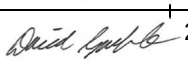
01	A Montgomery	D Gamble		D Gamble		24-11-11
02	A Montgomery	D Gamble		D Gamble		25-11-11