FINAL REPORT

ThaQuarry Pty Ltd &
ACN 114 843 453 Pty Ltd

Light Horse Business Centre

Volume 1: Environmental Assessment Report

December 2008

Reference: 0088621

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For and on behalf of Environmental Resources Management Australia
Approved by: _____
Signed: _____
Position: _____
Date _____

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EXECUTIVE SUMMARY

PROPOSAL AND INTRODUCTION

ThaQuarry Pty Ltd and ACN 114 843 453 Pty Ltd (the proponent) is seeking project approval for the construction and operation of a resource recovery facility (RRF) and landfill facility at Eastern Creek (herein referred to as the Project), in the western suburbs of Sydney, New South Wales (NSW), under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act). The Project has been declared a 'major project' to which Part 3A of the EP&A Act applies. As such, it will be determined by the Minister for Planning.

The RRF will include a Material Processing Centre (MPC) and Waste Transfer Station (WTS) which will have the ability to accept up to two million tonnes of waste per annum. Waste loads received at the RRF that are classified as containing material capable of being recovered or recycled will go through the recovery process, where an estimated 80% of material is expected to be recycled or recovered (up to 1.6 mtpa, based on maximum capacity intake). After reprocessing and/or recovery, recycled goods will be stored on-site within material stockpile areas until sold. The remaining 20% of that incoming waste stream is expected to constitute unsalvageable material and will be directed to the adjoining landfill facility or off-site as appropriate.

In addition to the unsalvageable material left over from the abovementioned sorting process, some material brought onto the site will be identified outright as unsuitable for recovery (for example, contaminated soils) and will be directed to the WTS from where it will be transferred to the adjoining landfill facility or off-site if required. Asbestos waste may bypass the WTS and be sent directly to the landfill facility in instances where full asbestos (or asbestos contaminated) loads are received. Dependent on the volume of material classified outright as unsuitable for recovery, an estimated 20 to 50% of total material received at the site will be landfilled.

The project aims to have an operational lifetime for the landfill facility of 20 years and an ongoing RRF beyond the life of the landfill to manage recyclable waste loads. The Project aims to operate the landfill facility: 7 days per week, 6am to 6pm and other site operations: 7 days per week, 6am to 10pm. Waste may be received from time to time,(on average once a week), after 10pm to accept waste from night road works and similar activities. Accounting for gazetted public holidays and annual holiday periods the site will not operate for more than 350 days per year.

Other site operations which will support the landfill facility and RRF include an administration building, workshop building for maintenance, amenity berms, material stockpile areas, drop-off zones, internal road network, wheel wash stations to mitigate tracking of mud off site, an on-site detention basin to manage stormwater flows, a leachate collection and treatment system to manage wastewater produced by the landfill and weighbridges to record and manage waste loads entering and exiting the site in accordance with DECC Guidelines.

The Project has been designed to facilitate the economic re-use and rehabilitation of the Pioneer quarry void which was formerly quarried by Hanson Construction Materials Pty Ltd. Under the Project, land immediately adjacent to the quarry that would have been unsuited for normal commercial development in accordance with State Environmental Planning Policy (SEPP) No. 59 will be used as a resource recovery facility to provide Sydney with recycled landscaping, building and construction material. Recycling of incoming waste materials at the RRF will, in turn, prolong the useful life of resources and assists in minimising quarrying for additional natural resources. . The quarry will be used as a solid waste (non putrescible), special waste and hazardous waste landfill in conjunction with the resource recovery facility and will provide a consistent rehabilitation plan for the quarry in line with SEPP No. 59 for future use of the site as a non-putrescible waste facility.

Environmental Resources Management Australia Pty Ltd has been engaged by ThaQuarry Pty Ltd and ACN 114 843 453 Pty Ltd to undertake an Environmental Assessment for the Project. This document is the main Environmental Assessment Report (EAR), and has been prepared in accordance with the requirements of the EP&A Act, the Environmental Planning and Assessment Regulation 2000 and the requirements of the Director-General of the Department of Planning issued on 6 May 2008. It describes the Project, the environmental implications associated with the key issues of the Project and identifies subsequent management or mitigation measures. Technical reports that were prepared as part of the Environmental Assessment are submitted with the Project application as supporting documents in Volume 2.

SITE SETTING

The site is located at Eastern Creek in the central western suburbs of Sydney NSW, approximately 36 km west of the Sydney CBD, 18 km west of Parramatta and 12 km east of Penrith. The site is wholly within the local government area (LGA) of Blacktown, situated in the area known as the M7 Business Hub. The site and surrounding lands to the north-east, east and south are zoned for future industrial redevelopment as part of the 'Eastern Creek Business Park'. The Business Park is planned to create a major employment hub for western Sydney.

The site is south west of the confluence of the M4 and M7 Motorways. The M4 motorway runs adjacent to the northern boundary of the site with an associated landscaped buffer from the quarry pit. Archbold Road forms the western boundary with a buffer of unoccupied land further to the west and open grazing land to the south and along part of its eastern boundary. The remaining part of the eastern boundary is occupied by the Hanson Asphalt Batching Plant and the Hanson yard ('Hanson site').

The land immediately north of the M4 motorway accommodates low density residential areas of Minchinbury, with an industrial area to the north-west. The nearest residences are located approximately 120 m from the northern site boundary and 550 m from the quarry pit edge.

The land adjacent to the eastern site boundary accommodates cleared grazing land and the channel of Upper Angus Creek. There is an area of woodland beyond and further

east are the M7 Motorway, Eastern Creek Raceway, Prospect Reservoir and the site of the former Australia's Wonderland.

The land adjacent to the southern and western site boundaries accommodates predominately cleared grazing lands with patches of trees, associated with the Ropes Creek regional open space corridor, and regional high voltage overhead electrical transmission lines. The residential suburb of Erskine Park is located approximately 800 m beyond the western site boundary. An industrial facility and the Sydney West Substation are located approximately 500 m and 1 km to the south-east, respectively.

The site is within the Employment zone under the State Environmental Planning Policy No. 59 - Central Western Sydney Economic and Employment Area (SEPP 59). The proposed development is permissible in the Employment zone.

KEY ENVIRONMENTAL ISSUES

Assessment Approach

The assessment of the Project has involved input from a range of disciplines including engineering, heritage, water, acoustics, planning, risk, air, traffic, ecology and socio-economics. It addressed issues identified during the consultation process. Technical reports were prepared which investigated the environmental implications of the Project and provided mitigation and management measures.

Surface Water Management

Surface water has been assessed by Storm Consulting (April, 2008) in accordance with the Landcom (2004) Managing Urban Stormwater- Soils and Construction (the 'Blue Book'); Blacktown City Council (BCC) (2005a) Eastern Creek Precinct Plan; and BCC (2005b) Stormwater Quality Control Policy.

Surface stormwater runoff generated on-site will be categorised as either 'clean' or 'dirty'. Clean stormwater runoff will be generated from building roofs (workshop, MPC/WTS, administration building and weighbridge shed), roads, car parks and other hardstand areas, pit walls, haul road and capped areas within the landfill.

Dirty runoff will comprise stormwater that has come into contact with mixed wastes, green and timber wastes and uncovered landfill wastes. The dirty runoff will be collected separately from clean stormwater and will be treated as leachate.

Based on the XP-RAFTS hydrology modelling results for the operational area subject to change in land use, an on site detention and re- use ("OSD") basin storage volume of 5500 m^3 is required to enable post development peak flows for the operational areas to match pre development peak flows up to the 100 year storm event as required by Council. For flows in excess of the design event, and which therefore cause overtopping of the OSD basin, overland flow paths are to follow natural drainage lines to the north of the site.

In accordance with Blue Book calculations the gross basin volume required for the in pit stormwater pond is 4362 m^3, which equates to 165 m^3/ha. This can be provided

either as one basin, or as a series of smaller basins, so long as each basin meets the minimum storage requirement of 165 m³/ha of catchment feeding into it. Captured rainwater from building roofs will be used to help meet toilet flushing and wheel wash needs. Recycled stormwater captured in the OSD basin will be used for dust suppression and irrigation i.e. sprinklers and water carts, and that captured in the stormwater pond (in pit and surface) will also be used in water carts.

Flooding

Eastern Creek Precinct Plan Stormwater Management Strategy indicated that there is only one overland flow path in the operational area of the site, located in the Quarry North catchment. The OSD basin has been sized to ensure post-development flows in the Quarry North Catchment are detained to match pre-development flows up to the 100 year average recurrence interval (ARI) event.

A Stormwater Management Plan has been recommended to manage the stormwater system.

Groundwater

The Groundwater Assessment included a desktop review of the existing geological, hydrogeological and groundwater chemistry information for the site.

The pit geology comprises shallow fill and clay layers to 18 m below ground level (bgl), clay and weathered shale to depths of 32 m bgl and Bringelly Shale to depths up to 5 m below the base of the quarry (approximately 140 m bgl). The eastern and southern edges of the pits are fractured and deformed. The fractures are generally sparse and localised.

A shallow perched and intermittent groundwater system is located within the shallow fill and weathered shale and clay up to depths approximating 32 m bgl. This was observed to have little connection with the open pit (i.e., very little seepage was observed from the clay and weathered shale deposits). Current estimates of fluctuations of the leachate levels during operation suggest leachate levels will be maintained well below this aquifer system.

A deeper regional aquifer system is present within the shale and volcanic sediments. The permeability of this aquifer system is very low and generally below the recommended permeability of clay liners. This supports a calculated seepage of 2 m³/day into the quarry pit. The potential yield and water quality of this aquifer system suggest that the system is of low human and environmental value.

Leachate

The design of the infilling system will allow separation of surface water run-off from the sides of the landfill from the rain falling directly onto the landfill waste and infiltrating to become leachate. This will significantly reduce the volume of leachate generated. Based on this, the conservatively estimated volumes of surface water and leachate generated within the landfill is anticipated to range between 45 and 872 m³/day, with and average of 241 m³/day. The pumping rates required to dewater

leachate, whilst meeting the DECC requirements to maintain an inward head gradient, will range between 250 m^3 per day and 500 m^3per day.

A chevron/herringbone collection system on the quarry floor will be installed to collect leachate infiltration into the waste mass and a leachate trench will be provided on the tipping floor to collect leachate run off from uncovered areas of the active tipping area. A drainage layer will be constructed on the quarry floor prior to filling commencing. The layer includes a permeable granular blanket of geosynthetic and granular materials designed to a minimum 500mm thick in accordance with NSW Benchmark Techniques.

A sump will be located at the lowest elevation of the base, serving to collect the leachate in preparation for removal.

The sump will contain two (2) risers and a housing for leachate extraction pumps at the eastern end of the landfill. Leachate will be treated and, dependent on the results of quality monitoring, will either be re-used for on-site irrigation or disposed of to sewer via a trade waste agreement with Sydney Water.

At the completion of the landfill and subsequent capping, leachate generation is likely to fall below 90 m^3/day. Post landfill monitoring will help to quantify this process, however, there is potential for ongoing pumping to be required to prevent impact to receptors in potential hydraulic contact with the landfill.

Air Quality and Odour

An air quality assessment was undertaken for the Project, addressing both construction and operational activities. The key contaminants identified for consideration in this assessment were total suspended particulates (TSP); particulate matter less than 10 microns (PM_{10}); and odour.

Road haulage to landfill was identified to be the most significant dust generating activity. Therefore, particulate matter emissions are highest during the initial stages of operations, when the haul, distance to the base of the pit is greatest.

The predicted ground level incremental and cumulative annual average TSP and PM_{10} concentrations and dust deposition were assessed at sensitive receivers (nearby residences) to be well below the relevant DECC criteria. Predicted maximum 24-hour average concentrations of PM_{10} from the Project at sensitive receptors we also identified to be below the relevant DECC criteria.

Odour has the potential to be generated from uncapped areas of the landfill (no putrescible waste is to be landfilled, however a small volume of biodegradable materials may be land filled which could produce odours over time), the active tip face in the landfill, the leachate trench in the pit; and the composting of green waste within windrows. The stringent DECC odour criteria, (2 odour units), does not extend into any residential areas, suggesting that adverse odour impacts from the Project would not occur.

An Air Quality Management Plan (AQMP) is recommended and will be included in the site Environmental Waste Management Plan (EWMP) consisting of the Landfill

Environmental Management Plan (LEMP) and EWMP to be developed for the Project, with a focus on activities which generate the most significant emissions – in this instance those associated with haulage movements and transfer and loading activities.

Noise

The noise impact assessment was undertaken in accordance with the DECC (2000) Industrial Noise Policy (INP),DECC (1994) Environmental Noise Control Manual (ENCM) and DECC (1999a) Environmental Criteria for Road Traffic Noise (ECRTN).

Construction works for the Project are expected to last for approximately six months, conducted during daytime hours. Construction noise is not expected to exceed criteria levels identified by ENCM.

Noise levels for all stages of the Project operations are predicted to meet the relevant Project specific noise criteria at assessed sensitive receivers (nearby residences) under all meteorological conditions during the evening, night-time and morning shoulder period. Although site operations will generally not occur during the night time, approximately once per week waste may be received at the site after 10pm from time to time. The modelling results indicate that maximum noise emissions during night time operations under INP weather conditions are predicted to remain below the sleep disturbance noise criteria at all assessment locations.

The Noise Assessment recommended that the following noise mitigation measures be included in a Noise Management Plan prepared for the site:

- *restriction of normal hours of operation between 6am and 10pm, with landfilling operations further restricted to the hours between 6am and 6pm (receivable of material would only occur after 10pm on occasion); and*

- *construction of impervious barriers at various positions around the facility, including 10 m high barriers to the north, north-west, west and south of the main area of operations and retention of the existing earth mound to the north-east of the quarry pit.*

These recommendations have been incorporated into the Project design or as part of operational procedures.

Traffic and Transport

The Project will generate light, medium and heavy vehicle traffic on the surrounding road network associated with deliveries of waste loads, dispatch of recycled products, service and maintenance activities, and some light vehicle traffic generated by staff, visitors and subcontractors.

The Eastern Creek Precinct Plan outlines the future road network for the Precinct. The Project proposes to connect to the future road network once suitable demand has been established within the Precinct.

Vehicle access for the Project is proposed through the Old Wallgrove Road (ie Wallgrove Road and Quarry Road) intersections, the existing roadway constructed within the Registered ROW between Old Wallgrove Road and the site boundary and the existing haulage road which runs along the southern side of the quarry wall.

These existing intersections have been modeled and are identified as suitable for the types of vehicles associated with the proposed development (given the long standing uses on the site (with heavy vehicles etc.) and the other industrial uses in the area which access these intersections which are subject to an RTA approved B Double route.

Commitments to improve the condition of the road network have been identified including improvement to the existing section of haulage road running along the southern side of the quarry wall in accordance with the requirements of AS 2890.2 and AS 2890.2.

The main internal circulation roadways from the MPC will operate with a one-way traffic flow with two-way connectors to/from the drop-off zone and landfill etc. It will be appropriate for advisory (directional) signage as well as regulatory (one-way etc) signage to be provided including a 20kph speed restriction.

The design of the access roads, manoeuvring and carpark areas will be suitable for the intended traffic movements and will comply with AS 2890.1 and 2, Austroads, and Council's Development Control Plans. These design requirements have been included within the draft Statement of Commitments.

Visual Amenity

There are no receivers with elevated views of the site. The visual character of the locality is variable with the site surrounded by urban areas of Minchinbury to the north and Erskine Park to the south-west, industrial development including Hanson Asphalt Batching Works to the south-east, and transport and utilities infrastructure including the M4 Motorway and an associated landscaped buffer adjacent to the north.

The Hanson site to the south-east of the quarry pit is the only receiver which can experience uninterrupted views across the area where the majority of operations are to be focussed. The other receptors views of the site are shielded by existing Cumberland Plain Woodland along to northern boundary and 10 metre high earthen amenity berms designed along the north, south and western boundary of the operations area.

Interrupted views of the proposed location of the on-site detention basin (OSD) basin and the north and north-west amenity berms and visual barrier can be experienced from the M4 and from a small number of residences in Minchinbury; however views from these residences are fully screened by vegetation and the M4 embankments.

Some residences in Erskine Park will have distant obscured views of part of the internal road network through a narrow gap between the west and south berms. Otherwise, there are no views into the proposed area of operations from the west, including from Archbold Road due to shielding by overburden stockpiles and dense

Cumberland Plain Woodland vegetation, or from the south due to an intervening east west ridge.

Subject to the implementation of recommended mitigation measures including lighting, landscaping of amenity berms and design of the built form elements the Project is not expected to adversely affect the visual amenity of the surrounding area.

Flora and Fauna

The majority of the site is cleared, containing open grassland dominated by weed species. Large areas of the site have been highly disturbed by quarrying and bulk earthworks and all original vegetation has been removed from the quarry and overburden stockpiles. This is typical of the vast majority of the proposed area of operations. Natural vegetation on the site is restricted to a few small disturbed woodland remnants, located along the western site boundary and in the south-eastern, north-eastern and north-western corners of the site.

The dominant vegetation community is Shale Plains Woodland; this community has been identified as representative of Cumberland Plain Woodland (CPW) which is listed as an EEC under the NSW Threatened Species Conservation (TSC) Act and the Commonwealth Environment Protection & Biodiversity Conservation (EPBC) Act. The assessment of the potential impact to the EEC concluded that a referral to the Commonwealth Minister for the Environment was not required. The assessment of significance conducted by Keystone Ecological (2007) also considered removal of the three smaller areas of CPW from the site (2.83 ha) and retention of 8.3 ha of CPW within a conservation area in the north-western portion of the site. Since the assessment of significance, the Project has been altered so as not to remove any vegetation from the site, resulting in an improved ecological outcome.

No threatened flora species were recorded on the site during field surveys. Database searches identified a number of flora species listed under the EPBC Act and TSC Act as occurring within the local area. Assessments of significance for those species considered to have potential habitat within the site concluded that the Project was unlikely to significantly impact these species.

Several shells belonging to the endangered Cumberland Plain Large Land Snail were identified on the north-western portion of the site within the CPW remnant. An assessment of significance concluded that the Project was unlikely to have a significant impact on the Cumberland Plain Large Land Snail. Database searches identified several species listed under the EPBC Act and TSC Act as occurring within the local area. Assessments of significance concluded that the Project was unlikely to have a significant impact on those species with potential habitat on the site.

Aboriginal Heritage

The recommendations made by McDonald (2005) within the Heritage Conservation Strategy have been adopted by Blacktown City Council as part of the Eastern Creek Precinct Plan. The Conservation Strategy did not identify any items of historical heritage significance at or adjacent to the site. On this basis no further archaeological investigations have been undertaken as part of this Project. As a precaution however,

in the unlikely event that previously unrecorded relics (non-Indigenous heritage items) are encountered during construction, works will cease immediately at that location and the NSW Heritage Office will be notified and advice sought as to the appropriate course of action.

Hazards and Risks

The project is not considered to be a 'potentially hazardous' industry as it will not exceed the SEPP No. 33 (Hazardous and Offensive Development) threshold limits for volumes of Class 3 (diesel) dangerous goods stored on-site or vehicle movements to be generated for transportation of dangerous goods. It is considered to be a 'potentially offensive' industry under SEPP 33 as it has potential to emit polluting discharges. The 'potentially offensive' aspect of the development has been assessed. However it is not likely to be considered an offensive industry with respect to SEPP 33 due to the inclusion of management and mitigation measures.

Previous investigations identified contaminant concentrations to be below the adopted threshold criteria for both the stockpiled and in-situ material, other than within the areas of the site leased by Hanson, which are outside the development footprint for the Project. On this basis, the stockpiled material, which was sourced as virgin excavated natural material (VENM) from the quarry is considered suitable for re-use as fill.

The Bushfire Hazard Assessment recommended that Asset Protection Zones (APZs) be constructed and maintained around the areas of operation to limit potential fire hazards. Mitigation measures also included the provision of fire fighting equipment within the buildings and separate storage of potable water for fire fighting purposes.

A geotechnical assessment of the pit wall stability was undertaken which identified management procedures to reduce rock falls along the haul road, manage landslip within the pit and recommended the installation of clay bunds and security fencing to provide safety to the internal road network along the pit edge.

Waste Management

The proposed facility will incorporate waste reduction strategies in accordance with the NSW Waste Management Hierarchy: avoid, re-use, recycle/reprocess, dispose.

As discussed above, all 'clean' run-off from the facility will be either recycled for further use within the administration/workshop buildings or used for irrigation and dust suppression.

All putrescible waste generated during the construction and operation phases of the Project will be collected separately and disposed of off-site to a suitable landfill.

Plant chemical containers and routine maintenance consumables such as oil and grease required for plant operations at the project site will be stored in a bunded area and collected by a licensed waste contractor as required. The small amount of 'inert' and general waste generated at the facility by employees, agents, invitees or contractors (not as part of the waste receival for the site) will be separated within the RRF and either directed for recycling or disposed of as necessary. A site Environmental Waste Management Plan (EWMP) *for waste generated by the facility (not as part of the waste receival for the site) has been included in the statement of commitments to manage waste stream on site.*

Social Implications

In 2001, Minchinbury recorded a higher proportion of employed persons working full time (66.7%) than Blacktown LGA (64.3%) and Australia (59.8%). The dominant occupation was Intermediate Clerical, Sales and Service Workers (13.4%) followed by Tradespersons and Related Workers (9.1%) and Intermediate Production and Transport Workers (9%). This data indicates that there is reasonable potential for residents of Minchinbury to be employed at the proposed waste management and landfill facility. On this basis, a commitment has been provided to source where possible construction and operational staff from the local community.

The main concerns raised by the community as a result of social research undertaken within focus groups included noise, human health and contamination including dust impacts, odour, traffic and access, visual amenity, regulation and monitoring, local employment generation and property prices. To address these issues, separate technical reports were prepared to assess the potential impacts of the Project and recommend mitigation and management measures.

Concerns were raised regarding the availability of information regarding the Project. When presented with information at the focus group meetings, a better understanding of the benefits for the local community were identified. Communication with the community has been recommended through the development of a Communications Strategy to improve the dissemination of information to the public. This recommendation has been adopted within the Statement of Commitments.

Greenhouse Gas

The release of greenhouse gases from the Project will occur predominantly from carbon dioxide (CO_2) through the combustion of fossil fuels through energy consumption within the RRF and associated administration building and workshop and the transportation of waste loads in and around the site. Some methane production will also contribute to greenhouse gas production from composting and landfilling operations.

Greenhouse Gas emissions have been calculated for the Project in accordance with the Australian Greenhouse Office (AGO) Factors and Methods Workbook. Direct (diesel and electricity consumption and anaerobic and aerobic process within the landfill of

degradable materials) and indirect (transportation of waste loads) greenhouse gas production has been assessed. Diesel consumption from the sorting process to be conducted at the material processing centre and waste transfer station is estimated to produce 1,404 tonnes CO_2/annum.

The electricity consumption within the workshop, administration building, weighbridges and pumps is expected to create 207tCO_2 /annum. Indirect diesel consumption from the transportation of waste loads to and from the site is anticipated to produce 3,806tCO_2/ annum.

Estimating emissions of greenhouse gases from landfills has also been identified which requires the calculation of variables including the quantity of degradable organic material available for dissimilation, decay rate constant, stock of carbon and other factors. Given that biodegradable material is anticipated to represent a small proportion of material to landfill, and the degree of uncertainty in estimating emissions of greenhouse gases from landfill operations, quantification of greenhouse gas emissions from decomposition of biodegradable material in the landfill has not been undertaken. It is anticipated that this would represent a minor source of emissions of greenhouse gases from the Project.

Measures to mitigate greenhouse gas emissions include sourcing energy efficient mobile and fixed equipment, annual internal review of energy consumption to identify techniques to minimise energy use and assess if equipment is operating at optimum energy levels, equipment maintenance to reduce energy losses and inventory of emissions to be regularly updated and maintained.

PART A – THE PROPOSAL

1 BACKGROUND TO THE PROJECT

This Chapter introduces the Project and provides the background information, including the geographical setting and strategic context. The need for the Project is outlined and a description of the purpose and structure of this Environmental Assessment Report is provided.

1.1 INTRODUCTION

ThaQuarry Pty Ltd and ACN 114 843 453 Pty Ltd as neighbouring owners, joint applicants and proponents (herein referred to as the proponent) seek project approval for the construction and operation of a resource recovery facility (RRF) and landfill facility at Eastern Creek (herein referred to as the Project), in the western suburbs of Sydney, New South Wales (NSW). The application process is to be managed on behalf of both owners by ThaQuarry Pty Ltd under the project name Light Horse Business Centre (LHBC).

The predominant feature at the proposed Project site is a brecchia quarry known as the Pioneer Quarry, where extractive operations started in the 1950s. Pioneer Quarry has now reached the end of its economic life and all quarrying activities at the site ceased in September 2006.

The Project will include the development and operation of a RRF and a general solid waste (non putrescible) landfill. The RRF will include a Materials Processing Centre (MPC) and Waste Transfer Station (WTS). In summary, the following activities are proposed:

- capacity to receive up to two million tonnes (t) of waste per annum, including inert and solid wastes from construction and demolition (C&D), commercial and industrial (C&I) waste streams complying with acceptable waste for general solid waste (non putrescible) facilities and green waste clean ups;

- on-site waste processing including sorting, screening, sieving, crushing, grinding, shredding and/or chipping, and composting of green waste;

- recycling of an estimated 50-80% of incoming waste (1 to 1.6 million tonnes per annum (mtpa), based on maximum capacity intake) e.g. to produce road base, aggregate, landscaping soil, bedding sand, mulch, wood chip, green waste compost and asphalt derived products for land application;

- testing and on-site storage/stockpiling of finished products prior to resale from stockpiles, predominantly to the building, construction and landscaping sectors and potentially the domestic market;

- transport of an estimated 20-50% of incoming waste (0.4 to 1 mtpa, based on maximum capacity intake) to the landfill proposed within the quarry void, comprising incoming materials which are unsuitable or uneconomical for recovery and recycling (for example, contaminated soils, asbestos waste and loads that cannot physically be sorted);

- quarantine and transfer of unacceptable wastes to an appropriate off-site facility for disposal;

- construction and operation of associated infrastructure, plant and equipment, including upgrade of the internal road network and reshaping of earthen amenity berms;

- the use of the existing site access via Old Wallgrove Road; and

- retention and conservation of a significant area in the north-west corner of the site, incorporating a remnant endangered ecological community (EEC) of Cumberland Plain Woodland (CPW).

The Project has been declared a project to which Part 3A of the *Environmental Planning and Assessment Act 1979 (*EP&A Act) applies and for which approval of the NSW Minister for Planning is required.

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged to undertake an Environmental Assessment (EA) for the Project. This Environmental Assessment Report (EAR) has been prepared in accordance with the requirements of the EP&A Act, the *Environmental Planning and Assessment Regulation 2000* and the requirements of the Director-General of the Department of Planning (DoP) issued on the 6 May 2008 (refer to *Annex A*). This EAR describes the Project, environmental implications associated with key aspects of the Project and identifies mitigation and management measures to minimise potential impacts.

1.2 PROPONENT

ThaQuarry Pty Ltd and ACN 114 843 453 Pty Ltd are joint proponents (herein referred to as the proponent) for this Project. ACN 114 843 453 Pty Ltd purchased a portion of the Project site in mid 2005 and ThaQuarry Pty Ltd purchased the remainder of the site in mid 2006. The proponents are newly formed entities that do not yet trade. As outlined above, the application process is to be managed on behalf of both parties by ThaQuarry Pty Ltd.

The proponent will draw on experience in operating a RRF and landfill facility from their commercial association with Sydney-based waste management companies, Dial-a-Dump Industries (DADI) and Alexandria Landfill Pty Ltd. Both waste management companies have extensive experience in waste collection, transportation, recycling and disposal and currently:

- operate a RRF and adjoining general solid waste (non putrescible) landfill at Alexandria, approximately five kilometres (km) south of the Sydney CBD, which recovers or recycles approximately 80% of waste received;
- engage in the collection and transportation of waste throughout the Sydney metropolitan region;
- provide quality recycled landscaping and building products for the householder and construction industry, including road base, bedding sands and aggregates, processed to meet relevant NSW Environment Protection Authority (EPA) standards; and
- hire out and sell plant and equipment for demolition, construction and excavation projects; and
- undertake heavy equipment maintenance and repairs.

The Alexandria facility has been run by Alexandria Landfill Pty Ltd since 2002 and in part by Dial A Dump Industries since 2006. These facility use best practice management processes with the aim to minimise the volume of waste sent to landfill.

1.3 SITE DESCRIPTION

1.3.1 Site Setting

The site is located at Eastern Creek in the central western suburbs of Sydney NSW, approximately 36 km west of the Sydney CBD, 18 km west of Parramatta and 12 km east of Penrith (refer *Figure 1.1*). The site is wholly within the local government area (LGA) of Blacktown, situated in the area known as the M7 Business Hub.

The site is in close proximity to the confluence of the M4 and M7 Motorways, which are part of the regional transport network and make the site highly accessible to metropolitan Sydney. An aerial photograph of the site and surrounding area is presented in *Figure 1.2*.

Land use in the region is variable and includes residential, commercial and industrial development, small rural allotments with residences, tracts of undeveloped land which are cleared or support remnant vegetation, waterways and associated riparian vegetation corridors and transport and utilities infrastructure. The landform is gently undulating.

The site is bounded by the M4 Motorway and an associated landscaped buffer to the north, Archbold Road to the west and open grazing land to the south and along part of its eastern boundary. The Hanson Asphalt Batching Plant and Hanson yard ('Hanson site') is located along the remainder of the eastern boundary. Operations at the adjoining Hanson site include crushing, processing, stockpiling and transport of materials for the building and construction industry. These features are shown on *Figure 1.2*.

The M4 is a major regional road providing connection between the Sydney CBD and the Blue Mountains. Archbold Road is a local road which crosses the M4 and connects to the Great Western Highway. It is currently gated to the north of the M4 and at its southern end and is used infrequently. However, the NSW Roads and Traffic Authority (RTA) have a draft plan (soon to be exhibited) for its upgrade and extension. The land adjacent to the northern site boundary accommodates low density residential areas of Minchinbury, with an industrial area to the north-west. The nearest residences are located approximately 120 m from the northern site boundary and 550 m from the quarry pit edge. Operations at the site under for the Project will be kept to a minimum of 500m from the nearest residents.

The land adjacent to the eastern site boundary accommodates cleared grazing land and the channel of Upper Angus Creek (refer to *Figure 1.2*) which originates here and runs in a northerly direction into an artificial channel through Minchinbury. This channel is flanked by sparse trees. There is an area of woodland beyond and further east are the M7 Motorway, Eastern Creek Raceway, Prospect Reservoir and the site of the former Australia's Wonderland.

The land adjacent to the southern and western site boundaries accommodates predominately cleared grazing lands with patches of trees, associated with the Ropes Creek regional open space corridor, and regional high voltage overhead electrical transmission lines. Ropes Creek and its riparian corridor provides a regionally significant fauna and flora corridor which acts as a buffer to the residential suburb of Erskine Park, located approximately 800 m beyond the western site boundary. An industrial facility and the Sydney West Substation are located approximately 500 m and 1 km to the south-east, respectively.

The site and surrounding lands to the north-east, east and south are zoned for future industrial redevelopment as part of the 'Eastern Creek Business Park'. The Business Park is planned to create a major employment hub for western Sydney.

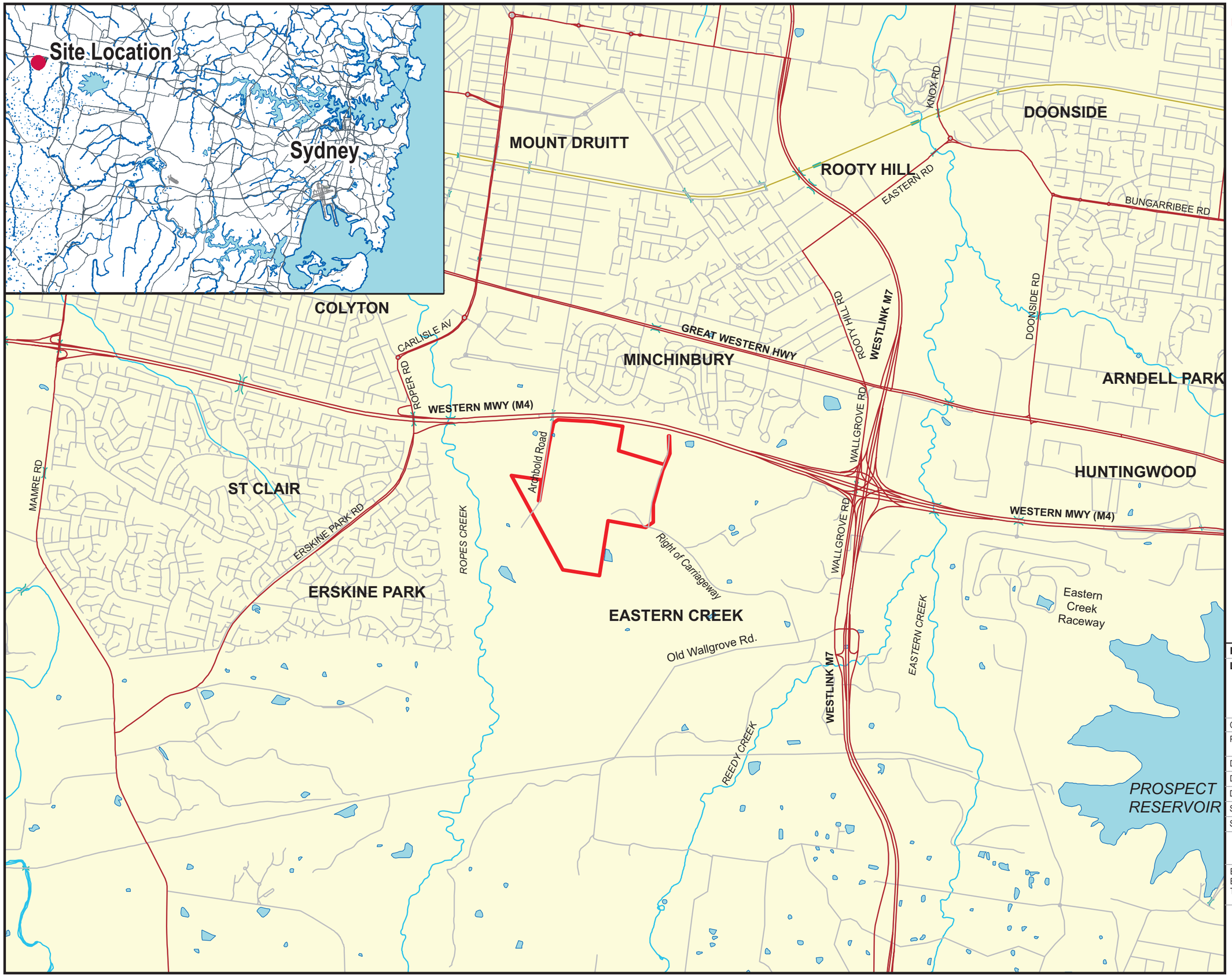

Figure 1.1
Locality Map

Client:	ThaQuarry Pty. Ltd.	
Project:	Light Horse Business Centre	
Drawing No:	0071234s_EA_10	
Date:	19/03/2008	Drawing size: A3
Drawn by:	ML	Reviewed by: -
Source:	-	
Scale:	Refer to Scale Bar	

N

0 500 1000m

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ERM

Legend

- Approximate area of Hanson Leasehold
- Operational Area
- Detention Basins
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	20-11-07	JS
R1	Minor Layout Changes	21-11-07	JS
R2	Layout Changes	06-02-08	RPC
R3	Layout and Lease changes	08-05-08	JS
R4	Addition of Basins	18-08-08	JF

Figure 1.2

Aerial Photograph of the Site and Surrounding Area

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse Business Centre		
Drawing No:	0071234s_GIS02_R4	Suffix No:	R4
Date:	18/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	RB
Source:	LHBC		
Scale:	Refer Scale Bar		

N

0 50 100 200 300 Meters

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ERM

1.3.2 Site Features

The site is 121.6 hectares (ha) in area and comprises four land parcels, identified as Lot 2 on Deposited Plan (DP) 262213, Lot 10 on DP 241859, Lot 1 on DP 400697 and Lot W on DP 419612 (refer *Figure 1.2*). References to the 'site' in this EAR refer to these four parcels of land in their entirety. This is distinct from the 'proposed area of operations' which refers to a sub-set of the total site that is to be developed for this Project and includes the quarry pit and RRF areas. The operational area (*refer Figure 1.2*) including the void as measured at surface is approximately 46.52 ha in size and comprises land within Lot W, Lot 1 and Lot 2.

The proposed area of operations will be bounded by landscaped earthern bunds or berms averaging 10 m in height. These will be significant structures and will entirely contain the proposed development and all structures and internal roads proposed within it. The berms which are significant earthwork structures will effectively preclude the proposed development from exceeding its approved bounds.

Past land use has resulted in areas of the site being highly disturbed and modified. The site comprises cleared agricultural grazing land to the north and south of a former quarry site and overburden stockpiles. A number of single lane unformed tracks provide access across the site to stockpiles and other parts of the site. There are stands of native trees located along the western site boundary and in the south-eastern, north-eastern and north-western corners of the site. The southern portion of the site has been modified by earth works and slopes gently toward a minor tributary of Ropes Creek. This tributary is flanked by scattered stands of trees.

Site topography would have originally been gently undulating rises, with broad rounded crests and ridges with gently inclined slopes (Hazelton *et al*, 1989). However this has been significantly altered from its original state by over 50 years of quarrying and associated earthmoving activities.

Hanson Construction Materials Lease

Hanson Construction Materials Pty Ltd (Hanson) currently lease part of the eastern portion of the site, being part Lot 2 on DP 262213 (asphalt batching operations), part Lot W on DP 419612 (logistics: office and workshop) and part Lot 1 on DP 400697 (haul road and operations). The approximate area leased by Hanson is indicated by the hashed area on *Figure 1.2* above.

With the exception of the shared access road, the areas leased by Hanson are completely separate and distinct from the operational area of the Project. The Hanson lease consists of land and operational infrastructure on which Hanson undertakes asphalt batching and has been used for this purpose for many years prior to the proponent acquiring the land.

Hanson has taken five consecutive five (5) year leases for this land. It is also proposed that this land will be transferred to Hanson by boundary realignment (refer below) and forms part of the land encompassed by a Development Application lodged by Hanson with DoP.

There is no contractual agreement or otherwise between the proponent and Hanson about any effect this may have on the future siting of the precinct road.

Site Subdivision

No application for subdivision is proposed as part of this Project.

An application for a boundary realignment and subdivision of the site has previously been lodged with Blacktown City Council and a Complying Development Certificate has been issued by Blacktown City Council.

On 31st July 2008 the proponent advised Planning Officers of Blacktown Council the proponent would not be proceeding with the title consolidation envisaged by the existing Complying Development Certificate.

Following consultation with the Department of Planning the Applicant will submit a revised plan of subdivision to effect a boundary alignment giving effect both to the contractual obligations to Hanson but more importantly aligning the new land titles with the scope of the proposed project.

Two plans are included with Figure 3.3 the first showing current titles and the second the proposed realigned titles.

Blacktown City Council issued a Complying Development Certificate to the proponent on 15 October 2007 the aim of which was to consolidate four titles in the east of the site (Lot 1 on DP 400697, Lot W on DP 419612 and Lot 10 on DP 241859) held in the name of ThaQuarry Pty Ltd into one title and to divide Lot 2 on DP 262213 at the west of the site held by ACN 114 843 453 Pty Ltd into three titles.

Previously ACN 114 843 453 Pty Ltd and ThaQuarry Pty Ltd (as an incident of the original land purchase) had contractually agreed with Hanson to lodge appropriate applications with Consent authorities in order to adjust the boundary lines as between the Lots held by adjoining neighbours. (Hanson and the proponents).

Principally these boundary realignments aimed to enable the following,

- future transfer to Hanson of the leased area of land on which an asphalt batching plant is located; and

- regularisation of a boundary so as to minimise operational disruption to the existing Hanson business by through traffic to the ACN land ; and

- to regularise through traffic at the eastern boundary entering from the registered right of carriageway.

Hanson has taken no steps to make the relevant applications to BCC and recently Hanson and the proponent refreshed their agreement to submit appropriate applications aiming to carry these out.

The proposed boundary realignments have no effect on the proposed locations of the precinct roads.

There is no agreement, arrangement, undertaking or understanding between either of the proponents and any other party to construct or locate roads in or across any of the proponent's land other than entirely in accord with the Precinct Plan.

1.3.3 Site Infrastructure

In the east, the logistics site currently leased by Hanson includes heavy and light vehicle parking and maintenance areas, fuel and oil storage facility, technical laboratory (supporting aggregate and concrete quality), quarry and logistics office buildings, amenities and store rooms, truck workshop and maintenance facility and truck washing facility.

The quarry pit occupies the north-eastern portion of the site. It is an open cut elliptical void approximately 430 x 700 metres (m) and up to 150 m in depth, with stepped walls and an estimated volume of 11 million cubic metres. The side slopes are steep at approximately 75 to 80° and are intersected by flat benches approximately seven to eight metres in width. There is a spiraling access road approximately 20 m in width around the pit edge which descends to the quarry floor. Steep banked stockpiles of excavated quarry overburden material up to 30 m in height are located to the north, east and west of the quarry pit.

The primary access to the site is via an existing right-of-carriageway (No. D227638) across Lot 2 of DP 644518, which connects to Old Wallgrove Road approximately 2 km south-east of the site. Vehicular access to the site is also available from Archbold Road, though this access road is gated and is used infrequently.

Authorised Infrastructure

Certain buildings located on ThaQuarry land have been in existence for many years prior to the proponent's acquisition and have been occupied by Hanson in conjunction with its operations as offices, amenities, training rooms, workshops, weighbridges, fuel tanks, storage sheds and technical laboratory. This infrastructure is shown in Figure 3.3 and within Annex C –Architectural Plans Within the operational area of the Project, existing infrastructure includes two disused corrugated iron clad sheds to the west of the quarry pit,

site fencing and unsealed roads. A shallow dam is located in the north-west corner of the site.

Unauthorised Works

The site also contains some infrastructure, termed 'unauthorised works' for which consent either from the responsible state agency or local council was not obtained prior to the activity occurring. These works, and the action proposed to be taken by the proponent to rectify the situation, is described below.

Weighbridge

This unauthorised work is within the Project's operational area and forms part of the Project.

An open farm style shed, a weighbridge and portable office together with tank water supply and electricity generator have been constructed west of the quarry pit (refer Figure 3.3).

It is proposed that the unauthorized weighbridge and farm shed construction with appurtenances will be inspected by an appropriate certifying authority in terms of Council construction requirements.

Tributary to Ropes Creek water course remediation works

Whilst within the site boundaries, this unauthorised work occurs in the non-operational land and does not form any part of the Project. A description is provided for completeness.

Unauthorised works were undertaken near the southern boundary of Lot 2/DP 262213. These works consisted of a diversion trench to temporarily divert overflow from the adjacent Hanson land and to collect silt and sediment from the Hanson land while noxious weeds were removed and erosion and scouring on the proponent's land was corrected.

The proponent has submitted to DECC details of the nature of those works, the reasons for them and the proposed completion of them. The proponent has also submitted a proposal to complete works to ensure continuation of the existing natural watercourse and adjacent riparian area and to refill the temporary diversion trench. DECC concluded in its letter dated the 18 February 2008 that the Draft Remedial Action Plan submitted was satisfactory.

By a Clean Up Notice No: 1089619 DECC has required ACN 114 843 453 Pty Ltd to carry out the works that the landholder had earlier proposed in a Works Plan submitted to DECC. That work has now been commissioned by the landholder, under the supervision of an independent qualified landscape architect and is expected to be completed by no later than 19th Decemeber 2009. In all other respects the watercourse tributary of Ropes Creek drains along its original path.

1.3.4 Soils

Interpretation of the Hazelton *et al* (1989) Penrith 1: 100 000 Soil Landscape Map indicates that the majority of the site is assigned to the residual Blacktown soil landscape, with an area of disturbed terrain over the quarry. The Blacktown soil landscape is characterised by shallow to moderately deep (<100cm) hard-setting mottled texture contrast soils, which are moderately reactive and highly plastic. Red and brown podzolic soils typically occur on crests, grading to yellow podzolic soils on lower slopes and in drainage lines. These soils typically have low fertility and are poorly drained. The original soils have been removed and greatly disturbed from the area classed as 'disturbed terrain'.

Pits up to three metres deep were excavated at the site by Douglas Partners in 2006 for geotechnical assessment. These excavations revealed that stockpiled material to the west of the quarry pit typically comprised grey-black ripped sandstone and mudstone filling with cobble and boulder inclusions and brown gravely clay filling with sandstone cobble inclusions. It has low to medium plasticity fines which have a slight to moderate potential for shrink/ swell reactivity with changes in moisture content. This material was originally sourced from the quarry as Virgin Excavated Natural Material (VENM) and constituent soils are consistent with materials present within the upper quarry cut faces. The geotechnical assessment conducted by Douglas Partners (2006) indicated that this material is suitable for most earthworks sites and as controlled filling for residential and industrial allotments, pavements and as road sub-grade, though not for sub-base and base course layers.

Pits in natural in-situ material along the western portion of the site revealed brown silty top soil 0.2 m in thickness, underlain by residual silty clays (light grey mottled red brown silty clay and brown silty sandy clay), with some ironstone gravel (Douglas Partners, 2006, refer to Appendix J, *Volume 2*).

This subsurface profile is consistent with that observed during investigations conducted in the vicinity of the site by Jeffery and Katauskas Pty Ltd (2007) and generally corresponds with that described by Hazelton *et al* (1989). These residual clays are of lower plasticity than indicated by Hazelton *et al* (1989), however are more plastic and reactive than the stockpiled material. Erosion and sediment control is discussed in *Section 6.5.1.*

1.3.5 Geology

Reference to the Clark and Jones (1991) Penrith 1:100,000 Geological Sheet indicates the natural soils and fill material at the site are underlain by Bringelly Shale of the Wianamatta Group. This consists of shale, carbonaceous claystone, claystone, laminite, occasional interbedded units of fine to medium grained lithic sandstone and rare coal and tuff.

The quarry is within an intrusive (igneous) plug of dolerite and volcanic breccia which may have caused localised metamorphism of the shale rocks.

1.4 STRATEGIC CONTEXT

State Environmental Planning Policy (SEPP) 59 Central Western Sydney Economic and Employment Area was gazetted in 1999 and applies to a number of landholdings in western Sydney including the Project site. The site lies within the Eastern Creek Precinct of the SEPP 59 Lands. SEPP 59 was developed to facilitate and promote economic development and employment within western Sydney. As part of SEPP 59, specific provision has been made for the site to be used '*for the purpose of a waste facility for non-putrescible material*'. The Project will meet the need for a new waste management, recycling and landfill facility in metropolitan Sydney, as provided for in Clause 31A of SEPP 59..

The *Eastern Creek Precinct Plan (Stage 3)* (Precinct Plan) was prepared under the provisions of SEPP 59 to guide the development of land within the Eastern Creek Precinct, to ensure the SEPP aims are met. This Plan has been considered during Project planning. Strategic planning considerations are discussed further in *Chapter 4*.

1.5 NEED FOR THE PROJECT

In addressing requirements for the project, two separate criteria of "needs" are addressed:

- the need for the project as set out in the Director General's Requirements; and

the "justifiable demand" for the landfill as required by State Environmental Planning Project 59 - Central Western Sydney Economic and Employment Area.

The consideration of "need for the project" in this EAR has looked at the overall scope of the project on a number of bases as set out below, whereas the justifiable demand for the landfill has focused more heavily upon issues relating to potential waste streams in the Sydney Metropolitan region and the capacity of the landfill site to receive this waste and the capacity of the Materials Processing Centre to cater for recyclable wastes.

This waste stream based analysis has been looked at in conjunction with the capacity of the proposed associated RRF to divert waste from landfill to the maximum extent possible whilst still fulfilling an overall need for a viable landfill site for unrecyclable waste.

The need for the Project derives principally from the inherent environmental, social and economic benefits it will enable to be realised, including:

- provision of a waste disposal and resource recovery facility for up to 2 million tonnes of Sydney's inert and solid waste (non putrescible) per annum;

- ability to optimise the use of a former quarry site that is no longer economically viable for use as a quarry;

- provision of employment, with approximately 30 people to be directly employed during construction and approximately 54 people during operations (includes 20 truck drivers for transportation of waste materials to and from the site), and indirect employment generated via support services such as maintenance workers and short term contractors;

- economic benefits to the local and regional community via capital injection and value added spending;

- enhancement of the economic position of the proponent which in turn will fuel investment in other projects;

- rehabilitation of the former quarry site, by infilling, to facilitate its future re-use for uses consistent with the surrounding precinct;

- preservation of an area of Cumberland Plains Woodland and its associated ecological, heritage and amenity values;

- reduction in green house gas emissions through recycling of incoming waste materials into the site;

- contribution to meeting the aims of SEPP 59 and overarching government waste avoidance and recovery legislation, policy and directives;

- recycling of building and construction materials to minimise quarrying for natural resources;

- provision of a supply of building, construction and landscaping materials; and

- help to address the scarce commodity of landfill space being available in Sydney.

To facilitate future economic development of the site and hence meet the SEPP 59 aims for long term economic development and employment within western Sydney, the quarry void must be rehabilitated.

An assessment of alternative uses for the quarry void (refer *Chapter 2*) found landfilling to be the most feasible use/rehabilitation strategy. This is recognised in the SEPP 59 provision for use of the site for a waste facility *(refer Section 4.3.5)*.

1.6 *STATE ENVIRONMENTAL PLANNING POLICY (INFRASTRUCTURE) 2007*

State Environmental Planning Policy (Infrastructure) 2007 which was gazetted in late 2007 requires that in determining a development application for development for the purpose of the construction, operation or maintenance of a landfill for the disposal of waste, including putrescible waste, the consent authority must take the following matters into consideration:

(a) whether a justifiable demand exists for the landfill, having regard to the provisions of the NSW Waste Avoidance and Resource Recovery Strategy and the waste disposal data provided from time to time by the Department of Environment and Climate Change,

(b) whether the location of the development is consistent with any regional planning strategies or locational principles included in the publication EIS Guideline: Landfilling (Department of Planning, 1996), as in force from time to time,

(c) the views of relevant public authorities and councils responsible for the area from which the waste material is proposed to be sourced.

Section 1.7 demonstrates the Project's 'justifiable demand' based upon the *NSW Waste Avoidance and Resource Recovery Strategy* and DECC progress reporting on waste management within NSW, the requirements of regional planning strategies including SEPP 59 and the stated requirements of relevant public authorities within planning policies and the DGRs issued for the Project.

1.7 *JUSTIFIABLE DEMAND*

To facilitate future economic development of the site and hence meet the SEPP 59 aims for long term economic development and employment within western Sydney, the quarry void must be rehabilitated. An assessment of alternative uses for the quarry void (refer *Chapter 2*) found landfilling to be the most feasible use/rehabilitation strategy. This is recognised in the SEPP 59 provision for use of the site for a waste facility. The Project will fill the void to produce a final landform consistent with the surrounding landform (refer *Figure 3.8*), which can then be redeveloped for uses consistent with the surrounding Eastern Creek Precinct lands. Proposed final landform and rehabilitation is discussed in *Section 3.9*.

The Project will meet the need for a new waste management, recycling and landfill facility in metropolitan Sydney, as provided for in Clause 31A of SEPP 59 which earmarks the site for future use as a non-putrescible waste facility. *Table 1.1* shows that 7.2 million tonnes of construction and demolition (C&D) and commercial and industrial (C&I) waste were generated in metropolitan Sydney over the 2004/2005 period, almost half of which was sent to landfill. The volume of these waste streams sent to landfill was similar for the 2005/2006 period.

Operating the landfill in conjunction with a recycling facility will minimise the volume of waste sent to landfill and provide a source of recycled building products.

The Project's focus on reuse and recycling is consistent with the *Waste Avoidance and Resource Recovery Act 2001* and contributes to meeting the aims of SEPP 59. Reuse and recycling of materials is socially and environmentally desirable and will aid in achieving NSW government policies and objectives regarding waste avoidance and resource recovery..

However it is recognised that not all waste can be recovered or recycled and hence the adjoining landfill facility will help meet an important need for metropolitan Sydney.

The Project is also conveniently located in close proximity to the Western Sydney Orbital including the M7 and M4 Motorways which provides ideal transport access to the site via this major regional road network. The location of the Project to this major transport hub surrounded by a growing industrial precinct provides a convenient and appropriately located waste disposal and resource recovery facility.

The Project also provides a safe disposal option for asbestos waste. In 2004-05, asbestos and asbestos-contaminated material, was the largest single material type disposed to landfill as C&D waste, being 24.7% or 320,000 tonnes of the total land filled volume of C&D waste (Department of Environment and Climate Change (DECC), 2007). The quantity of asbestos disposed of in metropolitan Sydney has been increasing since January 2000 and is predicted to remain high while asbestos building stock continues to be demolished (DECC, 2007).

The human health risks associated with asbestos which is not bonded or in matrix form are widely documented. There are still a significant number of buildings which have asbestos sheeting and to allow renovation of these buildings, a safe method of asbestos disposal must be available. Landfilling this material at depth presents the safest alternative available for the disposal of asbestos and asbestos contaminated soils. The acceptance, handling and disposal of this waste are guided by strict management procedures, including health and safety procedures outlined within the waste regulations including the handling of asbestos contaminated waste loads.

Through on-going consultation with the relevant government agencies issues have been raised regarding the Project which have been correlated into the DGRs. Through ongoing liaison with relevant government authorities this EAR has addressed the DGRs and the issues raised by the government agencies. Refer to *Chapter 5* which identifies the issues raised.

In considering the justifiable demand for the Project, this assessment includes the identification of a more focused 'need' for the particular commercial or

other activity for which Consent is sought which is a narrower or more specific concept than the broader concept of community or social 'need'.

1.7.1 Waste Generation in Sydney.

Data from the DECC NSW Waste Avoidance and Resource Recovery Strategy 2007 shows that total waste generation per capita in Sydney in the years 2000 to 2004/2005 increased from 2306.6kg to 2376.1kg.

The change in per capita generation of C&I waste from 2000 to 2004/2005 was a reduction from 645kg to 600kg, however over the same period C&D waste generation increased from 315kg to 349kg per capita.

The data also further shows that whilst per capita waste generation is decreasing, total waste generation within the Sydney metropolitan area is increasing.

It is significant, when the data for C&I and C&D waste generation over the period is analysed, that there is not a direct linear relationship. Each waste stream demonstrated a significant drop in 2000 for each of the waste classes which were then followed by a trend line increase.

Table 1.1 shows that 7.2 million tonnes of C&D and C&I waste were generated in metropolitan Sydney over the 2004/2005 period, almost half of which was sent to landfill. The volume of these waste streams sent to landfill was similar for the 2005/2006 period.

It is expected that recent changes to the Protection of the Environment Operations Act (POEO) increasing the levy payable on landfilled waste pursuant to s 88 of the Act will have the desired effect of diverting waste from landfill and encouraging its recycling.

It should be observed however that this levy increase has been matched by the introduction of quality standards for recycled products at the same time. Unless the recycled products manufactured from the waste meet rigorous processing procedural standards and testing and certification by independent NATA accredited laboratories they are not permitted to be sold as recycled products and therefore remains, for the purposes of the legislative framework, wastes that must be landfilled.

The inability or unwillingness of some recycling operators to meet the product standards may tend to encourage them to leave the industry and thereby cause some redistribution of available materials between the remaining operators. Such product standard requirements create a significant barrier to entry to new potential entrants into this field.

The net cost implications for waste operators between the relative effects of the increase in the s88 levy and the 3 Fs regime is as yet unknown. This project however represents a significant commitment to the recycling of construction demolition and excavation materials and to the institution and

maintenance of practices and procedures designed to comply with the product quality standards.

The infrastructure capacity for large volume throughput, combined with suitable location for transport and logistics, together with a co-located disposal facility for non recyclable materials combine to enhance the ability of this proposed facility to achieve a large share of the available market in Sydney of the raw materials for recycling.

The Project's focus on recycling is consistent with the *Waste Avoidance and Resource Recovery Act 2001* and will aid in achieving NSW government policies and objectives regarding waste avoidance and resource recovery.

Table 1.1 Volume of Waste Recycled and Landfilled in Metropolitan Sydney, 2004-2006

Period	Waste Stream	Volume Recycled (tpa)	Volume Landfilled (tpa)	TOTAL Volume (tpa)
2004/2005	C&D	2,500,000	1,300,000	3,800,000
	C&I	1,200,000	2,200,000	3,400,000
2005/2006	C&D	N/A	1,330,000	N/A
	C&I	N/A	2,200,000	N/A

1. N/A – not available
2. Source: DECC *pers. comms. November 2007*

Based on this data and assuming maximum capacity intake, the Project would have capacity to recycle or landfill approximately 28% of metropolitan Sydney's C&D and C&I waste, complying with acceptable wastes for general solid waste (non putrescible) facilities. In addition the Project would achieve recovery rates up to 28.6% higher than those achieved for metropolitan Sydney as a whole in 2004/2005.

The proportions of different types of incoming waste raw materials are one indicator of the potential of this proposed facility to achieve significant growth in market share.

Table 1.2 shows the results of an audit conducted in the Sydney Metropolitan area between 15th November 2004 to 16 December 2004 by the Department of Environment and Climate Change of the Construction and Demolition Mixed Waste Stream.

Table 1.2 Composition of construction and demolition mixed waste in the Sydney metropolitan area, 2004

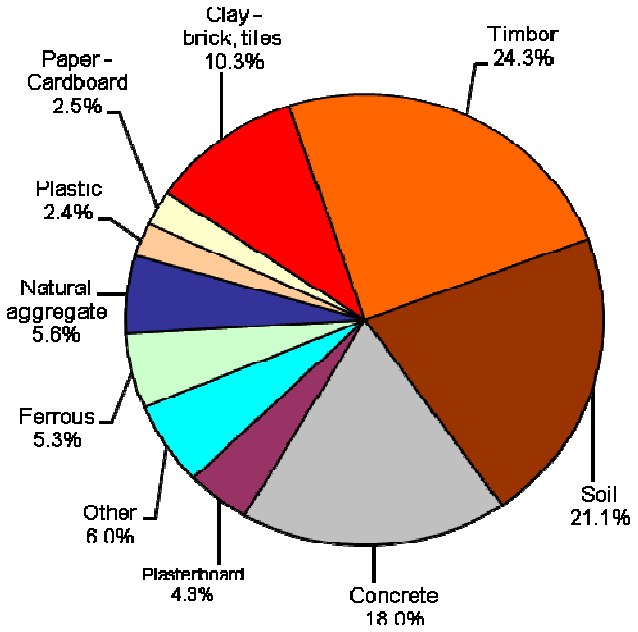
	Fraction weight				Composition
	>300mm	30 to 300mm	4.75 to 30mm	<4.75mm	(%)
Proportion (%)	24.4%	45.4%	9.0%	21.1%	100.0%
Material type					
Timber	45.3%	27.1%	10.2%	0.0%	24.3%
- hardwood	21.8%				
- softwood	15.2%				
- other	8.3%				
Concrete	13.9%	28.3%	19.6%	0.0%	18.0%
Clay - brick, tiles	0.9%	21.5%	4.3%	0.0%	10.3%

Natural aggregate	2.1%	3.4%	39.0%	0.0%	5.6%
Paper - Cardboard	1.0%	4.2%	3.8%	0.0%	2.5%
Plastic	4.1%	2.9%	1.2%	0.0%	2.4%
Textiles	3.9%	0.9%	0.2%	0.0%	1.3%
Ferrous metals	14.9%	3.5%	1.5%	0.0%	5.3%
Non ferrous metals	2.2%	0.4%	0.1%	0.0%	0.7%
Plasterboard	5.8%	4.1%	11.7%	0.0%	4.3%
Glass	0.0%	0.3%	3.5%	0.0%	0.4%
Asphalt	0.0%	0.6%	0.4%	0.0%	0.3%
Garden	3.5%	1.1%	2.2%	0.0%	1.6%
Soil	0.0%	0.0%	0.0%	100.0%	21.1%
Other	2.5%	1.8%	2.4%	0.0%	1.6%
TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

1. Source: NSW DECC

As presented in *Figure 1.3*, timber, concrete, clay, brick tiles, soil, natural aggregates, and metals together account for 85.3% of the C&D waste stream which is recyclable and which are the types of materials for which the Project is designed.

Figure 1.3 ***Composition of construction and demolition mixed waste in the Sydney metropolitan area, 2004***



Source: NSW DECC, 2004

Based on the available data in the 2004/2005 period, approximately 3.5 million tonnes of C&D and C&I waste was sent to landfill.

Even allowing that perhaps not such a high proportion of C&I as C&D wastes may be recoverable, based on the available audit data, 85% of the C&D wastes may be potentially recoverable resulting in a potential market in the Sydney Basin (based on 2004 figures) of almost three million tonnes. This is expected

to be a conservative figure and the proponent expects to capture a large share of this market.

Major Infrastructure Projects

Taking account of only a few of the announced major government projects over the next few years within a reasonable distance of the proposed site, still shows a significant amount of construction work which will generate significant waste. Projects include:

- NSW Roads construction programs. In the region of the project, these include: the proposed road widening in Hoxton Park set to commence in 2010 with a budget of $71 million. (Source: NSW budget papers 2008-2009); and the Woodford to Hazel brook road widening projected to commence in 2011 with a forecast budget of $160 million.

These types of infrastructure projects will generate significant amount of C&D waste which must be dealt with proximate to its source. The Project site is ideally placed to service the waste management needs of these projects.

A significant number of other major projects have been foreshadowed by the Commonwealth Government which could also be serviced by the capacity of this project to receive materials excavated during these processes, recycle them and make them available for resale.

Non Recyclable Materials.

It is recognised that not all waste can be recovered or recycled and hence the adjoining landfill facility will help meet an important need for metropolitan Sydney. There are many sources of non putrescible waste within the Sydney metropolitan area which are required to be landfilled because whilst they contain recyclable materials, these are either so mixed as to not be economically viable to recover or contain material (such as asbestos) which is not recoverable and by its nature must be landfilled.

There is a shortage of landfill space in Sydney, as reflected in the large discrepancy between landfill 'gate' fees in Sydney ($60-100/t) and the other major Australian metropolitan centres ($25-35/t) (Department of Environment and Heritage, 2001).

The other major solid waste landfill in western Sydney, run by Enviroguard, accepts on average one million tonnes of waste per annum. It is now in its closure stages and a new facility is required to replace it. Blacktown Waste Services, located east of Minchinbury accepts approximately 400,000 tonnes of waste per annum. However recent rezoning of lands adjacent to this site for residential use threatens its future viability.

Other equivalent waste facilities in the area, including Penrith Waste, have much smaller annual throughputs and may not have capacity to cater for increasing volumes of waste generated in metropolitan Sydney. The quarry void presents a unique opportunity for development and operation of a new high capacity landfill and site features including proximity to major regional transport networks make it ideally suited to this land use.

The Waste Management Association of Australia (WMAA) response to NSW Waste Avoidance and Resource Recovery (WARR) Act 2001 Performance Report of 19 October 2006 shows target versus actual trend lines for land fill and recycling in the Sydney metro area through to 2014. These projections identify a C&I total waste stream in the Sydney Metro area of 4.4 mtpa and a C&D total waste stream trend of 6.9 mtpa for the Sydney Metropolitan area by 2014.

These figures are inclusive of both recycling and material landfilled. In aggregate, the figures show a total landfill requirement for the two waste streams (based on trend line analysis) of 3.9 mtpa for the Sydney Metropolitan area by 2014.

Given the current reducing capacity of landfill facilities in Sydney, the project will meet a demand in Sydney's landfill requirements.

1.7.2 Asbestos

By 1954 Australia was number four in the Western world in gross consumption of asbestos cement products, after the USA, UK and France, and first on a per capita basis. Asbestos consumption in Australia peaked in about 1975 at 70,000 tonnes per year. In Australia, over 60% of all production and 90% of all consumption of asbestos fibre occurred in the asbestos cement manufacturing industry. Much of the industry output remains in service today in the form of "fibro" houses and water and sewerage piping.

Asbestos containing materials continued to be used in construction of houses in Australia up until the mid 1980's particularly in large exterior areas of house such as eaves.

A recent survey of building material in the housing stock in the ACT identified that of the housing still extant approximately 10% of the surveyed houses built before 1965 were clad in asbestos. The survey also identified that asbestos of one form or another was confirmed as being present in some form in 70% of all houses surveyed. It is noted that there was a significant reduction in the presence of asbestos in houses constructed post 1985. (ACT Asbestos Surveys – Health Risk assessment - URS Australia Pty Ltd 8 August 2005).

Whilst there appears to be no firm data on the absolute amount of asbestos in existence in the Sydney region, it is clear that there will be a continuing and significant demand for landfill to dispose of asbestos when disturbed in renovation and demolition of houses and other buildings.

NSW DECC figures for 2005/2006 show that 3% or 152,624 tonnes of contaminated building materials had to be landfilled as they could not be recycled. (NSW Resource Recovery Survey 2005-2006 NSW DECC). In 2004/2005, asbestos and asbestos-contaminated material, was the largest single material type disposed to landfill as C&D waste, being 24.7% or 320,000 tonnes of the total landfilled volume of C&D waste (Department of Environment and Climate Change, 2007).

The quantity of asbestos disposed of in metropolitan Sydney has been increasing since January 2000 and is predicted to remain high while asbestos building stock continues to be demolished (Department of Environment and Climate Change, 2007).

The human health risks associated with asbestos which is not bonded or in matrix form are widely documented. There are still a significant number of buildings which have asbestos sheeting and to allow renovation of these buildings, a safe method of asbestos disposal must be available.

The Project provides a safe disposal option for asbestos waste.

Landfilling this material at depth presents the safest alternative available for the disposal of asbestos and asbestos contaminated soils. The acceptance, handling and disposal of this waste is guided by strict management procedures, including health and safety procedures, which are outlined in *Section 16.2.3*

Forecasts by the Housing Industry Association of Australia indicate value of housing renovations in NSW will be stable throughout 2008/2009 at approximately $8,835 million, this is forecast to increase by 3% in 2009/2010 and 7% in 2010 to $9,100 million and $9737 million respectively.

For the foreseeable future this will drive a continued need for landfilling. Householders will seek to remove asbestos from their premises upon two primary bases:

- A general desire to improve homes resulting in renovations which will result in asbestos containing materials being refurbished. This will result in asbestos currently existing in a low risk bonded state becoming altered to a more high risk state and requiring disposal to landfill in accordance with DECC and WorkCover Guidelines; and

- Some persons will hold a concern for the safety of their families and look to remove all asbestos no matter what state it is in from residential dwellings thus creating a further demand for landfill.

Alternative Landfill Facilities For Disposal Of Asbestos.

There are a limited number of landfill sites in Sydney that can directly compete with the proposed LHBC site in terms of all the classes of waste they accept and in particular asbestos.

The DECC lists 11 facilities within the Sydney Metropolitan area which are identified as able to accept asbestos waste. Of these, Katoomba and Woy Woy, seem too geographically removed to provide a realistic and cost effective alternative for asbestos waste produced in much of Sydney. A further two in Camden and Belrose, specifically indicate that they do not accept "security waste "in which category they include asbestos. It is likely that the Blaxland facility is also too remote to be a realistic alternative for much of the Sydney market.

An assessment of the remaining seven facilities sited at Eastern Creek, Horsley Park, Kemps Creek, Lucas Heights, St Peters and Terry Hills is provided:

WSN (Waste Services New South Wales)

WSN is owned and operated by the NSW State Government. WSN is almost in a monopolistic situation for operations of NSW EPA Class 1 Putrescible scheduled waste facility (landfill and transfer station). WSN transfer most of their dry waste to Class 2 (non Putrescible) landfill facilities because of the higher cost of management of a Class 1 landfill. Further, this is economically beneficial in conserving landfill space for the more expensive putrescible wastes that are landfilled at their facilities. WSN also operate the Lucas Heights Belrose, Camden and Eastern Creek sites. Of these only Camden and Lucas Heights are truly competitive based upon the acceptance of asbestos.

Enviroguard

Enviroguard was recently acquired by TPI (Transpacific Industries) on or about July 2007 from Cleanaway. The EPA licence for this facility allows up to 1 million tonnes to be landfilled per annum. Enviroguard is currently landfilling above ground (forming a hill over the previous landfill hole) and the life expectancy of this site is not expected to go beyond 2009/2010 at the latest. Discussion with Enviroguard indicate that the landfill rate is close to 1 million tonnes per annum, further reducing the life expectancyof the facility.

Veolia (Collex) Horsley Park.

Horsley Park accepts asbestos and is located only a few kilometres from the LHBC Eastern Creek Site. Capacity of the facility is limited for all input materials to approximately 400,000 tpa. Construction of the M7 motorway reduced the potential landfill area which is estimated to be limited to a few million cubic metres of capacity.

Brandown (Kemps Creek)

Brandown is privately owned and also accepts asbestos. It is a landfill with a small capacity. Brandown also benefits from a recycling licence to perform resource recovery activities.

Glenfield Waste

Glenfield waste is a privately owned landfill facility with a relatively small capacity which accepts asbestos waste.

Blacktown Waste And Penrith Waste

Penrith Waste is privately owned (same owner as Blacktown Waste) and is nearing end of its life. It is currently used as a transfer facility for material transport to the Blacktown Waste Facility. Blacktown Waste is estimated to have a capacity of almost 4 - 5 million cubic metres. All landfill space needs to be dug out of the premises to be made available for landfilling purposes.

Blacktown Waste is currently operating in a cell with a capacity of a few hundred cubic metres. It is possible that landfilling activity on this site will cease as residential rezoning of the surrounding lands occurs and land values increase.

Kimbriki

Kimbriki is a Council owned and operated landfill which accepts asbestos.

SITA (Elizabeth Drive)

The SITA site holds a Hazardous Waste license from the EPA and Council approval for landfilling this specific type of material. The costs of operating this landfill are very high. The disposal of excavated material from the site has proven difficult which has resulted in quantities of material stockpiled on site.

Kurnell Landfill (KLF)

KLF is an Inert Landfill that cannot accept solid waste or asbestos waste. Given its distance by road from many waste sources in the Sydney Metropolitan area, particularly major C&D waste, it is a less viable alternative for much waste.

St Peters

St Peters should be considered a complementary site as it has limited remaining capacity of about 1 million cubic metres and is also operated by the related entities of the proponent. The St Peters site is located very close to the Sydney CBD and provides a proximate site for much waste generated in the CBD. However, given the high charges it levies due to its proximity to the

CBD, and the associated traffic access difficulties, it is not a realistic competitor for much of Sydney's waste, nor the proposed Project.

Summary

The impact of the proposed development has been assessed in accordance with the provisions of Section 79C of the EP&A Act, 1979 and consideration has been given both to community need and justifiable demand for the project. The project satisfies the community need for a safe mode of disposal of asbestos waste and has the capacity to satisfy the quantitative demand.

The proposal is permissible with Council's consent in the Employment Zone pursuant to SEPP No.59 and achieves many of the stated objectives for the zones. The proposal is also considered to generally comply with the relevant requirements under the Eastern Creek Precinct Plan - Stage 3.

The proposed works are considered to appropriately respond to the site opportunities and constraints. The proposed development will have a manageable impact on the micro-climate, air and water quality of the locality. Similarly, given the nature of existing and future surrounding development, the proposal is unlikely to result in any adverse amenity impacts on neighbouring properties.

Furthermore, the likely traffic generation of the construction works is considered to be minimal and acceptable within the locality. It will not result in any significant impacts on the existing levels of service of the surrounding road network. The proposed development is compatible with Council and State government planning objectives for the site and the locality. The site is suitable for the development proposed which will generally have acceptable environmental impacts and no significant adverse impacts on the amenity of the locality. Accordingly, it is considered that the proposal has a robust and justifiable demand and is considered to be in the public interest.

1.8 ENVIRONMENTAL ASSESSMENT APPROACH AND PURPOSE

This EA has been undertaken to assess potential environmental and socioeconomic impacts associated with the Project, identify management, mitigation and monitoring measures required to address identified potential impacts and to meet the Director General's Requirements (DGRs) for the Project and relevant legislative and stakeholder requirements.

The EAR will be submitted to the Minister for Planning to seek Project approval under Part 3A of the EP&A Act.

The EA has been based on the Project specific DGRs which were developed by DoP in conjunction with relevant government agencies. It takes into account issues raised during the consultation process by relevant government agencies, non-government organisations and the community (refer *Section 5.4*) including comments received from regulators following an initial adequacy review prior to public exhibition..

An environmental envelope approach has been used for the assessment to allow for maximum flexibility for operations within acceptable environmental parameters. The envelope identifies the limits for each environmental parameter in combination with other environmental parameters, beyond which, unacceptable environmental impacts are likely to occur. Accordingly, the EA has been based on the greatest levels of permissible Project activity to provide for the modelling of conservative 'worst case' scenarios for assessments of each of the affected environmental parameters, to develop a range of acceptable environmental and social parameters within which the Project can operate. The operations can therefore remain flexible within the constraints of the identified environmental envelope in instances where the level of Project activity is less than the maximum proposed due to non-environmental factors such as market forces.

Technical assessment reports prepared by ERM and its sub-consultants and where applicable, recent technical studies undertaken for the site, are submitted with the EAR as supporting documents and the key outcomes are presented in this EAR.

The preparation of each technical report has been based on the project description and has been co-ordinated with the relevant associated technical reports of other specialists so that the interaction of inter-related environmental parameters has been assessed across the range of scenarios that may be presented under the Project's construction and operating conditions. Examples of this coordination include assessments of traffic numbers and their respective noise and air quality impacts and the groundwater and leachate impacts under different land-filling rates.

Sub consultants engaged to undertake selected specialist technical assessments are identified below in the EAR structure.

1.9 STRUCTURE OF THE ENVIRONMENTAL ASSESSMENT REPORT

This EAR comprises two volumes. The EAR is contained within Volume 1 and the supporting specialist technical studies are contained in Volume 2.

VOLUME 1 – ENVIRONMENTAL ASSESSMENT REPORT

Volume 1 is divided into seven parts, as outlined below.

Executive Summary

The executive summary provides a succinct overview of the Project, key environmental issues, assessment results and environmental management procedures.

Part A – The Proposal

Part A contains three chapters. It provides a background to the Project, an outline of the need for the Project (Chapter 1), an overview of alternatives assessed, justification for the preferred option and a detailed description of the Project.

Part B – Planning Framework, Consultation and Issues Identification

Part B contains two chapters. It provides a description of the legislative considerations and statutory requirements for the Project, and an outline of the issues identification process including consultation undertaken with government and community stakeholders.

Part C – Social and Environmental Interactions

Part C contains 13 chapters. It describes the interactions between the Project and the biophysical and socioeconomic environment. In addition, it provides an assessment of the potential environmental, social and economic impacts associated with the Project and a description of the management, mitigation and monitoring measures proposed to manage any identified impacts.

Part D – Environmental Management and Project Justification

Part D contains two chapters. It provides the draft Statement of Commitments which consolidate the proposed management measures to be adhered to, to mitigate and /or monitor any potential environmental, social and economic impacts associated with the Project. In addition, it provides a conclusion to the EAR.

Part E – References and Abbreviations

Part E contains a list of references and a list of acronyms and abbreviations used in this EA,.

Part F – Annexes

Annexes included in ***Volume 1*** are:

- *Annex A:* The requirements of the Director General and the applicable sections within the EAR which address these requirements including a table of responses identifying where issues raised by regulators in the adequacy review have been addressed in this EAR;

- *Annex B:* Correspondence undertaken with Action groups including the newsletter provided to the residents of Minchinbury and the newspaper article outlining the project;

- *Annex C: Architectural Plans* prepared by Stanic Harding Architects, Land Partners Built Environment Consultants and Site Image Landscape Architects, and

- *Annex D*: The 7 Part Test - Flora and Fauna Impact Assessment prepared by Keystone Ecological Pty Ltd.

- *Annex E*: Complying Development Certificate No. 07-93 issued by Blacktown City Council for subdivision boundary adjustment

- *Annex F*: Certificates of Land Title

- *Annex G*: Transfer granting access easement between Hanson Construction Materials and ThaQuarry Pty. Ltd.

- *Annex H*: Technical drawings of unauthorised works – weighbridge facility

VOLUME 2 - APPENDICES

Volume 2 includes the following Technical Reports:

- *Appendix A: Site Surface Water Management*, prepared by Storm Consulting, February 2008;

- *Appendix B: Groundwater Assessment*, prepared by Environmental Resources Management (ERM), July 2008;

- *Appendix C: Groundwater and Salinity Assessment*, prepared by Ian Grey Groundwater Consulting Pty Ltd, May 2007; and

- *Appendix D: Leachate Collection System – Concept Design*, prepared by Environmental Resources Management (ERM), July 2008;

- *Appendix E: Air Quality – Odour and Dust*, prepared by Holmes Air Sciences, April 2008;

- *Appendix F : Noise Impact Assessment*, prepared by Environmental Resources Management, August 2008;

- *Appendix G: Traffic Impact Assessment,* prepared by Transport and Traffic Planning Associates, April 2008;

- *Appendix H:Heritage Conservation Strategy,* prepared by Jo McDonald Cultural Heritage Management Pty Ltd, July 2005 – prepared for Blacktown City Council as part of the Eastern Creek Precinct Plan;

- *Appendix I: Bushfire Hazard Assessment*, prepared by Holmes Fire and Safety, July, 2008;

- *Appendix J: Preliminary Contamination Assessment of Materials*, prepared by Douglas Partners, April 2006;

- *Appendix K : Geotechnical Quarry Slope Stability Assessment,* prepared by Jeffery & Katauskas Pty Ltd, 17 March 2008;

- *Appendix L: Short Term Risks in Quarry* and *Long Term Risks in Quarry*, prepared by Pells Sullivan and Meynink Pty Ltd, December 2006.

- *Appendix M: Extraction and Rehabilitation Plan*, prepared by Hyder Consulting, May 2007.

2 *PROJECT ALTERNATIVES*

This chapter provides an overview of alternatives considered during development of the Project. The advantages and disadvantages of each option are discussed and a justification for the preferred option provided.

2.1 Overview

The proponent has explored alternatives regarding the ability to optimise the use of a former quarry site that is no longer economically viable for extractive purposes.

2.1.1 Non-Land-filling Alternatives/"Do nothing" Alternative

Alternative uses for the site that have been considered include:

1. Water retention/reservoir,
2. Building; and
3. Development within the envelope of the pit (as has been discussed in relation to the former quarry at Hornsby).

Evaluation of these alternatives by the proponent indicate that none are economically viable propositions. There is a high likelihood that over time, through the nature of its steep sides, the quarry void if left unattended, unworked and unmanaged will present a hazard to the community. There is also a high likelihood that if left unattended the quarry may attract unlawful tipping of wastes in an unregulated way resulting in environmental management requirements with associated economic costs to be borne by the community.

2.1.2 Land-filling Alternatives

The aim of the alternatives assessment was to ensure the Project design meets economic, social and environmental objectives and stakeholder expectations, whilst being economically and logistically feasible. Findings of the technical investigations and recommendations of government agencies were considered during this process. In particular, strong consideration was given to designing key project components to minimise noise, air quality and visual impacts on neighbouring residences and produce no impact on the conservation area in the north-west of the site.

A summary of each of the options assessed for respective key project components and the advantages and disadvantages of each, including justification for the preferred options is provided in *Sections 2.2* and *2.3* below. An assessment of the 'do nothing' option is provided in *Section 2.4*.

2.2 Project Alternatives

Option 1

Option 1 involved construction and operation of a general solid waste (non putrescible) landfill in the former quarry pit, in conjunction with a RRF.

Advantages

- Economic re-use and rehabilitation of quarry void to restore to a landform suitable for future redevelopment;
- maximises opportunities for resource recovery, in line with NSW waste avoidance and resource recovery goals;
- provides a supply of recycled building, construction and landscaping materials, which will minimise extraction of natural resources;
- enables the proponent to take advantage of RRF and landfill environmental management experience and technology gained through their commercial association with DADI and Alexandria Landfill Pty Ltd;
- reduces greenhouse gas emissions associated with landfilling of biodegradable waste, by maximising recycling and recovery of these materials;
- provides a waste disposal and resource recovery facility for Sydney;
- consistent with SEPP 59 provisions for future use of the site as a non-putrescible waste facility; and
- waste does not need to be processed to the same level as engineered fill, with associated cost reduction.

Disadvantages

- Limited range of waste materials able to be accepted onto the site (e.g. no putrescible material); and
- cost of landfill levy taxes and mitigation to address potential environmental impacts e.g. dust suppression technologies, leachate treatment and environmental monitoring.

Option 2

Option 2 involved filling the quarry pit with straight engineered fill, with or without an accompanying RRF.

Advantages

- Economic re-use and rehabilitation of quarry void to restore to a landform suitable for future redevelopment;
- if a RRF were incorporated, opportunities for resource recovery would be maximised, in line with NSW waste avoidance and resource recovery goals;
- if a RRF were incorporated, a supply of recycled building, construction and landscaping materials will be provided, which will minimise extraction of natural resources;
- if a RRF were incorporated, greenhouse gas emissions associated with landfilling of biodegradable waste will be reduced, by maximising recycling and recovery of these materials; and
- consistent with SEPP 59 provisions for future use of the site as a non-putrescible waste facility.

Disadvantages

- The facility would still be classified as a landfill, meaning landfill levy taxes would still apply and therefore the additional cost of processing waste to engineered fill could not be justified;
- limited range of waste materials able to be accepted onto the site;
- potential local community opposition to operation of any landfill at the site;
- if there were no RRF, the proponent would be unable to take advantage of experience and progress in the recycling industry from its commercial association with DADI and Alexandria Landfill Pty Ltd or generate revenue from sale of recycled product and this use would be contrary to NSW waste management strategies and resource recovery goals; and

- the finished landform would offer no engineering or construction advantage over a void filled with adequately compacted solid and inert waste, and therefore the additional cost could not be justified.

Option 3

Option 3 involved allowing the quarry void to fill up with water and provide water supply to neighbouring lands. In conjunction, a concrete cover would

be constructed over the pit, on which light industrial activity could take place, with buildings of two and three levels extending down into the pit.

Advantages

- Provision of alternative water supply for surrounding lands; and
- employment generating industrial development consistent with the aims of SEPP 59.

Disadvantages

- Complex engineering issues;
- prohibitively expensive development cost which was unable to be justified; and
- does not comply with SEPP 59 provisions for future use of the site as a non-putrescible waste facility.

Justification for Preferred Option- Option 1

Option 1 is preferred as it maximises resource recovery, allows the proponent to take advantage of experience from its commercial association with DADI and Alexandria Landfill Pty Ltd, is consistent with SEPP 59 provisions for future site use and is the most economically viable option for the proponent.

2.3 *DEVELOPMENT ALTERNATIVES*

Based upon Option 1 which included a combined Landfill and Resource Recovery Facility (RRF) development alternatives were considered in order to facilitate the preferred option. These alternatives focused on preferred site access, transportation, the design of the RRF, stockpile and on-site detention basin location, waste management, leachate collection, hours of operation, and the ability to incorporate putrescible waste and green waste.

The following development alternatives consider the advantages and disadvantages of possible options and identify the preferred options to facilitate the development of a landfill and RRF.

2.3.1 Site Access

Option 1

Option 1 involved using the existing site access via the registered right of carriageway off Old Wallgrove Road.

Advantages

- Makes use of the existing road network and site access which has historically been subject to high volumes of heavy vehicle traffic associated with the quarry and asphalt batching plant;

- avoids road traffic noise impacts to sensitive receptors adjacent to Archbold Road; and

- most economical option.

Disadvantages

- Potential for future change to the access arrangement as stated within the Eastern Creek Precinct Plan.

Option 2

The second option looked at for site access involved using the existing site access via the registered right of carriageway off Old Wallgrove Road, in conjunction with access from Archbold Road.

Advantages

- As for Option 1;

- site traffic would be distributed along two routes thus minimising traffic volumes and associated impacts along each route; and

- site access from Archbold Road is consistent with the proposed local road network set out in the Precinct Plan.

Disadvantages

- upgrades would be required to Archbold Road north of the M4 to cater for proposed traffic generation, including removal of the existing three tonne weight limit;

- potential adverse impact of road traffic noise on sensitive receptors adjacent to Archbold Road; and

- uncertainty regarding funding and timing for construction of the proposed road network set out in the Precinct Plan and its connections to the regional road network, including viability of potential future on/off ramps to the M4 Motorway (the latter is to be subject to a separate investigation to be commissioned by the RTA).

Justification for Preferred Option

Option 1 is preferred as it is the most economical, whilst not predicted to adversely impact the surrounding road network (refer *Chapter 11*). Subject to future development of the Precinct, the access arrangement may be altered. If this occurred, the appropriate assessment and approval process would be undertaken, as required.

2.3.2 Resource Recovery Area Design

Option 1

Option 1 was for an enclosed, raised MPC/ WTS structure, inclusive of a hand-unload area, with some open air processing and stockpiling behind amenity berms, subject to imposition of strict dust mitigation measures.

Advantages

- Maximises sorting opportunities, including opportunities for customer self sorting, which maximises recycling;
- minimises noise, dust and odour emissions from this area, leachate generation areas and visual impact associated with the spread of materials and equipment around the site;
- provides some protection from the elements;
- Crushing, grinding areas contained over 2 levels which are gravity fed for processing; and

Disadvantages

- Higher cost of design and construction.

Option 2

Completely open air sorting and stockpiling of waste materials and recycling and stockpiling of finished products.

Advantages

- Minimal cost of design and construction.

Disadvantages

- Potential adverse noise, air quality and visual impacts;
- increased extent of leachate generation areas which present more complex and costly management issues; and
- affords no protection from the elements.

Justification for Preferred Option

Option 1 is preferred despite increased cost as it reduces potential noise, air quality, surface water and visual impacts.

2.3.3 Stockpile Locations

Option 1

Option 1 involved locating the stockpiles adjacent to the quarry pit, shielded by berms.

Advantages

- The stockpiles will not be visible to receptors off-site, other than the adjoining industrial facility at the Hanson site, negating associated visual impacts;
- provides greater separation to Minchinbury, thus reducing impacts of dust and noise emissions associated with stockpiling and processing activities upon sensitive receptors within Minchinbury; and
- minimises haul distance to landfill facility, with associated decrease in cost and environmental impact e.g. exhaust and dust emissions.

Disadvantages

- Smaller area for operations; and
- cost of construction, maintenance and landscaping of amenity berms.

Option 2

Option 2 involved locating the stockpiles adjacent to the M4 Motorway.

Advantages

- More space available for operations; and
- avoids costs associated with construction, maintenance and landscaping of amenity berms .

Disadvantages

- Closer to residents, thus having greater potential for noise and air quality impacts;

- stockpiles would be visible to some residents, adversely impacting upon their visual amenity; and
- longer haul distance to landfill facility, with associated increase in cost and environmental impact e.g. exhaust and dust emissions.

Justification for Preferred Option

Option 1 is preferred as the location will allow efficient site operations whilst reducing potential noise, air and visual impacts.

2.3.4 On-Site Detention Basin Location

Option 1

Option 1 was to construct the on-site detention (OSD) basin to the north of the proposed location of the northern berm, adjacent to the conservation area.

Advantages

- Greatly minimises disturbance to the conservation area during construction and operations, and associated impacts to ecological and heritage values.

Disadvantages

- Reduces developable area; and
- differs from the proposed drainage detention basin/ wetland location set out in the Precinct Plan.

Option 2

The second option looked at for siting of the OSD basin was to construct it in the north-west corner of the conservation area.

Advantages

- Increases developable area; and
- consistent with the proposed drainage detention basin/ wetland location set out in the Precinct Plan.

Disadvantages

- Requires clearing of part of an endangered ecological community with potential associated disturbance to ecological and heritage values and mitigation and management costs.

Justification for Preferred Option

Option 1 is preferred despite the associated reduction in the developable area, as it will minimise impacts upon the conservation area. For this reason, positioning the basin at a different location in the northern portion of the site to that proposed in the Precinct Plan is justified.

2.3.5 Putrescible Waste

Option 1

Option 1 involved prohibiting acceptance of putrescible waste to the RRF and landfill facility.

Advantages

- Reduces risk of odour impact at nearby sensitive receptors;
- preferred by the local community;
- reduces risk of vermin; and
- consistent with SEPP 59 provisions for future use of the site as a non-putrescible waste facility.

Disadvantages

- More restricted range of materials able to be accepted; and
- significant reduction in revenue.

Option 2

Option 2 involved acceptance of putrescible waste to the RRF and landfill facility.

Advantages

- More flexibility in that a wider range of materials are able to be accepted.

Disadvantages

- Potential odour issues;
- risk of vermin problems;
- potential local community opposition;
- inconsistent with SEPP 59 provisions for future use of the site as a non-putrescible waste facility;

- greater level of leachate treatment and gas extraction management required due to the nature of the waste landfilled; and

- greater settlement issues to be considered for future redevelopment of site, if possible, once the landfill site is closed.

Justification for Preferred Option

Option 1 is preferred as it avoids potential environmental impacts associated with putrescible waste and is in keeping with preferences of the local community and SEPP 59 provisions for future use of the site.

2.3.6 Green Waste

Option 1

Option 1 involved acceptance and recycling of green waste at the RRF.

Advantages

- More flexibility in that a wider range of materials are able to be accepted;

- in keeping with the proponent's core business and enables the proponent to take advantage of green waste processing and environmental management experience developed at the Alexandria facility;

- maximises resource recovery undertaken at the facility, in line with NSW waste avoidance and resource recovery goals;

- recycling of green waste reduces greenhouse gas emissions associated with landfilling of biodegradable waste, by maximising recycling and recovery of these materials; and

- facilitates production of a valuable recycled product and generates revenue from its sale.

Disadvantages

- Potential odour issues which require management (refer *Section 9.5.3*); and

- additional cost and labour requirement associated with management of green waste.

Option 2

Option 2 looked at prohibiting acceptance of green waste to the RRF.

Advantages

- Reduces odour management requirements.

Disadvantages

- More restricted range of materials able to be accepted and recovered/ recycled;
- contrary to the proponent's core business and to NSW waste management strategies and resource recovery goals;
- the proponent would be unable to take advantage of existing experience and progress in the green waste recycling industry gained from its commercial association with DADI and Alexandria Landfill Pty Ltd or generate revenue from sale of recycled mulch and compost; and
- Negative environmental impact if green waste were not recovered and directed to landfill due to increase in landfill gas emission (green house gases), worsening of leachate quality and longer period for monitoring, testing and mitigation required post landfill closure.

Justification for Preferred Option

Option 1 is preferred as it facilitates a higher level of resource recovery at the site and is in keeping with DECC goals of maximum resource recovery.

2.3.7 Transport of Material to Landfill

Option 1

Option 1 involved using dump trucks to transport material to landfill, via the in-pit road.

Advantages

- More flexibility with regard to load-out and materials placement;
- Tried and tested at other landfill sites; and

- enables the proponent to make use of existing equipment (dump trucks) and avoid costly and complicated design, construction and maintenance of alternative transportation.

Disadvantages

- More extensive upgrade and maintenance requirement for in-pit road;
- more extensive dust mitigation required to address wheel generated dust; and
- costly to operate.

Option 2

The second option looked at for transport of waste to the landfill was to use a conveyor belt with waste load (whether as is coming from the conveyor or bagged) directed to a chute (or other similar transport mechanism) to send the waste material directly from the RRF to the landfill floor.

Advantages

- Reduction in wheel generated dust emissions;
- reduced labour requirement; and
- less extensive upgrade and maintenance requirement for in-pit road.

Disadvantages

- Anticipation of costly and complicated design required;
- Requirement for automation in the load-out stage; and
- Higher level maintenance and monitoring required.

Justification for Preferred Option

Option 1 is currently preferred as it has been tested successfully at other sites and is likely to provide greater flexibility for operations. Option 2 should not, however, be completely dismissed due to the benefits it may provide.

2.3.8 Water Management

Option 1

Option 1 involved use of captured rainwater, recycled stormwater and potentially leachate which has been treated to an acceptable standard, to meet site water needs where possible, supplemented by town water.

Advantages

- Aids in the conservation of water resources;
- increases water available for dust suppression and irrigation; and
- minimises off-site releases.

Disadvantages

- Cost of treatment and storage infrastructure.

Option 2

Option 2 was to utilise predominately town water supply to support operations.

Advantages

- Reduced setup costs; and
- additional treatment not required.

Disadvantages

- Cost of supply;
- reliance and impact on town water supply;
- may result in more frequent off-site discharge of leachate and stormwater as it is not re-used on-site.

Justification for Preferred Option

Option 1 is preferred as it aids in water conservation and minimises off-site stormwater discharges and potentially, leachate discharges.

2.3.9 Hours of Operation

Option 1

Option 1 was for 16 hour operation (6am-10pm) with additional waste deliveries only after 10pm from time to time, whilst further restricting operating hours for landfilling operations (6am-6pm).

Advantages

- Significantly reduces the potential for adverse noise impacts during the night time; and

- avoids costly installation of pit lighting and its associated visual impact.

Disadvantages

- Reduced productivity; and
- restricted hours of traffic generation, increasing peak hour vehicle movements.

Option 2

Option 2 was for 24 hour operations.

Advantages

- Increased productivity; and
- greater spread of daily traffic generation, decreasing peak hour vehicle movements.

Disadvantages

- Greater potential for adverse noise impacts during night time hours;
- cost and visual impact of pit lighting; and
- safety issues associated with night-time operations around the pit i.e. reduced visibility at night.

Justification for Preferred Option

Option 1 is preferred despite reduced productivity as it would reduce potential noise impacts at night and does not require pit lighting.

2.3.10 Leachate Collection System

Several options were looked at for design of the leachate collection system in the pit. An assessment of the advantages and disadvantages of each of these options and a justification for the preferred option is presented in *Chapter 8* and in *Volume 2 – Technical Report for Leachate Collection System prepared by ERM*.

2.4 'Do Nothing' Option

The 'do nothing' option would potentially fail to meet the need for a new high capacity waste management, recycling and landfill facility in metropolitan Sydney. SEPP 59 provisions for future use of the site for a non-putrescible landfill would not be realised. The rehabilitation and economic use of the

former quarry site, to facilitate its future development, consistent with the surrounding Precinct would not proceed. This in turn would likely increase the volume of water retained in the void, result in the quarry pit suffering spalling and fretting of its edge and sides and landslips due to lack of maintenance and present a potential hazard to persons entering the site. It would not be possible to contribute to achieving NSW government legislation, policies and objectives regarding waste avoidance and resource recovery. If the Project does not proceed, the associated economic and employment benefits for the local and regional community would not be possible. Similarly, a failure to continue with the Project would not take advantage of the proponent's initial investment and would not realise the potential economic benefits of the Project.

2.5 Conclusions

The management of environmental and social issues was strongly considered during development and modification of the preferred Project option. Various alternatives for the site layout and proposed operations were evaluated by the proponent and environmental specialists to ensure the Project met environmental and social objectives and stakeholder expectations, whilst still being economical and feasible. In addition, several key aspects of the Project design, including gas, leachate, surface water and dust management systems, were informed by the technical assessments, to ensure potential impacts were adequately mitigated. These aspects are described in Part C of this report. This Project will provide a new waste management, resource recovery and landfill facility for metropolitan Sydney whilst not significantly impacting on the environment.

3 PROJECT DESCRIPTION

Details of the preferred components of the Project and a summary of key Project information are provided in this Chapter.

3.1 Overview

The proponent proposes to construct and operate a RRF (including a MPC and WTS) and a general solid waste (non putrescible) landfill at their Eastern Creek site. A license for operations will be obtained from DECC (the regulatory body) which will be adhered to throughout operations.

The RRF will have the ability to accept up to two million tonnes of waste per annum, an estimated 50 to 80% (up to 1.6 mtpa, based on maximum capacity intake) of which will be recycled (*refer Section 3.1.1*).

Waste loads received at the facility that are classified as containing material capable of being recovered or recycled will go through the recovery process, where an estimated 80% of material is expected to be recycled or recovered. After reprocessing or recovery, it will be stored on-site until sold. The remaining 20% will constitute unsalvageable material and will be directed to the adjoining landfill facility or off-site as appropriate.

In addition to the unsalvageable material left over from the sorting process, some material brought onto the site will be identified outright as unsuitable for recovery and will be directed to the WTS from where it will be transported to the adjoining landfill facility. This will include asbestos waste, which may also bypass the MPC/WTS and be sent directly to the landfill facility. Asbestos identification and management procedures are outlined in *Section 16.2.3*. Dependent on the volume of material classified outright as unsuitable for recovery, an estimated 20 to 50% of total material received at the site will be sent to landfill.

The above processes are depicted in the process flow diagram shown in *Figures 3.1 and 3.2*. A summary of key Project information is provided in *Table 3.1* and the proposed site layout is shown in *Figure 3.3*.

The proponent is not relying on previous EPA licences or licences issued to third parties as part of this project. New licences specifically relating to the proposed facility as set out in this project application will be sought by the proponent upon the granting of the project approval.

3.1.1 Operational Scenarios

The operational scenarios and the associated environmental assessments provided in this EA are based on projections of maximum and minimum throughput of material to both the RRF and landfill (refer *Figure 3.2*) based upon the proponent's historical and projected understanding of the waste market. As explained in *Section 1.8*, this approach provides the greatest

assurance of possible environmental impacts by defining the possible extremes of environmental impact within an assessment 'envelope' whilst maintaining the greatest flexibility for the Project's operations over its life.

Consequently, the precise quantification of how much material may be received, recovered, recycled and landfilled in any given year during the life of the project is dependent upon a number of factors many of which are beyond the control of the proponent such as market conditions.

To address this variability, and to assist understanding and facilitate assessment of the Project, the EA provides examples of various different ranges of materials landfilled versus materials recycled, recovered and sold. These scenarios define the assessment envelope and illustrate how different combinations might occur during the operating life of the facility. In certain cases, where modelling has been undertaken to assist in the prediction of environmental impacts, the scenario with the most detrimental possible environmental impact (termed 'worst case') has been selected.

Traffic numbers for this comparative worst case modelling remain consistent throughout the EA. However, it should be noted that:

- air quality modelling (assessing dust generation) takes into account traffic on unsealed roads within the quarry pit;
- traffic impact modelling takes into account deliveries to and from the site and the expected impact on the road networks;
- noise impacts include an assessment of both traffic and fixed plant and machinery confined to operations within the RRF and quarry such as crushers and loaders that are not included in the general traffic numbers;
- noise modelling is also based on the worst case scenario where in-pit landfilling is reduced and resource recovery activity at ground level is higher.

These scenario variances are further explained in the detailed assessment chapters within this EA.

Modeling used throughout this EA has been based on the upper limit of 1,000,000 tonnes per annum landfilled in order to assess potential 'worst case' environmental impacts. However project approval is only being sought for 700,000 tonnes per annum to landfill.

The figure of 1,000,000 tpa of waste to landfill has been chosen for modelling as it is in excess of the figure for which approval is sought (by approximately 40%) and provides a conservative assessment of the environmental impacts.

It is not expected, nor assumed that from commencement of operations that the facilities will either attract or process the stated anticipated maximum annual throughputs. It is to be expected that there will be some introductory period during which the throughputs will be significantly less than those modelled.

The proponent has sought approval for two adjacent facilities which *when combined* will anticipate a total maximum annual throughput of two million tonnes per annum. By reference to prior experience it is estimated that a maximum of 1.6 million tonnes could be recycled at the facility per annum (in which case the maximum amount to be landfilled would be 400,000 tonnes in that same year).

Maximum landfilling per annum might be 700,000 tonnes per annum and thus the amount recycled at the site could not exceed 1.3 million tonnes in that year. No combination of upper and lower limits could ever exceed 2 million tonnes per annum.

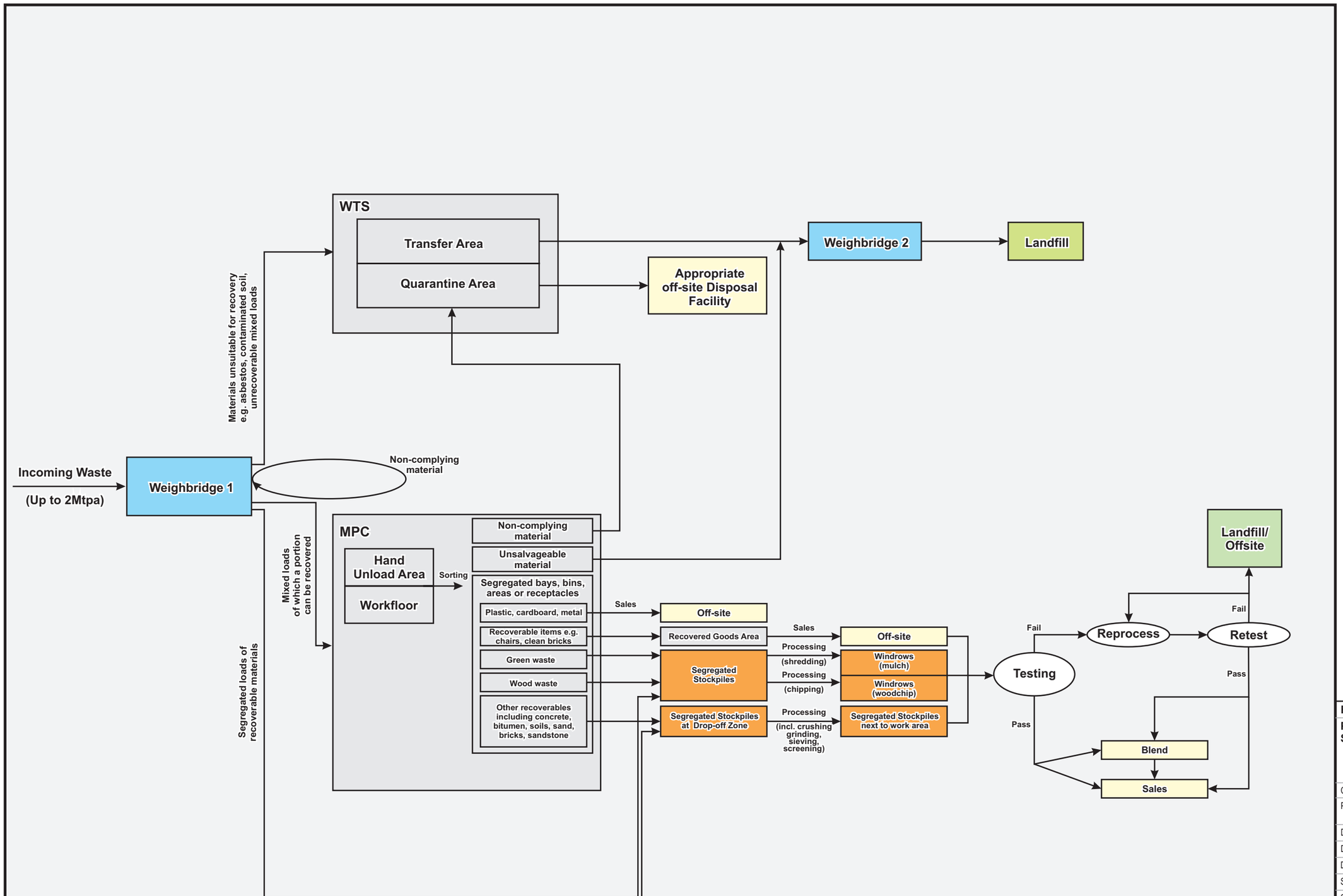


Figure 3.1

Process Flow Diagram for Waste Streams

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse Business Centre		
Drawing No:	0071234s_EA_06		
Date:	19/05/2008	Drawing size:	A3
Drawn by:	ML	Reviewed by:	JK
Source:	-		
Scale:	Not to Scale		

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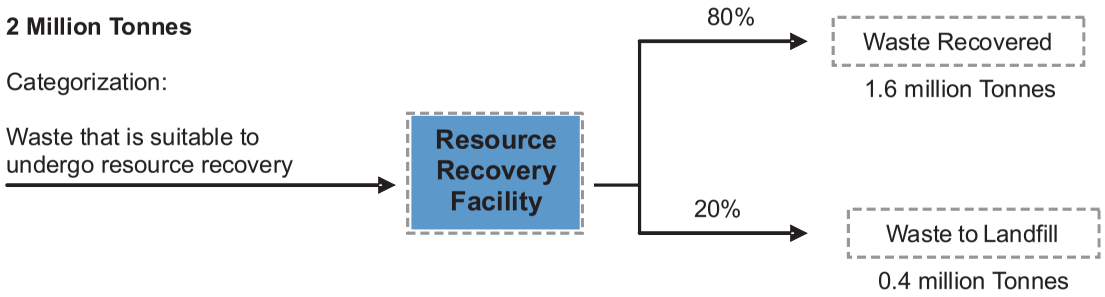
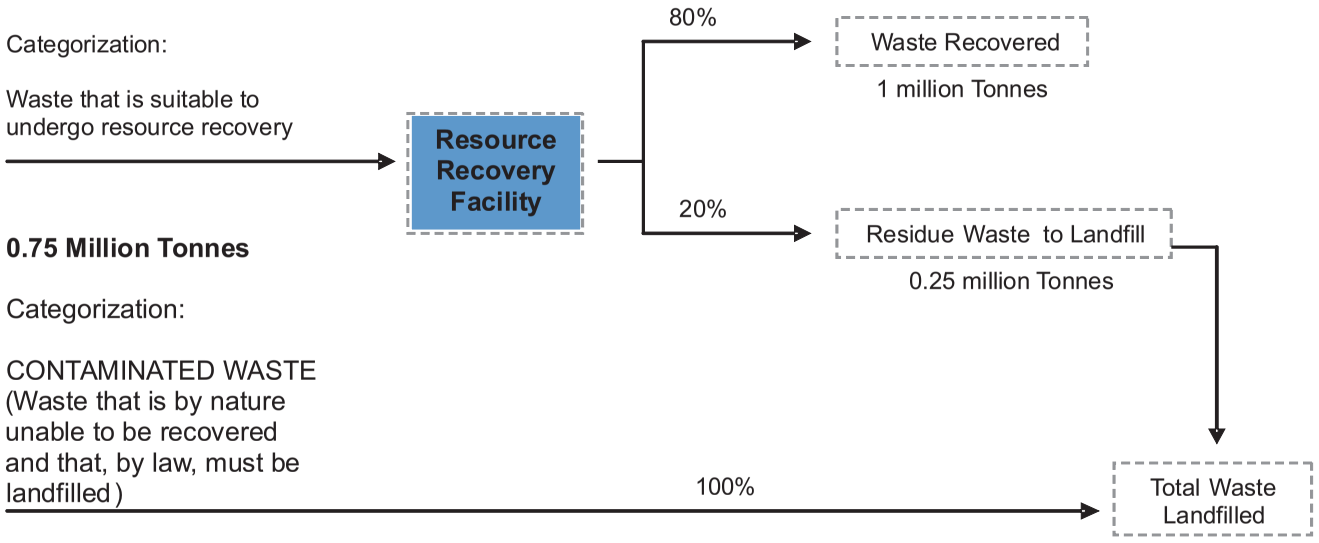
Telephone +61 2 8584 8888

ERM

BEST CASE SCENARIO



WORST CASE SCENARIO



Notes:

It is impossible to determine the exact quantities of each of the categories of waste that is likely to be received for the project, as this depend on market conditions from time to time. Though input quantities in each category will vary, it will remain true to say that 80% of what is recyclable will be recycled.

Figure 3.2

Best and Worst Case Scenarios for Waste Streams

Client:	ThaQuarry Pty. Ltd.	
Project:	Light Horse Business Centre	
Drawing No:	0071234s_EA_11	
Date:	07/04/2008	Drawing size: A4
Drawn by:	ML	Reviewed by: EW
Source:	Dial a Dump Industries	
Scale:	Not to Scale	

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ERM

Legend

- Visual Barrier Wall
- Dump Truck and Water Cart Route
- Site Design
- Detention Basins
- Site Boundary
- Berm

Suffix	*Revisions*	*Date*	*Init*
R0	From EA-09_R1	08-05-08	JS
R1	Site layout edits	19-05-08	JS
R2	Addition of Basins	18-08-08	JF

Figure 3.3

Site Layout

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse Buisiness Centre		
Drawing No:	0071234_GIS18	Suffix No:	R2
Date:	18/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	VGT Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

N

0 50 100 200 300 Metres

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ERM

ORIGIN OF LEVELS & COORDINATES
SSM 73008 RL 62.937 AHD
E295361.587,N6255854.532

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

MGA NORTH (ZONE 56)

8
D P 2 4 0 1 4 3

4
D P 5 6 3 2 4 9

9
D P 2 4 1 8 5 9

Proposed Precinct Detention Basin (subject to Council approval)

Temporary Detention Basin

WOODPLAIN RESERVE

LOT 2
DP 262213

LOT W
DP 419612
8.54 ha

1
D P 4 0 0 6 9 7

W
D P 4 1 9 6 1 2

1
D P 6 5 0 1 7 9

LOT 1
DP 650179
23.59 ha
"SUNNY P/L"

LOT 1
DP 400697
20.63 ha

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

LOT 11
DP 558723
20.9 ha

LOT 122
DP 1049623

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (Light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.4
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

NOTES

The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.
Services shown hereon have been located where possible by field survey. If not able to be so located, services have been plotted from the records of relevant authorities where available and have been noted accordingly on the plan. Where such records do not exist or are inadequate a notation has been made hereon.
Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

PPP/DF	LPL	DD/MM/YY	COMMENT

Symbols shown are indicative only. The symbol size and orientation does not necessarily represent the real size or orientation of the feature.

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w www.landpartners.com.au

HEIGHT DATUM: AHD	LOCAL AUTHORITY: BLACKTOWN COUNCIL
HEIGHT ORIGIN: SSM 73008 RL 62.937	SCALE: 1:3000 (A1)
MERIDIAN: 56	CONTOUR INTERVAL: ?.? Metre
CO-ORD SYSTEM: MGA	SURVEYOR: BS — DATE OF SURVEY: 01/04/05
DCAD FILE: 68124	DRAWN: LJMc — DATE: 01/08/08
AUTOCAD FILE: 71825	CHECKED: GKO — DATE: 01/08/08
ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08

PLAN NUMBER

PLAN No.4

PROPOSED NEW TITLES

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

APPROXIMATE LOCATION OF FUTURE PRECINCT ROAD

ORIGIN OF LEVELS & COORDINATES SSM 73008 RL 62.937 AHD E296361.587,N6256884.532

M.G.A. NORTH (ZONE 56)

8
D P 2 4 0 1 4 3

9
D P 2 4 1 8 5 9

4
D P 5 6 3 2 4 9

1
D P 6 5 0 1 7 9

WOODPLAIN RESERVE

LOT 1

LOT 2

LOT 3

LOT 4

LOT 5

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

LOT 122
DP 1049623

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
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- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

Lots

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.8
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

NOTES

The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.
Services shown hereon have been located where possible by field survey. If not able to be so located, services have been plotted from the records of relevant authorities where available and have been noted accordingly on the plan. Where such records do not exist or are inadequate a notation has been made hereon.
Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

PPP/CF	LPL	DD/MM/YY	COMMENT

Symbols shown are indicative only. The symbol size and orientation does not necessarily represent the real size or orientation of the feature.

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HEIGHT DATUM: AHD	LOCAL AUTHORITY: BLACKTOWN COUNCIL
HEIGHT ORIGIN: SSM 73008 RL 62.937	SCALE: 1:3000 (A1)
MERIDIAN: 56	CONTOUR INTERVAL: ?.? Metre
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AUTOCAD FILE: 71825	CHECKED: GKO — DATE: 01/08/08
ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08
PLAN NUMBER: PLAN No.8	

SHEET 8 OF 9

Table 3.1 Key Project Information

Component	Project
Project life	*Construction:* 6 months *Landfilling:* expected to be between 45-65 years based upon the upper and lower limits excepted. A filling rate of 26 years based on the worst case scenario of 1 million tpa has been assessed within this EAR. *RRF:* During and beyond the life of the landfill.
Waste streams	*Accepted:* Inert and solid wastes complying with acceptable wastes for a general solid waste (non putrescible) facility, sourced from C&D, C&I waste streams and green waste clean ups. *Landfilled:* classified solid waste, asbestos and asbestos contaminated materials, unsalvageable materials left over from the recovery process and loads that are so mixed it is not physically possible or commercially viable to sort them. *Recycled:* base materials for buildings, landscaping (including green and timber/wood waste recycling), road construction, plumbing and drainage systems and recovered goods e.g. chairs, clean bricks and pavers. Captured runoff and if possible, treated leachate, will also be recycled for use on-site.
Processing methodology	Chipping, shredding, composting, screening, sieving, crushing and/ or grinding at on-site processing facilities.
Throughput	*Total throughput:* up to 2 mtpa *Waste Recycled:* up to 1.6 mtpa (based on maximum capacity intake) *Waste Landfilled on-site*: up to 700,000 tpa (based on maximum capacity intake)
Services	Extensions/offtakes from existing electricity, phone, water, gas and sewerage lines.
External roads	No changes to external road network.
Water supply	Potable and raw water supplied by existing connection to Minchinbury's reticulated water supply. Recycled/reclaimed water for dust suppression, irrigation, wheelwash and toilet flushing (27.4 - 33.3 ML/annum) supplied from captured roof water and from stormwater captured and treated on-site. Provided treated leachate is of a standard suitable for re-use, it may also be used for site dust suppression. In addition, static 10 kL storage will be provided on-site for fire-fighting water.
Employment numbers	*Construction:* 30 *Full Production:* 49 + contractors
Hours of operation	*Construction:* Mon-Fri, 7am to 6pm, Sat 8am to 1pm or if inaudible at residences, 7am to 1pm. *Landfill Operations:* 7 days per week, 6am to 6pm. Other Site Operations: 7 days per week, 6am to 10pm, with waste received only to occur after 10pm from time to time. Accounting for gazetted public holidays and annual closedown periods the facility will not operate for more than 350 days per year.

3.2 CONSTRUCTION METHOD

3.2.1 Overview

The location of the site buildings and infrastructure to be constructed for the Project are shown in *Figure 3.3*. The site layout was planned to minimise potential environmental impacts during construction and operations whilst meeting the feasibility and practicality requirements of the operation. It was developed with consideration to input from stakeholders received during the consultation process. Construction works for the Project will be in accordance with relevant industry standards and good practice.

Equipment used during construction will include 50 t truck mounted cranes, mobile cranes, light vehicles, delivery trucks (semis and rigid), concrete agitators (as required), elevating work platforms, earth moving equipment and a variety of smaller hand held tooling (e.g. welders, grinders, saws etc). Construction of infrastructure will be short term in duration with an expected construction period of up to six months. Potential impacts associated with construction have been addressed in this EA.

3.2.2 Construction Phases

The Project will require the construction of civil type infrastructure and will be conducted in the following stages:

- Stage 1 – Preconstruction;
- Stage 2 – Construction; and
- Stage 3 – Commissioning.

Stage 1 – Preconstruction

The preconstruction stage finalises engineering designs, establishes critical services and prepares the land site for construction purposes. This will involve:

- refinement of designs from pre-feasibility stage taking into account mitigation of core business risks such as environmental impacts and safety standards;
- establishment of essential services such as power (off-take from existing transmission lines), water (pipelines for "raw" and potable water), sewerage and telecommunications;
- pumping water out of the base of the pit;

- quarry pit maintenance works and wall stabilisation for safety;
- establishment and laying of site drainage works and piping;
- upgrade of internal roads, land re-profiling and bulk earthworks, including regrading of quarry floor and reshaping of the quarry face, with bulk earthworks to be performed over an estimated two month period. Note that material left over from earthworks will be stockpiled on-site and resold (this material is classified as virgin excavated natural material (VENM)- refer to the *Geotechnical Assessment of Materials Report* dated April, 2006 prepared by Douglas Partners included within Appendix J, Volume 2); and
- allocation of areas in the pit for gas chimneys.

Stage 2 – General Construction

The general construction stage involves the excavation of foundations and footings, placement of reinforced concrete and the erection of various structures. The key activities include:

- excavation of free digging waste rock materials for major footings, foundations and permanent service lines (e.g. trenches);
- placement of reinforced concrete;
- construction and furbishment of site buildings;
- construction of leachate treatment plant and water storage tanks;
- construction of the OSD basin;
- construction of drainage layers and herringbone pipe works in the base of the pit;
- construction of an in-pit leachate sump and riser; and
- further quarry wall stabilisation works if required.

Stage 3 – Commissioning

The commissioning stage involves testing and commissioning equipment and plant and training operations personnel. This will involve:

- erection of fencing;
- pre-commissioning, involving alignment and clearance checks on the mechanical equipment, electrical testing and instrumentation checks;

- service and process commissioning, involving ordering and testing of plant and equipment; and

- training of operations personnel involving site induction, occupational health and safety training and operational procedures training.

3.2.3 Access for Construction

The existing access to the site via Old Wallgrove Road will be used throughout construction, as discussed in *Chapter 11*.

3.3 DESCRIPTION OF WASTE TO BE RECEIVED

In NSW, waste is classified under the Protection of the Environment Operations Act, 1997 according to the DECC *Waste Classification Guidelines* 2008. In NSW, waste landfills are licenced and regulated by the NSW DECC under the Protection of Environment Operations Act, 1997. Penalties apply to entities that breach licence requirements including fines, stop work and make good provisions. The licence issued is specific to the facility and strictly identifies the nature of waste that can be accepted into the landfill and the conditions that must be observed by specific facilities. The proponent will adhere to the conditions of any licence issued by the DECC.

The proponent is seeking to restrict the class of licence under which the landfill would operate so as to ensure that an absolute minimum of biologically degradable material enters the landfill. The classifications of waste proposed for acceptance into the landfill are:

- General solid waste (non-putrescible);

- Special waste including asbestos but excluding clinical and related waste; and

- Hazardous waste (excluding clinical and biohazard waste).

The Definition of "hazardous waste" is to be found in Schedule 1 to the Protection of the Environment Operations Act which refers to classes of materials referred to in the Transport of Dangerous Goods Code. Not all materials referred to in the Code are acceptable at a Recycling Centre or Landfill.

The reference to "hazardous" waste is limited to;

(a) lead acid or nickel cadmium batteries (being waste generated or separately collected by activities carried out for business, commercial or community services purposes),

(b) lead paint waste arising otherwise than from residential premises or educational or child care institutions,

(c) coal tar or coal tar pitch waste (being the tarry residue from the heating, processing or burning of coal or coke) comprising more than 1% (by weight) of coal tar or coal tar pitch waste,

- and

anything that is classified as ←hazardous→ ←waste→ pursuant to an EPA Gazettal notice or anything that is ←hazardous→ ←waste→ within the meaning of the Waste Classification Guidelines and which is permitted by the premises licence issued by the DECC to be accepted at the Premises

The following waste classifications will not be accepted into the landfill:

- General solid waste (putrescibles);
- Clinical and related waste (including clinical waste, cytotoxic waste, pharmaceutical, drug or medicine waste and sharps waste);
- Liquid waste; and
- Restricted solid waste.

The proponent will mitigate impacts through the use of work practices designed to maximise useful landfill volume by excluding materials not covered in the licence and ensuring that they pass into the recycling and re use streams of the materials processing centre.

Co-location of a material processing centre with an adjacent landfill will ensure that materials which, because of their categorisation (ie asbestos) or because of their condition (ie too mixed or damaged to be recycled) must be removed from the recycling stream and landfilled can be appropriately disposed of while involving minimal fuel and energy use in transportation between facilities. This in turn ensures a further mitigation of the potential for greenhouse gases being generated by such activities.

Once licenced and operational, it is proposed that the RRF and adjoining landfill facility will be able to accept material in the following waste classes:

- General solid waste (non-putrescible) that includes:

• glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal;	• household waste from municipal clean-up that does not contain food waste;
• paper or cardboard;	• virgin excavated natural material;
• garden waste;	• wood waste;
• non-putrescible vegetative waste from agriculture, silviculture or horticulture;	• grit and screenings from potable water and water reticulation plants that has been dewatered so that it does not contain free liquids;

• grit, sediment, litter and gross pollutants collected in, and removed from, stormwater treatment devices and/or stormwater management systems that has been dewatered so that it does not contain free liquids;	• containers previously containing dangerous goods, as defined under the Australian Code for the Transport of Dangerous Goods by Road and Rail, from which residues have been removed by washing or vacuuming;
• waste contaminated with lead (including lead paint waste) from residential premises or educational or child care institutions;	• drained oil filters (mechanically crushed) and rags and oil-absorbent materials that only contain non-volatile petroleum hydrocarbons and do not contain free liquids;
• drained motor oil containers that do not contain free liquids;	• waste collected by, or on behalf of, local councils from street sweeping;
• building cavity dust waste removed from residential premises or educational or child care institutions, being waste that is packaged securely to prevent dust emissions and direct contact;	• synthetic fibre waste from materials such as fibreglass, polyesters and other plastics, being waste that is packaged securely to prevent dust emissions, but excluding asbestos waste[1] which is a special waste;
• building and demolition waste;	• cured concrete waste from a batch plant;
• asphalt waste, including asphalt resulting from road construction and waterproofing works;	• biosolids categorised as unrestricted use or as restricted use 1,2, or 3, in accordance with the criteria set out in the Biosolids Guidelines (EPA 2000)
• fully cured and set thermosetting polymers and fibre-reinforcing resins, glues, paints coatings and inks;	• any mixture of the wastes referred to above.

- Special waste that includes:
  - Asbestos or any waste containing asbestos; and
  - Waste tyres including used, rejected or unwanted tyres, shredded tyres and tyre pieces; and

This waste will be sourced from local Councils, construction and demolition industries (C&D), excavation and earthworks companies, developers, builders and renovators, and domestic, commercial and industrial (C&I) disposal streams for the appropriate waste.

Non-complying loads identified e.g. putrescible, liquid and chemical waste, will not be accepted at the site and will be recorded as a rejected load before being redirected off-site.

[1] It is proposed that the Project will accept asbestos waste at the landfill under the Special Waste classification.

3.4 PROCESS DESCRIPTION

3.4.1 Materials Receivable

Waste material will be delivered to the site by a combination of light, medium and heavy vehicles, with loads typically varying from approximately one to 40 tonnes (t) in weight. The waste transporters will be required to ensure that incoming loads are covered prior to entering the facility. All waste carrying vehicles entering the site will be weighed over Weighbridge 1 (Refer to *Figure 3.3*). The loads will be classified at the weighbridge in accordance with DECC's *Material Composition Codes*. Classification will be based on advice from the carrier, inspection of the carrier's documentation prepared in accordance with the DECC (2008) *Waste Classification Guidelines* and verification of this information by visual inspection using the weighbridge camera ('Check Point 1'). Non-complying loads identified e.g. putrescible, liquid and chemical waste, will be recorded as a rejected load and redirected off-site.

Depending on its constituent material, incoming vehicles will be directed to unload at the appropriate area as follows:

- *segregated load*: directly at the appropriate segregated stockpile either at the green/timber waste stockpiles or at the drop off zone (concrete, brick, ceramics, soils & sands);

- *mixed load suitable to undergo the recovery process:* the MPC. Small mixed loads which can be unloaded by hand will be directed to the hand unload area at the western end of the MPC. Larger mixed loads will be directed to tip at the MPC work floor; or

- *material unable to be recycled at the site or separated* i.e. waste with solid waste classification, asbestos waste, contaminated soils or loads that are so mixed they cannot be physically or economically separated: the WTS, or if it is a segregated load of asbestos or asbestos contaminated materials, potentially directly to landfill.

Potentially dusty loads will be wetted down prior to the vehicle tipping on-site and sprinkler systems will be located in potentially dusty areas.

A spotter will inspect all loads tipped to ascertain that the material conforms to the material classification at the weighbridge 2 ('Check Point 2') and will identify any non-complying material missed at Check Point 1. When the spotter identifies a non complying material during unloading, the vehicle will be reloaded with the non complying material, which will be recorded as a rejected load and will be directed off-site.

After unloading, vehicles will pass through a wheel wash and then be reweighed at Weighbridge 1 to calculate the net vehicle weight and thereby record the total weight of the load delivered, prior to exiting the site.

3.4.2 Sorting

Mixed loads delivered to the MPC/ WTS will be segregated by material type and placed in adequate, appropriately labeled bays and bins for transport to appropriate stockpiles for recycling, to landfill or off-site (as required). The small loads unloaded at the hand unload area of the MPC will be sorted and placed into the segregated bays and bins by hand. Larger loads tipped at the work floor will be mechanically and hand sorted by working from the western to the eastern end.

In the event that non complying material e.g. putrescible, liquid or chemical waste is identified after the carrier has left the site, the management procedures for non complying wastes will be implemented. Any non-complying material will be quarantined in appropriate, separated, clearly labeled receptacles at the WTS for off-site disposal at an appropriate facility. Quarantined material will be sent off-site when the receptacle is full or if not full, at least once per week.

Asbestos waste found during sorting will be quarantined at the WTS prior to transfer to landfill or if required, to an appropriate off-site facility, in accordance with the regulations under *the Protection of the Environment Operations Act (POEO) Act.*

Ferrous and non-ferrous metals recovered through the sorting process (generally by use of a magnet), as well as plastics and paper/ cardboard will be sorted, placed into bays and bins and stored until sold. Recoverable goods capable of resale e.g. furniture items will be directed to the recoverable goods area for resale or re-use. Following sorting, other recoverable material will be retrieved from receptacles and placed within the appropriate stockpile to be processed. The remaining 'unsalvageable' material will be transported to the adjoining landfill facility or off-site as required.

3.4.3 Stockpiling and Processing

Recoverable materials will be placed in segregated stockpiles adjacent to the MPC undercover facility awaiting transport to the appropriate processing facilities as specified below.

- Timber waste material will be chipped and stockpiled in windrows for blending and/ or testing and resale as woodchip.

- Green waste material will be shredded on-site and stockpiled in windrows of approximately 5000m^2. The windrows will be turned every two weeks, or as required if the temperature in the pile gets over 70 Degrees Celsius. The water collected from a sump at the green/ timber waste stockpiles will

be re-circulated by pumping from the sump and allowing it to gently seep out of perforated pipes at several locations across the windrow, to aid in the green waste composting process. Any excess water will be directed to the leachate treatment system. After a resting period of eight weeks the product will be tested and ready for sale as mulch or blended e.g. with tested recycled or VENM soil to produce an organic soil mix and be available for sale. The odour minimising oxidizing agent, Biomagic, which is discussed in *Section 9.5.2,* will be used to mitigate odour impacts associated with composting materials. No accelerants, putrescibles, biological materials or animal products will be used for the composting of green waste.

- Other recoverable waste material e.g. concrete and bricks will be directed to the drop off zone for processing by screening, sieving, crushing and/ or grinding to separate it into different size products. Following processing, the material will be stockpiled by material type next to the work area, tested and made available for resale. The working floor for stockpile processing is proposed to be set approximately seven metres below the drop-off zone so gravity can be used in the screening process. It should be noted that the height of the berms is approximately four metres above the drop off zone and approximately 11 m above the working floor. It is proposed that trees be planted on top of the berms, which will provide further screening of operations, to a greater height. A green stockpile ID number will be placed on stockpiles that have appropriately passed the required recycled material tests. A red flag will indicate untested material and a yellow flag will indicate a stockpile that is in the process of being tested.

3.4.4 Material Testing

Recycled products which do not pass testing will be retested where appropriate or subject to further processing or blending and then retested for compliance with the appropriate recycled material standard. Chemical testing for aggregates, sands, soil, compost and mulch will be assessed against the relevant EPA recycled products standards as required under clause 51A of the *Protection of the Environment Operations Act* 2005 (NSW). If required recycled material will be tested against Australian Standard and structural fill classifications. Recycled organics may also be tested against the Australian Standard AS 4454. Product testing may change in the future to meet any exemptions required by the DECC for recycled products.

Should the material still fail to comply with criteria and be deemed not fit for purpose, it will be quarantined at the WTS and sent to the adjoining landfill or off-site as appropriate.

Stockpiles will be kept to the limits provided in *Table 3.2* below and will not exceed the height of the earthen berms.

Table 3.2 Stockpile Limits

Material	Stockpiled quantity (t)
Green Waste & Timber for re-use	20,000
Shredded green waste and timber	20,000
Glass	5,000
Plastic	5,000
Scrap metals	10,000
Other material for processing and re-use	600,000

3.4.5 Landfill Operation

All materials suitable for landfilling and incapable of being recovered, re-used or recycled will be directed to the landfill. This will include:

- incoming material with solid waste classification;
- asbestos and asbestos contaminated materials;
- loads that are so mixed they cannot physically be sorted/ recovered, or are commercially unsuitable for recovery; and
- unsalvageable materials left over from the recovery process.

No green waste will be landfilled at the site other than a small residual amount which may be present in mixed loads. No putrescible material will be landfilled at the site and asbestos will not be landfilled within 5m of the finished surface of the landfill. To help address community concerns about asbestos waste, this is deeper than the legal depth requirement of 3 m stipulated by the *Protection of the Environment Operations (Waste) Regulation 2005*. Dependent on the quantity of material received that is classified outright as unrecoverable, it is estimated that 20% to 50% of total material accepted onto the site will be sent to landfill i.e. 0.4 to 1 mtpa (based on maximum capacity intake).

All dump truck loads to the landfill will be recorded through Weighbridge 2. (Refer to *Figure 3.3*) The truck will travel down the haul road to the tipping area and return via the same route. Dust mitigation measures will be implemented along the haul road to the landfill, including watering of the haul road and use of onboard reservoirs on the site dump trucks to allow wetting whilst in motion. These measures are described in *Section 9.5.2*.

3.4.6 Key Components of the Landfilling Plan

Leachate Drainage System & Sump

A network of collection pipes in a chevron/herringbone pattern will be installed, with 150mm diameter laterals spaced nominally 25m on-centre, and a central 300 mm diameter header pipe to collect leachate from the active tipping areas within the pit. The drainage layer will be constructed on the

quarry floor prior to filling commencing. The layer includes a permeable granular blanket to be placed across the entire landfill base area. The geosynthetic and granular materials are designed to a minimum 500mm thick in accordance with NSW Benchmark Techniques.

A sump will be located at the lowest elevation of the base, serving to collect the leachate in preparation for removal. The sump will contain two (2) risers and a housing for leachate extraction pumps at the eastern end of the landfill Leachate will be treated and dependent on quality monitoring will either be:

- re-used for on-site irrigation; or
- disposed of to sewer via a trade waste agreement with Sydney Water.

Further details of the leachate collection system and leachate management are provided in Chapter 8.

Filling Plan

Initial filling will commence in the north eastern corner of the quarry base at the deepest point and proceed south in a series of landfill tipping areas towards the south eastern corner. The proposed fill method is depicted in *Figure 3.4*. Benching and vehicle movements will be accommodated around the tipping area. The initial lift is expected to be a total of 10m in height with subsequent lifts of 15m. Each lift will be composed of sub lifts of a maximum height of approximately 5m depending on the amount of waste landfilled on a given day. Each sub lift will have a controlled active tipping surface area (open tip face) of approximately 450 square metres with a total daily tipping surface area of between 1000 to 1600 square metres depending on the filling stage and waste amount landfilled. The length of the tipping area is expected to be between 30m and 40m.

Once the south-eastern corner is reached, the filling area will proceed west and continue back to the northern side of the pit. This will constitute a 'windscreen wiper' formation, as depicted in *Chapter 8*. This process will be repeated until filling reaches the western end of the quarry at which time the total lift throughout the base of the quarry is expected to reach the initial 10 metres. Filling will then occur in the same manner in the opposite direction and with subsequent lifts to be 15 metres.

The active tipping area will be covered daily with 150 mm of cover material, comprising VENM or an alternative daily cover material approved by DECC. Daily cover will be scraped off each day prior to filling. There will be a net loss of cover material with each scraping off of approximately 50%, which will require this material to be topped up as needed.

Concept landfill plans have been prepared based on the anticipated upper limit fill rate of 700,000 tpa and are presented in *Chapter 8* for Years 0, 5, 13 and 20 of landfill operations respectively. Year 0 represents the quarry void in its

current state and Year 20 represents the final rehabilitated landform. It should be noted that these plans were prepared to depict levels and landform within the landfill facility; surrounding landform is the existing landform rather than post development landform.

CONCEPT FILLING AREA

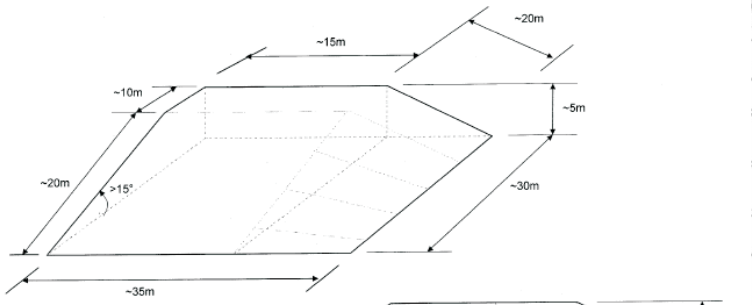


Fig: end to wall concept
(showing filling direction from left to right)

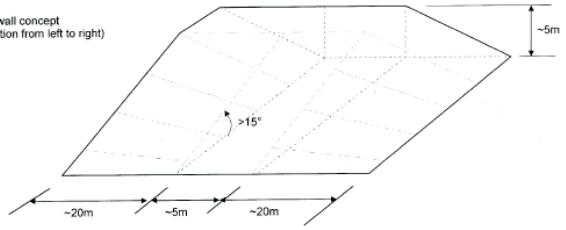


Fig: filling progression to wall concept
(showing filling direction from left to right)

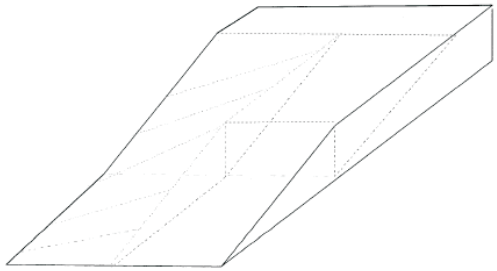
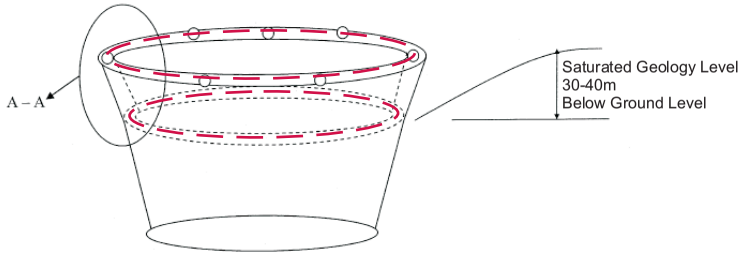


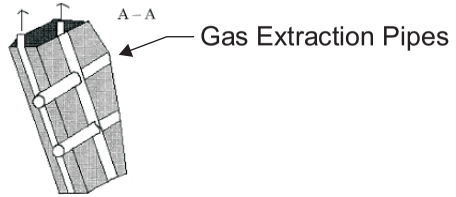
Fig: concept for second stage filling for
representation only without dimensions
(showing filling direction from right to left)

NOTE:
Drawing is not to scale. Dimensions are approximate for average 3100 tonnes landfilled daily. Concept filling and sizes may change depending on amounts of waste landfilled in a given day.

It is expected that the *active* tipping surface (open) area at any one time will be approximately 450 square metres. The total tipping surface area for a given day will depend on the amounts of waste landfilled and is expected to be between approximately 1000 square metres and 1600 square metres.

GAS MANAGEMENT





Legend

Gas Drainage Layer

Figure 3.4

Design of Active Tipping Areas

Client:	Dial a Dump Industries	
Project:	Light Horse	
Drawing No:	0071234s_EA_12	
Date:	07/04/2008	Drawing size: A4
Drawn by:	ML	Reviewed by: -
Source:	Dial a Dump Industries	
Scale:	Not to Scale	

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Building C, 33 Saunders St, Pyrmont, NSW 2009
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ERM

Surface Water Management

Surface water management for the landfill facility is discussed in *Section 6.4* and a summary is provided herein. For the initial 10 m of lift, the pit floor will be divided into two areas i.e. a 'clean' area and a 'dirty' active emplacement area where landfilling operations are taking place, by construction of a clay bund across the pit floor, as depicted in *Figure 3.5*. The pit floor will be graded so that it slopes to the east.

The haul road will be graded to direct run-off from pit walls and the road itself to the clean area in the base of the pit. A temporary stormwater pond will be constructed to capture clean runoff, placed upslope on the western side of the pit, separated by the clay bund from the active emplacement area. The stormwater pond will be lined with High Density Polyethylene (HDPE) to avoid contamination. This water can be drawn down for re-use for site dust suppression, as discussed in *Section 6.4.*

Runoff from the active emplacement area will drain to the leachate sump, from where it will be pumped to the leachate treatment system, for treatment and disposal.

Following the initial 10 m of lift, the landfilled area outside of the active tipping area will be capped with VENM or an EPA approved alternative cover material. Runoff from capped areas will be directed to the stormwater pond.

A leachate trench will then be constructed downslope of the active tipping area to capture runoff which will be managed as leachate, as shown in *Figure 3.5 Filling Plan*. The leachate trench and stormwater pond will be relocated as required depending on the stage of filling.

Gas

To manage landfill gas generation a perimeter gas drainage layer around the edge of the quarry will be installed above the regional groundwater table (saturated geology). This is likely to be at 25 metres below ground level. Further detail on the proposed gas management system is provided in *Section 9.5.2*. *Figure 3.4* depicts the proposed gas drainage layer.

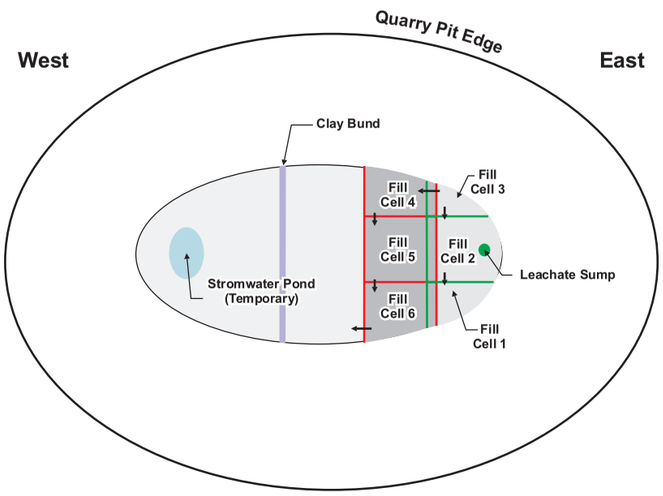
Capacity

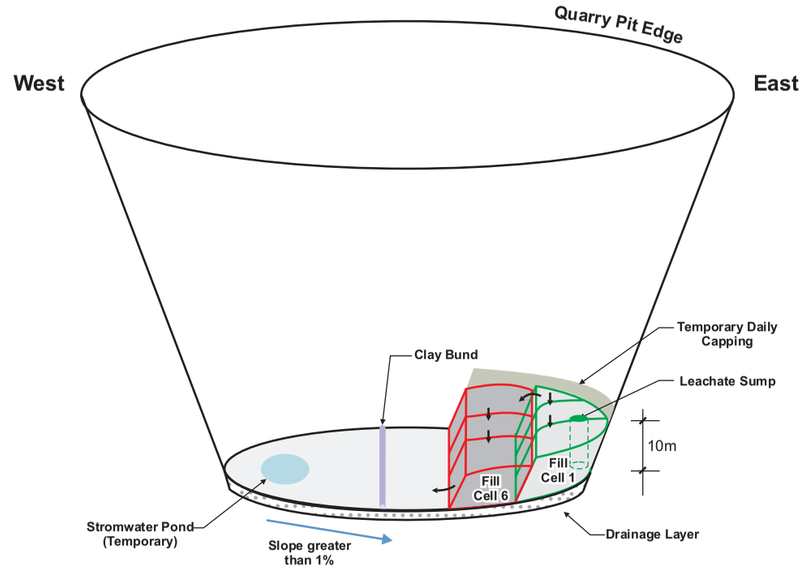
Survey data indicates that there is in excess of 11 million cubic metres of space available for land filling. At the projected rate of filling, this give the landfill site a life of approximately 20 years. An anticipated additional 1 to 1.5 million cubic metres will be made available by progressive removal of the haul road as filling progresses. A lesser filling rate than that projected will correspondingly extend the landfill site life.

AERIAL VIEW

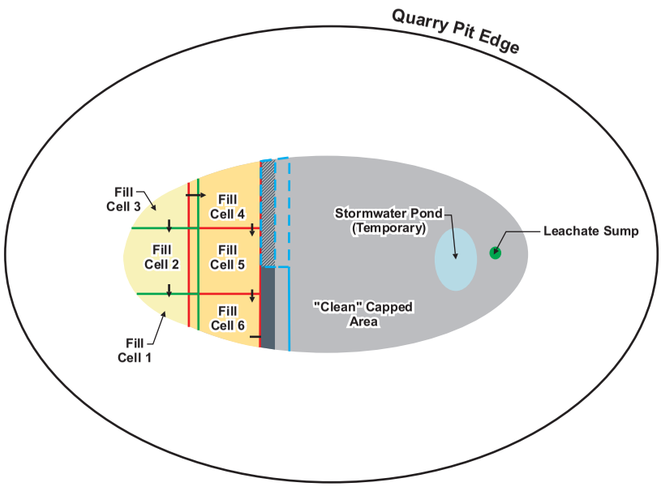
CROSS - SECTIONAL VIEW

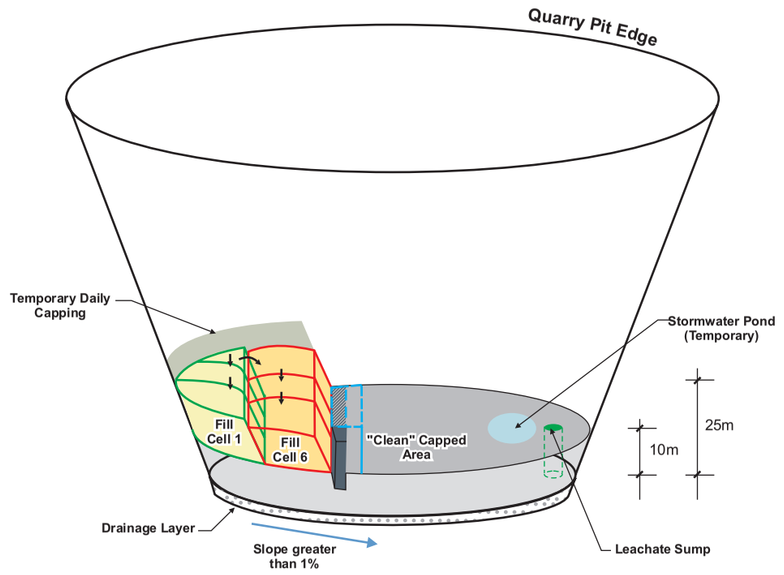
FIRST LIFT



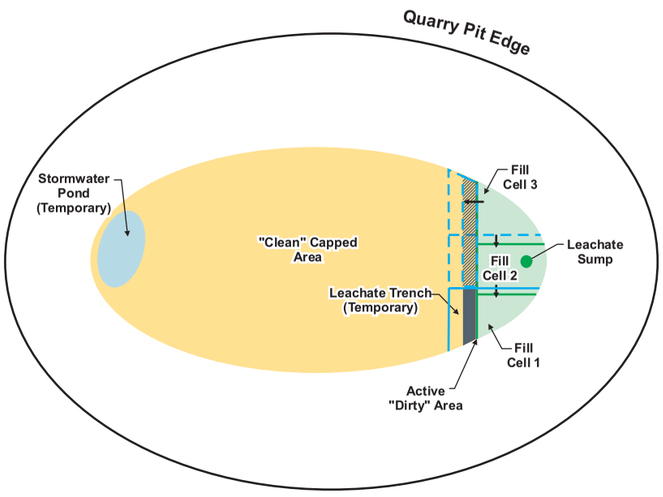


SECOND LIFT





THIRD LIFT



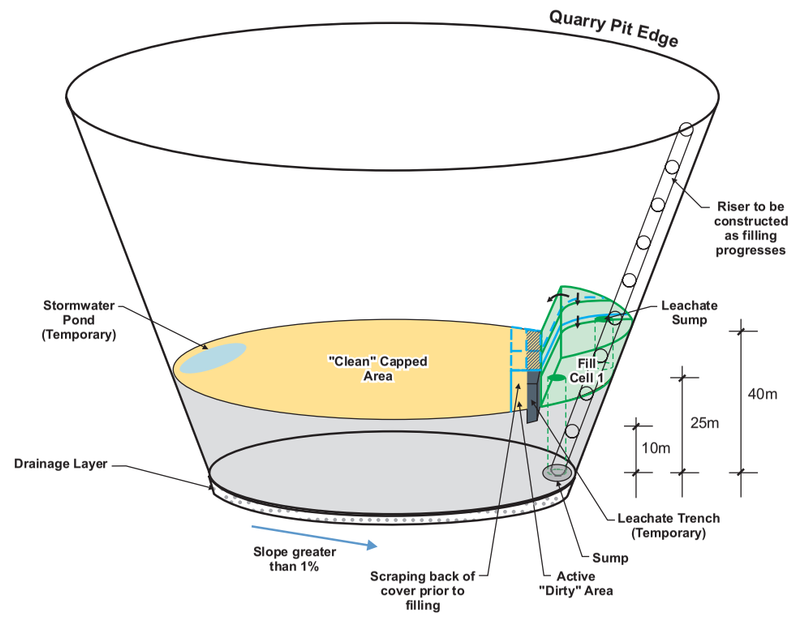


Figure 3.5

Filling Plan

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse Business Centre		
Drawing No:	0071234s_EA_07_R2		
Date:	19/05/2008	Drawing size:	A3
Drawn by:	ML	Reviewed by:	RB
Source:	-		
Scale:	Not to Scale		

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ERM

3.4.7 Recovered Materials Sales

Processed Material

Of the waste loads received at the facility that are classified as containing material capable of being recovered or recycled, it is estimated that on average, 80% of materials will be recovered by sorting, separating and processing, and made available for resale. The end products recovered will include road base, aggregates, bitumen road base, landscaping soil, bedding sand, dry shredded wood product (mulch and wood chip) and green waste compost.

These products are anticipated to be sold predominantly to the building, construction, infrastructure and landscaping industries, for use as base materials for buildings, landscaping, road construction, plumbing and drainage systems. Products will also be sold to smaller scale markets, including small building/ landscaping businesses and the 'do-it-yourself' home maintenance market.

All processed materials will be stockpiled immediately next to the working floor for testing and sold straight from these stockpiles.

Recovered Goods Area

A recovered goods area will be located adjacent to the administration office and will be clearly marked. It will be used for storage of recovered goods that need not be reprocessed e.g. chairs, tables and recycled building products recovered by sorting e.g. clean bricks and pavers, and these will be sold as second hand objects either straight to the general public or online.

Other Recovered Goods

Plastics, paper/ cardboard and metals (ferrous and non ferrous) will be sold from the WTS and/ or sent to off-site recycling facilities.

3.5 SITE INFRASTRUCTURE

3.5.1 Site Facilities and Processing Equipment

Infrastructure to be constructed for this Project is shown in *Figure 3.3* and includes:

- raised enclosed MPC/WTS structure;
    - wheel washing station;
    - inwards/ outwards weighbridge (Weighbridge 1) for vehicles entering the facility and one way dump truck weighbridge facility (Weighbridge 2) for loads entering the landfilling area;

- administration building which will include employee amenities, administration offices, training rooms, first aid facilities, logistics central control and communications centre;
- workshop building and plant storage bays, for maintenance and service activities for site trucks, plant and equipment;
- bunded above ground double skin diesel fuel tanks;
- light and heavy vehicle parking areas;
- internal roads, including relocation of the access road on the western edge of the quarry;
- hardstand processing and stockpile areas;
- paved sales areas;
- leachate drainage works including leachate wells, sump, riser and pump;
- non-leachate site drainage/ stormwater system, including pipework, culverts, sumps, tanks and detention ponds;
- water treatment facilities;
- telemetry controlled water spray and sprinkler system, with provision for manual override, installed at stockpile areas and earthern berms;

- dust, windspeed and water quality monitoring systems;
- lighting;
- landfill gas extraction system;
- security fencing and gates for the RRF and landfill; and

- earthern amenity berms to a height of ten metres to the west, north, north-west and south of the RRF, to be constructed from overburden stockpiles on-site and landscaped.

To ensure that in the advent of future subdivision access is available to non-operational areas of the site, the Project design provides for access to these areas, as shown on *Figure 3.3.* With the exception of the earthen berm creation, and reshaping activities all other site preparatory works will be contained within the 'proposed areas of operations'.

3.5.2 Plant and Equipment

Site plant and equipment will include the following:

- dump trucks (3);
- water cart (1);
- multi purpose Hooklift Truck (1);
- excavators (6);
- loaders (5);
- bulldozer (1);
- compactors (2);
- mobile screens (3);
- mobile crusher (1)
- modular recycling installation (fixed crusher) (1);
- forklifts (2);
- magnet (1); and
- utes (2).

In addition, suitably qualified contractors may be engaged on an *ad hoc* basis to perform recycling operations at the site. Equipment likely to be used by contractors includes a wood chipper, shredder and crusher.

3.5.3 Site Access

The existing site access via the two lane registered Right Of Carriageway (ROW) (No. D227638) off Old Wallgrove Road will be used throughout construction and operations, and is discussed in *Chapter 11*. The Precinct Plan's proposed local road pattern has provision for future access off Archbold Road. The access road position has not changed and is not proposed to change unless or until the Precinct plan road connecting Archbold road at the western extremity and the eastern extremity of the Hanson site is constructed. If any future changes to the access arrangement are proposed, the appropriate assessment and approval process would be undertaken as required and prior to establishment. The internal site layout of the Project (refer Figure 3.3) has been designed to accommodate the Eastern Creek Precinct Plan Stage 3 road plan, when this is constructed.

By a Transfer dated: 7 July 2006, Hanson Construction Materials Pty Limited (ABN 90 009 679 734) granted ThaQuarry Pty Ltd (ACN 119 533 372) a right of carriageway (ROW) over the corner of its land at the eastern boundary being Lot 11 DP 558723.

This is confirmed by a copy of the Transfer granting Easement together with the title searches (refer Appendix G). This ensures that access to Lot 2 DP 262213 owned by ACN 114 843 453 Pty Ltd and the land owned by ThaQuarry Pty Ltd is guaranteed via the registered ROW which connects the land to Old Wallgrove Road.

Use of the existing ROW is a right permitted by law and unless or until the carriageway across other landowner's land is replaced by a public road complying with the SEPP 59 (a Precinct Road), it qualifies as a satisfactory mode of access. Blacktown Council and the RTA have agreed with the proponent's proposed use of the existing ROW road until the precinct road is constructed.

The proponent supports and encourages the replacement of the ROW with a public road in accordance with the Precinct Plan. Presently proposed site access can only be reflected against present reality (refer *Section 11.4.1)*.

In 2006, Hanson and the proponent contractually agreed to make application for approval and registration of boundary realignments between them the effect of which, when carried out, would be to transfer to Hanson certain portions of land upon which its existing operations were carried out. The timing for construction of the Precinct Road through the Hanson site is a matter for Hanson to consider in accordance with its operational requirements. However, there is no cross over of traffic proposed between. Hanson's facility and that of the proponent. Hanson accesses its Asphalt area from within its own site and not via the proponent's road.

3.6 UTILITIES AND SERVICES

3.6.1 Electricity

The *Eastern Creek Precinct Plan (Stage 3)* indicated that two or possible three substations may be required for the precinct depending upon the type of industries established.

If a third zone substation is required it will be placed on the non operational land and construction will be dependent upon Integral Energy's capital works program. It is expected that it may be a 132kV to 11kV substation and will generally provide approximately 200MVA to service the proponent's land Tesrol and Sargent's site. It is to be noted that currently both Sargent's and Tesrol's land are undeveloped and currently without any electricity demand.

It has been indicated by Energy Australia that if there should be a need to do so and depending upon the stage of progress of stage 1 and 2 developments, the zone substation 2 on the Australand site may be used to provide a supply to the proponent's land.

By negotiation with Energy Australia the proponents will be designating and transferring up to 1 Ha of land for the construction of an electricity zone substation.

The site is currently serviced by an underground high voltage cable connection over Archbold Road bridge, which supplies approximately 1 MVA to the site. The site electricity needs are projected to be minimal and would be adequately provided by the existing supply or by diesel generators. It is to be noted that the plant and equipment utilized by the proponent is almost wholly diesel powered and not requiring electricity.

Electricity supply for the weighbridge and administration office will be met by an off-take from the existing electrical transmission lines at the site.

Another option for electricity could potentially involve supply from GridX which is a registered electricity supply company which is seeking to expand their operations within the Eastern Creek Precinct.

Initial consultation has been undertaken with the service provider, Integral Energy and with Blacktown City Council. Consultation with these groups will continue to be undertaken to ensure their requirements are met and that existing services are not damaged during construction works for the Project. Prior to construction, the proponent will obtain a certificate from an accredited electricity supplier outlining their notification of arrangements for servicing the site.

The Precinct Plan includes future provision for establishment of three substations and additional infrastructure to ensure that electrical services can cater for full development of the Precinct. This is planned to include a one hectare zone substation located in the south-west of the site and servicing the northern and western portions of the Precinct, including the site.

The proponent has presently instructed LandPartners to prepare draft plans of subdivision for submission to Integral Energy.

3.6.2 Gas

Should site gas be required, a piped connection to the existing high capacity 1050kpa secondary gas main along Archbold Road can be constructed and will meet the installation and operational requirements of the gas service provider.

3.6.3 Sewer

The ECBP is comprised of a south, east, central and west catchment of which the south east and central catchments drain to the eastern creek sewer carrier which connects to the Quakers Hill Sewerage Treatment Plant STP.

The proponent's site is situated in the west catchment and drains to St Marys STP.

There is currently suitable sewerage infrastructure connected to the site at or near the meeting of the northern boundary of lot 10 DP419612 and the M4 Motorway. It is not suggested that this facility is sufficient to drain the site if development other than that proposed in this application was to take place.

In the case of an industrial development of the 'non operational land' there would be required at that time the installation of suitable infrastructure reticulated to the sewer network which drains to St Mary's sewerage treatment plant (STP).Such a connection would typically be made by a 1200m length of sewer main which would require boring under the M4 to establish a connection to the existing 600mm Carlisle Avenue Carrier which in turn connects to the St Marys STP.

A 500 metre length of sewer main from the site to the M4 will also be required in the case of a development application concerning the remainder of the future developable land.

Developer Charges will be payable to Sydney Water at the time that the remainder of the site is developed and connection is made to the sewer and these charges have been revised from $81,837 per hectare for Industrial developments to $201,434 pHa

In the instant case, if leachate is required to be discharged a trade waste agreement with Sydney Water will be obtained for discharge of trade waste from the site as a result of leachate treatment. Subject to the quantity and quality requirements of Sydney Water's Trade Waste Agreement, treated leachate may be pumped to St Mary's STP or be connected to the south-western ocean outfall sewer (SWOOS). During construction works prior to establishment of sewered site facilities, portable toilets will be available on-site, supplied and maintained by a licensed contractor.

3.6.4 Telecommunications

Telecommunications needs are met through existing and adequate line connection currently at the site. Any required new lines will meet the installation and operational requirements of the network providers and Council. Prior to construction, the proponent will obtain written clearance from a recognised telecommunications carrier stating that services have been made available to the site or that arrangements have been made for the provision of services to the site.

3.6.5 Water

Site raw and potable water needs will be met by water sourced from Minchinbury surface reservoir via connection to the current water supply servicing Lot W DP 419612. It should be noted that a significant amount of water needs will be met by re-use of runoff captured on-site and provided the quality is adequate, by re-use of treated leachate.

3.7 *WORKFORCE AND HOURS OF OPERATION*

The construction workforce is estimated to comprise of 30 people. Construction works will be conducted during the following hours:

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

Once operational, the RRF will generally operate seven days a week between the hours of 6am and 10pm. From time to time, the RRF may receive materials after 10pm, from essential works, such as millings and asphalt from out of hours road works. For operations after 10pm, only waste receival will occur, with no sorting or processing of materials to take place. The landfill will generally operate seven days a week, between the hours of 6am and 6pm. Accounting for gazetted public holidays and annual closedown periods the facility will not operate for more than 350 days per year.

It is anticipated that the on-site workforce will comprise of 49 staff, including approximately:

- 3 mechanics;
- 3 weighbridge operators;
- 12 plant operators;
- 3 foreman;
- 2 sales personnel;
- 8 laborers/ spotters;
- 6 drivers (on-site);
- 15 truck drivers (for waste transportation to and from site); and
- 2 managers.

No more than 49 staff are expected to be on-site for any day of operations and for operations after 10pm it is anticipated that only one employee would be present on the site. However, office cleaning contractors and security patrol personnel may be present after normal business hours. An estimated 10 sub-contractors are expected to be employed, up to four of which may be on the site at any one during for the operation of the facility. In addition, it is expected that the construction phase will provide for employment of approximately 30 workers.

There will nominally be one shift for drivers, managers and sales personnel. For other site personnel, there will be two shifts, with shift changeover nominally between 3 and 5pm, dependent on occupation.

3.8 TIMING

Once the necessary approvals are in place, construction works will begin and are expected to last for approximately six months. Site operations are predicted to commence by late 2008, early 2009, with landfilling anticipated to continue for a period of approximately 20 years and recycling activities to continue indefinitely.

3.9 LANDFILL CLOSURE STRATEGY

The objective of the landfill closure strategy is for rehabilitation of the landfill/quarry void to ensure it does not cause environmental harm and creates a final landform which is stable and supports the post-landfilling landuse. This will minimise potential for long term adverse impacts.

The final landform of the landfill area will be a gently sloping surface, consistent with topography of surrounding area. Throughout operations, progressive rehabilitation will take place to the extent possible. The Extraction and Rehabilitation Plan prepared by Hyder Consulting dated May 2007 (contained in Appendix M, Volume 2) details the rehabilitation plan for the pit, MPC and overburden stockpiles included within the 'proposed area of operations'. The plan makes reference to the requirements and intended future land uses specified within SEPP 59 –Eastern Creek Precinct Plan.

A landfill closure plan will be developed and submitted to DECC for approval twelve months prior to the estimated completion date for landfilling of waste. The plan will be developed with consideration to relevant regulations, guidelines and polices for landfill closure planning and implementation, and conditions of consent. It will include:

- objectives for landscape management and rehabilitation;
- a conceptual plan and proposed implementation methodology for decommissioning and landscape management and rehabilitation to achieve the objectives (including an indicative timetable for closure), along with proposed final land use for this area; and
- post-landfilling monitoring and maintenance program to ensure the long-term integrity of the landfill and that it does not result in pollution of the surrounding environment. This will address air quality, protection of land use and local amenity, drainage, erosion and sediment control and monitoring and reporting practices. Post-landfilling monitoring will cover site settlement, leachate collection, gas collection and stormwater.

Final capping will be in accordance with relevant DECC guidelines for solid waste landfilling. Final surface cover material will be VENM or an EPA approved substitute material. The VENM may be sourced from existing overburden stockpiles currently on-site which have been assessed by Douglas Partners *Geotechnical Assessment of Material* dated April 2006. Final capping is anticipated to require:

- prevention of infiltration of rainwater to less than 10% of the monthly average rainfall;
- prevention of the uncontrolled release of landfill gas by ensuring methane concentration at surface does not exceed 500 ppm at any place on the landfill cap; and
- maintenance of maximum permissible leachate levels inside landfill cells.

To ensure that sufficient financial resources are available to implement the rehabilitation measures proposed, the proponent will put in place an appropriate bond/security as determined in consultation with the DoP.

PART B – PLANNING FRAMEWORK, CONSULTATION AND ISSUES IDENTIFICATION

4 PLANNING AND STATUTORY CONSIDERATIONS

This chapter details the statutory context in which the Project is to be considered and the required approvals. It identifies the Commonwealth, State, Regional and Local Environmental Planning Policies relevant to the Project.

4.1 COMMONWEALTH LEGISLATION

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the approval of the Commonwealth Minister for the Environment for actions that may have a significant impact on matters of national environmental significance. The EPBC Act also requires Commonwealth approval for certain actions on Commonwealth land. Matters of national environmental significance under the Act include:

- world heritage properties;
- natural heritage places;
- Ramsar wetlands of international importance;
- threatened species or ecological communities listed in the EPBC Act;
- migratory species listed in the EPBC Act;
- Commonwealth marine environments; and
- nuclear actions.

A search of the Department of Environment and Heritage (DEH) Protected Matters database confirmed that the site is not a world heritage property or a natural heritage place, does not comprise a Ramsar wetland of international importance or a Commonwealth marine environment and does not include nuclear actions.

An assessment of the potential impact of the Project on threatened species, endangered ecological communities and migratory species listed under the EPBC Act with potential to occur in the locality concluded that no significant impact is likely (refer *to the 7 Part Test prepared by Keystone Ecological Pty Ltd- Volume 2 of this EAR*). A referral to the Commonwealth Minister for the Environment was not required for this Project.

4.2 STATE LEGISLATION

4.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act provides the statutory framework for assessment of the Project.

The EP&A Act includes Part 3A, which provides a streamlined assessment and approval process for development that is defined as a Major Project. The Project is defined as a Major Project under Clause 75(b) of the EP&A Act. DoP confirmed on the 25 June, 2006 that the Project is to be classified as a 'Major Project' to which Part 3A of the EP&A Act applies.

This EAR considers the likely impact of the Project on the environment and has been prepared in accordance with environmental assessment requirements of Clause 75(F) and Clause 75(R) of the EP&A Act.

4.2.2 Protection of the Environment Operations Act 1997

The Protection of the Environment Operations Act 1997 (POEO Act) provides an integrated system of licensing for polluting industries. Schedule 1 of the POEO Act identifies types of development that require an Environment Protection Licence (EPL) for polluting industries and land uses.

Schedule 1 of the POEO Act identifies licensing requirements for the following activities:

> ***Crushing, grinding or separating works that:***
>
> *(1) process materials including sand, gravel, rock, minerals, slag, road base or demolition material (such as concrete, bricks, tiles, asphaltic material, metal or timber) by crushing, grinding or separating into different sizes, and*
>
> *(2) have an intended processing capacity of more than 150 tonnes per day or 30,000 tonnes per year.*
>
> ***Waste facilities:***
>
> *(1) A waste facility that is of any one or more of the following classes:*
>
> *(a) hazardous, industrial, Group A or Group B waste processing facilities, being waste facilities that treat, process or reprocess hazardous waste, industrial waste, Group A waste or Group B waste (or any combination of those types of waste),*

(h) solid waste landfill or application-sites, being landfill or application-sites that receive over 5,000 tonnes per year of solid waste or solid waste and inert waste,

(j) large-scale landfill or application-sites, being landfill or application-sites that receive over 20,000 tonnes per year of any waste.

Project activities will include crushing, grinding and separating of sand, gravel, rock, road base and demolition materials including bricks, concrete and tiles, with a processing capacity in excess of 150 tonnes per day. The Project includes a solid waste landfill which accepts up to two million tonnes of waste per annum, inclusive of solid waste. An EPL will be sought from the DECC prior to the commencement of operations.

4.3 STATE ENVIRONMENTAL PLANNING POLICIES

4.3.1 State Environmental Planning Policy- Major Project 2005

The *State Environmental Planning Policy- Major Projects 2005* (SEPP-MP) was prepared to identify projects which would fall under Part 3A of the EP&A Act and clearly articulate the role of the Minister for Planning as the consent authority.

Schedule 1 of SEPP–MP identifies the different classes of development which are defined as Major Projects under Part 3A. The Project is defined as a Major Project under *Clause 27 Resource recovery or waste facilities*, which includes:

(2) Development for the purpose of waste transfer stations in metropolitan areas of the Sydney region that handle more than 75,000 tonnes per year of waste.

(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 includes resource recovery and recycling facilities including an MPC and WTS, which will accept up to two million tonnes of waste per annum. The Project is therefore classified as a Major Project and is subject to assessment under Part 3A of the EP&A Act.

4.3.2 State Environmental Planning Policy (Infrastructure) 2007

The relevant aims of State Environmental Planning Policy (Infrastructure) 2007 to the Project relate to improving regulatory certainty and efficiency through a consistent planning regime for infrastructure, the provision of services identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.

Under Schedule 3 the NSW Roads and Traffic Authority (RTA) are required to provide input and given the opportunity to make representations in respect of major traffic generating development. Consultation has been undertaken with the RTA, as required by the DGRs (refer to Chapter 11) and a traffic impact assessment has been prepared. The traffic impact assessment is submitted with the application in Volume 2, and key outcomes are presented in Chapter 11.

Division 23- Waste or Resource Management Facilities

Division 23 identifies zones where development for the purposes of a waste or resource transfer station may be carried out. The subject site is located in a prescribed zone where a waste or resource transfer station is permissible under *SEPP No.59- Central Western Sydney Economic and Employment Area.*

Under Division 23, Clause 123 the development consent authority must take into account justifiable need, the location of the project and the views of relevant public authorities. The matters for consideration by the development consent authority relating to Clause 123 have been addressed within *Section 1.5* of this EAR.

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

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) requires development consent for hazardous or offensive development proposals. It aims to ensure that in determining whether a development is a hazardous or offensive industry, any measures proposed to be employed to reduce the impact of the development are taken into account.

DoP, formerly the Department of Urban Affairs & Planning (DUAP) prepared *Applying SEPP 33 - Hazardous and Offensive Development Application Guidelines*, which outline assessment criteria to determine whether a proposal constitutes a potentially offensive or hazardous industry.

Potentially Offensive Industry

SEPP 33 defines a potentially offensive industry as *"a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment."*

The DUAP (1997) Guidelines state that *"the key consideration in the assessment of a potentially offensive industry is that the consent authority is satisfied there are adequate safeguards to ensure emissions from a facility can be controlled to a level at which they are not significant. An important factor in making this judgement is the view of the EPA (now DECC) (for those proposals requiring a pollution control licence under EPA legislation). If the EPA considers that its licence requirements can be met, then the proposal is not likely to be 'offensive industry'. In most cases, compliance with EPA requirements should be sufficient to demonstrate that a proposal is not an offensive industry."* (DUAP, 1997)

The Project is required to obtain licences from DECC with respect to recycling and use of the existing quarry as a solid waste landfill. Schedule 1 of the POEO Act details the licence requirements. The potential impacts of the Project on air quality, groundwater, surface water, noise and other environmental aspects have been assessed and the results are included in this EAR. It is considered that the Project will be able to achieve the requirements of the DECC licences. Therefore, although the Project is considered to be a *potentially* offensive industry, it is unlikely to be considered an offensive industry.

Potentially Hazardous Industry

SEPP 33 defines a potentially hazardous industry as *"a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*

(a) to human health, life or property, or

(b) to the biophysical environment, and includes a hazardous industry and a hazardous storage establishment."

The Project will include the storage of potentially dangerous goods on-site in the form diesel fuel which is classified as C1 – Class 3 hazardous goods under the Department of Planning's *Applying SEPP 33 - Hazardous and Offensive Development Application Guidelines*. Diesel fuel is a combustible liquid however it is not classified within the Dangerous Goods Code. The diesel fuel storage is proposed to be within a double skin tank located adjacent to the proposed workshop building (refer to *Figure 3.2*). In terms of transportation screening in accordance with DoP (1996) guidelines, the number of vehicle movements per week relating to diesel fuel supply for the Project will be considerably less than 30 movements. Therefore the storage and handling of diesel as proposed is not considered potentially hazardous and the proposed development is not considered to be a potentially hazardous industry.

4.3.4 State Environmental Planning Policy No.55 -Remediation of Land

State Environmental Planning Policy No.55 (SEPP 55) aims to provide a statewide approach to the remediation of contaminated land. A Preliminary Contamination Assessment was carried out at the site by Douglas Partners in April 2006. The assessment report is presented as a supporting technical document and key outcomes are included in *Section 15.3*. In summary, no contaminated soils have been identified at the proposed area of operations. The stockpiled material currently on-site is consistent with virgin excavated natural materials (VENM) and suitable for re-use as fill on the site. From a contamination perspective, the site is suitable for commercial/industrial use. In accordance with the recommendations of Douglas Partners (2006), additional testing may be carried out in the future to confirm this.

4.3.5 State Environmental Planning Policy No.59 - Central Western Sydney Economic and Employment Area

State Environmental Planning Policy No. 59 - Central Western Sydney Economic and Employment Area (SEPP 59) was gazetted on 19 February, 1999 and applies to the subject site. The SEPP contains a series of objectives and planning controls.

The SEPP recognises the importance of ensuring land is available for employment generating development in western Sydney, with good access to existing and proposed transport infrastructure.

SEPP 59 earmarks the site for future use as a non-putrescible waste facility and provides that the land contained within Lot 2, DP 262213, Lot 1, DP 400697, Lot W, DP 419612 and Lot 11, DP 558723 may be used with the consent of the consent authority for the purpose of a waste management facility for non-putrescible material.

The aims of SEPP 59 are:

- *to promote economic development and the creation of employment in Western Sydney by providing for the development of major warehousing, industrial, high technology, research or ancillary facilities with good access to the existing and proposed road freight network, including the M4 motorway and the Western Sydney Orbital;*

- *to encourage the staged rehabilitation and construction of existing quarries to facilitate their longer term use as employment lands;*

- *to provide for the optimal environmental and planning outcomes for the land, to which the Policy applies by:*

    - *conserving those areas that have a high biodiversity or heritage, scenic or cultural value and, in particular, areas of remnant vegetation;*

    - *helping to achieve the goals set out in Action for Air, the New South Wales Government's 25 year Air Quality Management Plan; and*

    - *implementing the principles of good urban design.*

The Project is considered to be consistent with these aims. The proposed project and associated works will establish the required state community infrastructure for the disposal by landfilling of non-recyclable materials and the recycling of recyclable materials, satisfying, in a broad sense, the requirements set out in clause 2 of the SEPP and addressing the following specific aims and objectives of the SEPP:

- (c) to promote economic development and the creation of employment in Western Sydney by providing for the development of major warehousing, industrial, high technology, research or ancillary facilities with good access to the existing and proposed road freight network, including the M4 motorway and the Western Sydney Orbital; and

- (e) to provide for the staged optimum extraction of resources from existing quarries, and

- (f) to encourage the staged rehabilitation and construction of existing quarries to facilitate their longer term use as employment lands; and

- (g) to provide for the optimal environmental and planning outcomes for the land to which this Policy applies by:

    - (i) conserving those areas that have a high biodiversity or heritage, scenic or cultural value and, in particular, areas of remnant vegetation; and

    - (ii) helping to achieve the goals set out in Action for Air, the New South Wales Government's 25 year Air Qualify Management Plan, published by the New South Wales Government in March 1998, by containing the

per capita growth in vehicle kilometers travelled (VKT) by achieving higher than normal public transport usage

In particular the proposed development includes conservation of remnant (Endangered Ecological Community (EEC)) vegetation in the north-west of the site and will promote economic development and the creation of employment in Western Sydney. The latter will be achieved by providing industrial development which facilitates the staged rehabilitation of the existing quarry and long-term use as employment lands. The Project aims to rehabilitate the existing quarry through its use as a landfill. The Project will employ approximately 30 people during the construction phase and approximately 54 staff and 10 contractors during the operational phase.

Subdivision

Clause 28 of the SEPP relates to subdivision and states that land must not be subdivided unless it is in accordance with a development consent or complying development certificate. Hence development consent is required for any subdivision of the land.

No subdivision is contemplated by the proposed development.

Tree preservation

Clause 29 of the SEPP relates to tree preservation and states that a person must not ringbark, cut down, lop, top, remove, injure or willfully destroy any tree within a Precinct except with the consent of the consent authority.

The proposed development does not promote, encourage or suggest the removal of any trees.

Matters for Consideration

Clause 10 of SEPP 59 includes a number of matters for consideration to be addressed by the consent authority. These matters are outlined in *Table 4.1* below.

Permissibility

The Project site is within the Employment Zone of SEPP 59. The permissibility of the Project is addressed in Clause 31A.

Clause 31A

Clause 31A applies to the Project site and identifies a non-putrescible waste facility as a use permissible with consent.

Clause 31A states:

(1) This clause applies to certain land at Wallgrove, being the land comprised in Lot 2, DP 262213, Lot 1, DP 400697, Lot W, DP 419612, Lot 10, DP 241859 and Lot 11, DP 558723.

(2) Despite the other provisions of this Policy, the land to which this clause applies may be used, with the consent of the consent authority, for the purpose of a waste facility for non-putrescible material.

The Project includes a non-putrescible landfill with an associated RRF. Pursuant to *Clause 31A* these parts of the Project are permissible subject to development consent.

Employment Zone

The site is zoned Employment Zone under the provisions of the SEPP.

Pursuant to Clause 23, development for the purpose of any employment-generating development that meets the objectives for the zone is permissible with consent.

The proposed development satisfies the objectives of the Employment Zone contained in Clause 23 and in particular, the following sub-clauses:

(a) to facilitate employment-generating industrial … purposes …that is consistent with a Precinct plan applying to the land, and

(b) to ensure that development in Central Western Sydney is of a high standard and that the development:

(i) incorporates best practice environmental management techniques and adopts all measures necessary to protect the environment of the zone by reason of: emissions (noise, air, liquids or solid wastes), or environmental risks (including potentially hazardous and offensive industries), and

(iii) encourages an efficient use of resources in the construction and operation of the development, and

(iv) enhances the biodiversity of the region by the retention of significant bushland communities or through the regeneration of bushland communities as part of landscaping, and

(v) enhances or does not degrade the water quality of natural waterways and their riparian zones, and

(d) to allow for local open space that is accessible and well located, that promotes the use and enjoyment of local open space for both residents and the workforce, that may include elements of the natural environment, and that provides for active and passive recreation.

The Project is for employment generating industry, consistent with the Precinct Plan applying to the land and administration, workshop and sales, which are ancillary to the RRF and landfill. The ancillary activities are therefore also permissible with consent.

Table 4.1 SEPP 59 Matters for Consideration

Matters for Consideration	Project
(a) the contribution the development makes to the economic development and the number and diversity of jobs in Central Western Sydney,	The Project will contribute to economic development and diversity of jobs in Central Western Sydney, by compliance with SEPP 59 and employment of 30 staff during the construction phase and 54 staff and up to 10 contractors during the operational phase. Operational staff will include mechanics, weighbridge operators, plant operators, foremen, sales personnel, laborers, drivers and managers.
(b) the range of lot sizes and resulting ability to accommodate a wide range of employment-generating development including those uses which require large sites such as major distribution-sites,	Subdivision is not proposed as part of the Project. Therefore this matter is not applicable.
(c) the timing, location and design of the development having regard to the orderly provision of infrastructure and services,	The timing, location and design of appropriate servicing infrastructure including sewerage, gas, electricity and water shall be discussed with the relevant authorities.
(d) the remaining resources which are of a high quality, regionally significant and identified in Sydney Regional Environmental Plan No 9--Extractive Industry, should be extracted while economically viable,	The quarry at the site has ceased to operate. The extraction of natural resources is no longer economically viable.
(e) there should be an orderly and co-ordinated sequence of extraction and rehabilitation to achieve the progressive construction of landforms that are suitable for development as employment lands,	Resource extraction has occurred at the site for over 50 years and the Project will include the orderly rehabilitation of the quarry site through its use as a landfill, including extraction of in-pit roads and reshaping of the pit walls by mechanical means as filling progresses. The final rehabilitated landform will be consistent with surrounding landforms and suitable for development.
(f) housing choice will be achieved by a wide range of housing types and lot sizes, with an overall density within a Precinct of at least 15 dwellings per hectare to meet the principles of the compact city as described in Cities for the 21st Century, published by the Department of Planning in January 1995,	Not applicable
(g) development should be consistent with the principles of ecologically sustainable development which requires an active approach to anticipating and preventing damage to the environment, and where possible, ensuring that developments are planned in a way that enhances the environment.	The Project is consistent with ESD principles by proposing a suitable approach to rehabilitating the site in line with SEPP No.59. The Project will not adversely affect the surrounding natural environment nor will the Project adversely impact on the future development of the Eastern Creek Precinct as an employment hub for the future prosperity of the surrounding local communities. All environmental aspects of the Project including odour, surface water, groundwater, noise, etc have been assessed and management measures identified within the Statement of Commitment in order for the project to meet its environmental obligations in line with ESD.

Matters for Consideration	Project
(h) development should be consistent with Action for Air, the New South Wales Government's 25 year Air Quality Management Plan, published by the New South Wales Government in March 1998, including all aspects of air quality, from assessing emissions from a development to transport and land use considerations,	The Project has been assessed with respect to the relevant air quality requirements/ standards. (refer to *Chapter 9* and *Volume 2* of this EAR for the technical air quality report prepared by Air Holmes Sciences Pty Ltd dated April, 2008.)
(i) development should be consistent with the principles of total water cycle management, including minimising total water usage, minimising waste water requiring treatment and disposal, minimising stormwater impacts on the environment, and maximising water retention and re-use,	The Project is consistent with water use best practice and aims to provide the majority of its water needs by re-use of runoff captured on-site, and ensure any water to be disposed is treated to meet appropriate trade waste quality standards. Proposed groundwater and surface water management is based on a total water cycle management approach discussed in Chapters 6 and 7 of this EAR and in Volume Two technical reports.
(j) development should be consistent with the principles of waste minimisation as set out in A Guide to the Waste Minimisation and Management Regulation, published by the Environment Protection Authority in 1996, and should ensure that waste is minimised through re-use, recycling and reprocessing, with disposal being the last resort option,	The Project involves recycling 50-80% of waste received, to ensure that the landfill is used as a last resort, after extensive sorting and processing within the RRF. This will ensure the longevity of the landfill and the appropriate management of received wastes from the building and construction industry, commercial and industrial sectors and private individuals. Waste management is discussed in Chapters 3.
(k) development should be planned to achieve maximum energy efficiency through such measures as building location, design and materials use, the selection of energy and water efficient building services, equipment and appliances,	The principles of energy efficiency are incorporated into the design of the buildings and facilities. The RRF is closely located to the existing quarry to ensure maximum energy efficiency in the handling and movement of material on-site. The buildings will be designed with pre-cast metal sheeting which is considered to be an appropriate building material for the proposed industrial use, to ensure the longevity of the buildings. Rainwater tanks are proposed for the collection and re-use of rainwater (refer to Chapter 6).
(l) the conservation of items of heritage significance identified in this Policy or any other environmental planning instruments or subject to an order under the Heritage Act 1977,	The proposed strategy for conservation of any heritage items or values associated with the site is discussed in *Section 14.5*.
(m) the conservation of significant bushland and other natural features,	The significant ecological communities identified on site are addressed within Chapter 13. The operational area of the Project will be located outside of significant ecological communities thereby mitigating the potential impacts of the Project.

Matters for Consideration	Project
(n) development should be planned to minimise impacts on areas of high biodiversity or Aboriginal heritage significance and should seek to enhance the values of these areas,	The Project has been planned to minimise impact upon areas nominated in the Precinct Plan as having high or moderate sensitivity, in terms of aboriginal heritage and ecological values. This includes the designated conservation area in the north-west corner of the site, which will be conserved as part of the Project. Measures are proposed to mitigate potential impacts (refer to *Sections 13.5* and *14.5*)
(o) the suitability of the site or part of the site for open space that will enhance and link the regional open space and special uses corridor and provide for the needs of the local community,	The final capped form of the landfill will be designed for future use as identified within the Eastern Creek Precinct Plan. The Project has been designed to minimise impacts to non-operational areas of the site and these areas may be used for industrial/commercial uses in the future. Preservation of an area of Cumberland Plains Woodland enhances the ecological, heritage and community amenity.
(p)the protection and improvement of the cultural landscape particularly that surrounding St Bartholomew's Church and Prospect Reservoir,	Not applicable.
(q) the range of permissible land uses, the design and layout of the site, and connections to existing transport networks should minimise vehicle kilometres travelled (VKT) while recognising the freight and transport requirements of the industry,	The Project utilises the existing transport networks available via Old Wallgrove Road (refer to Chapter 11 for further detail.)
(r) development should provide for users of all modes of transport, including public transport, cycling and walking, with a recognition of the need to integrate the development into the surrounding network of each mode,	The Project is most appropriately accessed via private modes of transport since the transfer of waste materials and the purchase of recycled materials would not be easily accommodated on public transport. Public transport has however been considered as a mode of transport for operational staff which is discussed within Chapter 11. The Project will not adversely impact on the provision of public transport as proposed within the Eastern Creek Precinct Plan.
(s) the identification of freight links through the Greystanes Precinct from the land zoned "Employment" at Wetherill Park to the M4,	This clause is not applicable to the Project or the site location.
(t) the identification of links to the Transitway identified in Action for Transport 2010, an Integrated Transport Plan for Sydney published by the NSW Government in November 1998	The Project does not intend to link to the Transitway. Therefore this clause is not applicable.
(u) development should ensure that the environmental and social quality of existing and future residential areas are safeguarded and that, in particular, noise and vibration from quarry operations is minimised,	A noise impact assessment (Chapter 10), visual assessment (Chapter 12), assessment of hazards and risks (Chapter 15), air quality assessment (Chapter 9), traffic impact assessment (Chapter 11) and socio-economic impact assessment (Chapter 17) have been prepared to address environmental and social quality impacts of the Project.
(v) development should be designed and located to ensure the best	The landfill and RRF will be surrounded by existing overburden stockpiles which will be reshaped

Matters for Consideration	Project
possible urban design outcomes including landscape quality and visual character,	as 10 m high landscaped berms, and the inclusion of 10m high visual barriers to shield operations and provide visual buffers to adjacent lands.
(w) the scale and character of any development derived from an analysis of the site, having particular regard for its character when viewed from the M4, or the environs of Prospect Reservoir,	The majority of operational areas will be screened by existing reshaped overburden stockpiles, 10 m high, landscaped berms, visual barriers and woodland in the north-west of the site. It is not expected to have any significant adverse impact on view corridors from the M4 (refer to *Section 12.4*).
(x) development of the land will integrate community services with land use planning,	Not applicable.
(y) development of the land is to result in an attractive and safe built environment which satisfies a diverse range of community needs,	The majority of operational areas will be screened by existing overburden stockpiles, 10 m high, landscaped berms and woodland in the north-west of the site. This will minimise any adverse visual impacts on surrounding employment lands. The safety of the site will be managed via boundary fences, gates and berms to restrict access to the landfill area and a security service will conduct patrols in the area after hours.
(z) the full range of human services and community facilities infrastructure appropriate to the changing needs of the community will be provided in a timely manner,	This is more appropriately addressed in the future development of adjacent lands.
(aa) the amenity of the region will be promoted through the provision of on-site services and facilities, and through complementing or augmenting existing service networks, *(bb) equitable access to services and facilities will be promoted for all groups and individuals in the community,* *(cc) development will integrate the new community with existing adjoining communities,* *(dd) community participation will be encouraged in the identification of community services and facility needs.*	Not applicable.

4.3.6 Consideration of Precinct Plan

Clause 25 of the SEPP requires a consent authority to take into consideration any Precinct Plan that applies to the determination of a development application in respect of land within a Precinct.

In addition, pursuant to clause 271(1) of the Environmental Planning and Assessment Regulation 2000 (the Regulation), a person cannot apply to a consent authority for consent to carry out development on land zoned 'Employment" under SEPP 59 unless the Minister has, in accordance with clause 11 of SEPP 59, declared the land to be, or to be part of, a release area. On 25 February 2003, in accordance with clause 11 of SEPP 59, the Minister declared the Eastern Creek Precinct to be a release area under the Policy.

Once the Minister declares the land to be a release area, clause 12 of the SEPP requires a Precinct Plan and Contributions Plan under section 94 of the Act to be prepared for that land.

The site is subject to the Eastern Creek Precinct Plan - Stage 3 which was adopted by Blacktown Council on the 7 December 2005 and came into force on the 14 December 2005. The proposed development and the need for it has been assessed against this Precinct Plan

Currently, there is no relevant Section 94 Contributions Plan for the site. However, clause 271(2)(c) of the Regulation states that the Precinct Plan and Contributions Plan may be dispensed with if the developer has entered into an agreement with the consent authority that makes adequate provision with respect to the matters that may be the subject of the two plans.

4.3.7 Eastern Creek Precinct Plan (Stage 3)

Clause 12 of SEPP 59 requires the preparation of a Precinct Plan. The *Eastern Creek Precinct Plan (Stage 3)* prepared by Blacktown City Council applies to the Project site and came into force on the 14th December, 2005.

The Precinct Plan sets out guidelines for land use, built form controls, traffic and transport management, stormwater management, biodiversity conservation, heritage management and environmental management. *Table 4.2* below provides an assessment of the Project against the provisions of the Precinct Plan.

Table 4.2 Assessment of the Project against Requirements of the Eastern Creek Precinct Plan (Stage 3)

Precinct Plan	Project
Economic Development and Employment	
Objectives: (a) Establish a high quality industrial Precinct that provides diversity in employment opportunities and economic development to benefit Blacktown and Central Western Sydney. (b) Provide a range of development consistent with the provisions of SEPP 59 and having regard to the location of the site in close proximity to the junction of the M4 Motorway and the M7 Motorway. (c) Provide for a range of community services that service the daily convenience needs of the local workforce and visitors, and the needs of local businesses and activities. (d) Enhance the skill of the local workforce through the provision of appropriate facilities for the training of apprentices, and ongoing training and development. (e) Contribute to the increased levels of skill matching with the local workforce. (f) Development should aim to achieve a minimum employment density target of 45 jobs per hectare in order to achieve the overall projected on-site employment forecast of approximately 20,000 jobs for the whole Precinct.	The proposed works will help to achieve the Precinct Plan's objectives by preparing the land for its future development for employment generating activities. The Project will contribute to the economic development and employment opportunities within Western Sydney by providing diverse employment opportunities for roles including mechanics, weighbridge operators, plant operators, foremen, sales personnel, labourers and managers. The site's location close to the junction of the M4 and M7 provides access to major traffic nodes and interchanges. This accessibility to road networks supports employment opportunities within the site by providing accessibility to road networks, and provides good accessibility for delivery and dispatch vehicles travelling to and from the site from metropolitan Sydney and surrounds. Community services including daily convenience needs are not proposed as part of this Project. The presence of the RRF and landfill represents ongoing economic benefits to the local and regional community via capital injection and value added spending Staff employed at the RRF and landfill facility will be skilled labour and ongoing training will be provided where appropriate. A skilled workforce will be required for the project and staff can potentially be sourced from the local community (refer *Section 17.4.3*). The recycling and lanfilling activities of the Project will directly create jobs for 54 staff plus 10 contractors. Indirect employment will also be generated via support services such as maintenance workers and short term contractors. In contrast to the majority of Precinct lands, the nature of the area to be developed for this Project i.e. the quarry pit, is ideally suited to the

Precinct Plan	Project
	operation of a landfill and RRF. Operation of these facilities require a specific skilled labour force, however do not require an employment density as high as 45 jobs/ha. The Project will not detract adjacent lands within the Precinct from achieving the desirable employment densities.
General Services	
Telecommunications, Gas, Water, Sewerage and Electricity will need to be provided to the specifications of the relevant authorities. There are no permanent water, sewerage or power supplies sufficient enough to cater for the future development of Stage 3.	Refer to *Section 3.6* for details regarding the servicing of the site.
Stormwater Management	
• Development Applications must be accompanied by a site specific Stormwater Management Plan, designed to be consistent with the Precinct stormwater management system and with the latest stormwater quality control requirements of Blacktown City Council. • Stormwater management and drainage works are to be constructed in accordance with Council's drainage standards and other relevant guidelines and standards. • Applicants are required to demonstrate that water sensitive urban design principles have been considered development shall comply with Council's latest flood policy and building code requirements. • Each development will be required to provide a water quality control mechanism to Council's satisfaction. Maintenance, monitoring and reporting of any stormwater infrastructure shall be undertaken and reported to Council.	Surface water management including stormwater management has been addressed as part of this EA and is detailed within Chapter 6 and *Volume 2* Storm Consulting Assessment dated February 2008.
Extraction and Rehabilitation	
SEPP 59 (Amendment No 5) was gazetted on 7 May 2004 to insert clause 18(5) relating to the Pioneer quarry, stating that: "*An extraction and rehabilitation plan referred to in Schedule 1 need not be prepared for land*	The RRF is to be located approximately 25 m from the top of the bank of the pit. Landscaped 10 m high amenity berms are proposed to screen the operation of the landfill and RRF. The berms and separation provided to adjoining land will help mitigate Project impacts on the adjacent land, including land to be developed for future employment uses. A landscaped

Precinct Plan	Project
at Eastern Creek comprised of Lot 2 DP 262213, Lot 1 DP 400697, Lot W DP 419612 and Lot 11 DP 558723 before a Precinct plan is approved for that land, but the consent authority is to have regard to such an extraction and rehabilitation plan before granting consent to any development on that land."	buffer is not necessary in the 25 m setback zone as the adjacent land is included in the operational area for the Project. Inclusion of a landscape buffer around the pit edge would impact on the efficient functioning of the facility. The identified use of this zone in the Precinct Pan is suitably addressed by the landscaped berms surrounding the RRF.
Development relating to an area directly adjacent to the Pioneer Quarry pit shall be setback a minimum of 30m (when measured from the top of the bank of the pit). The 30m setback shall be provided as a landscaped buffer, with appropriate earth mounding and fencing in order to screen the operation of the quarry. The landscaped buffer shall remain until such time as the quarry pit is rehabilitated to Council's satisfaction.	With respect to safety surrounding the pit edge Jeffery and Katauskas Pty Ltd undertook a geotechnical assessment of the pit wall stability and concluded that the provision of a new safety bund setback about 1m from the crest of the new slope (being the slope from the zone of influence), the installation of a new catch bund at the toe of the slope. And a secured setback of 1 metre for the internal road network from the pit edge would mitigate the potential safety issues associated with the operations areas being located within 30 metre of the pit edge.
Environmental Management	
Ecologically Sustainable Development (ESD)Controls: (i) measures that will reduce waste and conserve water (by including water recycling);	Waste minimisation is discussed in Chapters 3 for the management of the RRF and Landfill and in Chapter 16, for general waste management during construction and operational phases. Water conservation and waste water recycling for the Project is discussed in Chapter 6.
(ii) measures to minimise run-off and stormwater generation;	Refer to Chapter 6 which addresses surface water management.
(iii) implementing total water cycle management by measures that include reducing consumption of potable water for non-potable uses, treating and recycling wastewater for re-use, minimising site run-off and promoting stormwater re-use;	Refer to Chapter 6 which outlines total water cycle management.
(iv) utilising recycled materials and renewable building resources;	The Project includes a MPC and will recycle waste materials for redistribution, including the sale of recycled building materials.
(v) promoting biological diversity by measures which include increasing habitat through appropriate retention, planting and maintenance of native flora considered representative of the area;	Areas of native vegetation will be preserved on the site. Landscaping will include additional planting of native species. Refer to Chapter 12 for further details.
(vi) implementing a waste management strategy and promoting the achievement of the 60 percent waste reduction target for New South Wales by measures including,	An estimated 50 to 80% of waste materials received at the site will be recycled.

Precinct Plan	Project
utilising recycled materials and renewable building resources, and recycling building and demolition materials for recycling and composting; and	
(vii) implementing energy conservation measures that include reducing energy consumption and increasing inherent energy efficiency through design and materials selection, and adopting energy management plans.	The proposed site buildings including the administration building, workshop and MPC/ WTS have been designed to provide energy efficiency. Energy conservation is discussed further in Chapter 16.
(i) complementing and reinforcing the development and use of the existing and planned integrated public transport, pedestrian and cycling networks servicing the site;	Public transport, pedestrian or cycling networks would not be appropriate transport networks to access or transfer waste to or from the site.
(ii) encouraging increased reliance on public transport and reduced reliance on private vehicles for journeys to work and other trips, so as to reduce vehicle kilometers travelled;	Not applicable, as public transport would be an inappropriate form of vehicular access to the RRF and landfill.
(iii) providing levels of on-site parking aimed at reducing reliance on private vehicles for journey to work trips.	Parking has been provided on-site to meet the needs of site staff and visitors and is discussed in Chapter 11.
Water Conservation Controls: (a) Development should incorporate water efficient fixtures such as taps, showerheads, and toilet suites (cisterns and urinals). The fixtures must be rated to at least AAA under the National Water Conservation Rating and Labelling Scheme.	Water efficient fixtures and fittings will be installed during the construction phase of the Project.
(b) Development Applications are required to submit a Site Water Management Plan that investigates, and where feasible, provides for the integrated management and use of water. The Site Water Management Plan should demonstrate that other water sources have been considered including: (i) an integrated water collection and recycling system for capturing and recycling of roofwater; (ii) the re-use of greywater on-site; (iii) the capture and re-use of stormwater from the site; (iv) treating and re-using any process water generated by the development; and (v) controlling the quality of waste water and stormwater to be disposed.	The Site Water Management Plan is addressed in Chapter 6 and Volume 2 which includes strategies for capturing and recycling of water on-site and water quality controls.

Precinct Plan	Project
Energy Efficiency: (a) Applicants are required to demonstrate appropriate use of energy efficient materials during construction.	Detail of the type of building materials to be used on-site will accompany the construction certificate stage of the development process.
(b) Development should be planned to achieve maximum energy efficiency in building design through measures including building location, internal layout, design and materials use, and the selection of energy and water efficient building services, equipment and appliances, and the use of landscape elements for microclimate control. These measures should aim to achieve: (i) optimal solar access and natural lighting; and (ii) optimal natural heating, cooling and ventilation.	Energy efficient appliances will be installed. Energy efficiency has been incorporated into the design of the buildings through the use of cross ventilation for heating and cooling. Location of the RRF close to the landfill will promote energy efficient by minimising the distance vehicles have to travel to and from the landfill.
(c) Development should incorporate energy efficient hot water systems, air-conditioning, and lighting and lighting control systems. (d) An Energy Performance Statement ('EPS') is to be prepared and lodged with all Development Applications, if not participating in SEDA's Greenhouse Rating Scheme. The EPS shall provide justification for the proposed energy efficiency measures by addressing: (i) solar access; (ii) building form and construction; (iii) heating/cooling and ventilation; and (iv) lighting, water usage and appliances.	The incorporation of energy efficient systems shall be addressed as part of the detailed design phase of the Project. Chapter 17 addresses greenhouse gas production and identifies commitments to manage greenhouse gas emissions and produce energy efficiency with respect tot functioning of the ancillary buildings including the administration and workshop buildings.
(e) Consideration should be given to the feasibility of any measures to substitute gridsource power with environmentally sustainable alternatives such as co-generation (i.e. recovery of waste energy) or photovoltaics.	Discussions with Integral Energy as the relevant authority will be undertaken to ensure suitable power is provided to the site.

Precinct Plan	Project
Air Quality:	
(a) Development Applications should provide an assessment, and identify necessary mitigation measures, to minimise the potential environmental impacts from air pollutants generated by the proposed development.	Air quality has been addressed within Chapter 9 of the EAR.
(b) Development Applications must comply with relevant Council, and government authority guidelines, to ensure no adverse environmental impacts occur both during and after development of the Precinct.	Air quality has been addressed within Chapter 9 of the EAR.
Waste:	
(a) identify any licensing requirements under the *Waste Avoidance and Resource Recovery Act 2001*;	Licensing requirements will be provided by DECC under the *Waste Avoidance and Resource Recovery Act 2001* linked to the waste management requirements under the *Protection of the Environment Operations (Waste) Regulations 2005*.
(b) document the type, classification and quantity of all waste that are likely to be generated during the development and post-development phases; (c) identify initiatives for reusing and/or recycling of waste; and	Waste streams are identified in Chapters 3 of this EAR. Chapter 16 identifies general site waste management during construction and operational phases of the Project. As set out in Chapter 3, the Project incorporates initiatives to re-use and recover 1 to 1.6 mtpa of waste, based on maximum capacity intake. Refer to Chapters 3 for further detail.
(d) identify waste management protocols during the development and post development phases including: (i) storage and handling of waste on-site; (ii) transportation of waste; (iii) record keeping and target setting; (iv) compliance with obligations for notifying the relevant government authority; and (v) training and education of workers.	Waste management is addressed within Chapters 3 of this EAR. The protocols will be set out in a LEMP (for the landfill) and a EWMP (for the RRF), to be prepared prior to commencement of operations and implemented throughout operations.
Contamination:	
(a) Applicants are required to submit a site specific contamination report and/or remedial action plan prepared by a suitably qualified person to confirm that the site does not pose a risk to human health or the environment.	A site contamination report is included in Volume 2 prepared by Douglas Partners dated April 2006, with key outcomes presented in Chapter 15 of this EAR.
(b) Development should be designed and managed to minimise the potential for	Measures will be in place to minimise potential for polluting discharges, fumes, emission and

Precinct Plan	Project
polluting discharges, fugitive emissions and controlled spillages by appropriate site management techniques.	spills, and these are outlined in Chapters 6, 7, 8 and 9 of this EAR.
(c) All development must comply with the requirements of Council's *Site Contamination Policy*, and relevant government guidelines.	A site contamination report is included in Volume 2, with key outcomes presented in Chapter 15 of this EAR.
Salinity: Applicants are required to provide a salinity model for the site, describing the distribution and concentration of salinity within the soil and groundwater profile in order to identify any potential different zones that may require different management strategies to be applied as a result of developing that site. A Salinity Management Plan must be submitted with all Development. Applications, outlining what actions are proposed to minimise the impact of development on the saline environment.	Issues with respect to groundwater and its management have been addressed within Chapter 7 and Section 6.4.5 Salinity of this EAR.
Noise and Vibration: Development Applications should provide an assessment, and identify necessary mitigation measures, to minimise the potential environmental impacts from noise and vibration generated by the proposed development. Development Applications must comply with relevant Council, and government authority guidelines, to ensure no adverse environmental impacts occur both during and after development of the Precinct. Where appropriate, development may need to be treated to minimise the impact from noise generated both on and off-site with respect to surrounding sensitive land uses.	Noise and vibration have been addressed within Chapter 10 and Volume 2 Noise Impact Assessment (ERM) of the EAR.
Biodiversity	
Applications for development of an allotment of land containing an identified conservation area or riparian corridor shall demonstrate that satisfactory arrangements have been made for the ongoing protection, enhancement, and management of biodiversity on that land.	Proposed management strategies to be implemented for the conservation area in the north-west of the site are identified in *Section 13.5*. A plan of management for this area will be prepared and implemented.

Precinct Plan	Project
Biodiversity Conservation Areas: 8.3.5 When measured from the top of the bank on either side of the creek, development consent shall not be granted, except for development associated with the protection, enhancement and management of the riparian corridor, on land within the precinct that is within: **40** m of Ropes Creek Tributary or **10** m of Upper Angus Creek.	The operational land subject to this proposal is located more than 40 metres from Ropes Creek Tributary. Works associated with the enhancement, protection and management of Upper Angus Creek shall be undertaken within the riparian corridor where it bisects the subject site. The existing bunded wall of the pit which is located within the 10 metre buffer shall be maintained and landscaped as part of the proposal.
Feral and Domestic Animal Management: (a) Covered bulk rubbish bins are to be used during construction to ensure that there are not uncovered stock or rubbish piles. (b) Development must incorporate refuse storage areas that are designed to prevent feral animals entering. (c) Landscaping of all development sites, particularly those located adjacent to biodiversity conservation areas is to include native shrubs and trees.	Access to the site shall be controlled via security fencing to be constructed around the perimeter of the site. Waste shall also be managed on-site to limit access and mitigate any associated impacts. Landscaping will include planting of native species.
Bushfire Management: Development Applications relating to an area directly adjacent to land identified on Council's Bushfire Prone Land Map are to be accompanied by a bushfire hazard assessment	A bushfire hazard assessment has been undertaken for the site and is included in Volume 2 prepared by Holmes Fire and Safety dated May 2007) with key outcomes presented in Chapter 15.
8.4.3 (d)APZ's are to be located wholly within the development site, outside of any conservation area or riparian corridor .	Appendix I Volume 2 - Holmes Fire and Safety Report identifies the location and type of APZ required to address bushfire management.

Precinct Plan	Project
Heritage	
Non-indigenous heritage located at Southridge house and property. A Conservation Management Plan ('CMP') prepared by Eric Martin and Associates dated August 2003 relates to the management of this site. Applications for development of an allotment of land containing an identified conservation area shall demonstrate that satisfactory arrangements have been made for the ongoing protection, enhancement, and management of indigenous heritage values on that land.	Not applicable as the site does not contain any items of non-indigenous heritage. Proposed management of indigenous heritage values within the conservation area in the north-west of the site including the preparation of a plan of management for this area are discussed in *Section 14.5*.
Traffic and Transport	
Development should comply with the road design principles contained in the following documents: (i) Roads and Traffic Authority, *Road Design Guidelines*; and (ii) Roads and Traffic Authority, *Guide to Traffic Generating Development*, (1993). **Local Road Network** - Applicants will need to extinguish the existing right of way to the Pioneer Quarry in order to implement the local road network. The extinguishment of the right of way shall not detrimentally impact on the existing quarry operations.	Site access is a right-of-carriageway via Old Wallgrove Road. Refer to Chapter 11 for details regarding traffic and transport. This right-of-carriageway is not to be extinguished for this Project. It is considered to be the most appropriate site access at this time as it is the most economical option, alternative road networks have not yet been established, it avoids road traffic noise impacts on residents adjacent to Archbold Road and can adequately cater for predicted Project traffic generation.
Public transport: Applicants will need to demonstrate that satisfactory arrangements have been entered into with the relevant State government authorities for the provision of public transport services to the Precinct.	Public transport networks are not proposed as part of this Project.
Parking: Off street parking should be designed to be consistent with the car parking standards of this Precinct Plan.	Parking will be provided on-site to service customers, visitors and staff. Parking is discussed further in Chapter 11.
Urban Design	
A site analysis based on a survey drawing produced by a suitably qualified person must be submitted with all Development Applications.	Site constraints to development were considered during Project planning and these include ecological and heritage constraints which are reflected in *Figures 13.1* and *14.1* respectively.

Precinct Plan	Project
Siting and Setbacks: No building or hardstand area (concrete or bitumen pavement) shall be erected on any land within 10m of the boundary (excluding public roads) of a: • conservation area; • riparian corridor • open space area; or • trunk drainage area. All setback areas should be landscaped in accordance with the Landscape Controls outlined in this Plan, and maintained as open space.	No buildings or hardstand areas will be within 10 m of a riparian corridor, open space area or trunk drainage area. The Project has been planned to avoid the conservation area in the north-west of the site, however the north-west berms will be constructed adjacent to this area. Management measures will be in place to address potential impacts to ecological and heritage values (refer *Sections 13.5* and *14.5*).
The site coverage of the footprint of all buildings and canopy areas (excluding hardstand areas) to the area of the allotment on which it is to be situated shall not exceed 65% of the site area.	The footprint of all buildings does not exceed 65% of the site area.
Building Heights and Design: Applicants must give consideration to the following: (i) integration of building design with landscape elements; (ii) the impact of building heights on district views; (iii) building orientation and siting to optimise the use of natural elements, including topography, wind and sunlight, and maximise aspect and views;	The proposed building heights of the workshop and administration building will not exceed the height of the amenity berms and any trees planted on top. The roof of the MPC/ WTS building may exceed the height if berms, however as discussed in *Section 12.4*, this is not predicted to have an adverse visual impact at sensitive receivers. As discussed in Chapter 12 building design is consistent with other industrial facilities in the area and is not expected to adversely impact district views.
(iv) the articulation of building facades to provide visual relief from the public domain by using architectural elements such as: • external structures, finishes, etchings and recessed patterns; • decorative features, textures and colours; or • locating offices and highlighting entries within front facades to reduce the apparent bulk and scale of the structure; and • prevention of blank building facades.	The proposed buildings have been designed to support the functioning of the Project without unduly impacting on the amenity of the surrounding area.
Details (including elevations) of all water tanks must be submitted with the Development Application.	Rainwater tanks are to be located on site adjoining buildings including the MPC, administration building and workshop. Further details will be addressed at detailed design stage.

Precinct Plan	Project
External Building Materials and Colours: Applicants are required to submit a panel of external finishes and detail of coloured elevations when lodging a Development Application. A condition of development consent will refer to the approved schedule of finishes.	Chapter 12 identifies the commitment for the external finishes which will complement the surrounding natural environment so as to mitigate any visual impact on the precinct and immediate local setting.
Ancillary Buildings, Storage and Service Areas: Council will not accept open storage areas that are visible from the public domain. Where any materials are to be stored outside the primary industrial building, the storage areas are to be fully enclosed with solid fencing, surrounded by mature vegetation, and sited as part of the primary industrial building.	Open stockpile areas will be shielded from the public domain by vegetated amenity berms as shown in *Figure 3.3*.
Details of any proposed ancillary buildings, open storage and services areas must be submitted with all Development Applications.	The ancillary open storage areas and buildings are detailed within *Figure 3.3*.
Cut and Fill: A Development Application that includes cut and fill on a site adjoining a conservation area, open space area, or trunk drainage area is to address the potential environmental impacts of the proposed works on those areas.	All area of operation are located outside the Endangered Ecological Community (EEC) located in the north-western corner of the site, therefore there will be no impact to the identified conservation area. The cut and fill proposed on site is unlikely to affect any open space areas or trunk drainage areas within the immediate vicinity.
Signage and Lighting: Signage within the Precinct should be kept to a minimum, relate only to the use occurring on the respective property, and should identify the relevant business name. Directional signs for car parking areas, loading docks, delivery areas and the like should be designed in an attractive manner and should be located at a convenient point close to the main access to a development site. No form of moving or flashing signage or lighting is permitted within the Precinct.	Signage will be in accordance with the requirements of the Precinct Plan. Some safety signs may require illumination.

Precinct Plan	Project
Details of all signage must accompany Development Applications for a proposed building, including both free standing, fascia, and wall signs.	
Creating a sense of place: To contribute to the character of the area and the sense of place the development should *inter alia* aim to retain significant natural areas and tree canopy surrounding buildings; create buildings nestled into the landscape; keep high points within the Precinct vegetated; include water courses that run though the Precinct as an important element in the existing and future character of the site.	The proposed development will help to promote and to achieve these objectives by protecting sensitive areas of vegetation and watercourses and facilitating the preservation of the remnant Cumberland Plain Woodland.
Private open Space: Each development shall be provided with at least 1 private open space area for the use and enjoyment of all employees of that development. The private open space area shall be suitably landscaped and directly accessible from the main office component of the development. The private open space area shall be provided at a rate of 5% of the total gross floor area of the office component of the development or a minimum of 50 square metres, whichever is the greater, to a maximum area of 100 square metres.	The Project is for a RRF and landfill. The areas of operations have been located so as to mitigate impacts on the surrounding precinct. The provision of private open space adjoining an open landfill within high traffic operational areas is not recommended. The Administration buildings will therefore provide internal lunch room and kitchens for use by staff.
Community Safety: Development should comply with the NSW Government, *Crime Prevention and the Assessment of Development Applications* (April 2001). Buildings should be designed to overlook public domain areas and provide casual surveillance. Building entrances should be orientated towards the street to ensure visibility between entrances, foyers, car parking areas and the street.	The RRF and landfill are to be surrounded by security fencing which will discourage unauthorised entrance. Security patrols after hours will increase the surveillance around the site. The site is accessed via a right-of-carriageway which will be under passive surveillance from surrounding land uses. The administration building and workshop are orientated to the entrance and will have sightlines to traffic entering and exiting the site.
Community Services	
In order for Council to consider community services within the Precinct, applicants will need to justify that the size, function and proposed use serves the daily convenience needs of the workforce in the Precinct, or is for the benefit of the local workforce.	Community services are not proposed as part of this Project.
Open Space	
Development Applications that propose open spaces are to clearly identify the intended use and management of the open space, having regard to the potential	Community open spaces and neighbourhood open spaces are not proposed as part of this Project. However, rehabilitation of the former quarry site, by infilling, to facilitate its future

Precinct Plan	Project
multi-purpose use of these areas.	reuse for uses consistent with the surrounding precinct and the associated preservation of an area of Cumberland Plains Woodland enhances the ecological, heritage and community amenity. The economic activity which the proponent seeks to undertake then bears the costs which might otherwise be borne by the community in order to achieve these socially desirable outcomes. Consequently, the project will transfer of costs from the public domain to the private sector.
Landscaping	
A landscape plan is to be prepared and submitted with development applications for each allotment.	The project includes amenity berms which will be landscaped to provide a visual barrier to the surrounding locality and provide landscaping on site. The landscaping of the amenity berms is discussed within the *Air Quality – Odour and Dust*, prepared by Holmes Air Sciences, in Vol 2.

4.4 REGIONAL ENVIRONMENTAL PLANS

4.4.1 *Sydney Regional Environmental Plan No. 9 – Extractive Industry*

Sydney REP No.9 - Extractive Industry (No.2-1995) was gazetted on 15 September, 1995. The aims and objectives of the SREP are *inter alia*:

" (a) to facilitate the development of extractive resources in proximity to the population of the Sydney Metropolitan Area by identifying land which contains extractive material of regional significance, and

(b) to permit, with the consent of the council, development for the purpose of extractive industries on land described in Schedule 1 or 2, and

(c) to ensure consideration is given to the impact of encroaching development on the ability of extractive industries to realise their full potential, and

(d) to promote the carrying out of development for the purpose of extractive industries in an environmentally acceptable manner, and

(e) to prohibit development for the purpose of extractive industry on the land described in Schedule 3 in the Macdonald, Colo, Hawkesbury and Nepean Rivers, being land which is environmentally sensitive."

SREP 9 applies to the local government area of Blacktown, and therefore applies to the proposed development. The main implication of the SREP arises from clause 8 which requires consultation with the Department of Mineral Resources in respect of the subject development application.

As indicated, the existing quarry has reached the end of its economic viability but notwithstanding this, until a new consent is issued for alternative uses such as proposed by the proponent, responsibility for the quarry continues to be held by Hanson pursuant to the Mines Inspections Act.

The proponent has agreed with Hanson to fulfill their continuing maintenance obligations until a new consent is obtained at which time the parties, in consultation with the Department of Primary Industry will arrange a transition where Hanson would be relieved of its future obligations and the proponent would then undertake all obligations for the future.

4.4.2 *State Regional Environmental Plan No. 20- Hawkesbury-Nepean River (No.2-1997)*

This plan aims to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land use are considered in a regional context.

The specific planning policies and recommended strategies relating to total catchment management, environmentally sensitive areas, water quality, cultural heritage, fauna and flora, riverine scenic quality, agriculture and related relevant matters have been give consideration and where appropriate incorporated into the Project.

4.5 OTHER CONSIDERATIONS

4.5.1 Sydney Metropolitan Strategy

The Sydney Metropolitan Strategy (Metro Strategy) sets the strategic direction for the Greater Metropolitan Region of Sydney for the next 30 years. It identifies seven key issues that are considered vital to Sydney's sustainability, namely: economic employment centres and corridors; housing; transport; environment and resources; parks and public places; and implementation and governance.

The site is located within the Employment Zone of SEPP 59. The proposed development facilitates the achievement of the objectives and initiatives that relate to Employment and Economy in the Metro Strategy as it provides:

- greater flexibility in the types of uses that are permissible on the site, creating opportunities for emerging businesses and uses that support skill development and innovation;
- opportunities for increased employment generating activities in proximity to residential areas improving access to jobs in Western Sydney; and
- employment generating activities that are located adjacent to existing and future public transport routes, improving access to jobs in Western Sydney.

4.5.2 Planning For Bushfire Protection 2006

The NSW Rural Fire Surface (2006) *Planning for Bushfire Protection* includes performance based outcomes as well as prescriptive requirements and established bushfire planning objectives for development.

Planning for Bushfire Protection applies to all applications for development on land classified as bushfire prone. The site does not include any bushfire prone land, however is adjacent to an area of bushfire prone land, as mapped by Council. Therefore to meet requirements of the Precinct Plan, a preliminary bushfire hazard assessment was undertaken for the Project by Holmes Fire and Safety (2007). This assessment is provided as a supporting technical document in Volume 2 - Appendix I and key outcomes are presented in Chapter 15.

4.5.3 Section 94 Contributions

Director General Requirements

The Director General requires Light Horse Business Centre ("the Proponent") to address developer contributions for the Project as follows. The Proponent is to:

- review the project against any existing, draft, or likely requirements for the provision of regional and local infrastructure in the Western Sydney Employment Hub in consultation with the Roads and Traffic Authority, BCC and any relevant service providers; and

- describe the contributions that would be made towards the provision of this infrastructure and justify these contributions.

Requirements for the Provision of Regional and Local Infrastructure

The Project is classified as a 'major project' under clause 27 of the *State Environmental Planning Policy – Major Projects 2005* as it involves receipt, transfer and recovery of wastes over 75,000 tonnes per annum.

The Project also includes a waste disposal facility (landfill) to be operated in conjunction with the resource recovery and transfer activities. The Project is therefore subject to assessment under Part 3A of the *Environment Planning and Assessment Act 1979* (NSW).

The land in respect of which development application is being sought comprises four lots:

- Lot 2 DP 262213;

- Lot 1 DP 400697;

- Lot W DP 419612; and

- Lot 10 DP 241859.

The land was rezoned in 1999 under the SEPP 59 for employment, residential and regional open space purposes. The Pioneer Quarry forming part of the land that is the subject of the present development application was subsequently rezoned under clause 31A of SEPP 59 as being suitable for use as a non putrescible waste facility.

The SEPP 59 lands were divided into 3 release stages with the land forming part of the Stage 3 release area. On 25 February 2003, the Minister declared Stage 3 of the Eastern Creek Precinct a release area.

In this case Blacktown City Council is the relevant consent authority for the purposes of SEPP 59 except as provided by the EP&A Act. Under Part 3A of the EP&A Act, the Project is to be determined by the Minister.

Under clause 271 (1) of the *Environmental Planning and Assessment Regulation* 2000 (NSW), the Project must not be determined by the Minister unless the following plans have been prepared for the land:

1) a precinct plan (within the meaning of SEPP 59); and

2) a contributions plan under section 94EA of the EPAA.

Since development consent under Part 4 of the EP&A Act does not apply to the Project, Blacktown City Council is to provide a contribution plan under section 94 and not section 94A in compliance with clause 271 (1) of the EP&A Regulations.

However it is noted that clause 271 (2) of the EP&A Regulations provides that the consent authority may dispense with the need for a contributions plan if the developer has entered into an agreement with the consent authority that makes adequate provision with respect to the matters that may be the subject of that plan ("Voluntary Planning Agreement").

Section 94 of the EP&A Act provides that if the Minister is satisfied that *the Project* for which approval is sought will or *is likely to* increase or augment the demand in the Blacktown Local Government Area for:

a. Public amenities; and

b. Public services,

The Minister may grant project approval subject to a condition requiring:

a. The reasonable dedication of land free of cost; or

b. The reasonable payment of monetary contribution; or

c. Both.

The Minister must however take into consideration any land, money or other *material public benefit* that the applicant has elsewhere dedicated or provided free of cost within the Blacktown Local Government Area or previously paid to the Minister.

The minister is to also have regard to the precinct plan in considering the Project.

Section 94 contribution issues to be addressed for the Project have been identified from the precinct plan as follows:

1) Traffic & Transport;

2) Conservation & Heritage;

3) Environmental Management;

4) Stormwater Management; and

5) General Services.

No Special Infrastructure Contributions under section 94 are required for the Project as the Land does not lie within the Special Contributions Area (as per the *Growth Centres (Development Corporations) Act* 1974 (NSW)).

There is no current s94 Contributions Plan for the Eastern Creek Precinct although the proponent has been provided with a draft contributions plan for the precinct. Blacktown City Council expects to have finalised and exhibited a s94 Contributions Plan by the end of calendar year 2008.

In principle the VPA gives the developer a mechanism to provide Council with a form of security for their future s94 Contributions. The value of any road works or storm water precinct works constructed by the developer or land dedicated to Council can be deducted from the amount of security required."

On 17 August 2007, BCC provided the proponent with a revised Draft cost distribution schedule for the Eastern Creek Precinct under SEPP 59. The contribution required for the whole of the proponents' land is shown below.

Net development area (m2)	735,828
Drainage Works Cost + 40%	$12,674,799
Drainage Land Cost + 20%	$13,266,080
TOTAL	**$25,940,879**
Road Works Cost	$7,413,502
Road Works Land Cost	$ 942,001
TOTAL	**$8,355,503**

*Net Development Area excludes areas designated for riparian areas, drainage land, conservation reserves, zone substation land.

The proponent, having regard to the Director General's requirements, has consulted with Blacktown Council Planning Officers regarding voluntary developer contributions.

The Applicants' gross Land area is (as shown in the Council Schedule) approximately 937,700sqm

Plan 4 shows each of the Applicant's existing Lots.

The Applicants propose to undertake a boundary realignment to achieve a realignment of title boundaries as shown in the Block Plan Figure 1.2

As a result of the boundary alignment the project area will be limited within two new proposed land titles and the areas marked "non operational" in separate titles will be clearly excluded from this project.

Plan 6A prepared by LandPartners registered Surveyors shows the areas of net developable land within the project area.

The proponents proposes to offer to Bond Developer Contributions based on a square metre basis generally in accordance with the Draft Developer Contributions Plan published by Blacktown Council.

Applying the Blacktown Council contribution rate $46.60psm = the proponent offers to bond $9,045,060 in respect of this Project.

The proponent propose to enter into a Voluntary Planning Agreement either with the Department or Blacktown Council or both as may be appropriate to fund infrastructure requirements on this basis.

RTA Regional Transport Infrastructure Contributions

Regional Infrastructure contributions for this Precinct are currently undergoing review and have not yet been determined by the NSW Government, accordingly the proponent has been unable to secure definitive information relating to its expected financial commitment to regional transport infrastructure.

The proponent understands that previously a figure of $68,000 (subject to an escalation formula) per net developable Hectare was assigned and has formed the basis of agreements between other Developers in the immediate area and the RTA.

In the absence of any proposal to the contrary the Applicant proposes to make contributions to the Regional Transport Infrastructure to the same extent as other Developers in the Precinct based on the net developable Hectares within its proposed project..

In this Particular application the Developer does not propose the construction of any public roads as envisaged by the Precinct Plan for the following reasons,

(a) such roads are not at this stage required for this development to take place,
and
(b) none of the proposed Precinct roads pass through the Operational area,
and
(c) even were the proponents to build such roads there are currently no public roads with which to connect.

Financial Assurance

The Proponent will engage in negotiations with the DECC regarding the type of suitable financial assurance required for the project. The mechanism for provision and draw down of a reasonable financial assurance for the project is expected to be determined prior to the commencement of operations.

4.6 CONCLUSION

The Project is within the Employment Zone under SEPP 59. Within this zone the Project is permissible with approval from the Minister for Planning.

The Project is classified as a Major Project in accordance with the provisions of Part 3A of the EP& A Act. Consequently, the Minister for Planning is the consent authority. This EA addresses the DGRs issued for this Project contained with *Annex A*. The inclusion of a draft VPA (*Annex I*) also demonstrates the Proponent's willingness to address infrastructure contributions to ensure safety and efficient access to the site and to the surrounding Eastern Creek Precinct. Infrastructure provision to the Precinct will be provided in line with the future development of the precinct.

The Project is considered to be generally consistent with the aims, objectives and provisions of SEPP 59 and the objectives and provisions of the Precinct Plan and all other relevant EPIs. Where non-compliances are identified within the Eastern Creek Precinct Plan adequate justification has been provided in support of the Project.

5 STAKEHOLDER CONSULTATION AND ISSUES IDENTIFICATION

This Chapter outlines the issues identification process undertaken for this EA, including consultation undertaken with government and community stakeholders and presents the key issues identified by this process.

5.1 OVERVIEW OF THE CONSULTATION AND ISSUES IDENTIFICATION PROCESS

The proponent has undertaken consultation with relevant government agencies and the local community to both inform stakeholders of the Project and to assist in identifying key issues and concerns for consideration during preparation of the EA. Consultation with relevant State and local authorities will continue as required following project approval.

The stakeholder consultation approach adopted by the proponent throughout the EA process was structured to provide open and transparent communication with the local community and key stakeholders. It provided a mechanism for dissemination of information about the Project to these groups and for obtaining feedback. Early stakeholder engagement enabled concerns raised by the community and government agencies to be identified early and addressed as part of the EA process.

5.2 GOVERNMENT CONSULTATION

5.2.1 Government Authorities Consulted

Consultation and information sharing has been ongoing with the following government authorities during Project planning, the EA process and preparation of the technical reports:

- Department of Planning;
- Department of Environment and Climate Change (DECC);
- NSW Roads and Traffic Authority (RTA);
- Department of Water and Energy (DWE) (formerly Department of Natural Resources);
- Integral Energy;
- Sydney Water; and
- Blacktown City Council (Council).

Members of the ERM Project team and the proponent representatives consulted with these authorities through face-to-face meetings, telephone conversations and written correspondence, as well as formal consultation, to ensure that the EA, technical reports and Project design met key agency requirements. Investigations into the availability and capacity of existing services and utilities for the site included consultation with Integral Energy and Sydney Water Corporation. In addition, the proponent conducted tours of the site with representatives of the DoP, DECC and Council. Key issues raised through this consultation process are included in *Table 5.1*.

The preliminary assessment report and application for the Project was lodged with the DoP to gain the DGRs for preparation of the EA and this formed part of the formal consultation process. The report provided an overview of the Project, the planning framework and potential environmental issues associated with the Project. The DoP distributed this report to relevant agencies and requested they outline the issues and matters that they wanted to see addressed in the EA. This engagement enabled these agencies to provide informed input into preparation of the DGRs and the individual agency requirements formed the basis of the DGRs. The individual agency requirements attached to the DGRs were also considered as part of the EA process and key issues identified in these are included in *Table 5.1*.

Planning Focus Meeting

Formal consultation included a Planning Focus Meeting (PFM), held at Council offices on 20 December 2007. It was attended by representatives of Council, DECC, DWE and members of the ERM Project team. The DoP was unable to attend the PFM; as a result subsequent face-to-face consultation was conducted by the proponent's representative and ERM Project team with the DoP on 22 February, 2008.

The PFM included a presentation providing an overview of the Project and preliminary environmental assessment results. This was followed by a period of open discussion. Key Project information and a process flow diagram were distributed to attendants. The PFM was an important tool for facilitating information exchange with relevant government agencies and enabling these agencies to provide further comment on the suitability of assessment methodologies and issues they wished to be addressed in the EA, given preliminary assessment outcomes.

Key issues raised during the PFM related to air quality and odour, potential groundwater inflow to the pit, leachate minimisation, management and disposal, source of cover material, cumulative noise and air impacts from adjacent industry, on-site stormwater detention and offset of impacts to the woodland community. These issues are addressed in Part C of this report.

Department of Planning

A meeting with the DoP was conducted on the 22nd February, 2008 since DoP could not attend the PFM. The meeting included a presentation providing an overview of the Project and discussion of the potential environmental assessment issues. Based upon the key issues raised by government agencies and changes to relevant policies and guidelines, DoP has resolved to reissue the DGRs. A summary of the revised DGRs and where each issue is addressed in the EAR is provided in Annex A.

Department Of Environment and Climate Change

A meeting with the DECC was conducted on the 19th March, 2008 to discuss the proposed water cycle management techniques to be employed for the Project. The discussions focused on groundwater, leachate and surface water management. ERM presented the finding of the technical studies and the proposed management techniques. DECC reiterated the need to justify the Project based upon the scientific investigations undertaken.

DECC also identified the need to address greenhouse gas as a stand alone issue in accordance with the regulations and also identified that justifiable need for the Project is required under the State Environmental Planning Policy (Infrastructures) 2007. All comments provided by DECC have been reiterated within the DGRs, which have been adequately addressed within this EAR and supporting technical studies.

Blacktown City Council

The proponent has met and corresponded with Planning Officers and Engineering personnel of Blacktown City Council and has progressively responded to issues raised by Council officers by providing additional information (where required) or amending the application (where appropriate).

On 26th November representatives of the proponent met with Council policy committee exhibiting to the Committee a video presentation regarding the project and answered questions posed by Council officers and Councillors.

5.3 COMMUNITY CONSULTATION

5.3.1 Approach

Prior to the commissioning of ERM the proponent undertook community consultation. The aim was to ensure that:

- the community was fully aware of the Project;

- there were multiple mechanisms for community participation and for ongoing communication and feedback including a pamphlet, website message board, website correspondence and media release;
- opportunities were provided for any queries to be addressed directly by the Project team to minimise the effects of incorrect information being passed through the community;
- community issues and concerns in relation to the Project were identified at an early stage of the EA process;
- issues raised by the community were pro-actively assessed and managed throughout the Project; and
- appropriate solutions and mitigation strategies were developed to minimise the negative impacts associated with the Project.

5.3.2 Overview of Proponent's Consultation Process

In October 2006, the proponent prepared and distributed pamphlets to all Minchinbury residences and businesses via a letterbox drop. The pamphlets provided information about the Project and the proponent and responded to issues of potential community concern relating to the Project, including noise and dust management and traffic generation. The pamphlet also invited residents to make comments and/or inquires. A copy of this pamphlet is provided in *Annex B*.

In addition the proponent undertook a media release issued in October 2006 which provided an overview of the site history, the Project, the current stage in the approvals process and proposed environmental management measures (refer *Annex B*).

As a result of the proponent's pamphlet and media release a number of Minchinbury resident's contacted members of the Proponent project team by telephone, in writing or by email.

The queries and concerns raised by members of the local community were responded to in writing.

5.3.3 Social Research – Focus Groups

ERM's engagement to prepare the Part 3A application for the Project required ERM to undertake social research into community perceptions of the Project. Social research was conducted in the form of two focus group meetings held by ERM at Rooty Hill RSL on 16 October 2007 and 24 October 2007 respectively. Residents were selected randomly, with the selection criterion designed to ensure group attendees were representative of Minchinbury's demographic profile. A total of 18 people attended the focus groups.

Issues raised related to potential and perceived environmental, social and economic impacts, along with requests for further information about the

Project. The community views are discussed further in *Section 5.4*. Issues raised through this correspondence are summarised in *Table 5.1* and have been responded to in this EA.

5.3.4 Consultation with Aboriginal Stakeholders

Blacktown City Council as part of the preparation of the *Eastern Creek Precinct Plan* sought to engage the local aboriginal groups to determine the Aboriginal heritage significance of the Precinct.

As a result a Heritage Conservation Strategy was prepared by McDonald (2005) which included consultation with Aboriginal stakeholders. McDonald (2006) identified the Aboriginal stakeholders to be the Deerubbin Local Aboriginal Land Council (DLALC), Darug Custodian Aboriginal Corporation (DCAC) and Darug Tribal Aboriginal Corporation Consultation (DTACC). The Heritage Conservation Strategy identified areas of high, medium and low heritage value within the Precinct.

5.4 ISSUES IDENTIFIED

The issues raised by government authorities and community stakeholders have been responded to in this EAR and through the preparation of technical reports contained within *Volume 2* of this EA. The issues raised are outlined in *Table 5.1* below.

Table 5.1 Summary of Issues Raised by Stakeholders

Issue or Concern Identified	Issue Raised By	Section Addressed
Potential local employment opportunities	Community (FGs)	Section 17.8.3
Visual amenity	Community (FGs, Resident Correspondence with Project team)	Chapter 12
Noise	Community (FGs, Resident Correspondence with Project team), DECC, Council	Chapter 10, Acoustic Assessment provided in Volume 2
Traffic and site access	Community (FGs, Resident Correspondence with Project team), Council	Chapter 11, Traffic and Transport Assessment -Volume 2
Operating hours	Community (FGs, Resident Correspondence with Project team), Council	Section 3.7
Air quality/ odour/ dust (including potential impact on asthma sufferers)	Community (FGs, Resident Correspondence with Project team), Council, DECC	Chapter 9, Air Quality Assessment – Volume 2
Impact on neighbouring property values	Community (FGs)	Section 17.8.3
Concern community consultation will be inadequate	Community (Resident Correspondence with Project team)	Chapter 5
Proximity to sensitive receptors and associated potential impacts	Community (Resident Correspondence with Project team), Council	Section 16.8.2
Water supply and management	Community (Resident Correspondence with Project team), DECC	Chapter 6, Groundwater, Surface Water and leachate Assessments provided in Volume 2
Stormwater management including location and management of in-pit detention ponds	DECC, Council	Chapter 6, Volume 2
Wastewater management including sewer capacity	DECC	Chapter 6 & 8 and Volume 2 Technical Reports
Groundwater inflow rates to pit	DECC	Chapter 7
Leachate minimisation, management and disposal	DECC	Chapters 6 to 8
Waste Management including asbestos management, controls to ensure prohibited waste is not landfilled and green waste management	Community (FGs), DECC, Council	Chapters 3 and 16
Litter Management	DECC	Section 16.3
Concern that the site would be used as a public tip. Community do not want more tips in this area	Community (FGs, Direct Resident Correspondence with Project team)	Chapter 3
Health issues associated with handling of asbestos waste	Community (Resident Correspondence with Project team)	Section 16.3.4

Issue or Concern Identified	Issue Raised By	Section Addressed
Flora and Fauna including impacts on the Cumberland Plains Woodland	DNR, Council	Chapter 13
Heritage	Council	Chapter 14
Quarry Stability	Council	Chapter 15
Contamination	Council, DECC	Section 15.3
Fire Management	DECC	Section 15.4
Extent and management of bulk earthworks	DECC	Section 3.2
Landfill design including leachate management, gas management and ground water monitoring	DECC	Chapter 3, Section 7.5, Chapter 8, Section 9.5.2
Post Project rehabilitation including final cover material for landfill	DECC	Section 3.9
Waste Sources	DECC	Section 3.3
Alternatives and Justification	DECC	Chapters 2 and 20
Consistency with ESD Principles	DECC	Chapter 4
Need for Clear Project Description	DECC	Chapter 3
Provision of figure showing Lot and DP numbers	DECC	Figure 1.2
Approval and licence requirements	DECC	Chapter 4
Approval Process i.e. concern that the Project would be approved regardless of public opinion	Community (FGs, Resident Correspondence with Project team)	Chapter 4
Regulation during operations	Community (FGs)	Statement of Commitments
Cumulative Impacts including those relating to future development	DECC	Sections 9.4.3, 10.4.5, 11.5
Need for plans of management and monitoring to address environmental issues	Council	Statement of Commitments
Compliance with POEO Act	DECC	Chapter 4
Address of SEPP 33	Council	Chapter 4
Consistency with Precinct Plan	Council, RTA (in terms of tying into future road layout of Precinct), Integral Energy (provision of parcel of land for substation)	Chapter 4
Financial Assurance	DECC	Section 3.9
Developer Contributions	Council, RTA	Section 3.6 & Chapter 4

PART C – SOCIAL AND ENVIRONMENTAL INTERACTIONS

6 SURFACE WATER

This Chapter provides an assessment of potential impacts of the Project on water resources within the site and surrounding areas. Measures to manage these impacts are also provided.

6.1 INTRODUCTION

A surface water impact assessment has been undertaken for the Project. It assessed potential impacts of the Project upon surface water resources, including on and off-site water resources, drainage networks, water supply systems and discharges and flooding. This Chapter sets out the key findings of the assessment. The full assessment including RAFTS modelling is presented in the Storm Consulting (2008) supporting technical report within Appendix A, *Volume 2* of the EAR.

6.2 METHODOLOGY

The elements of the surface water assessment conducted by Storm (2008) included:

- evaluation of the existing surface water conditions at the site including drainage networks, meteorology, hydrology and topography, based on previous site specific investigations, site visits and information available in the public domain;
- assessment of potential water demand impacts from Project operation, based on a site water balance model developed for wet, dry and average years;
- development of a concept stormwater drainage plan for the Project, including provision of water sensitive urban design (WSUD) elements where possible and detention calculations to determine appropriate sizing of basins and drainage works;
- assessment of the potential for Project discharges to impact receiving waters, inclusive of modeling of peak flows with the XP-RAFTS hydrology model and assessment of the performance of the proposed stormwater treatment system, using the MUSIC stormwater quality management model; and
- development of soil and water management, mitigation and monitoring measures to minimise the potential for adverse impacts on surface water resources.

The following key guidance documents were considered during preparation of the surface water assessment:

- Landcom (2004) *Managing Urban Stormwater- Soils and Construction* (the 'Blue Book');
- BCC (2005a) *Eastern Creek Precinct Plan*; and
- BCC (2005b) *Stormwater Quality Control Policy*.

A full description of methodology employed is presented in the Storm (2008) supporting technical report.

6.3 ASSUMPTIONS

To model the perceived 'worst case' scenario for the project the following assumptions have been made which are considered to result in conservative estimates for flows and On Site Detention storage requirements.

The pre-development model considered the operational area and pit void to be 100% pervious, and for the post-development model to be 100% impervious. This assumption dictates that any future development of the site must not produce any additional impact on the existing surface water system/flows. This assumption also takes a conservative view that the entire site will be impervious which is not the reality as some areas will be landscaped including the amenity berms, and could potentially be considered as pervious areas. However; in order to assess the worst case the operational areas have been modeled as being 100% impervious post-development.

Table 6.1 below details the assumptions made for determining on-site detention requirements.

Table 6.1 Assumptions for On-Site Detention Requirements

Parameter	Pre-development	Post-development
Initial Loss/ Continuing Loss (assumes wet antecedent conditions and is a conservative approach.)	15mm/ 3mm	5mm/ 1mm
Roughness value across the site	0.02	0.02
Proportion impervious (%)	0	100

1. Storm Consulting *Site Surface Water Management Plan* (February, 2008).

6.4 EXISTING ENVIRONMENT

The site surface water drainage network is characterised by wide, flat and generally poorly defined drainage lines, which is fairly typical of western Sydney. As outlined in *Section 1.3.2*, historical quarrying activities and earthworks have altered site topography which would have altered surface drainage patterns. Drainage paths within the site have no base flow and nil to very little native riparian vegetation.

There is an east-west ridgeline to the south of the quarry pit and proposed area of operations. South of this, overland drainage is generally south to south-west towards a tributary of Ropes Creek, which flows through the southern portion of the site and connects to Ropes Creek approximately 1 km to the west. Overland flow for the remainder of the site is generally to the north-west and ultimately reaches Ropes Creek approximately 1 km west of the site. There is an ephemeral drainage line in the northern portion of the site that flows west towards Ropes Creek and part of the northern portion of the site drains to the north via culverts under the M4. There is a dam in the woodland area in the north-west corner of the site with provision for overflow through culverts under Archbold Road.

The site lies within the broader Hawkesbury-Nepean catchment. Surface water features surrounding the site include:

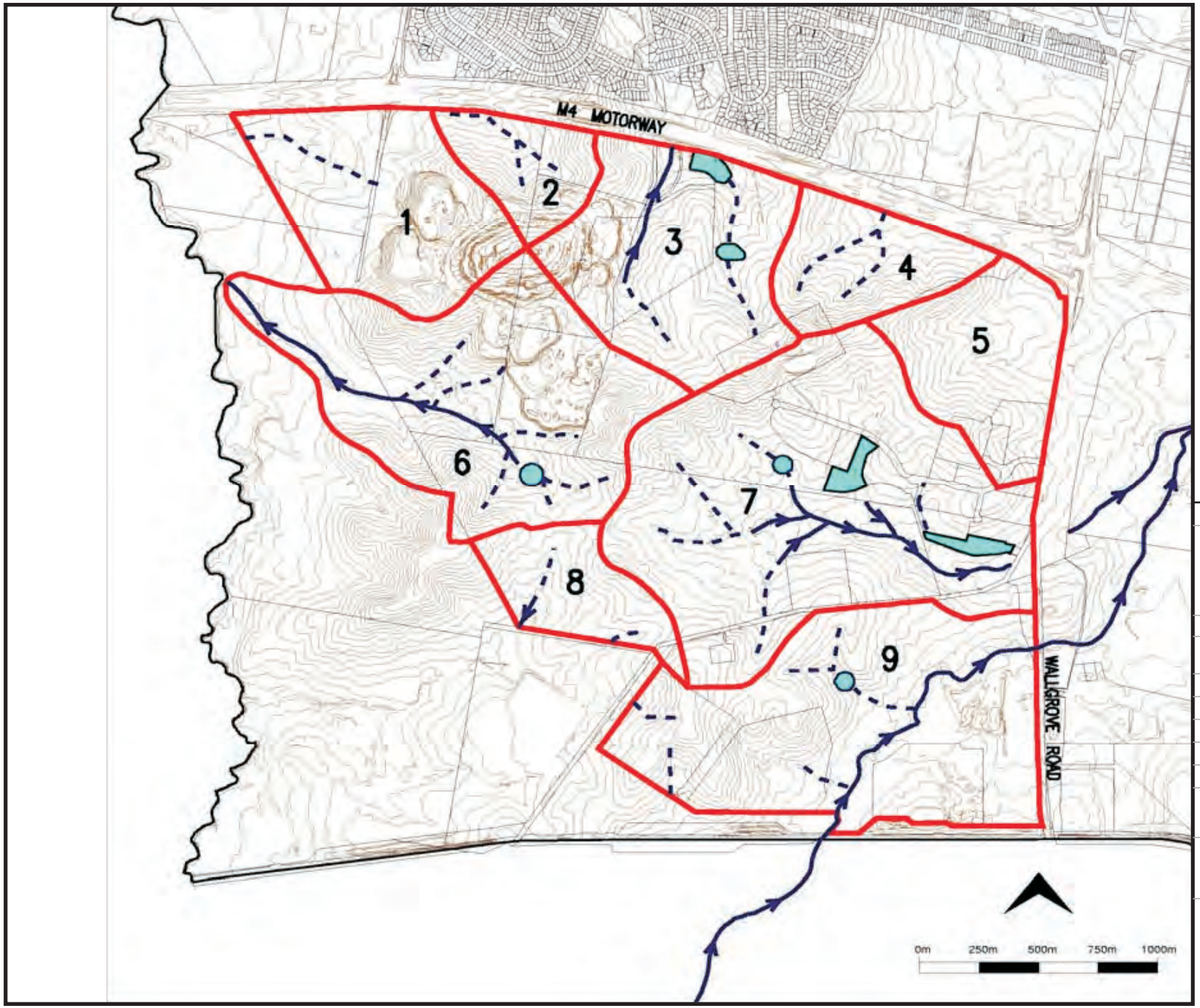
- Ropes Creek which flows in a northerly direction, approximately 1 km to the west of the quarry pit;
- the channel of Upper Angus Creek, which originates adjacent to the eastern site boundary and runs north into an artificial drainage system through Minchinbury and connects to Eastern Creek; and
- Eastern Creek which flows in a northerly direction, approximately 3 km east of the quarry pit.

Figure 6.1 identifies major catchments within the Eastern Creek Precinct, which are required to be maintained into the future. The site and the proposed area of operations intersect four of these catchments, as identified in *Table 6.1* and shown in *Figure 6.1*. The confluence of these four catchments is depicted as located centrally over the quarry pit. Runoff from these catchments is reduced due to the presence of the quarry pit.

Table 6.2 Site Catchments

Catchment Number	Catchment Name	Area of Site within Catchment (ha)	Total Catchment Area (ha) [1]	Drains to
1	Quarry Catchment	41	72	Ropes Creek via the existing site contours
2	Quarry North Catchment	19	28	North of the M4 via culverts under the M4
3	Upper Angus Creek Catchment	17.6	89	North of the M4
6	Ropes Creek Tributary Catchment	44	127	West via the Ropes Creek tributary
	TOTAL	121.6	316	

1. Source: Blacktown City Council Eastern Creek Precinct Plan 2005



Legend

Catchment
- 1 Quarry Catchment
- 2 Quarry North Catchment
- 3 Upper Angus Creek Catchment
- 4 Minchinbury Catchment
- 5 Wonderland Catchment
- 6 Ropes Creek Tributary Catchment
- 7 Eastern Creek Tributary Catchment
- 8 Substation Catchment
- 9 Reedy Creek Catchment

Defined Natural Form Creek

Overland Flow Path

Existing Dam

Figure 6.1

Existing Drainage Conditions

Client:	ThaQuarry Pty. Ltd.	
Project:	Light Horse Business Centre	
Drawing No:	0071234s_EA_13	
Date:	08/04/2008	Drawing size: A4
Drawn by:	ML	Reviewed by: -
Source:	Eastern Precinct Plan	
Scale:	Refer to Figure	

N

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ERM

6.5 IMPACT ASSESSMENT

This section identifies the potential impacts of the Project on surface water including, stormwater generated by the pit and operational areas, which is proposed to be collected within storage tanks and the OSD basin. Impacts to water quality as a result of demand and on-site reuse is discussed including management measures to address water quality within storage tanks and the OSD basin. Maintenance/monitoring techniques such as the preparation of a Stormwater Water Management Plan (SWMP) are also recommended to manage the stormwater system.

6.5.1 Site Stormwater

Overview

Surface stormwater runoff generated on-site will be categorised as either 'clean' or 'dirty'. Clean stormwater runoff will be generated from:

- building roofs (workshop, MPC/ WTS, administration building and weighbridge shed);
- roads, car parks and other hardstand areas;
- materials stockpile area/ working floor/ drop off zone; and
- pit walls, haul road and capped areas within the landfill.

Dirty runoff will comprise stormwater that has come into contact with mixed wastes, green and timber wastes and uncovered landfill wastes. The dirty runoff will be collected separately from clean stormwater and will be treated as leachate; or in the case of runoff from green waste area, runoff will be captured and recycled to irrigate the windrows to aid in decomposition Overflow from the windrows will be directed to the leachate treatment system at the site for treatment.

Bunding and site grading will allow runoff to be separated within the pit. Surface runoff from the pit area will be managed in two separate processes, stormwater and leachate. *Figure 3.5* Filling Plan identifies the separation of stormwater and leachate within the pit.

Based on the assumptions in *Section 6.3* a plan indicating the preliminary design of the stormwater system has been prepared within the Storm Consulting (2008) supporting technical report within Appendix A, Volume 2 of the EAR. The stormwater design shows that all site runoff is directed to proposed temporary detention basins (adjoining Archbold Road) for treatment, reuse on site and disposal. The design is preliminary. A detailed design will be prepared once the development has been finalised upon

approval. This requirement for a detailed design has been include within the Statement of Commitments (Commitment No.4.1.1).

The modelling has shown that even assuming the worst case no adverse impacts on downstream properties are anticipated given that peak flows from the disturbed areas match predevelopment peak flows, and the remaining areas are not affected by development. Therefore the request by Blacktown City Council for the preparation of a plan showing the impact to downstream catchments would not be useful since no adverse impacts are anticipated as modelled for the worst case.

Pit Area

A herringbone leachate drainage system will be constructed on the quarry floor prior to filling commencing. The drainage system will be sloped to a leachate collection sump constructed at the deepest point of the quarry, at its eastern end.

Leachate will be pumped from the sump to treatment tanks along the upper level of the quarry. It will be treated and dependent on leachate quality monitoring results will either be:

- re-used for on-site irrigation; or
- disposed to sewer as trade waste.

Further details of the leachate collection system and leachate management are provided in Chapter 8.

A stormwater pond will be constructed at the western end of the pit, separated from the landfill waste by a clay bund. The stormwater pond will collect 'clean' surface water falling within the pit, on capped waste areas and on the haul roads. The stormwater pond will be progressively relocated throughout landfilling, with its location predetermined at the development of each landfill lift. Volume 2B of the 'Blue Book' for Waste Landfills states that stormwater ponds and water storages should not be located on landfilled areas. However, the unavoidable constraint of the quarry pit/landfill, and the need to manage runoff efficiently within the pit, necessitates some form of temporary water storage within the pit.

In accordance with Blue Book calculations for the pit area (26.5 ha), the gross basin volume (including settling zone and sediment zone) required for the stormwater pond is 4,362.5 m^3, which equates to 165 m^3/ha. This can be provided either as one basin, or as a series of smaller basins, so long as each basin meets the minimum storage requirement of 165 m^3/ha of catchment feeding into it.

The clean operational water collected from the in-pit stormwater pond may be pumped to a separate stormwater pond at the surface ("Surface Stormwater Pond")..

Water carts will be able to draw from the stormwater pond (in pit and surface) and re-use this water for dust suppression. In pit water will need to be drawn down within five days of a storm event occurring, in compliance with Blue Book requirements and to minimise the time that water is stored at the landfill area.

Operational Area

Roof runoff will be collected in rainwater tanks for re-use for site toilet flushing and topping up the wheel wash. Flows in excess of tank capacity will discharge from tank overflows to the general site drainage network.

The *Precinct Plan* identifies a proposed location for a regional drainage detention basin/ wetland in the northern portion of the site, within the Quarry North Catchment adjacent to the M4 Motorway. Discussions with Council indicated that this basin may not be constructed for several years and hence site specific basin(s) would be required for any development in the interim. The proposed OSD basins meet this requirement.

Runoff from the operational area will be conveyed via a combination of major and minor drainage systems (refer *Figure 6.1*), including:

- an underground piped system with stormwater pits located along roadways, designed to convey 1 in 20 year flows without surcharge, and with provision for overland flow alongside roads;
- stormwater detention and pollution control structures including the proposed temporary OSD basins immediately to the east of Archbold Road. and
- the natural drainage systems including creeks and overland flow paths.

A management objective of the BCC (2005) *Stormwater Quality Control Policy* is to use stormwater infiltration 'at source' where soil types allow. This will be possible for smaller storm events, however the clay soils at the site inhibit use of infiltration for larger storms.

Clean runoff from operational areas will require treatment for gross pollutants and sediment only and will be directed to the proposed OSD basin. Water from the OSD basin will be available for re-use on-site in watercarts and site sprinkler systems. A water balance for re-use is presented in *Section 6.4.3*.

The size of the basin within the quarry pit, to detain stormwater from reaching active landfill areas and contributing to leachate, was re-assessed using 2 options for basin sizing.

The smaller basin size was used in the report. Data for a larger basin is also considered.

What the Data for a larger in pit detention basin means is that while it will capture more water within the landfill and from the quarry walls, it will also occupy a much larger volume than the basin described in the report. This may not always be practical or possible dependent upon operational factors of landfilling.

If it is necessary to retain a greater proportion of stormwater for reuse or further runoff containment, the 5-day 90th percentile basin size (7,159m^3) requires capture of 270m^3/ha stormwater (including quarry walls where necessary).

Storage sizing – basin – demand meeting

In-pit Basin Option 2 (alternative) (7,159m^3)	
Total water demand ML/yr	% water demand met
12.97	86%
12.07	100%
12.13	100%

Based on the XP-RAFTS hydrology modelling results for the operational area subject to change in land-use, an OSD basin storage volume of 5,400m^3 is required to enable post-development peak flows for the operational area to match pre-development peak flows up to the 100 year storm event, as required by Council.

In addition to containing the 1 in 100 year storm event, this storage volume is sufficient to act as storage for re-use on-site. If the impervious area is increased in the future, e.g. following landfill rehabilitation, an OSD volume of 330m^3/ ha may be adopted to achieve this outcome. For flows in excess of the design event, and which therefore cause overtopping of the OSD basin, overland flow paths are to follow natural drainage lines to the north of the site.

The MPC work floor and green/ timber waste area will be kept separate from other areas of the site by grading and bunding to direct clean run-on around these areas. This dirty area will be graded to a sump, where water will be treated and used for irrigating the green waste stockpiles, with excess directed to the leachate treatment plant.

Temporary On-site Detention and water re-use Basins

The NSW Dam Safety Committee has established a *Risk Management Policy Framework for Dam Safety*, which must be considered for dam design. In general, dam safety is initially determined through a risk assessment that uses the probability of dam failure in one year and the number of fatalities that would occur as a result of dam failure.

It is considered by Storm (2008) that the OSD basins are likely to pose a negligible safety risk due to the following factors:

- relatively small OSD basin sizes proposed;
- and
- culvert underpass of Archbold Road at the nearest drainage discharge point for the site which would limit the maximum flow rate from the site in the event of failure.

An appropriate dam safety assessment would need to be undertaken at the detailed design stage for the OSD basin.

6.5.2 Water Demand

Water uses for the Project will include:

- water spray and sprinkler systems located along berms, at materials stockpiles and unloading areas (estimated average application 30kL/ day), for dust suppression and irrigation of landscaped areas;
- dust suppression via water carts and site dump truck on-board reservoirs (estimated average application 80kL/ day);
- wheel wash top up - the wheel wash will be a fully bunded, closed system, with wash water passing through an oil water separator and sediment separator before being re-used in the wheel wash. There will be a net loss from this system and it will need to be topped up from time to time (estimated average use 1kL/ day);
- building internal uses e.g. toilet flushing (estimated average use 0.9kL/ day);
- potable uses (estimated average use 245 L/ day, based on 54 staff/ subcontractors on-site in any one day, each using 5 L of potable water); and
- fire fighting water (static on-site storage of 10 kL required).

On an annual basis, demand for potable water approximates 0.086 ML/ annum. Water demand for toilet flushing and wheel wash top up approximates 0.7 ML/ annum. Using a water balance model (see below for

discussion) demand for dust suppression was calculated to vary from 33 to 35.4 ML/ annum, dependent on prevailing weather conditions e.g. dust suppression not required when it is raining. An assessment of the ability of the proposed system of supply to meet site water demands is provided in *Section 6.5.3* below.

6.5.3 Water Supply

Overview

The site water management system has been designed to maximize re-use of stormwater for non-potable uses and thereby minimise reliance on external water sources. Captured rainwater from building roofs will be used to help meet toilet flushing and wheel wash needs. Recycled stormwater captured in the OSD basin will be used for dust suppression and irrigation i.e. sprinklers and water carts, and that captured in the stormwater pond will also be used in water carts. The portion of demand for these uses which cannot be met by water captured and recycled on-site will be met by mains water sourced from Minchinbury Reservoir, via the site's existing connection to Minchinbury's reticulated water supply. Mains water will also supply potable water demands. Fire fighting water can be supplied by either mains water or recycled water.

Stormwater runoff will be harvested from a 41.4 ha catchment area, comprising the areas identified in *Table 6.2*. A daily water balance analysis was used to determine the feasibility of the proposed rain and stormwater harvesting scheme. It utilised historical rainfall data from St Clair (BOM station 67102) for dry, median and wet rainfall years i.e. 553, 851 and 1104 mm per annum respectively. The MPC work floor and green/timber waste area (1.4 ha) was excluded from the water balance assessment as runoff from this area will be dealt with through the leachate system.

Calculated runoff volumes generated from each of the harvestable areas for a dry, median and wet year are presented in *Table 6.2* below. It should be noted that the runoff volumes that can be harvested for re-use are smaller than total runoff volumes due to losses from the system from overflows, and are dependent on storage behaviour (i.e. if the storage reaches 100% capacity, overflows will occur rather than further collection).

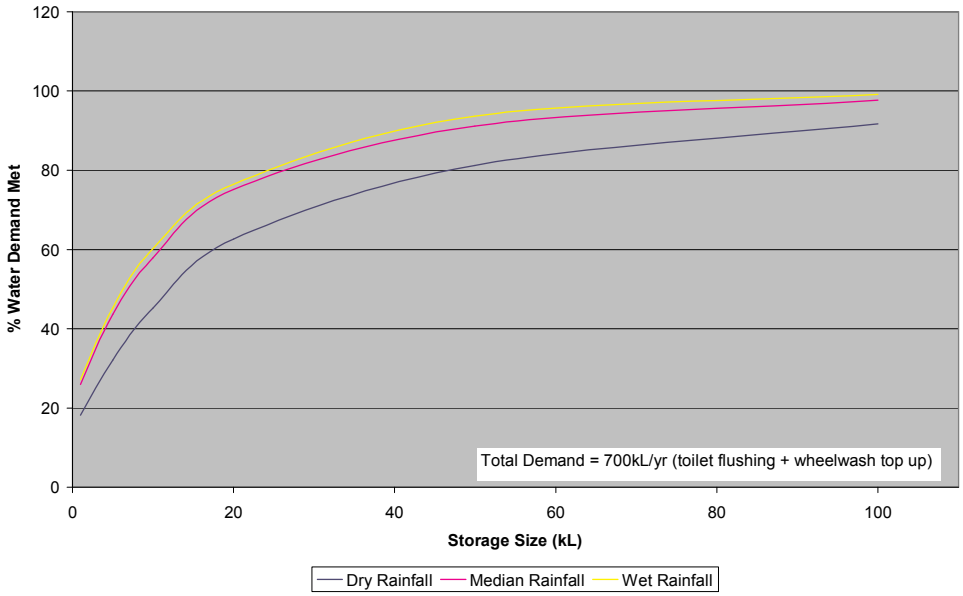
Table 6.3 Potential Runoff Generated

Runoff Source		Potential Runoff Generated (ML/yr)		
		Dry	Median	Wet
Building Roofs		3.0	4.7	6.2
Quarry		39.1	71.2	124.9
Remaining Site Operational Area		44.9	73.2	236.8
TOTAL	41.4	**87.0**	**149.1**	**367.9**

Re-Use Of Captured Roof water

The performance of varying rainwater storage sizes in terms of meeting water demands for toilet flushing and topping up of the wheel wash (estimated demand of 0.7 ML/ annum), given changes to rainfall patterns is illustrated in *Figure 6.2*. It can be seen that a minimum tank storage volume of 40kL would meet over 75% of the site's toilet flushing and wheel wash demands. As such it is recommended that a 10kL rainwater tank (minimum) be installed for each of the four buildings on-site.

Figure 6.2 Roof water re-use for toilet flushing and wheel wash



Re-Use Of Captured Stormwater

Water balances have been prepared for the following two water demand scenarios, assuming average daily application rates for dust suppression and sprinklers, an OSD basin volume of 5362m^3 and stormwater pond storage volume of 9772.5m^3:

- Scenario 1: OSD basin drawn down for water carts (40kL/day) and sprinklers (30kL/day) and stormwater pond for water carts (40kL/day)
- Scenario 2: OSD basin drawn down for sprinklers only (30kL/day) and stormwater pond for water carts (80kL/day)

Table 6.1 Water Demand for Dust Suppression and Amount Supplied by Stormwater Captured On-site

The water balance results in provided by the STORM report show that the proposed stormwater harvesting system will meet the majority of site water demands for dust suppression and irrigation. Overall, Scenario 1 will provide the greatest recycling efficiency, meeting 79.1% of water needs in a dry year and 98.8% in a wet year, by comparison to Scenario 2 which will supply 75.2% in a dry year and 94.8% in a wet year. Therefore allowing water carts to draw from both ponds will maximise re-use of recycled water and minimise demands on external water sources.

Summary of Water Demand

The water balance modelling undertaken indicates that overall water demands vary between 36.2ML/year (dry year) to 33.7ML/year (wet year). Water may be supplied from the temporary OSD and water re use basins (nom. 5362kL), sediment basin (within the quarry, nom. 4362kL or a combination of stormwater basins in quarry and at the surface receiving pumped water from quarry stormwater basin, as required and from tanks (nom. 50kL) capturing roof water flows from buildings around the site.

Based on the above, potential water supplied from the aforementioned storages range between 28.6ML/year (dry year - equivalent to 79% of overall demands) and 33.2ML/year (wet year - equivalent to 99% of overall demands). Shortfall in supplies will need to be sourced from mains water supplies.

6.5.4 Water Quality

The stormwater management controls for the site; including those to manage water quality; have been designed with consideration to the BCC (2005) *Stormwater Quality Control Policy* and WSUD principles.

In accordance with treatment priorities for industrial development presented in Table 1 of the BCC (2005) *Stormwater Quality Control Policy*, fine sediment; hydrocarbons, motor spirit, oil and grease; litter (gross pollutants); coarse sediment; and nutrients are to be treated. Highest treatment priority must be given to fine sediment, hydrocarbons, motor spirit, oil and grease and litter.

Proposed water quality control measures include:

- gross pollutant traps (GPT) located upstream of the OSD basins;
- treatment of clean stormwater runoff from the site operational area through a vegetated wetland (OSD) system i.e. sediment trap, bio-retention and OSD (impervious areas of the site are not in direct connection with the off-site stormwater drainage system);
- installation of sediment controls within the materials stockpile/ working floor and MPC work floor and green/ timber waste areas and maintenance to prevent excessive sediment and nutrients entering the drainage system. These controls are to include:
    - treatment through a GPT and underground tank at the drainage outlet;
    - protection of drains within these areas by vehicle exclusion, stabilisation or lining of drains, and construction of check devices every 50 m that will attenuate flows and encourage sediment dropout;
- treatment of clean stormwater runoff from the pit area through a sedimentation basin, which will enable settlement of most sediment and suspended contaminants;
- diversion of clean runoff from non-operational areas of the site around the area of operations;
- treatment and disposal of dirty runoff i.e. within the leachate treatment system, in accordance with procedures for leachate management, as discussed in Chapter 8; and
- re-use of stormwater runoff to meet non potable site water needs where possible.

The performance of proposed stormwater management systems was simulated using the MUSIC model, which is a standard industry model for this purpose. The MUSIC model takes into account factors such as climate, soil data and proposed treatment systems. Site areas which will undergo change in land use i.e. the site operational area and pit area were modelled.

The model results presented in *Table 6.4* provide a comparison of pollutant loads generated from the Project with, and without the proposed treatment controls, along with the percentage reduction in pollutant loads achieved by the treatment. The pollutant retention criteria prescribed by BCC (2005) are presented and provide the basis for assessing the effectiveness of the treatment system.

Table 6.4 Flow and Pollutant Load Reductions

Parameter	Post-Development Results		Pollutant Retention (% total annual load)	
	(without treatment controls)	(with treatment controls)	Project	Criteria for Development Sites[1]
Flow	64.8 ML/yr	42.7 ML/yr	34.1	-
TSS	15,600 kg/yr	770 kg/yr	95.1	Fine sediment (≤ 0.1mm) 50%; coarse (0.1-5mm) 80%
TP	29.7 kg/yr	6.33 kg/yr	78.7	45
TN	141 kg/yr	69.4 kg/yr	50.8	45
Gross Pollutants	2100 kg/yr	0 kg/yr	100	90

1. Criteria are sourced from Table 6.5 in BCC's (2005) Stormwater Quality Control Policy.

The water quality modelling results in *Table 6.4* indicate that the proposed stormwater treatment system will reduce loads of total suspended solids (TSS), total phosphorus (TP), total nitrogen (TN) and gross pollutants and ensure any stormwater discharged from the site is treated to a standard that meets water quality objectives prescribed by BCC (2005). The Project can be considered to have a beneficial effect in terms of water quality, due to the fact that it will result in a net decrease in pollutant loads.

Other pollutants such as hydrocarbons, motor spirit and oil and grease are not expected to pose a significant water quality issue under every day operations. The WMP will include procedures for their safe storage and handling and response measures to address any accidental spills.

6.5.5 Salinity

The *Precinct Plan* suggests that adverse impacts on salinity would be expected if the groundwater level were to be raised significantly over a period of time. This is not the case with this Project as impacts to the regional groundwater table are likely to be negligible (refer to the *Groundwater Report* prepared by ERM dated April, 2008 within Appendix B, Volume 2).

IGGC (2007) indicated that groundwater associated with igneous bodies such as a diatreme can be highly alkaline, with high levels of inorganic nitrogen. In addition, the surrounding groundwater could also be characterised by high salinity levels due to connate salts within the formation. Groundwater investigation undertaken by ERM in 2008 mapped the location and seepage rates for the regional groundwater table into the pit. The investigations concluded that the regional groundwater table is steeply sloping towards the pit. Furthermore the geology of the pit at the lower levels has low permeability therefore the flow of water into and out of the pit will be negligible thereby not requiring a pit liner for landfilling. Refer to Chapter 7 for key groundwater findings and the *Groundwater Report* prepared by ERM dated April, 2008 within Appendix B, Volume 2.

Furthermore the existing site vegetation will not be disturbed as a result of this Project. The majority of the development will take place on existing disturbed areas adjacent to the quarry pit. The OSD basin in the northern part of the site at a depth of approximately 3 metres below existing ground surface is not likely to intercept potentially saline groundwater.

6.5.6 Off-Site Surface Water Resources

Impacts to off-site surface water drainage from Project operations will be negligible, as site operations will be undertaken within areas that will be bunded and graded to prevent direct off-site runoff. There will be no off-site discharge for storms up to and including the 100-year ARI event. Water in the OSD basin will be either evaporated or re-used on-site. For larger storms, overflows from the OSD basin will discharge from the site at the existing discharge point at the northern boundary. However, water discharged under these conditions will be significantly diluted by surrounding floodwaters.

Key discharge points for site are to be maintained or will remain unaffected by site development. No stormwater will be directed to new discharge points, including bushland areas, and therefore it will not adversely affect these areas.

Leachate not reused on site will be discharged to sewer under a trade waste agreement to be sought from Sydney Water. Leachate will be treated to an adequate standard prior to release and any discharge will be in accordance with a trade waste agreement.

No other off-site wastewater discharge will occur from operational use, other than conventional sewage discharge to the sewerage system from toilets and staff facilities.

6.5.7 Flooding

A review of the hydraulic analysis within the SMEC (2004) *Eastern Creek Precinct Plan Stormwater Management Strategy* indicated that there is only one overland flow path in the operational area of the site, located in the Quarry North catchment. The OSD basin has been sized to ensure post-development flows in the Quarry North Catchment are detained to match pre-development flows up to the 100-year ARI event. Flows in the remaining site catchments will not be modified by the Project, as their catchment boundaries are outside the proposed operational area. Therefore no changes are anticipated to the existing flooding regime.

6.6 MANAGEMENT/ MITIGATION MEASURES

The Project design incorporates several measures for management of potential impacts of the Project on surface water resources, as outlined in *Section 6.4*. These include re-use of recycled stormwater as much as possible, segregation of clean and dirty areas, capture and treatment of stormwater runoff, sizing of the piped drainage network to convey 1 in 20 year flows without surcharge, no alterations to key discharge points and existing drainage paths from the site. Several additional management and monitoring measures are to be included in the Surface Water Management Plan (SWMP) developed for the site, and these are outlined below.

6.6.1 Maintenance and Monitoring

A maintenance plan will be developed during the detailed design phase. In general, the maintenance plan should allow for:

- regular visual inspection of the stormwater treatment measures and site drainage system (including sumps, pipelines, pumps, bunds, tanks, oil/ water separators, sediment traps and storages), for example on a monthly basis and after rain events, with maintenance works triggered as required;

- water sampling at the OSD basin and in pit stormwater pond to ensure re-used/released water is of the appropriate quality for end-use (refer ANZECC guidelines and relevant NSW guidance), conducted quarterly for the first 12 months of operations and six-monthly for following years. The quality of any water releases should be in accordance with the site's EPL. Sampling requirements may include TSS, turbidity, ammonia, Biochemical Oxygen Demand, TN and TP.

If salinity or TDS monitoring results for the in pit stormwater pond indicates the water is too saline for site irrigation or related surface uses, as determined from assessment against DECC (2006) *Managing Urban Stormwater: Harvesting for Reuse* guidelines, its use is to be restricted to suitable areas of the site, e.g. dust suppression within and around the pit;

- A maintenance and monitoring check-sheet would be developed that allows for the data entry, location of stormwater management devices on-site (e.g. based on a map with numbered locations), type of monitoring (visual, water sampling, etc), outcome (e.g. all clear, device needs cleaning), actions taken, and any follow up required;

- In terms of site salinity management with reference to water collected within the quarry pit, the aim will be to minimise additions to groundwater table by avoiding waterlogged areas and over-irrigation;

- Periodic removal of sediment and other materials from site storages and sediment traps and waste oil and sludge from the oil / water separators and wheel wash sediment separator, immediate stabilisation and disposal at an appropriate off-site facility. Storage dams will have markers that indicate when sediment is to be removed so that minimum storage requirements can be maintained;

- If sediment generation in the materials stockpiles/ working floor and MPC work floor and green/ timber waste areas is deemed to create management issues following installation and commissioning of erosion controls and treatment devices, a collection sump can be installed within each of the dirty areas to allow settlement of some coarse sediments prior to flows being directed through a treatment device; and

- Treatment devices around the site to provide sediment capture and are capable of capturing oil and fuel spills. Proprietary devices such as continuous deflective separation device (humeceptor type) or similar can be selected and designed in consultation with the manufacturer to accommodate sediment from storm events and fuel or oil spills to specified volumes.

6.6.2 On-Site Detention Basin

An OSD Basin and Gross Pollutant Trap Cleaning Program is recommended that includes more frequent monitoring as the site settles from the construction phase and then the monitoring regime would be based on results of regular visual inspections. The cleaning regime generally to consist of:

- sediment and weed removal from the OSD basin and its associated sediment control/stilling basin; and

- checking integrity of in-pit stormwater basin, plus sediment removal.

A settling basin for pre-treatment before entry to the OSD basin is also recommended to provide further attenuation and capture of sediment that may reach the detention basin.

6.6.3 Water Sensitive Urban Design

Water Sensitive Urban Design (WSUD) measures are incorporated into the stormwater system where practical. Given the nature of the proposed land use and associated activities, options for additional WSUD devices are limited, however the following measures have been proposed:

- grass swales around parts of the site near embankments and low-traffic areas; and
- wetland vegetation at the OSD basin.

Both of which once established are less susceptible to damage or unexpected sediment loads from site activities

6.6.4 Fuel and Chemical Management

Diesel fuel will be stored in bunded above ground double skin diesel fuel tanks located near the workshop. The tanks will be designed and manufactured in accordance with AS1940 and AS1692.

Any refuelling facilities or fuel/ chemical (including oil and lubricant) storages, are to be located in covered, bunded areas or self bunded storage containers, designed to prevent the entry of stormwater and capable of containing the full storage volume of the container plus an additional 10%.

6.6.5 Spill Management

Potential spills will be contained, in the first instance, by bunding and grading to sumps with backup containment created by the main storage basins. Spill kits will be available on-site and staff will be trained in their use to contain spills and prevent them from entering the stormwater drainage system. Runoff from areas where spills can occur will not be discharged off-site and will therefore not impact the external environment.

The SWMP includes details of drainage lines, sediment traps, check dams, erosions control, bunds infiltration areas, sediment fences, filters and all other erosion and sediment control devices.

6.7 CONCLUSION

Surface water management process has been identified within the pit and operational areas. Management involves the separation of clean water from leachate to allow for the storage of clean stormwater within tanks and the OSD basin for re-use on site. The collection and treatment of stormwater will allow re-use to occur which will reduce the impact of the Project on potable

water supply and allow the Project to present ecologically sustainable development principles by reducing the impact of the Project on available local water resources.

The preparation of a SWMP will require periodic revision to include, if necessary, actual flow data to allow for the effective management of multiple uses of stormwater facilities water treatment, detention, retention and supply.

Furthermore there will be no discharge of potentially contaminated process water from the site and therefore no impact on the environment. However, overflows from the stormwater drainage system may occur as a result of storms greater than the 100-year ARI event. In such instances the impact is predicted to be negligible as at this time there would be very high dilution from surrounding overland flows and flood waters.

7 GROUNDWATER

This chapter provides a conceptual site groundwater model and an assessment of potential impacts on water resources. Measures to manage these impacts are also provided.

7.1 INTRODUCTION

A groundwater assessment has been undertaken for the Project; and key outcomes are presented in this chapter. The full assessment including detailed water balance assumptions and modelling is presented in the Groundwater Assessment Report prepared by ERM dated April, 2008, Appendix C, *Volume 2*.

The main objective of the ERM (2008) assessment was to assess the geological, hydrogeological conditions and the groundwater and surface conditions (water balance) for the quarry, to provide information for the preliminary design of a suitable landfill leachate management and collection system. Key objectives were to:

- provide quantitative data on the type of geology, water bearing units and hydraulic characteristics of the geology surrounding the quarry;
- characterise baseline groundwater quality, further delineate the environmental/ human health quality of the groundwater resource and estimate the ratio of groundwater and surface water influx into the quarry;
- delineate groundwater elevations around the quarry to understand potential groundwater seepage volumes into the quarry pit void and their association with potential water levels within the pit;
- assess the potential surface water and groundwater seepage rates into the landfill under different rainfall and evaporation conditions such that an appropriate water balance can be developed for the site; and
- assess the likely water level variations within the landfill associated with expected water influx.

7.2 METHODOLOGY

7.2.1 Field Investigations

The Groundwater Assessment included a desktop review of the existing geological, hydrogeological and groundwater chemistry information for the site.

A field investigation was completed that included the following:

- drilling of nine boreholes around the perimeter of the quarry, to characterise the geology of the site and determine groundwater flow into and out of the quarry. The boreholes were advanced at three locations to three different depths to target potential shallow, intermediate and deep water bearing zones;

- a photographic survey to delineate variations in pit geology and groundwater seepage;

- installation and development of three sets of nested monitoring wells in the boreholes drilled around the quarry. Monitoring wells were installed at depths of 20 m below ground level (bgl) to assess shallow groundwater, 50 m bgl to assess intermediate groundwater and 134 to 146 m bgl to assess deep groundwater at the maximum depth of the quarry;

- completion of hydraulic testing (slug tests) on the monitoring wells;

- surveying of the wells by a registered surveyor to Australian Height Datum (AHD); and

- completion of water level monitoring and two groundwater sampling events from the nine monitoring wells.

7.2.2 Desktop Assessment

The desktop assessment and field investigation data were used as the basis to complete key quantitative data analysis including:

- analysis of the borehole log data to characterise subsurface geology and water bearing layers around the quarry pit;

- analysis of the water elevations within groundwater wells to determine groundwater elevations, around the quarry;

- laboratory analysis of groundwater samples;

- analysis of the hydraulic data to determine the hydraulic conductivities of the geology surrounding the quarry; and

- development of a spreadsheet based water balance model to estimate the potential influx of groundwater and surface water into the quarry pit void, the impact on water elevations within the quarry pit, the requirement for leachate storage and the required discharge rates from the leachate collection system.

The desktop review included investigation of currently available information to develop an initial conceptual understanding of the site. This included a review of the following sources of information:

- the previous groundwater investigation report completed for the site by Ian Grey Groundwater Consulting (IGGC) (2007);
- Penrith 1: 100,000 Geological Sheet 9030 1st Edition Geological Survey of New South Wales, Sydney, Clark N and Jones D (1991);
- NSW Topographical Map, 1:25,000 series, Sheet 9030-11-N, Prospect (1983);
- NSW DECC web atlas database for bore log and well location details; and
- the BoM website for rainfall and evaporation data.

The analytical results reported were compared against the ANZECC (2000) High Reliability Trigger Values (HRTVs) for the Protection of 95% of Freshwater Species. Where HRTVs were not available, the Moderate Reliability Trigger Values (MRTVs) for the Protection of 95% of Freshwater Species were adopted. Results were also compared against the NHMRC (2004) Australian Drinking Water Guidelines for the protection of Human Health.

7.3 *EXISTING ENVIRONMENT*

7.3.1 Pit Void Dimensions

The pit is estimated to approximate a surface area of 265,000 m2 at ground surface and 12,000 m2 at the quarry base. The quarry has a depth approximating 135 m bgl. The natural ground surface around the quarry is between 70 and 85 metres above the Australian Height Datum (m AHD) and the base of the quarry is at -57 m AHD (i.e. below sea level).

7.3.2 Hydrology

Seven small un-named dams or reservoirs are located within a one kilometre radius of the quarry. In addition the following surface water receptors were noted in close proximity to the site:

- Ropes Creek, approximately 1.5 km to the west of the quarry;
- Eastern Creek, approximately 3 km east of the quarry; and
- Prospect Reservoir, approximately 6 km east of the quarry.

The catchment area for the pit void is currently larger than the pit itself and approximates an area of 376,611 m2. Prior to operation of the landfill, to minimise the amount of surface runoff entering the landfill void, the site drainage system will be constructed to divert surface runoff from operational areas surrounding the quarry pit, to storages outside of the pit. Site grading will also ensure clean runoff from non operational areas of the site is diverted around the pit. This will reduce the landfill catchment to the same size as the pit void, which is estimated at 265,000 m2.

7.3.3 Geology

A description of site geology is provided in *Section 1.3.4*.

The Wianamatta Group is expected to extend to depths of -80 m AHD in the area of the site and is underlain by the Hawkesbury Sandstone (IGGC, 2007). Therefore, the base of the quarry is expected to be approximately 20 m above the potential sandstone bearing strata.

A search of the DECC Web Atlas indicates that there is one deep registered bore, GW018361, located approximately 2 km to the north-east of the site. The bore was installed to 217.93 m bgl. The geology encountered in this bore indicated shales with occasional interbedded sandstone.

7.3.4 Hydrogeology

A review of the groundwater assessment previously conducted at the site by IGGC (2007) suggests that the hydrology at the site is controlled by the surrounding Wianamatta Shale, which has a low permeability and hence a limited ability to transmit groundwater. Typical porosities for shales range from <1-10 % and hydraulic conductivity for shale typically ranges from 1 x 10^{-8} to 2 x 10^{-6} m/day (Weight and Sonderegger, 2001). A shallow perched groundwater system was identified within the weathered shales and clays. This is underlain by discrete layered aquifer systems within the shales, with the majority of flow occurring via fractures and bedding planes.

IGGC (2007) suggests that the intrusion of the igneous diatreme and historical quarrying activities may have led to an increase in the fracturing of the surrounding shale geology and therefore may also have resulted in an increase in the permeability of the quarry.

7.4 FIELD INVESTIGATIONS

7.4.1 Drilling

Groundwater Monitoring Bore Licences were obtained from DWE under Part 5 of the Water Act 1912 prior to the instillation of the bore holes. A copy of the licence issued by DWE on the 23 October, 2007 is included within the Groundwater Assessment Report prepared by ERM dated April, 2008, Appendix C, *Volume 2*.

A total of nine bores (designated as BH01 to BH09) were completed at three locations around the perimeter of the quarry. Three bores were advanced on the western side of the quarry near the existing weighbridge shed. Three bores were completed on an elevated roadway on the northern side of the quarry and three bores were completed on the eastern edge of the quarry near the Hanson carpark. At each location, a shallow borehole (20 m bgl), intermediate borehole (50 m bgl) and deep borehole (134 to 146 m bgl) was drilled. The locations of the bores are shown in *Figure 7.1* below.

Subsequent to drilling, monitoring wells were installed in the nine boreholes drilled around the quarry perimeter.

To obtain an understanding of the relationship between groundwater and surface water elevations within the quarry pit pond/sump a survey of the wells was completed on 27 February 2008.

7.4.2 Groundwater Sampling

Two groundwater sampling events were completed at the site. The initial sampling event was completed between 7 and 9 November 2007 and 22 and 23 November 2007. The second sampling event was completed between 20 February and 30 March 2008.

At the completion of purging BH01 the pump became wedged within the monitoring well and was unable to be retrieved. This prevented a sample from being obtained from BH01. In the absence of a suitable and available pump the remaining wells were purged manually using disposal bailers dedicated to each well. All wells were purged dry, except for BH05 which due to continuous recharge was purged of the recommended three well volumes to allow for robustness in sampling.

The recovery within boreholes BH02 (intermediate), BH04 (intermediate) and BH08 (shallow) was insufficient to be confident that samples from these wells were reflective of the in situ groundwater quality rather than water introduced during drilling and slug testing. Samples were obtained from BH02, BH03, BH05, BH06, BH07, BH08 and BH09. A surface water sample was also obtained from the quarry sump/pond on 26 February 2008.

The sampling which was unable to be obtained from BH01 due to the pump becoming wedged has not adversely impacted on the ability of the remaining groundwater bores to provide a clear understanding of the regional groundwater table and its interaction with the pit.

In order to finalise the base line groundwater data and to undertake ongoing groundwater monitoring during operations BH01 will need to the cleared or another deep level monitoring well constructed prior to the operation of the Project.

The information gathered from groundwater monitoring was presented by ERM to DECC on the 19 March, 2008. DECC was informed that sampling from BH01 has been restricted, however that information gathered from the remaining wells would provide sufficient data to categorise the groundwater table in the area and that BH01 would either be cleared or another deep level well constructed prior to operation of the landfill.

Legend

Borehole Locations:
- Deep
- Intermediate
- Shallow

Quarry Catchment Area

Figure 7.1

Site Layout, Borehole Locations and Quarry Catchment Area

Client:	ThaQuarry Pty. Ltd.	
Project:	Light Horse Business Centre	
Drawing No:	0071234s_EA_02	
Date:	20/11/2007	Drawing size: A4
Drawn by:	GC	Reviewed by: EW
Source:	Qasco Australia	
Scale:	Not to Scale	

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7.5 INVESTIGATION FINDINGS

7.5.1 Geological and Hydrogeological

The geological and hydrogeological observations made by ERM scientists during the fieldwork are summarised as follows:

- the bore logs suggest that the subsurface geology consist of brown silty clay or fill material (0 to 18 m bgl), underlain by a weathered bedrock zone characterised by grey clay and shale (18 to 32 m bgl). This is underlain by soft, followed by hard shale with some siltstone noted (32 to 146 m bgl). This generally concurs with the geology observed in the exposed quarry faces;

- sandstone units, which are more likely to be water bearing were not encountered during the drilling. This also concurs with the geology observed in the exposed quarry faces;

- depths at which lithological changes were identified are generally only accurate to 2 metres due to the water flush rotary drilling method that was used;

- visual inspections of the pit suggest that faulting and volcanically impacted/deformed country rock is apparent along the eastern and southern walls of the pit. The western edge of the pit is more uniform suggesting that either intact breccia intrusion or intact shales extend out from the western wall;

- in general, the intact shales/siltstones appeared to be relatively impermeable, with little water lost from the boreholes during the drilling at depth. At borehole BH01, fracturing in the shale was potentially encountered between 120 and 121 m during drilling works and some water loss was noted from 123 m bgl to 134 m bgl;

- the silty clays and fill material at the surface of the boreholes appeared to be relatively permeable. Significant loss of water was noted when drilling through the fill material (0 to 15 m bgl) at boreholes BH03, BH04 and BH05 (located along the northern perimeter of the quarry);

- seepage was observed to be very isolated from the exposed unconsolidated clay and weathered shale faces. Seepage from the deeper shale units was more substantial but was generally observed to be isolated and insufficient to induce flow or surface ponding at the bottom of each of the seepage faces. However, seepage from the fractured zone on the southern wall did initiate ponding and minimal surface flow.

- Overall the seepage was observed to be very low and likely to be less than 10 m^3/day; and

- the different lithologies observed within the pit were not observed to coincide with increased seepage suggesting that any remaining volcanic breccia units have a similar permeability to the surrounding shales and do not impact overall seepage into the pit.

7.5.2 Pit Seepage

Anecdotal information supplied in the IGGC (2007) report indicates that water is pumped from the quarry pit sump at a rate of 40 L/s for on average two hours every two to three days. More frequent pumping is conducted during wet conditions and less frequent pumping is conducted during dry conditions.

Based on this information a maximum groundwater seepage rate (including the influence of rainwater) was estimated to be 125 m3/day. IGGC (2007) indicated that this rate of seepage was very low for the large size of the quarry. This was supported by observations of very little seepage through the walls of the quarry, although some isolated locations of seepage from the pit walls were noted after rainfall by IGGC (2007), during water sampling events in 2005.

Photographs of seepage zones map the extent and distribution of seepage within the pit. The photograph log is presented in *Annex B* of the Groundwater Report prepared by ERM dated July 2008. In particularly photograph's: 12-17 map the seepage zones as localised and infrequent producing less than 10m^3 per day, supporting the findings/ calculations detailed in Section 7.5.3 below.

7.5.3 Water Sampling Results

BH02 and BH08 generally have higher reported concentrations of cations and anions from the second sampling event than concentrations reported for the initial sampling event. This suggests that the initial sampling within BH02 and BH08 may have been impacted by freshwater introduced during slug testing and drilling.

The laboratory results suggest that the background concentrations within the shallow perched groundwater are in excess of the human health aesthetic investigation level for sodium and chloride. Concentrations of ammonia in two of the three shallow groundwater wells also exceed the Human Health Investigation Level.

Isolated concentrations of nitrate and ammonia in excess of Ecological Investigations Levels were also observed within the shallow perched groundwater aquifer. Concentrations of ammonia in excess of Human Health

and Ecological Investigation Levels are present in the deeper regional aquifer system. Chloride and sodium concentrations in excess of the aesthetic investigation levels are also apparent in samples obtained from the deeper regional aquifer system.

The quarry pond also has concentrations of nitrate in excess of the Ecological Investigation Level. The results suggest that the background shallow and regional groundwater quality is of limited human and environmental value.

A clear relationship between shallow groundwater, deep groundwater and surface water within the quarry pit is not apparent. As such, a relationship between the quarry pit surface water samples and groundwater contributions cannot be established using the water chemistry results. However, the absence of a relationship between the deep regional aquifer system and the quarry pit water supports the presence of relatively small volumes of groundwater seepage into the pit relative to surface water flows.

7.5.4 Groundwater Elevations

The following provides the key finding of the groundwater elevations:

- Deeper Wells - groundwater elevations in the deeper wells (BH01, BH03 and BH06) ranged between approximately 14.3 and 24.2 m AHD prior to sampling in February/March 08 but had not stabilised. The rising groundwater elevations in these wells approximate 70 to 80 m above the base of the quarry pit (approx. -58 mAHD) suggesting that a steep regional groundwater gradient is present around, and is directed into, the pit. Variability in the relative groundwater elevations within these wells is likely to be due to the relative distance of each well from the pit walls. The groundwater elevation gradients around the pit support the presence of very low permeability geology and suggest that fracturing is unlikely to exert a significant control on groundwater movement in this area or that fracturing in this area is also of low permeability;

- Intermediate wells - BH02 recharged by approximately 12 metres, which may be partially attributed to impacts from surface run-off in this area. BH04 and BH07 have recharged by approximately 4 metres during this period. The slow recovery rate and low total recovery within BH02 and BH04 after purging during the February/March sampling raises uncertainty that the potential recharge observed between sampling events is reflective of the regional water table elevations and suggests that water within these wells may be residual water from drilling and hydraulic testing. However, there are sufficient observation data from BH07 after the February/March sampling round to suggest approximately 6 m of recharge in this well, which is likely to be indicative of the regional groundwater table or a perched water table.

- Shallow wells - groundwater elevations within the shallow wells at the site generally ranged between 59 and 69 m AHD prior to the sampling event completed in February/March 08, which is above the groundwater elevations present within the intermediate and deep wells.

- However, at the time of writing this report; stabilisation of the deeper wells had not occurred. The recovery in BH09 back to a relatively constant water elevation after sampling events suggests the presence of a shallow groundwater system at this location. Overall, the groundwater elevations in shallow wells suggest the presence of a discontinuous shallow groundwater system within the weathered shale and clay overburden at the site. This is supported by the absence of a continual seepage face at shallow depths around the pit.

7.5.5 Aquifer Testing

Slug tests were conducted on all wells at the site on 9 November 2007. Monitoring of groundwater elevations continued throughout the day, with three groundwater monitoring rounds (in which all wells were included) completed after initial recovery of the wells. Due to very slow dissipation of the introduced slug of water in the deeper wells, a fourth monitoring round was completed the following day to further quantify falls in water levels. Due to the negligible responses over the monitoring period within the intermediate and deeper wells further analysis was completed using long term water elevation monitoring data. This analysis used long term groundwater recovery data from wells BH01 (deep), BH03 (deep), BH06 (deep) and BH07 (intermediate).

The observed data and analytical results for each well presented in detail within the Groundwater Assessment and are summarised as follows:

- the hydraulic conductivities (Ks) estimated for the shallow wells (BH05, BH08 and BH09) ranged between 0.21 m/day and 0.25 m/day at BH05 and 1.46 x 10-3 m/day and 3.82 x 10-3 m/day at BH08. These Ks are indicative of the permeabilities of the fill (BH05) and the weathered clay and shale (BH08 and BH09), which the shallow bores were screened within the K calculated from slug testing for BH04, which was the only well screened within the deeper shale strata to have an observed fall in water elevations after a slug of water was introduced, ranged between 6.37 x 10-6 m/day and 7.90 x 10-6 m/day. This is consistent with typical hydraulic conductivities of un-fractured shales which range from 1 x 10-8 to 1 x 10-6 m/day (Weight and Sonderegger, 2000);

- hydraulic analysis of the long term water elevation data for deep wells BH01, BH03 and BH06 and intermediate well BH07 ranged between 1.75 x 10-6 and 8.7 x 10-6, which is consistent with the hydraulic testing result for BH04, which is also screened within shale;

- it was anticipated that the hydraulic testing results would have been higher for BH01 due to the potential for the gravel pack in this well to be contacting a fracture. The estimated top of the gravel pack is at, or about, the estimated location of fracturing (Annex C).

  Given the drilling and installation methods used, an accuracy of +/- 2 m can be expected and therefore, it may be that the gravel pack did not extend to the depth of fracturing;

- based on the permeabilities of the geology around the quarry, it is unlikely that groundwater yields would be suitable for water supply purposes; and

- the design permeability of clay liners generally approximate 8.64 x 10-5 m/day (1 x 10-9 m/s), which is the benchmark technique outlined in the NSW Solid Waste Landfill Guidelines (EPA, 1996). The very low permeability calculated for the shales surrounding the quarry are below this, suggesting that a clay liner is unlikely to further impede leachate migration through the base of the landfill once in operation. While it is noted that fracturing may result in localised zones of higher permeability, it is evident from the steep regional groundwater gradients around the pit that the fracture network does not exert a significant control on regional groundwater flow and bulk formation permeability in this area and therefore that any fracture network is likely to be intermittent and localised.

7.6 CONCEPTUAL SITE MODEL

Based on the findings of this investigation, a conceptual model has been developed for the site. Refer to *Figure 7.2* below. The model used the hydraulic conductivity calculated at the site, the potential seepage into the quarry pit, the estimated groundwater influx through the walls of the quarry which are estimated as follows:

- the shallow groundwater system has the potential to contribute 257 m3/day. This is considered to be a high end conservative value and is unlikely to be real as observed seepage from the exposed pit faces at the interface of the weathered shale/clay and shale was observed to be negligible; and

- the deeper groundwater system has the potential to contribute 2 m3/day. This seepage rate concurs with seepage observed within the pit, which was estimated to be less than 10 m3/day.

As detailed in *Chapter 6* a surface water management plan was completed for the site by Storm Consulting Pty Ltd in April 2008. The report suggests that the likely stormwater inflow to the quarry will approximate:

- 107 m3/day for a dry year - this was based on the 10th percentile annual rainfall of 562 mm/year recorded at the BoM weather station at Prospect Reservoir;
- 195 m3/day for a median year - this was based on the 50th percentile annual rainfall of 831 mm/year recorded at the BoM weather station at Prospect Reservoir; and
- 342 m3/day for a wet year - this was based on the 90th percentile annual rainfall of 1,183 mm/year recorded at the BoM weather station at Prospect Reservoir.

The calculations were based on a quarry open area of 265,000 m2 and the assumption that 15 mm of initial daily rainfall is lost to evaporation and/or infiltration. The results listed above are sensitive to the initial rainfall loss adopted. As such, there is potential for the surface inflow to the pit to approximate between 238 m3/day (dry year) and 560 m3/day (wet year) when reducing the initial rainfall loss within an acceptable range (i.e., to 5 mm).

Based upon the findings of the groundwater investigations, the hydraulic conductivity modelling, the stormwater modelling undertaken by Storm Consulting (2008) a conceptual model has been developed for the site producing the following key findings:

- the surficial geology comprises clay and weathered shales to depths approximating 32 m bgl. Some fill material was identified in wells located on bunded areas to depths approximating 6 m. Intact shales predominate below the weathered shales down to depths approximating 146 m bgl. A survey of the pit wall suggests some geological changes and fracturing along the eastern and southern walls of the pit. The Hawkesbury Sandstone) is likely to be located approximately 20 m below the base of the quarry;
- background groundwater is generally of a poor quality relative to human health and ecological investigation levels. The groundwater resource is therefore considered to be of limited water use potential and of low ecological value. This is supported by the presence of an aquaculture waste disposal well located within 2 km of the site;
- there is an intermittent shallow perched groundwater system located around the quarry within the fill, clay and weathered shale. Permeabilities of these deposits range from 1.46E-3 m/day to 0.25 m/day. Based on the very isolated seepage observed from the clay and weathered shales exposed on the pit walls, this system is not in significant hydraulic contact with the quarry. This suggests that, provided leachate levels within the pit are kept below the base of the shallow aquifer system, leachate migration into this system is unlikely to occur;

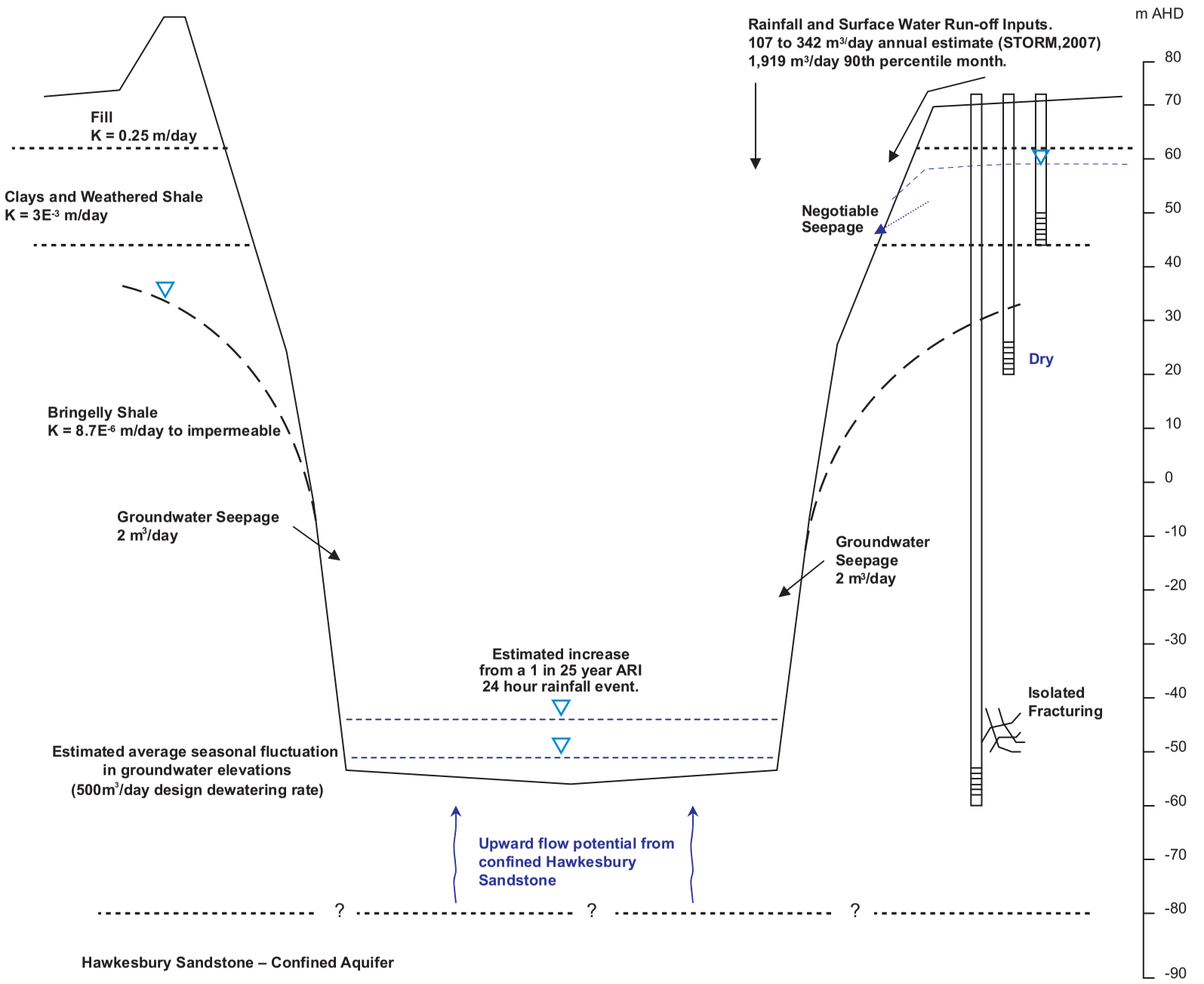
- there is a deeper regional groundwater system located within the shale deposits. The permeability of this shale has been calculated to be very low (1.75E-6 m/day to 8.7E-6 m/day). These permeabilities are below specified criteria for clay liners.

  The elevation of this water table is likely to be in excess of 24 m AHD, which approximates 82 m above the pit base. This indicates a strong inward hydraulic gradient and suggests that the bulk formation hydraulic properties (including fracturing) of the surrounding geology are low. Given the low permeabilities of the geology surrounding the pit there is unlikely to be significant hydraulic contact between the quarry pit and the underlying Hawkesbury Sandstone. These factors negate the need for the landfill to be lined;

- flow of groundwater into the pit is likely to be low and approximate 2 m3/day. This generally coincides with seepage observed within the pit; and

- surface water inflow into the landfill, once operational is likely to vary between 39 and 204 m3/day annually. This suggests that groundwater represents a small proportion of total water inflow to the quarry pit;

Based upon these key findings a leachate collection system was designed which is able to manage the potential surface water influx to be treated as leachate. The key findings also support a leachate collection system which functions without the need for a clay liner within the pit. Chapter 8 provides further detail regarding the leachate collection and treatment system.



Legend

▽ Regional Water Table

Figure 7.2

Conceptual Site Model

Client:	ThaQuarry Pty. Ltd	
Project:	Light Horse Business Centre	
Drawing No:	0071234s_EA_04_R1	
Date:	05/08/2008	Drawing size: A4
Drawn by:	ML	Reviewed by: -
Source:	-	
Scale:	Not to Scale	

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7.7 *CONCLUSIONS*

The main aim of this investigation was to develop a conceptual site model based on credible geological, hydrogeological and hydrochemical data, such that an understanding of the likely water influx to the landfill area and interactions with the surrounding groundwater systems could be adequately characterised. Subsequently the investigation has been completed to provide the background data to allow the preliminary design of an appropriate leachate collection system for the landfill. The key findings of the investigation are provided below:

- the pit geology comprises shallow fill and clay layers to 18 m bgl, clay and weathered shale to depths of 32 m bgl and Bringelly Shale to depths up to 5 m below the base of the quarry (approximately 140 m bgl). The eastern and southern edges of the pits are fractured and deformed, while the eastern and north eastern edges of the pit are relatively uniform. The fractures are generally sparse and localised. It is estimated from surrounding borehole information that the Hawkesbury Sandstone underlies the Bringelly shale approximately 20 m below the base of the quarry pit;

- a shallow perched and intermittent groundwater system is located within the shallow fill and weathered shale and clay up to depths approximating 32 m bgl. This was observed to have little connection with the open pit (i.e., very little seepage was observed from the clay and weathered shale deposits). Impacts to this intermittent perched aquifer system from leachate are likely to be minimal provided that the leachate levels remain below the depth of this aquifer. Current estimates of fluctuations of the leachate levels during operation suggest leachate levels will be maintained well below this aquifer system. In addition, the potential yield and water quality of this aquifer system suggest that the system is of low human and environmental value;

- a deeper regional aquifer system is present within the shale and volcanic sediments. The permeability of this aquifer system is very low and generally below the recommended permeability of clay liners. Fracture zones are unlikely to significantly impact flow into the pit, as evident in the very low seepage and very steep regional groundwater gradients into the pit. Overall groundwater seepage into the pit was observed to be isolated and low, which supports a calculated seepage of 2 m3/day into the quarry pit. The potential yield and water quality of this aquifer system suggest that the system is of low human and environmental value; and

- surface water input into the quarry pit void is conservatively estimated to range between 254 m3/day and 1,919 m3/day, of which between 45 and 910 m3/day will become leachate (averaging 253 m3/day).

The pumping rates required to dewater this leachate, while meeting DECC requirements to maintain an inward head gradient, will range between 250 m3/day and 500 m3/day. This pumping rate is within the design specification of the proposed leachate collection system. Pumping at the proposed design capacity of 500 m3/day will result in a 3 metre variation in leachate elevations above the base of the landfill. This will maintain an inward head gradient to the landfill and prevent leachate from migrating into the surrounding regional aquifer system. Pumping at this rate will also provide enough capacity to allow an instantaneous rainfall event from a 1 in 25 year 24 hour event (and the highest rainfall event on record) to be effectively stored within the landfill without impacting on the inward groundwater gradient to the landfill. As such the proposed leachate storage capacity of 2,200 m3 is considered to be acceptable; and

- after cessation of landfilling and capping of the landfill, leachate generated is likely to fall below 90 m3/day. After the cessation of pumping there is potential for groundwater elevations to eventually rise above the regional groundwater system and recharge the shallow system. However, given the low human and environmental value of surrounding groundwater systems monitoring should be used as a first step to quantify potential adverse impacts, with continued leachate dewatering instigated as required.

8 LEACHATE MANAGEMENT

This chapter provides a conceptual leachate collection system. A treatment system is also discussed to provide holistic management of leachate generated by the Project. An assessment of leachate generation and management measures to be employed for the collection and treatment system are also discussed.

8.1 INTRODUCTION

A leachate assessment has been undertaken for the Project. This Chapter sets out the key findings of the assessment. The full assessment including landfill leachate generation modelling is presented in the *Leachate Collection System – Concept Design*, prepared by Environmental Resources Management (ERM), July 2008, Appendix D, *Volume 2* of the EAR.

The objectives of this study are to:

- provide an opinion on whether a liner would be needed for the landfill;
- develop and provide detail on options for collecting leachate at the proposed landfill;
- recommend a preferred option for leachate collection, taking account of site geology, hydrogeology, water chemistry, calculated water balance and client specifications;
- recommend types of materials to be used to maintain longevity of leachate piping/drainage material in the landfill; and
- recommend measures to minimise the potential for failure of the leachate drainage system.

8.2 INFILLING PROCEDURE AND LANDFILL LEACHATE GENERATION

DECC requested as part of the adequacy reviewed that the Draft EAR be updated to specify a maximum input rate for the proposed landfill and all designs. As a result the best and worst case landfilling scenarios have been assessed.

It is anticipated that the 'best case' infilling rate of the landfill will approximate 400,000 tonnes/year (estimated to be 235,000 m^3/year), however under 'worst case' conditions the infilling rate is likely to approximate 1,000,000 tonnes/year (estimated to be 588,000 m^3/year). Under best case conditions it is anticipated that the pit cavity will be infilled within 65 years, this will shorten to approximately 26 years under worst case infilling conditions.

DECC requested that a spreadsheet based model be developed to assess the required discharge rates for leachate; the likely leachate water elevations in the landfill; the required leachate surface storage; and the anticipated discharge rate to sewer.

The spreadsheet based model (refer *Annex I* of the Draft EAR) was developed in accordance with the *Draft Environmental Guidelines: Landfilling* (DECC, 2008) as per DECC recommendations and included the following parameters:

- monthly time steps over a period of 100 years;
- the incorporation of 90th percentile wet years at year 1 and at 10 year intervals. Average rainfall conditions were used for the remaining years;
- groundwater inflow to the pit of 2 m^3/day;
- a surface area of the landfill base of 12,000 m^2 and a maximum surface area of 265,000 m^2;
- in accordance with the *Draft Environmental Guidelines: Landfilling* (DECC, 2008) it was assumed that 50% of rain falling on the temporary capping at the surface of the landfill becomes leachate while the remaining rainfall runs off as surface water. Following this it was assumed that 10% of rain falling on the landfill cap after closure becomes leachate; and
- the spreadsheet model is also designed to incorporate the infilling procedure outlined above.

Details of the proposed infilling procedure are presented in the *Figure 3.5* of the main report and are detailed by ERM (2008a).

The key data is summarised as follows:

- the design of the infilling system will allow separation of surface water run-off from the sides of the landfill from the rain falling directly onto the landfill waste and infiltrating to become leachate. This will significantly reduce the volume of leachate generated;
- *Table 8.1* below summarises the conservatively estimated volumes of surface water and leachate generated within the landfill. Based on these leachate volumes generated it is anticipated to range between 45 and 872 m^3/day, with an average of 241 m^3/day;
- in order to maintain groundwater elevations at acceptable levels within the landfill pumping rates from the landfill will be required to range between 250 m^3/day and 500 m^3/day;
- providing that pumping rates do not fall below 241 m^3/day, the landfill will be able to be used as a storage facility during times of

high rainfall. This will allow a constant flow rate to be achieved from the leachate collection system and will negate the need for surface storage capacity for leachate pumped from the landfill;

- at the completion of the landfill and subsequent capping, leachate generation is likely to fall below 90 m^3/day. Due to the potentially poor ability of the regional groundwater system to absorb this volume of leachate there is potential for leachate elevations to eventually rise above the regional groundwater elevation and begin recharging the shallow perched groundwater system. Post landfill monitoring will help to quantify this process, however, there is potential for ongoing pumping to be required to prevent impact to receptors in potential hydraulic contact with the landfill.

The results presented in *Table 8.1* present the results for a 'best case' landfill filling rate. These results were found not to change significantly under worst case conditions.

Table 8.1 Surface water and Leachate Generation Estimates

	Surface Water Inflow (m^3/day)	**Leachate Generation (m^3/day)**	**Total Inflow (m^3/day)**
Minimum	209	45	254
10th Percentile	238	119	357
Average	385	241	626
90th Percentile	507	374	881
Maximum	1,003	872	1,875

1. Values are based on monthly rainfall data.

8.3 WATER CHEMISTRY OF LEACHATE

Table 8.2 presents the anticipated contaminant concentrations present within leachate discharged from the landfill and are summarised as follows:

- the landfill is likely to accept solid and inert wastes. The NSW EPA (1999) Guidelines for the Classification of Liquid and Non-liquid Waste provide threshold concentrations for leachate from solid waste material. The threshold concentrations for key solid waste contaminants are presented in *Table 1.3* and are considered to represent the upper limits of contamination expected to leach from the landfill waste;

- the likely leachate concentrations presented in Table 8.2 have been obtained from a similar solid waste landfill located at Alexandria, NSW;

- the leachate concentrations are compared against Sydney Water Corporation trade waste criteria as this is the proposed primary means of discharging leachate water from the site;

- based on the information presented in *Table 8.2* expected contaminants requiring treatment may include:

    - ammonia, barium, petroleum hydrocarbons and polycyclic aromatic hydrocarbons, which are considered likely to be present within likely leachate concentrations; and

    - BTEX, chlorinated phenols, chloroform, cyanide, fluoride, metals and phenols, which are considered unlikely to be present at the concentrations identified in *Table 8.2* but which should be included in initial monitoring and treated if identified in excess of the trade waste criteria; and

- all infrastructure developed to house and transport leachate (i.e. the leachate collection system) will need to be constructed of materials to withstand the chemicals present within the leachate. Therefore the data presented within *Table 8.2* will form the base chemistry data for selecting suitable infrastructure materials when detailed design is undertaken following development application approval.

Table 8.2 Potential Contaminant Concentrations within Seepage Water

Contaminant	**Solid Waste**	**Likely Leachate Concentration**	**Trade waste Discharge Criteria**
	Leachable Concentration		
	TCLP2 (mg/L)	**mg/L**	**mg/L**
Aluminium	Nc	0.04	100
Ammonia as N	Nc	229	100
Arsenic	5	0.008	1
Barium	Nc	2.4	2
Benzene	0.5	0.002	0.1
Benzo(a)pyrene	0.04	nc	nc
Beryllium	1	nc	nc
Bicarbonate	Nc	2500	nc
Calcium	Nc	139	nc
Cadmium	1	0.0001	1
Carbon tetrachloride	0.5	nc	nc
Carbonate	nc	nc	nc
Chloride	nc	1860	nc
Chlorobenzene	100	nc	nc
Chloroform	6	nc	0.1
Chromium (total)	nc	0.023	3
Chromium (VI)	5	nd	3

Contaminant	Solid Waste	Likely Leachate Concentration	Trade waste Discharge Criteria
	Leachable Concentration		
	TCLP2 (mg/L)	mg/L	mg/L
Cobalt	nc	0.008	5
Copper	nc	0.002	5
m-Cresol	200	nc	nc
o-Cresol	200	nc	nc
p-Cresol	200	nc	nc
Cresol (total)	200	nc	nc
Cyanide (amenable)	3.5	nc	1
Cyanide (total)	16	nc	nc
2,4-D	10	nc	nc
1,2-Dichlorobenzene	4.3	nc	nc
1,4-Dichlorobenzene	7.5	nc	nc
1,2-Dichloroethane	0.5	nc	nc
1,1-Dichloroethylene	0.7	nc	nc
Dichloromethane	8.6	nc	nc
2,4-Dinitrotoluene	0.13	nc	nc
Electrical Conductivity (µS/cm)	nc	8573	nc
Ethylbenzene	30	nd	1
Fluoride	150	0.8	20
Iron	nc	12.5	50
Lead	5	0.002	2
Manganese	nc	0.211	10
Magnesium	nc	97	nc
Mercury	0.2	nd	0.03
Methyl ethyl ketone	200	nc	nc
Molybdenum	5	nc	100
Naphthalene	nc	13.4	nc
Nickel	2	nc	3
Nitrite	nc	0.032	nc
Nitrate	nc	0.027	nc
Nitrobenzene	2	nc	
C6-C9 petroleum hydrocarbons	nc	0.05	nc
C10-C36 petroleum hydrocarbons	nc	15.11	10 [b]
pH	nc	6.6 - 7.49	7 - 10
Phenol (nonnchalogenated)	14.4	0.233	10
Potassium	nc	230	nc
Polychlorinated biphenyls	nc	nc	nc
Polycyclic aromatic hydrocarbons(total)	nc	13.4	5

Contaminant	Solid Waste	Likely Leachate Concentration	Trade waste Discharge Criteria
	Leachable Concentration		
	TCLP2 (mg/L)	mg/L	mg/L
Scheduled chemicals	nc	nc	nc
Selenium	1	nc	5
Silver	5	nc	5
Sodium	nc	1490	nc
Styrene (vinyl benzene)	3	nc	nc
Sulphate	nc	1	2000
1,1,1,2 – Tetrachloroethane	10	nc	nc
1,1,2,2nc Tetrachloroethane	1.3	nc	nc
Tetrachloroethylene	0.7	nc	0.3
Toluene	14.4	nd	1
Total Dissolved Solids	nc	4520	10000
1,1,1-Trichloroethane	30	nc	nc
1,1,2-Trichloroethane	1.2	nc	nc
Trichloroethylene	0.5	nc	0.1
2,4,5-Trichlorophenol	400	nc	0.05 [a]
2,4,6 Trichrolophenol	2	nc	0.05 [a]
Vinyl chloride	0.2	nc	nc
Xylenes (total)	50	nd	2
Zinc	nc	0.191	5

Notes

- nc = no criteria.
- nd = non-detect.
- leachate concentration exceeds trade waste criteria.
- [a] 0.05 is trade waste criteria for total chlorinated phenolics.
- [b] 10 is the trade waste criteria for total petroleum hydrocarbons (C6 to C36).
- The likely leachate concentrations are based on leachate sampling analysis completed at Alexandria Solid Waste Landfill by Ian Grey Consulting Ltd. Sampling was completed on 8 occasions at quarterly intervals between 23/01/06 and 17/10/2007.
- Solid Waste TCLP data is from the Department of Environment & Conservation NSW (1999) Environmental Guidelines: Assessment, Classification & Management of Liquid and Non-liquid Wastes EPA, Table A4.
- The trade waste criteria are the acceptance standards listed on the Sydney water website.

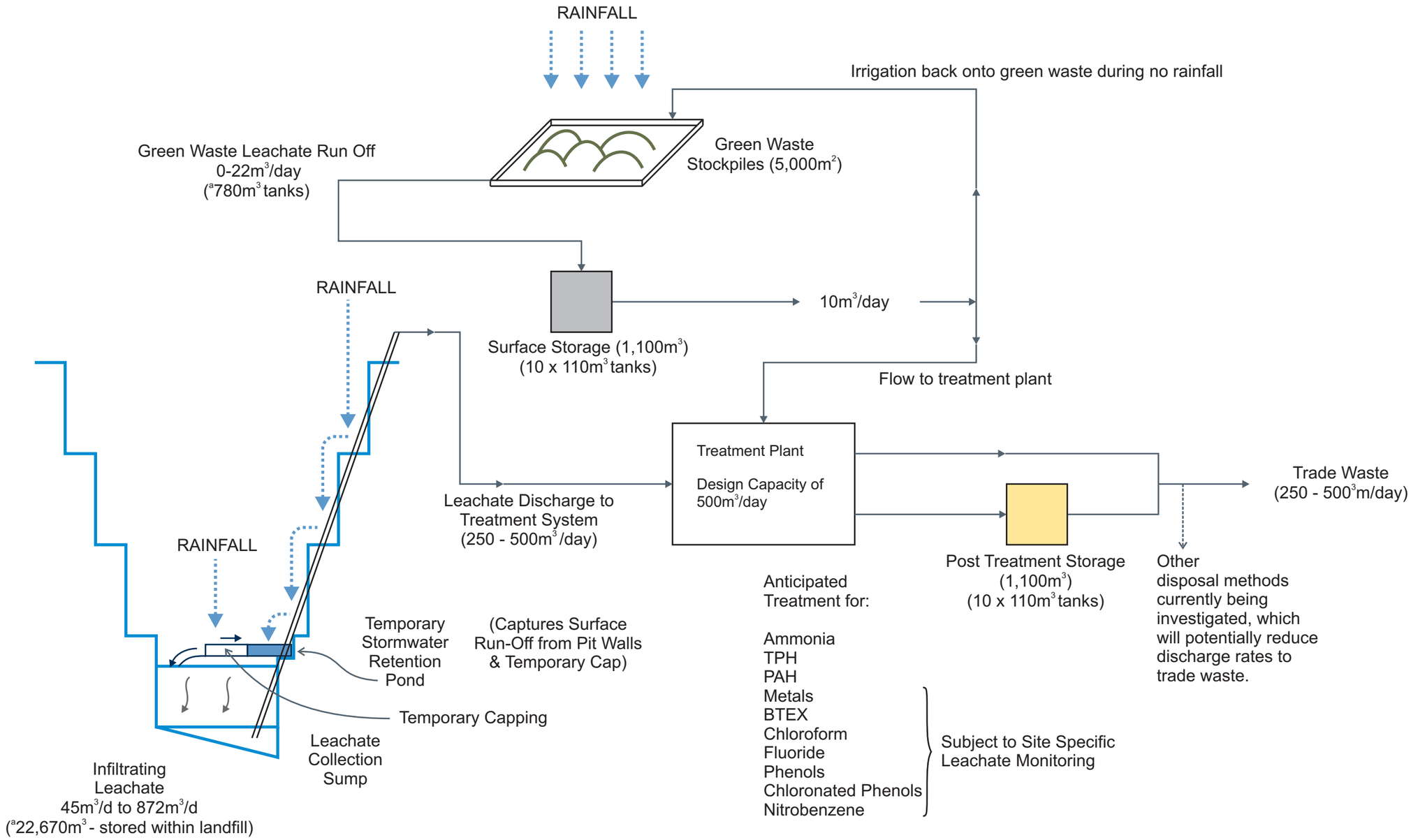
8.4 *TREATMENT PROCESS*

An overview of the entire treatment process is presented in *Figure 8.1*. This figure summarises the data flow volumes anticipated and potential treatment required before disposal to trade waste.

Additional information presented within this figure is summarised as follows:

- the preliminary treatment system has been designed to process 500m^3/day. This is sufficient to process the proposed discharge rates from the landfill leachate collection system; and

- surface storage capacity of leachate will be available prior to treatment (1,100 m^3) and post treatment (1,100 m^3). The storage of leachate prior to treatment will be used to house run-off from green waste areas, which will subsequently either be, irrigated back onto the green waste or transferred at a maximum anticipated rate of 10 m^3/day to the treatment system. The post treatment storage facility will be used to house treated water that will be disposed of via other methods, such as on-site dust suppression as outlined in Chapter 6. This process will serve to reduce overall discharge to trade waste.



Notes: [a] = 1 in 25 yr ARI 24 hr rainfall event

Figure 8.1

Leachate Processing & Management Diagram

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse Business Centre		
Drawing No:	0071234s_EA_15		
Date:	31/07/2008	Drawing size:	A3
Drawn by:	ML	Reviewed by:	-
Source:	-		
Scale:	Not to Scale		

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8.5 *LEACHATE CONTAINMENT SYSTEM*

The leachate containment system and potential need for a landfill liner may vary as a function of the depth and the soil/rock strata encountered at the base of the landfill facility and within the surrounding side slopes. The conceptual design for the leachate containment system takes account of the requirement set out in NSW EPA (1996) *Environmental Guidelines: Solid Waste Landfills* and the infilling procedure and leachate generation rates as discussed in *Section 8.4*.

The Leachate Assessment Report prepared by ERM (July, 2008) assessed the geology of the upper, middle and lower parts of the pit based upon previous geological investigations and the hydrological conductivity modelling undertaken within the Groundwater Assessment (Appendix B, *Volume 2*). Based upon this information the following conclusions and recommendation were made regarding the need for a liner:

- Additional leachate containment using a landfill liner is not recommended for the landfill, however the top 18 metres below ground level has a higher permeable geology therefore options need to be detailed at the detailed design phase to address potential horizontal leachate mitigation should filling occur between 18m bgl to the lip of the pit. The top 18m of fill could be proactively managed by compaction as a liner or a HDPE geo-membrane could be installed to adequately contain potential horizontal leachate mitigation in line with NSW Guidelines. After land-filling and the cessation of leachate dewatering there is potential for the leachate water elevations to rise above the regional water table and recharge the shallow perched aquifer system. In the NSW (1996) guidance, a further hydrogeological investigation of the landfill will be required at detailed design stage.

- The low hydraulic conductivity of the Bringelly Shale surrounding the proposed landfill facility results in minimal exfiltration of leachate (estimated to approximate 2 m^3/day) from the landfill even under the worst-case scenario that the waste mass is saturated. Additional containment is therefore not recommended for this area (32m bgs and below). However, a leachate collection and removal system should be installed across the landfill base and operated to minimize the leachate head within the landfill, by actively removing leachate as it is delivered into it.

- The leachate collection system may be required to operate at a minimal rate post landfill closure (approx. 1 L/s), however, an assessment of the leachate volumes generated and the potential for the regional aquifer

system to absorb the leachate produced post closure will confirm if this is necessary.

- The leachate level within the waste mass should be monitored by wells installed to depth. As a mitigation measure, in the event that the saturation zone rises within 3m of the interface between the Bringelly Shale and the overlying weathered shale/clay strata, leachate will be extracted from wells installed directly within the waste. The discharge from these wells should be treated as necessary.

- The upper 18m of fill soil requires further management. The options for this layer are compaction of the fill to form a soil liner layer or installation of a geomembrane liner over this side slope area.

8.6 LEACHATE COLLECTION SYSTEM

The leachate collection system is designed as a Basal Drainage System to handle the estimated maximum of 500 m^3 of leachate required to be discharged per day. This allows for the 'best case' and 'worst case' infilling scenarios as previously discussed. The rate of infilling does not effect the design with regard to the physical properties of the materials to be used. The key challenges in designing the system are:

- the depth of the void. This gives a large leachate head and poses challenges associated with handling leachate collection equipment;

- the geometry of the void. The conical-shaped benched void poses issues with locating the leachate riser and requires benches to be engineered; and

- operating below groundwater level. This requires particular attention to be paid to ensuring the surrounding strata are relatively impermeable and/or an inward hydraulic gradient is maintained.

8.6.1 Drainage Layer

Options considered for the drainage layer include geosynthetic and granular materials. Given the depth of the waste (up to 150m) and the resulting vertical pressures (approximately 1,500kPa), it is unlikely that geosynthetic materials will remain functionally intact and therefore these materials are not a practical alternative. By default, granular materials are to be employed in the basal drainage system.

A minimum 500mm thick, high-permeability granular blanket will be placed across the entire landfill base area. It is anticipated that this granular material will be comprised of predominantly rock (gravel/ cobbles) of greater than 25mm diameter.

In line with NSW EPA (1996), the drainage material should exhibit a co-efficient of permeability $K > 1 \times 10^{-3}$ ms^{-1} and the gravel should be rounded, smooth surfaced and non-reactive in mildly acidic conditions. The material should be relatively uniform in grain size and free of carbonates that could form encrustations around collector pipes.

The longitudinal gradient on the landfill base will be a minimum of 1%, to ensure good drainage towards the sump. The existing quarry floor already has sufficient fall. Trenches should also fall inwardly toward the main drain pipe. The hydraulic conductivity of the granular material will be sufficient to transport leachate to the sump within a limited period of time (less than 1 day) from its appearance in the collection system.

The leachate collection drainage layer needs to have sufficient thickness to manage the maximum hydraulic head between the piping network without pressurising the drainage layer; and to increase the "life expectancy" of the system from clogging. The maximum hydraulic head within the system is determined based on the horizontal permeability of the leachate collection layer granular material and the pipe spacing. The advantage to minimizing the hydraulic head (both maximum and average) within the drainage layer material across the base is to reduce the potential of leachate exfiltration from the landfill and maximize the "life expectancy" of the system from clogging.

8.6.2 Geotextile

There are applications that suggest either inclusion or exclusion of a geotextile is acceptable dependent upon the nature of the waste and leachate, and proper design of the granular drainage layer/selection of the geotextile.

In general, leachate with higher chemical oxygen demand (COD), calcium and/or suspended solids are more susceptible to clogging of the collection system. Regardless of the waste and leachate composition, the granular drainage layer material should be relatively uniform in size (single-sized) to maximize the horizontal permeability. Such a layer is not typically an appropriate filter for waste; therefore consideration should be given to inclusion of an additional layer of graded granular material and/or select waste material; as well as potential use of a geotextile. In general, geotextiles with larger openings are more resistant to clogging. Also, if a geotextile is employed, it should be placed as distant as practically possible from the piping network within the leachate drainage layer material to minimize the potential of clogging the entire drainage system.

The final decision of use of a granular material only or the addition of a geotextile should be made by the engineer responsible for the Preliminary Design/Detailed Design in consideration of the overall landfill and leachate collection system design.

8.6.3 Collection Pipes

To further assure the transport time and for redundancy, a network of collection pipes in a chevron/herringbone pattern will be installed, with 150mm diameter laterals spaced nominally 25m on-centre, and a central 300 mm diameter header pipe. These requirements are within the guideline diameters and spacing set out within *Benchmark Technique 1* of NSW EPA (1996).

The collection pipes are recommended to be polyethylene to provide maximum chemical resistance to leachate constituents. The pipes would be embedded into trenches beneath the blanket gravel drainage layer, to maintain structural integrity.

8.6.4 Sump and Risers

A sump will be located at the lowest elevation of the base, serving to collect the leachate in preparation for removal. The sump will contain two (2) risers and a housing for leachate extraction pumps at the eastern end of the landfill (See *Figure 3.5*). The leachate extraction pumps are sized with a capacity of nominally 500 m^3/day. A single pump will operate in one riser under normal conditions, while the second pump will serve as standby, for use if unusually high flow rates are reported (eg under high rainfall events) into the leachate collection system.

8.6.5 Riser

There are several options for the configuration of the leachate removal system riser pipes.

- **Option 1:** A vertical riser projecting through the landfill, constructed of concrete pipe sections installed incrementally as the waste level rises; and
- **Option 2:** A riser encased in concrete installed on and within the near surface layers of the slope; and
- **Option 3:** An inclined drilled-shaft.

The advantages and limitations of each are set out in *Table 8.3*.

Table 8.3 Advantages and Disadvantages of Riser options

Option	Advantages	Disadvantages
Option 1: Vertical Riser	• Cost effective • Ease of Installation (in segments as waste level rises) • Potentially can serve as leachate collection column (if walls are perforated and surrounded by granular materials)	• Subject to down-drag as surrounding waste settles • Requires special manufacture (wall thickness large to resist compressive forces) • Subject to damage/ misalignment (from being struck by vehicles and/or waste placement activities) • Difficult to operate (power supply and discharge line routed across waste surface requiring frequent relocation) • Concrete requires protective coating (interior and exterior)
Option 2: Riser installed on or in sideslope	• Not subject to down-drag forces • Can be constructed from within the existing quarry void • Not subject to damage/misalignment during waste placement operations • Ease of operation (all operations performed from surrounding ground surface rather than waste mass) • Pipe forming conduit may not require protective coating inside or out, with the exception of the portion within the sump pipe (encased in concrete) • Possible to construct and operate in segments (without disruption of waste placement operations) • though possible to construct and operate in segments - say, below haul road/above haul road	• Need to structurally supported against side of quarry at full length of riser • More effort to install when compared with Option 1
Option 3: Inclined drilled shaft	• Not subject to down-drag forces • Ease of operation (constructed and operated from surrounding ground surface external to landfill) • Conduit does not require protective coating, with the exception of the portion within the sump • Not subject to damage/misalignment during waste placement operation	• Most difficult to install (compared with options 1 and 2) • Least cost effective • Complete installation required prior to waste placement

In each option, the riser pipe is nominally 1.2m in diameter to allow easy access of the pump and, as a contingency, the equipment necessary in the event that cleaning or other maintenance of the leachate collection system is necessary.

Option 2 is chosen for this site because of the possibility to construct and operate in segments without disruption of waste placement operations. Option two also allows for anchoring the risers to the quarry walls, thus minimising down-drag impacts. The pipe would need to be of sufficient design strength to ensure crushing would not occur.

8.6.6 Monitoring the Leachate Collection System

The leachate collection system should be routinely monitored, inspected and flushed as may be necessary, employing proven methods. Monitoring of the system can be accomplished by measuring and logging the volume of leachate extracted as a function of time.

A reduction in the flow rate during the operational life of the landfill is typically an indication that the system is under the influence of clogging mechanisms. Inspection is accomplished through closed-circuit television (CCTV), and may not be necessary if the system is closely monitored and maintained. Maintenance of the system is practically limited to backflushing of the pipes and the perforations, and is typically accomplished through the application of high-pressure water jetting, with access provided through the removal (riser pipe) system.

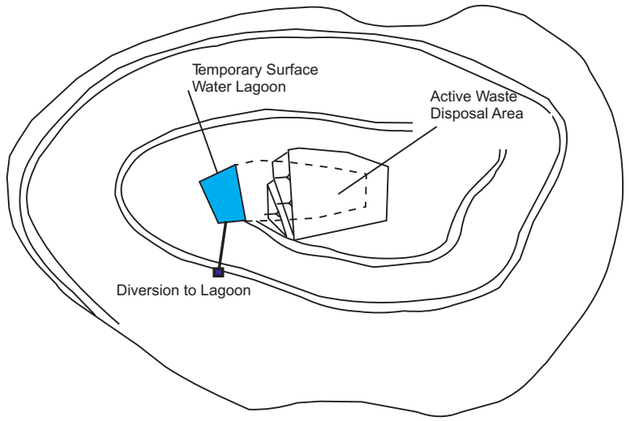
8.7 FILLING PLAN

Waste placement will initially proceed across the base of the landfill and progress upward with the waste deposited in horizontal layers commonly referred to as "lifts". The landfill base area will be sub-divided into smaller areas for efficient operation and to allow for the segregation of surface water from waste and leachate. In the operation of a given lift, the landfill base can be considered to be sub-divided into two general areas. Waste placement activities will be confined to one area (the active emplacement area) and surface water from this area will be collected through the leachate system. Segregated surface water from the capped area will be collected in a temporary surface water pond, from where it can be drawn down for reuse for dust suppression or ultimately transported by tanker to the surrounding ground surface.

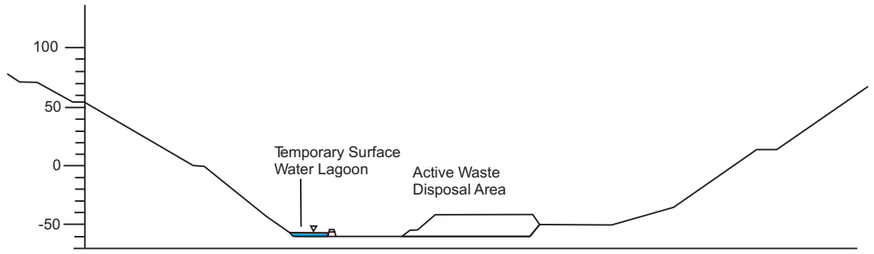
When a lift is completed on one side of the base area, the temporary surface water pond will be relocated to the upper-most surface of the waste, and waste placement activities continued on the opposite side. Refer to *Figure 8.2* below.

Concept landfill plans have also been prepared based on the anticipated average fill rate of 700,000 tpa for Years 0, 5, 13 and 20 of landfill operations respectively. Year 0 represents the quarry void in its current state and Year 20 represents the final rehabilitated landform. It should be noted that these plans were prepared to depict levels and landform within the landfill facility; surrounding landform is the existing landform rather than post development landform. The concept filling plans for the projected landfill life (unless landfilling rates are lower than expected) from Years 0 to 20 are shown in *Figures 8.5 to 8.6* below.

Phase 1



Phase 1



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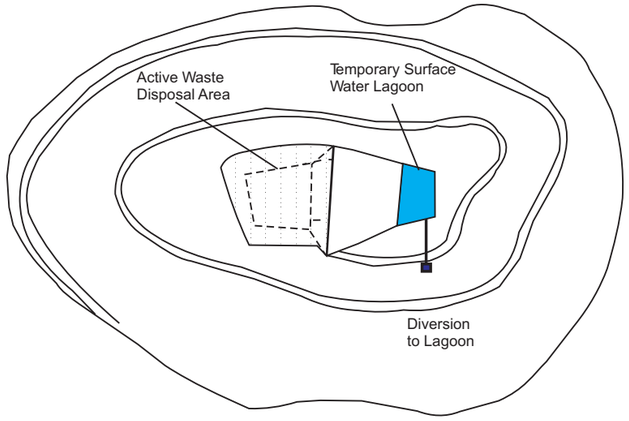

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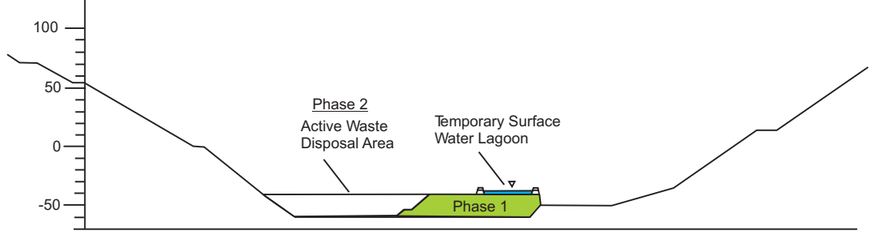

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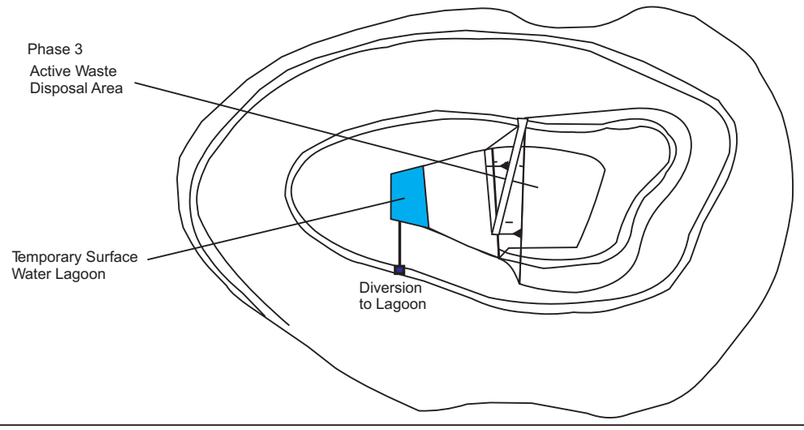

Phase 3

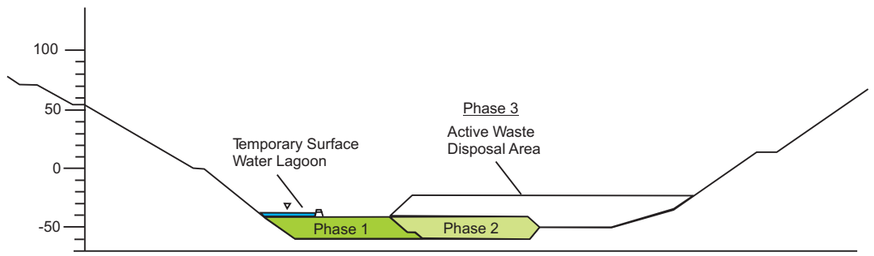

Figure 8.2

Indicative Plan and Section for Landfill Phasing Showing Temporary Surface Water Lagoon

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse		
Drawing No:	0071234s_EA_14		
Date:	09/04/2008	Drawing size:	A3
Drawn by:	ML	Reviewed by:	-
Source:	-		
Scale:	Not to Scale		

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Legend

Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	07-12-07	JS
R1	Contour Labels Added	04-01-08	JS
R2	Annotations Edited	01-02-08	RPC
R3	Labels Edited	01-02-08	RPC

Figure 8.3

Concept Landfill Plan - Year 0

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Business Centre EA		
Drawing No:	0071234s_GIS06	Suffix No:	R3
Date:	09/04/2008	Drawing size:	A4
Drawn by:	RPC	Reviewed by:	JK
Source:	vgt Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

N

0 45 90 180 270 Meters

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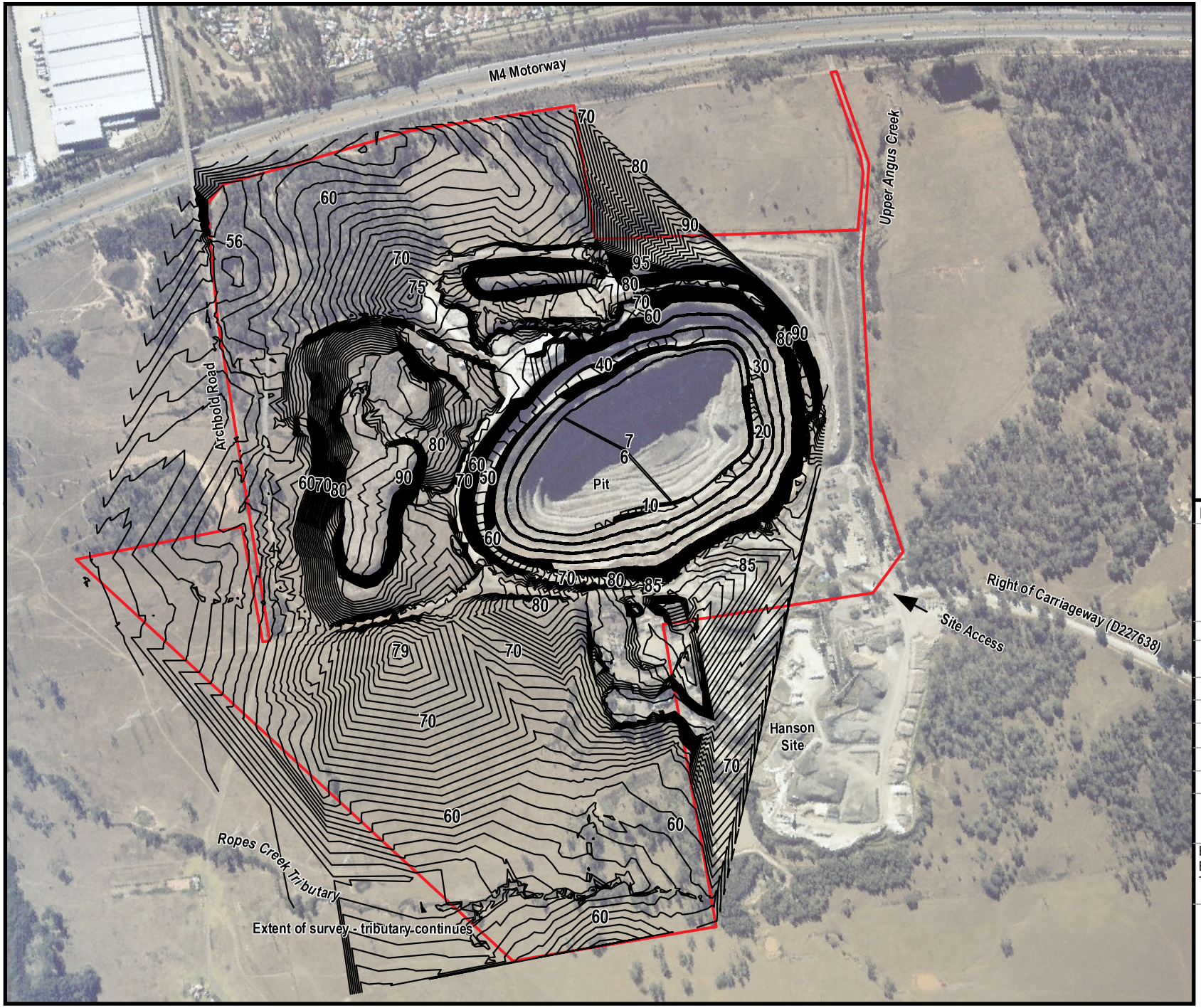

Legend

Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	07-12-07	JS
R1	Contour Labels Added	04-01-08	JS
R2	Annotations Edited	01-02-08	RPC
R3	Labels Edited	01-02-08	RPC

Figure 8.4

Concept Landfill Plan - Year 5

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Business Centre EA		
Drawing No:	0071234s_GIS07	Suffix No:	R3
Date:	09/04/2008	Drawing size:	A4
Drawn by:	RPC	Reviewed by:	JK
Source:	vgt Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

N

0 50 100 200 300 Meters

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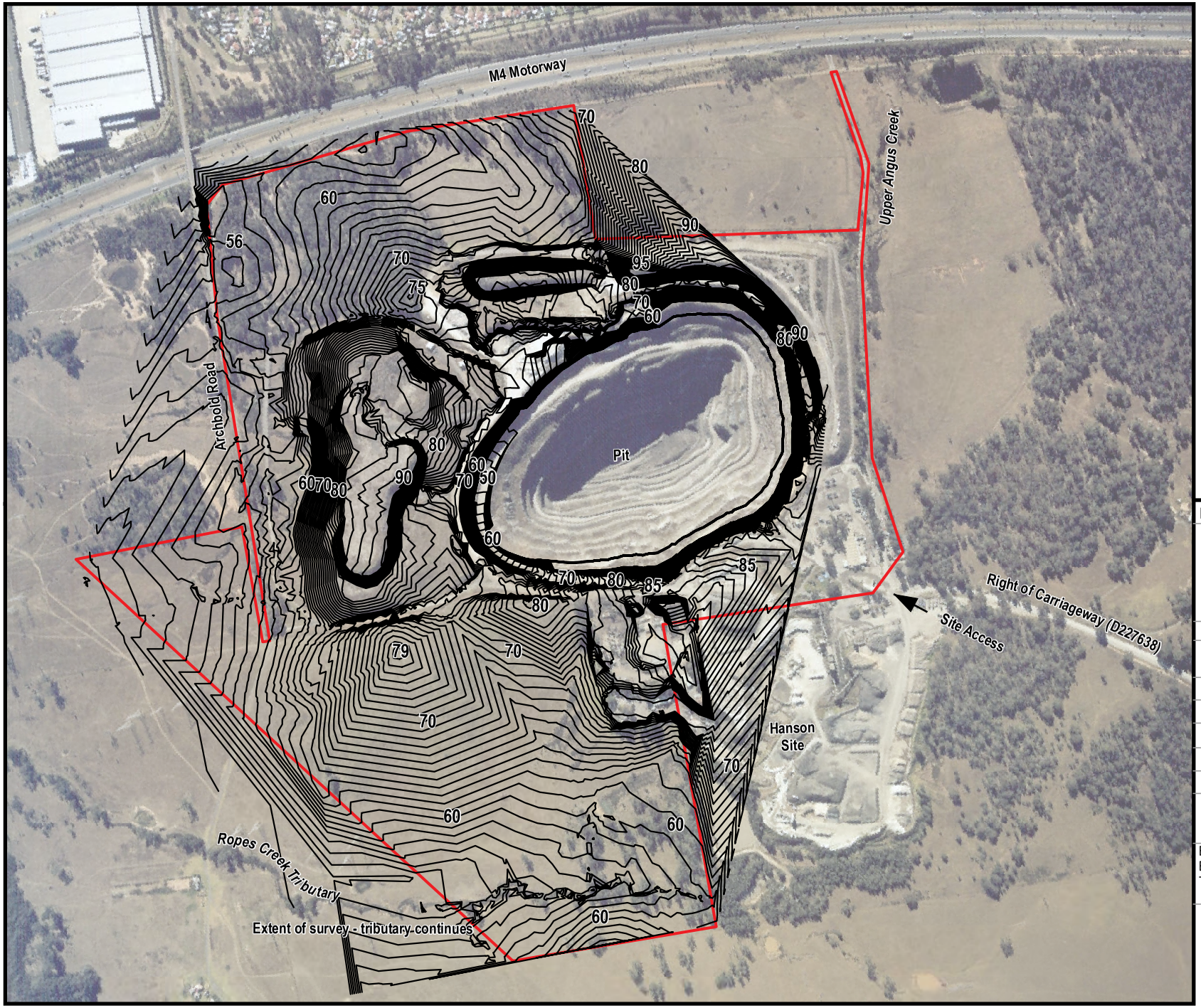

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Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	07-12-07	JS
R1	Contour Labels Added	04-01-08	JS
R2	Annotations Edited	01-02-08	RPC
R3	Labels Edited	01-02-08	RPC

Figure 8.5

Concept Landfill Plan - Year 13

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Business Centre EA		
Drawing No:	0071234s_GIS08	Suffix No:	R3
Date:	09/04/2008	Drawing size:	A4
Drawn by:	RPC	Reviewed by:	JK
Source:	vgt Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

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0 50 100 200 300 Meters

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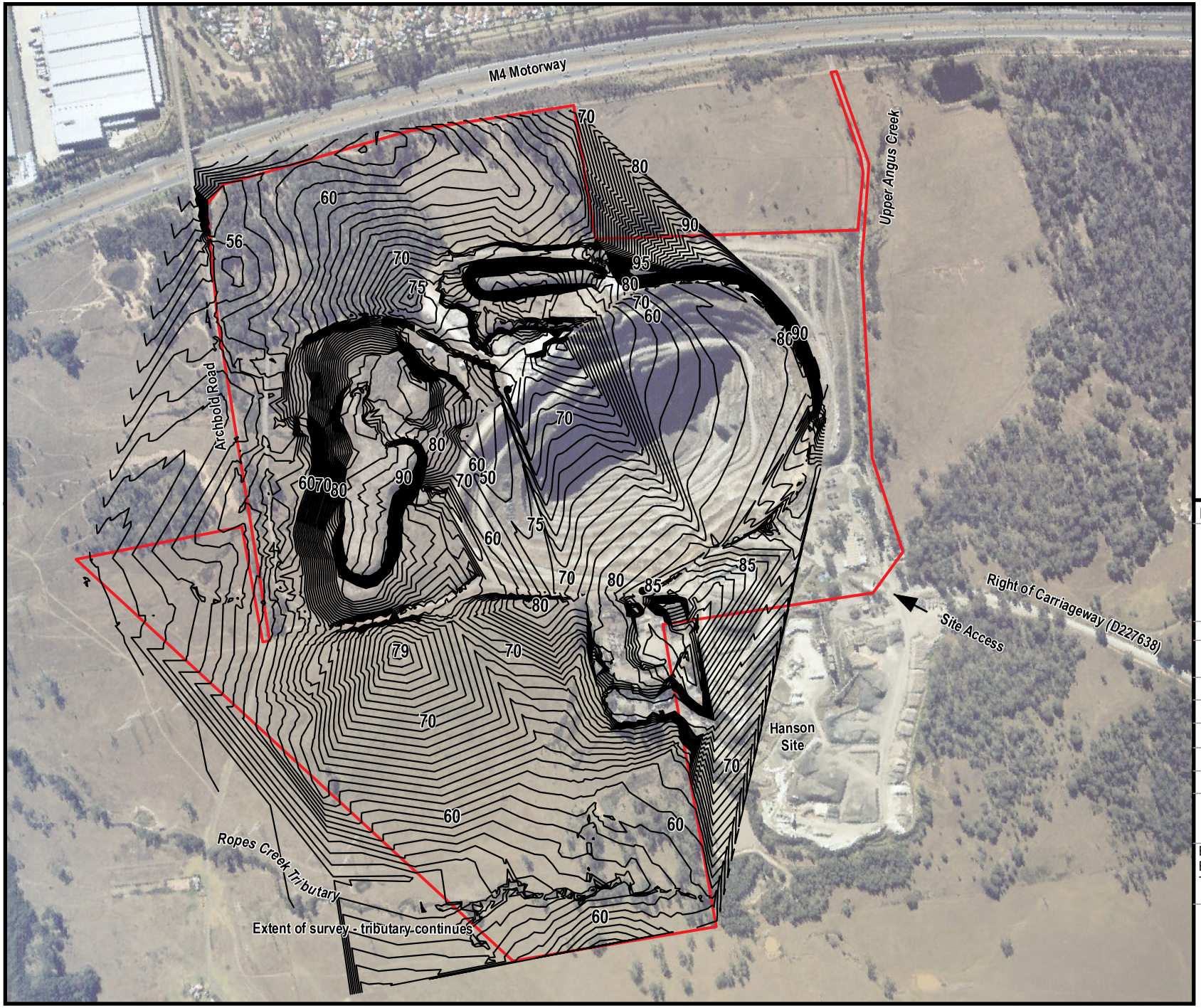

Legend

Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	07-12-07	JS
R1	Contour Labels Added	04-01-08	JS
R2	Annotations Edited	01-02-08	RPC
R3	Labels Edited	01-02-08	RPC

Figure 8.6

Concept Landfill Plan - Year 20

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Business Centre EA		
Drawing No:	0071234s_GIS09	Suffix No:	R3
Date:	09/04/2008	Drawing size:	A4
Drawn by:	RPC	Reviewed by:	JK
Source:	vgt Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

N

0 50 100 200 300 Meters

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8.8 LEACHATE TREATMENT SYSTEM

Leachate at the site is expected to be treated through a sequence batch reactor (or sequential batch reactor) and, provided approval is obtained for its use, will be followed by a 'WaterFresh' treatment system.

8.8.1 Sequence Batch Reactor

Sequencing batch reactors (SBR) or sequential batch reactors are industrial processing tanks for the treatment of waste water. SBR reactors treat waste water such as sewage or output from anaerobic digesters or mechanical biological treatment facilities in batches. Nitrifying bacteria supplied by Sydney Water converts ammonia to ammonium ion as a soluble nitrate. Oxygen is bubbled through the waste water to reduce biochemical oxygen demand and chemical oxygen demand to make suitable for discharge into sewers or for use on land.

The installation of the SBR consists of a tank with raw wastewater coming in at one end and treated water flowing out the other. The raw waste water is distributed over the whole area of the tank. This helps to mix the incoming influent and the returned activated sludge thus beginning the digestion process.

The sequence batch reactor at the site is expected to be used as a primary treatment system which will comply with Sydney Water requirements for discharge to sewer. Tanks to be placed at the site will likely be 110,000 L tanks with decanting capacity of approximately 80,000 L. The approximate treatment period will vary between 7 to 9 hours depending on weather (colder weather requiring longer treatment times). However, ammonia concentrations are expected to be low due to a lower level of green waste/organic material expected to be found in landfilled material thus requiring much shorter time for treatment. In the initial stages of the landfill treatment may not be required if leachate quality testing demonstrates that the untreated leachate meets the trade waste requirements.

Whilst this system treats ammonia to negligible levels effluent after the SBR stage is not expected to be able to be used in dust suppression due to other contaminants (and bacteria) being present.

8.8.2 WaterFresh System

The second leachate treatment stage is expected to consist of the WaterFresh treatment to eliminate all the bacteria, reduce the solids and provide adequate dust suppression water able to be discharged to stormwater or sprayed.

WaterFresh is an Australian water treatment technology company that has developed a modular and innovative method to treat effluent into potable or A + reuse water within one hour. It provides a wide range of solutions to

treating all grades of water using its High Velocity Sonic Disintegrator (HVSD) technology.

WaterFresh Plants utilise a single stage mechanical process to effectively provide total pathogen destruction and hence complete disinfection (a 99.999% reduction of known pathogens in raw sewage). Current design parameters mean that one WaterFresh system is able to treat up to 200,000 – 240,000 Litres per day.

It is expected that the treated effluent from the SBR be run through a series of sand and/or multimedia filters and then into the WaterFresh system. The water may then be stored in tanks for reuse around the site.

Essentially, the SBR will reduce ammonia to negligible levels or totally from the waste water, the filter will minimise the suspended solids and the WaterFresh system will kill pathogens and provide complete disinfection. The proponent's associate commercial entity is presently in the process of seeking approval for operations at Alexandria Landfill. The water treatment systems are expected to be placed on the north eastern side of the quarry (at the surface).

8.8.3 Disposal Of Waste

Primary Disposal Option

The primary disposal option for the treated leachate water is as trade waste. Industrial customers need to meet the conditions of Sydney Water Corporation Trade Waste Management Plan. The relevant trade waste discharge criteria are presented in *Table 8.2*.

A trade waste consent agreement will be sought for the disposal of leachate to the sewer system. Each industrial customer that discharges trade wastewater to the sewer system needs to negotiate a trade waste consent agreement with Sydney Water Corporation. Under a consent agreement, the customer is responsible for managing the wastewater.

The location of the most appropriate connection to the sewer system needs to be investigated through application to Sydney Water Corporation.

Secondary Disposal Options

There are several secondary disposal options that are being considered to reduce disposal volumes of leachate to trade waste. These options include:

1. re-injection into the landfill;

2. irrigation of the active landfill (over the face of the tipping area); and

3. treatment (beneficial use) and disposal over land (landscaping, etc.)

The first two options will be investigated and instituted where possible once sufficient depth of waste is achieved to allow for leachate storage in the waste mass itself. The beneficial on-site reuse of the treated leachate will be investigated upon collection of monitoring data to assess leachate water quality.

8.9 CONCLUSIONS

A variety of options for different components of the leachate collection system have been set out and reviewed in this chapter. The preferred options selected are based on site geology, hydrogeology, water chemistry, water balance and client specifications. In summary, the preferred options for leachate collection are:

- a granular basal layer;
- basal collection pipes embedded in trenches leading to a sump at the base of the landfill;
- leachate collection pipes made from polyethylene;
- a sump located at the western end of the landfill;
- two leachate risers located to the western end of the landfill;
- leachate risers installed on/in side slope by sculpting / excavating or directional drilling; and
- management of surface water runoff into the pit by using drainage infrastructure along in pit haul roads and a temporary holding facility on the waste surface.

The principal areas where the leachate collection system has the potential to fail are:

- clogging of the drainage and pipe network and
- pump failure.

Clogging can be prevented by good system design. Use of a suitable, open rock drainage material to prevent clogging (as above), ensuring gradients at the base are at least 1% and providing a means of flushing the system will help to prevent this.

As a further contingency, the technology exists to flush leachate collection pipe networks from the ground surface using water jets controlled by robotic systems.

There will be one service and one standby pump and two risers to ensure that there is always a means of removing a failed pump.

9 AIR QUALITY

This Chapter presents the outcomes of the air quality assessment undertaken for the Project, which assessed the potential for dust and odour emissions from the Project to impact air quality of the surrounding community. Measures are included to ensure identified potential impacts are appropriately managed.

9.1 INTRODUCTION

An air quality assessment was undertaken for the Project, addressing both construction and operational activities. The key contaminants identified for consideration in this assessment were:

- total suspended particulates (TSP);
- particulate matter less than 10 microns (PM_{10}); and
- odour.

This chapter sets out the key findings of the assessment. The full assessment is presented in the Holmes Air Sciences (April 2008) supporting technical report in Appendix E, *Volume 2*.

9.2 METHODOLOGY

The Holmes Air Sciences (2008) assessment was conducted in accordance with DECC (2005) *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales*. This included:

- a desktop assessment to characterise existing air quality, meteorological conditions and geographical features (e.g. vegetation and landform) of the site and surrounding area;
- identification of emission sources and development of an emissions inventory for the Project;
- computer-based air dispersion modelling of particulate matter emissions from the Project, to predict ground-level dust concentrations and deposition levels in the surrounding areas and at sensitive receivers, undertaken with AUSPLUME v6.0 software, which is a DECC approved model;

- computer-based air dispersion modelling of odour emissions from the Project, to predict odour levels in the surrounding areas and at sensitive receivers, undertaken with CALPUFF v 6.113 software, which is a DECC approved model;

- assessment of predicted air quality impacts against the DECC impact assessment criteria to assess the potential for ambient air quality to give rise to adverse health or nuisance effects or unacceptable odours, taking account of the existing air quality, where relevant.

To account for changes to the landform and equipment elevations as pit filling progresses, the concept landfill plans developed and shown in *Figures 3.6* were input to the dispersion models.

Impacts were assessed for two representative residences (A1 and A2), located approximately 200m north and 430m north-east of the site boundary, respectively, as shown in *Figure 6* of the *Air Quality Report* prepared by Air Holmes Sciences. In addition, to enable a broader assessment of impacts, a study area was set up covering an area of approximately 10km by 10 km, centred on the pit. Model predictions were made at 125 discrete receptors (including nearest residences) located within this study area. The locations of these receptors were selected to provide finer resolution closer to the dust sources and nearby receptors.

A full description of methodology employed is included in the Holmes (2008) supporting technical report in Appendix E, *Volume 2* of this EAR.

9.3 EXISTING ENVIRONMENT

Background air quality is a measure of the existing air quality, prior to the commencement of Project activities. Existing air quality is an important consideration when determining cumulative impacts of the Project on sensitive receivers.

Existing air quality (in terms of dust levels) has been determined from air quality monitoring previously undertaken in the area. DECC measurements of PM_{10} concentrations at St Marys (5 km west of the site) for 2004, 2005 and 2006 are presented in *Table 9.1*. These data have been used to estimate TSP concentrations for these years. Heggies Australia (2006) presented dust deposition monitoring results for two locations near the northern boundary of the site, obtained between January 2004 and July 2006. The average for both sites has been taken as representative of the existing deposition levels at the site. It is noted that this data were collected when quarrying was occurring on the site, which would have contributed to the measured levels. Background air quality is summarised in *Table 9.1*.

Table 9.1 Summary of Background Air Quality

Parameter	2004	2005	2006	Criteria[4]
PM_{10} – Maximum 24-hour average in year ($\mu g/m^3$)[1]	49	55	71	50
PM_{10} – Average for year ($\mu g/m^3$)[1]	17	19	20	30
TSP – Average for year ($\mu g/m^3$)[2]	43	48	50	90
Dust Deposition – Average for year (g/m^2/month)[3]		1.6		2 (incremental) 4 (incremental + background)

1. Source: PM_{10} data is DECC monitoring data for St Marys sourced from DECC (2005b), (2006) and (2007).

2. Source: TSP concentrations were estimated by assuming 40% of the annual average measured PM_{10} concentrations was TSP. This relationship was established by the NSW Minerals Council (2000).

3. Source: Heggies Australia (2006): average of dust deposition measured between January 2004 and July 2006 at two locations near the northern site boundary, on the southern side of the M4 Motorway (i.e. average of 2.4 and 0.9 g/m2/month).

4. Source: DECC (2005a).

The data in *Table 9.1* indicates that existing dust deposition levels and annual average PM_{10} and TSP concentrations in the vicinity of the site are below DECC assessment criterion. The maximum 24-hour average PM_{10} concentrations currently vary from day to day and exceed the DECC criterion of 50 $\mu g/m^3$ criterion on occasions. Excedences of 50 $\mu g/m^3$ have been recorded in many parts of NSW, predominantly due to natural events such as bushfires and dust storms. The highest measurements at St Marys were generally recorded in the summer months, when bushfires are commonly a contributing factor.

The highest average particulate matter concentrations and dust deposition were recorded in 2006, and so these data were conservatively taken to be representative of existing concentrations. It should be noted that the highest 24-hour average PM_{10} concentration recorded at St Marys in 2006 was 71 $\mu g/m^3$, which represents an existing 21 $\mu g/m^3$ criteria excedences and does not permit any further contribution from a project before the DECC (2005a) criterion is exceeded. The maximum average value may only occur once in a year and therefore, given this high background level, further analysis is required to ascertain the likelihood of criteria excedences, given various, more typical background levels.

In summary, the following background levels have been taken to apply both at the site and at the nearest sensitive residential receivers:

- maximum 24-hour average PM_{10} concentration of 71 $\mu g/m^3$
- annual average PM_{10} concentration of 20 $\mu g/m^3$;
- annual average TSP concentration of 50 $\mu g/m^3$; and
- annual average dust deposition of 1.6 g/m^2/month.

9.4 IMPACT ASSESSMENT

9.4.1 Construction

Air quality impacts during construction works for the Project would largely result from dust generated by earthworks and other engineering activities for road and plant construction, and from unsealed exposed surfaces (e.g. caused by vehicle movements and/ or wind erosion). Dust emissions from construction works have the potential to cause nuisance impacts if not properly managed. However, emissions generated during construction are expected to be short-term in duration and can be managed through implementation of the measures described in *Section 9.5.1*.

Dispersion modelling of particulate matter emissions during construction activities was not undertaken as significant off-site impacts are not anticipated. Furthermore, in practice, it is not possible to realistically quantify impacts using dispersion modelling. This is because to do so would require knowledge of weather conditions for the few weeks that work will be taking place in each location on the site.

9.4.2 Operations

The main air quality issues identified in association with Project operations are related to particulate matter and odour emissions to the atmosphere.

Particulate Matter

Particulate matter emissions will be generated from the following sources during operations:

- vehicles travelling to and from the site (along paved roads);
- dumping, loading, sorting, screening and crushing of materials;
- dump truck movements along the in pit haul road (unpaved); and

- wind erosion of the exposed landfill area and stockpiles.

To assess the potential range of air quality impacts throughout operations, three modelling scenarios were adopted, representative of Years 0, 13 and 20 of operations (refer to *Table 9.2* below). Annual dust emissions from each of these sources were estimated, taking into account air pollution controls proposed as part of the Project design, including watering of stockpiles, load-out points and haul routes, with dust emissions reduced according to NPI control factor estimates.

The modelling of dust impacts was conducted on the 'worst case scenario' being landfilling of 1 mtpa of waste resulting in the highest predicted number of vehicles accessing the haulage road which is an unsealed road. It should be noted that the project is seeking approval for an expected rate of landfilling being approximately 700,000tpa however; the air assessment has modelled the 'worst case scenario' which is over and above the expected rate of landfilling.

The traffic data spreadsheet adopted a convention that 296,800 movements referred to as 148,400 trips to the site plus 148,400 trips from the site would occur per annum. Based upon these traffic volumes dust dispersion modelling assumed that there were 148,400 vehicles coming to the site and then 148,400 vehicles leaving the site.

The maximum amount of waste to be transferred to the landfill being 1mtpa was selected over the 0.4mtpa as the best case scenario since the total dust emissions were determined to be higher for the 1 mtpa, providing for a more conservative assessment.

Dust emissions for the 1 mtpa to landfill scenario were approximately 195 t/y while the 0.4 mtpa to landfill estimate was estimated to be approximately 139 t/y. Therefore, the waste landfilled was more important for the dust emission estimates as this activity would be over unsealed haul roads. This is shown in Table 9.2.

It should be noted that the traffic report identifies a minimum and maximum range of traffic accessing the site of between 296,800 - 340,200 vehicle movements/annum. The traffic report assesses the worst case scenario for traffic based on the maximum number of vehicles accessing the entire site, this includes vehicles accessing the sealed roads around the MPC, stockpile areas, administration building and the landfill.

It should be noted that only vehicles movements on the unsealed haulage road down into the pit represents the worst case for dust. The worst case for vehicles movements accessing the haulage road is not based on the maximum number of vehicles accessing the site but on the worst case scenario for landfilling being 1 mtpa. Therefore even if the number of vehicles accessing the site increases in the traffic report to present the worst case for impacts on the transport network these additional vehicles will be moving along the

sealed roads and not down into the pit because movements into the pit will always be restricted to landfilling of 1 mtpa as the worst case scenario.

Table 9.2 Estimated Dust Emissions from proposed Operations

ACTIVITY	TSP emission rate (kg/y)		
	Year 0	Year 13	Year 20
Vehicles coming to site (paved)	20,776	20,776	20,776
Dumping material at MPC or segregated stockpile	3,757	3,757	3,757
Dumping material at WTS	2,254	2,254	2,254
Loading material by FEL for processing	3,757	3,757	3,757
Loading and sorting material by excavator	12,523	12,523	12,523
Screening material	3,938	3,938	3,938
Crushing material	270	270	270
Loading material to stockpiles	6,262	6,262	6,262
Loading material to trucks	10,019	10,019	10,019
Hauling material to landfill (unpaved, inc return)	92,312	27,694	23,078
Vehicles leaving site (paved)	20,776	20,776	20,776
Dumping material to landfill	10,019	10,019	10,019
Wind erosion from exposed landfill area	7,247	7,247	7,247
Wind erosion from soil stockpiles	412	412	412
Wind erosion from other stockpiles	329	329	329
Total dust (kg)	194,651	130,032	125,417

Road haulage to landfill was identified to be the most significant dust generating activity. Therefore, particulate matter emissions are highest during the initial stages of operations, when the haul, distance to the base of the pit is greatest. In practice, dust emissions will be controlled by measures outlined in *Section 9.5.2* to reduce this source of dust to the minimum practicable.

Dust emissions were modelled using dispersion modelling (AUSPLUME software). Modelling takes into account factors such as meteorological information, terrain and pit retention of coarser particles. A detailed outline of the air quality modelling approach is presented in the Air Quality Assessment within Appendix E, *Volume 2* of this EAR, including details on calculation procedures and meteorological conditions.

Incremental (emissions from the Project only) modelling results have been prepared for Year 0 (representative of the worst case impact). It should be noted that these contour plots do not represent the dispersion pattern for any particular day, but show the highest predicted concentrations that occurred at each location for the worst day in the year. The modelling shows that assessed contaminants are predicted to be concentrated around the processing area and decrease rapidly in concentration with distance from the site. With regard to comparison with DECC criteria, the 30 $\mu g/m^3$, 90 $\mu g/m^3$ and 2 g/m^2/month contours for annual average PM_{10}, TSP and deposited dust, respectively, will remain on-site for the worst case dust generating stage of operations (Year 0). The 50 $\mu g/m^3$ contour for maximum 24-hour average

PM_{10} will extend marginally into the residential areas of Minchinbury to the north. This criteria excedences is shown within *Figure 7* of the Air Quality Report within Appendix E, *Volume 2* and is discussed further below.

Table 9.3 summarises the dispersion model predictions for two nearby receivers, at locations R1 and R2 against DECC (2005a) criteria. Ground level concentrations for incremental emissions are given. The potential total cumulative concentration of assessed pollutants was also determined, by combining predicted emissions from the Project for the worst case year of operations (Year 0) with background concentrations of these pollutants in the area.

Table 9.3 Dispersion Modelling Results at nearby sensitive receivers

Receiver ID	Due to project only			Background levels (refer *Section 9.3*)	Total (maximum year from project + existing)	Criteria
	Year 0	Year 13	Year 20			
Maximum 24-hour average PM_{10} ($\mu g/m^3$)						
R1	39	28	27	71	**110**	50
R2	18	9	9	71	**89**	50
Annual average PM_{10} ($\mu g/m^3$)						
R1	5.6	4.5	4.4	20	25.6	30
R2	1.3	0.9	0.9	20	21.3	30
Annual average TSP ($\mu g/m^3$)						
R1	7.0	5.6	5.5	50	57	90
R2	1.4	1.0	1.0	50	51.4	90
Annual average dust deposition (g/m^2/month)						
R1	0.3	0.3	0.3	1.6	1.9	4
R2	0.1	0.1	0.1	1.6	1.7	4

1. Maximum increment has been estimated based on dispersion modelling.
2. Criteria are sourced from DECC (2005a).
3. Criteria exceedences are in bold.

Table 9.3 shows that the ground level concentrations of particulate matter at receivers will decrease as landfilling progresses closer to the surface and in-pit haul distances decrease.

The results in *Table 9.3* show that predicted ground level incremental and cumulative annual average TSP and PM_{10} concentrations and dust deposition at sensitive receivers are well below the relevant DECC criteria. Predicted maximum 24-hour average concentrations of PM_{10} from the Project at sensitive receptors are also below the relevant DECC criteria. However, the approach of adding maximum predicted incremental and background 24-hour average PM_{10} concentrations shows an exceedence of the 50 $\mu g/m^3$ criterion. This is because the maximum measured value of 71 $\mu g/m^3$ does not permit any contribution from the Project before an exceedence is predicted.

The potential 24-hour average PM_{10} impacts have been investigated further for Year 0 by examining the predicted frequency of incremental emissions producing given PM_{10} concentrations at the two nearby receptors. This data was then combined with a range of background PM_{10} concentrations to gain an indication of the approximate number of days when the cumulative PM_{10} concentration will exceed 50 $\mu g/m^3$ for various background levels. This accounts for the fact that existing PM_{10} concentrations will vary from day to day. The results are presented in *Table 9.4*.

Table 9.4 Predicted number of days when PM_{10} concentration exceeds 50 $\mu g/m^3$

Assumed background PM10 level (µg/m3)	Permitted contribution from Project before exceedance is predicted (µg/m3)	Approximate number of exceedences of 50 µg/m3 per year	
		A1	A2
17 or less	33	4	0
20	30	4	0
25	25	5	0
30	20	9	0
40	10	68	2

The probability of the Project causing an exceedence of 50 $\mu g/m^3$ (cumulative impacts) increases, with increasing background levels. *Table 9.4* shows that if the existing annual average PM_{10} concentration (17 $\mu g/m^3$) occurred every day of the year, the Project would not cause any criteria exceedences at R2, however would cause an exceedence of 50 $\mu g/m^3$ at R1 on four days in the year (i.e. the four days when the Project contributes over 33 $\mu g/m^3$ of PM_{10} at this location).

No subdivision is proposed for the proposed development. However, there is potential for future subdivision and industrial development of site land to the west of the area of operations. Based on the dispersion modelling results, some of this area may experience dust impacts of similar magnitude to those predicted for R1, if not properly managed. However industrial receivers are not considered to be as sensitive as residential.

While annual average dust concentrations and deposition levels are predicted to comply with ambient air quality criteria, there is potential for the Project to cause exceedences of the 24-hour average PM_{10} criterion at nearby residences in Minchinbury. Therefore, strict air quality management procedures are required to minimise the potential for adverse short-term air quality impacts. Dust mitigation measures are discussed in *Section 16.5*.

Odour

The Project may potentially generate odour from:

- capped areas of the landfill (no putrescible waste is to be land filled, however a small volume of biodegradable materials may be land filled which could produce odours over time);
- active tip face in the landfill;
- leachate trench in the pit; and
- composting of green waste on-site.

Odour emissions from each of these sources were estimated based on data from previous studies of odour emissions from similar sources. The odour emission estimates used for the assessment are considered to represent the "upper limit" of Project emissions, given the tight controls on materials that will be accepted for landfill, the low proportion of biodegradable materials and assumed maximum extents of odour emitting surfaces in the modelling. Also, landfill gas monitoring at the Alexandria site operated by an associate entity of the Proponent. (EMR, 2005 and 2006) detected negligible methane emissions from the landfill cap. Details of assumptions used for predicting emissions are included in the Holmes Air Sciences (2008) report.

Holmes (2008) used estimated odour emissions from each identified odour source, meteorological information and the CALPUFF (Version 6.113) dispersion model to predict off-site odour levels from the Project. 1-hour average odour levels (expressed in odour units) were predicted at the receptor locations used for the dust modelling. Model predictions were then compared with DECC odour assessment criteria (Refer to *Table 9.5* below).

Table 9.5 Odour sources and emissions used in dispersion modelling

Source	Area (m^2)	SOER ($ou.m^3/m^2/s$)	SOER with peak-to-mean ($ou.m^3/m^2/s$)		TOER with peak-to-mean ($ou.m^3/s$)	
			Neutral (2.5)	Stable (2.3)	Neutral (2.5)	Stable (2.3)
Capped areas	220,000	0.00051*	0.0013	0.0012	280	258
Covered tip face	450	3.83	9.58	8.81	4309	3964
Greenwaste windrows	5,000	0.105	0.263	0.242	1313	1208
Leachate pond/trench	30	0.069	0.173	0.159	5	5

Odour modelling results are shown in *Figure 10* of the *Air Quality Report* (Air Holmes Sciences, April 2008*)* in the form of contour plots and show the extent to which odours are predicted to occur for 99% of the time. The contours extend further to the north and south, consistent with the predominant wind patterns in the area. It can be seen that the most stringent DECC odour criteria of 2 odour units, which is considered to be acceptable for the whole population does not extend into any residential areas. This indicates that adverse odour impacts from the Project would not occur. The results for two nearby residences are presented in *Table 9.6* and also demonstrate compliance with applicable criteria.

Table 9.6 Odour dispersion modelling results at nearby sensitive receivers

Receiver ID	Predicted 99th percentile nose-response odour levels (odour units)	Criteria
R1	1.0	2
R2	0.3	2

1. Criteria are sourced from DECC (2005a)

Adverse odour impacts are not predicted for the project due to maximisation of resource recovery of material with the propensity to biodegrade. However, should the quantity of biodegradable material accepted at the landfill be higher than anticipated, the potential for adverse odour impacts will also increase.

9.4.3 Cumulative Impact

The assessment results presented in *Section 9.4.2* provide predictions of the cumulative impacts of the Project with existing activities in the area. In addition it was considered necessary to assess potential cumulative air quality impacts of the Project with future proposed activities in the area. A concept plan application has been lodged with the DoP for a proposed development at the adjacent Hanson site. This included an air quality impact assessment conducted by Heggies (2006). Dispersion model results presented in the Heggies (2006) report indicated that the predicted maximum 24-hour average PM_{10} concentration from the Hanson site was 2.1 $\mu g/m^3$ at A1. This is a small increment which would not affect the conclusions of this assessment and so no further assessment has been undertaken.

9.5 MANAGEMENT/ MITIGATION MEASURES

9.5.1 Construction

The *Construction Environmental Management Plan* developed for the Project will include the following dust mitigation and monitoring measures to minimise particulate matter emissions during the construction phase:

- use of water carts and watering of exposed surfaces when necessary. This could include spray mists and sprinkler systems for crushing, grinding and chipping operations and on all material stockpiles;
- minimising dust generating activities on days of extreme unfavourable weather conditions when there is a high risk of dust generation e.g. dry, windy conditions;
- defining of trafficked areas;
- imposition of site vehicle speed limits;
- stabilising exposed areas as quickly as possible;
- construction of perimeter berms around the main area of operations to provide a barrier for dust emissions;
- cleaning spills of potentially dust materials immediately;
- wheel wash for all vehicles travelling off-site; and
- sealing of operational surfaces at the RRF.

It is desirable that monitoring be carried out during the construction phase of the Project to assess compliance with DECC criteria. Monitoring may include dust deposition gauges, at the closest residences or other sensitive receivers, to assess compliance.

An Air Quality Management Plan (AQMP) is recommended which could be included in the Landfill Environmental Management Plan (LEMP) and the Environmental Waste Management Plan (EWMP) to be developed for the Project, with a focus on activities which generate the most significant emissions – in this instance those associated with haulage movements and transfer and loading activities.

9.5.2 Operations

Particulate Matter

A number of management and mitigation measures are proposed to reduce particulate matter emissions generated by the Project. In combination with proposed monitoring discussed below, they will ensure that dust emissions are minimised to the most practical extent, and will be included in the WMP to be developed for the Project. These measures focus on activities which generate the most significant emissions i.e. haulage movements and transfer and loading activities and are identified as follows:

- all operating internal roads outside of the pit, and operational areas at the RRF, will be sealed;
- water spray mists and/or sprinkler systems to be used for dust suppression as follows:
    - at crushing, grinding and chipping operations;
    - along perimeter berms
    - at all material stockpiles;
    - along internal unsealed haul roads, applied by water cart at an application rate of at 1 - 2L/minute;
- use of onboard reservoirs on the site dump trucks to allow wetting whilst in motion;
- wetting of vehicles with potentially dusty loads, prior to unloading;
- construction of perimeter berms approximately 10m in height around the main area of operations to provide a barrier for dust emissions;

- planting of trees in berms, which when mature will serve as further mitigation of off-site dust emissions;
- cleaning spills of potentially dust materials immediately;
- regular cleaning of paved roads;
- consideration to application of binding agents to pit haul roads if required; and
- wheel wash for all vehicles travelling off-site.

In practice, the dust emissions are likely to be controlled beyond the level assumed in the modelling, however given that the air dispersion modelling has highlighted the potential for short-term air quality impacts to occur, the operations will need to adopt best practice mitigation measures.

Odour

Measures will be in place to address potential odour emissions from landfill gases and green waste stockpiles.

The proponent has proposed the use of a product referred to as "BioMagic". BioMagic is a solution which acts as an oxidising agent to speed up the bacteria consumption of waste in order to reduce or eliminate odours. This product is proposed for use on any identified odour source at the site including the green waste stockpiles, composting products, the active tipping face and uncovered tipping areas. The product has the potential to control odour emissions from many of the sources listed in *Table 9.5*, although no emission reduction has been assumed for the dispersion modelling.

BioMagic has been tested by the proponent on key odour sources and has been found to minimise emissions. It is recommended that site specific odour sampling be undertaken during operations to test BioMagic as an odour treatment option and reported in accordance with the Environmental Protection Licence (EPL) requirements.

Landfill Gas Management

Landfill gas (LFG) will be managed by perimeter gas drainage layers around the quarry above the regional groundwater table (saturated geology). They are likely to be 25 m *bgl.* The gas drainage layer is likely to be an aggregate filled trench with a width of approximately 1 metre with stages of horizontal and vertical pipes to the surface. They will intercept and vent landfill gas that is migrating towards the periphery of the waste mass, diverting it from entering the adjacent substrate, and will reduce gas pressure along the flanks.

These gas drainage layers will be raised as filling progresses up the pit. It is expected that the trench be capped appropriately to stop infiltration of water, with a final capping provided at the end of landfilling. Gas is expected to be passively vented at the perimeter of the pit or at suitable places with the use of reticulated gas systems.

Following construction of the gas management system, gas monitoring will be undertaken as per DECC (1996) *Environment Guidelines: Solid Waste Landfills*. Unless otherwise approved by DECC, monitoring will be conducted monthly for initial operations, and if no adverse impacts are observed, will be reduced to quarterly after six months of operations and to annually after 18 months of operation.

Monitoring would include a walkover along chimneys with monitoring of landfill gas (methane and hydrogen sulfide) undertaken using a suitable LFG monitor e.g. GA 2000, capable of reading % gas and % LEL. It should also include recording of odour observations.

Monitoring

A real-time dust monitoring and reactive control system will help to identify activities that may lead to off-site air quality impacts. Real-time air monitoring equipment will provide important information on short-term air quality not obtainable from high volume air sampling or deposition jars. The dust monitoring can be used to assess compliance with DECC ambient air quality criteria and access to the data in real-time will enable site operators to modify activities, as required, to minimise dust emissions and off-site impacts. A minimum of one real time monitor (e.g. DustTrak, TEOM, E-Bam, E-Sampler) should be used to identify real-time impacts and delineate short term particulate matter concentrations and thus trigger required maintenance/ repairs or development of engineering solutions.

The data from such a system would enable identification of potential "trouble spots"/ periods of elevated emissions that may occur during routine operations. This data would also enable records of operational dust levels to be maintained and provide opportunity to implement mitigation measures based upon monitoring peaks e.g. increased watering of haul roads)

The monitoring location should be determined through an assessment of potential suitable locations on the site. Dispersion modelling results and meteorological data indicates key impacts and receptors to the north or north-west of the facility and this would be the preference for a monitoring location.

9.6 CONCLUSIONS

Annual average particulate matter emissions and dust deposition rates are predicted to comply with DECC air quality criteria throughout the Project. To ensure that emissions to atmosphere are minimised, a number of management measures will be implemented. In addition, the proponent will implement an air quality monitoring program, inclusive if landfill gas monitoring, to confirm that air quality is not being adversely impacted by the Project and identify the need for implementation of any additional control measures.

10 NOISE

This Chapter provides an assessment of the potential for noise from the Project to impact the surrounding community, taking into consideration the existing noise conditions. It also outlines noise mitigation measures to be employed.

10.1 INTRODUCTION

A noise impact assessment has been undertaken for the Project. It assessed potential noise impacts associated with construction works, general site operations, project-related traffic on the roads surrounding the site and cumulative impacts from the Project and existing industrial facilities in the area. This Chapter sets out the key findings of the assessment. The full assessment is presented in the ERM (2008) supporting technical report in Appendix F, *Volume 2*.

10.2 METHODOLOGY

The noise impact assessment was undertaken in accordance with the DECC (2000) *Industrial Noise Policy* (INP). Other guidelines referenced were the DECC (1994) *Environmental Noise Control Manual* (ENCM) and DECC (1999a) *Environmental Criteria for Road Traffic Noise* (ECRTN).

To characterise and quantify the existing noise environment in the area surrounding the site, monitoring of noise levels was conducted at representative residences (monitoring locations shown in *Figure 10.1*). These residences were selected to represent the worst case receivers for the nearby residential areas of Erskine Park and Minchinbury, respectively. Unattended noise monitoring was conducted for three weeks at these residences. In addition, attended 15 minute measurements were taken at or near to these locations, to gain a better understanding of the existing noise environment, including dominant ambient noise sources and the existing industrial noise contributions. Noise measurements obtained from monitoring were analysed in accordance with the INP.

The impact assessment included modelling of noise from significant noise generating construction and operational plant and equipment, using Environmental Noise Model (ENM) noise prediction software and addressing the DECC's INP with regard to weather effects. To identify potential noise impacts, model results were then compared against applicable DECC impact assessment criteria. A detailed outline of the noise modelling approach is presented in Appendix F, *Volume 2*, including details on calculation procedures, modelling scenarios and plant noise levels.

Legend

- Visiual Barrier Wall
- Site Design
- Detention Basins
- School
- Site Boundary
- Receiver Location

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	Label rotation	11-01-08	JS
R2	Vis Boundry + Sern Change	08-05-08	JS
R3	School Locations Added	04-08-08	JF

Figure 10.1

Sensitive Receiver and Noise Monitoring Locations

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Buisiness Centre EA		
Drawing No:	0071234s_GIS22	Suffix No:	R3
Date:	04/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	© 2007 Google TM		
Scale:	Refer Scale Bar		

N

0 95 190 380 570 Meters

Environmental Resources Management Australia Pty Ltd
Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888

ERM

10.3 EXISTING ENVIRONMENT

Background noise surveys identified the noise environment in residential areas surrounding the site to be dominated by 'urban hum' that is largely traffic related, particularly from the M4 Motorway and Great Western Highway. Minimal industrial noise contribution was identified.

Potentially noise sensitive receivers identified near the site are residences and schools in the nearby suburbs of Minchinbury and Erskine Park. Representative assessment points were selected to represent the worst case general receivers for the residential areas surrounding the site and their locations are shown on *Figures 10.1* (locations R1 to R5). Assessment locations were also set up for Minchinbury Public School (R7) and Erskine Park High and James Erskine Primary (R6).

The results of background noise monitoring are included in the *Noise Impact Assessment* prepared by ERM dated March 2008 within Appendix F, *Volume 2* of this EAR. This data indicates that background noise levels at residences in the vicinity of the site are generally typical of an urban environment. During the day-time, average ambient noise levels were 54 decibels (A-weighted) (dB(A)) at Location R1 and 55 dB(A) at Location R2. During the night-time they were 49 dB(A) at Location R4 and 51 dB(A) at Location R2. Rating Background Levels (RBLs) have been calculated for the monitored locations, based on monitoring data. These RBLs are shown in *Table 10.1* and range from 39 to 47 dB(A) of a day and 37 to 41 dB(A) of a night.

Table 10.1 Rating Background (Noise) Levels at Assessment Locations

Monitoring Location		Rating Background Level, dB(A)			
		Morning Shoulder[2]	Day[1]	Evening[1]	Night[1]
R1	West – Swamphen Street, Erskine Park	38	39	39[3]	37
R2	North – McFarlane Drive, Minchinbury	44	47	47	41

1. Weekdays and Saturdays: Daytime 7am – 6pm; Evening 6pm – 10pm; Night 10pm - 7am. Sundays: Daytime 8am - 6pm; Evening 6pm - 8am; Night 10pm - 8am (INP)

2. In accordance with Section 3.3 of the INP, the morning shoulder (6am-7am) RBL is taken to be the midpoint between day and night RBLs and accounts for steadily rising background noise levels due to traffic.

3. In accordance with the DECC's Application Notes for the INP, adjustments are to be made to the Project specific noise criteria to account for evening noise levels being 1 dBA higher than daytime.

4. Noise data during periods of rainfall and/or wind speeds above 5m/s were discarded.

Noise monitoring data from R1 was considered representative of the noise environment at locations R1 and R2. Monitoring data from R2 was considered representative of locations R3, R4 and R5.

10.4 IMPACT ASSESSMENT

10.4.1 Construction Noise

Construction works for the Project are expected to last for approximately six months, conducted during daytime hours. Typical construction equipment at the surface that would contribute to received noise levels at receivers would include a compressor, transit mixer, excavator, crane and hand tools. Other activities at the base of the pit could include rock cutters and breakers. Noise levels from these sources have been predicted at assessment locations using the ENM. Modelling conservatively assumed concurrent operation of construction equipment at the proposed location of the crushing and screening facilities, as this is the construction area located closest to potentially sensitive receivers. The modelling results are presented in *Table 10.2*.

Table 10.2 Construction Noise Levels

Assessment Location		Predicted $L_{10,15minute}$ Noise Level, dB(A) – Calm Weather	Project Specific Noise Criteria $L_{10,15minute}$, dB(A)
ID	Bearing from Site		
R1	SW	<30	44
R2	W	<30	44
R3	N	38	52
R4	NE	37	52
R5	ENE	30	52

1. Criteria are ENCM criteria for construction periods greater than 26 weeks.

The modelling results in *Table 10.2* show that construction noise is not expected to exceed the relevant criteria at any of the assessment locations.

10.4.2 Operational Noise Levels

Approach to Assessment

To assess the potential range of noise impacts throughout operations (as in-pit equipment progresses closer to the surface), three modelling scenarios were adopted, representative of Years 5, 13 and 20 of operations.

Noise from significant noise generating plant and equipment identified in *Section 3.5.2* was modelled using three-dimensional noise modelling methods (ENM software). Modelling takes into account distance, ground effect, atmosphere absorption and topographical detail. Plant and equipment was modelled at various locations and elevations, representing typical operating conditions. To account for changes to the landform and equipment elevations as pit filling progresses, the concept landfill plans developed and shown in *Figures 3.5* were input to the model. This assessment has conservatively assumed that all plant and equipment operate simultaneously.

Assessment criteria for receivers potentially affected by industrial noise are outlined in the INP which includes the following objectives:

- protection of the community from excessive intrusive noise; and
- preservation of the amenity for specific land uses.

The INP states that these criteria have been selected to protect at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

Both the intrusiveness and amenity criteria need to be met by the Project. The residential intrusiveness criterion is met if the $L_{Aeq,15min}$ noise levels from the newly-introduced source do not exceed the existing RBL by more than 5dB. The criterion for the preservation of residential amenity requires ambient noise levels from all industries to be within the acceptable levels for the particular locality and land uses.

Project specific noise criteria were developed and are presented in the Noise Impact Assessment contained within Appendix F, *Volume 2* of this EAR. Criteria for operational noise experienced at nearby residences are the stricter of the amenity and intrusiveness criteria for residential receivers. For schools, criteria were derived from the INP amenity criteria for schools. To assess the impact of modelled noise levels, comparison has been made with the Project specific criteria.

Figure 10.5 shows the indicative location of plant equipment and operating locations which were assessed for noise impacts.

Daytime

The noise modelling results for Years 5, 13 and 20 of day-time operations during calm weather conditions are presented in *Figures 10.2, 10.3* and *10.4*, respectively, in the form of noise contours. *Table 10.3* summarises these results against Project specific criteria for each assessment location. It can be seen that daytime noise levels are predicted to remain below the relevant DECC criteria at assessed residences and schools for the duration of the Project.

Table 10.3 Predicted Daytime Noise Levels (7am to 7pm)

Assessment Location		Predicted $L_{eq,15minute}$ Noise level, dB(A)			Criteria, dB(A)
ID	**Bearing from Site**	**Year 5**	**Year 13**	**Year 20**	
R1	SW	<35	<35	<35	44
R2	W	<35	<35	<35	44
R3	N	42	43	44	52
R4	NE	42	42	42	52
R5	ENE	36	36	37	52
R6	School - W	<35	<35	<35	45 (when in use)
R7	School - N	<45	<45	<45	45 (when in use)

1. Criteria for R1 to R5 are the stricter of the INP amenity and intrusiveness criteria for residential receivers. Criteria for R6 and R7 are the INP amenity criteria for school classrooms (internal) plus 10dB. This accounts for the fact that as a rule of thumb, even when windows are partially open, external received noise levels will be 10dB higher than those experienced inside.

Legend

Noise Level

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- School
- Receiver Location
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	CTour Data Source Change	11-01-08	JS
R2	School Locations Added	01-08-08	JF

Figure 10.2

$L_{eq,15minute}$ Daytime Operational Noise Levels, dB(A) - Year 5

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Buisiness Centre EA		
Drawing No:	0071234_GIS11	Suffix No:	R2
Date:	01/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	© 2007 Google TM		
Scale:	Refer Scale Bar		

N

0 95 190 380 570 Meters

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ERM

Noise Level

Legend

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- School
- Receiver Location
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	CTour Data Source Change	11-01-08	JS
R2	School Locations Added	04-08-08	JF

Figure 10.3

$L_{eq,15minute}$ Daytime Operational Noise Levels, dB(A) - Year 13

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Buisiness Centre EA		
Drawing No:	0071234s_GIS20	Suffix No:	R2
Date:	04/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	© 2007 Google TM		
Scale:	Refer Scale Bar		

N

0 95 190 380 570 Meters

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ERM

Legend

Noise Level

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- School
- Receiver Location
- 60 dB(A)
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	CTour Data Source Change	11-01-08	JS
R2	School Locations Added	04-08-08	JF

Figure 10.4

$L_{eq,15minute}$ Daytime Operational Noise Levels, dB(A) - Year 20

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Buisiness Centre EA		
Drawing No:	0071234s_GIS21	Suffix No:	R2
Date:	04/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	© 2007 Google TM		
Scale:	Refer Scale Bar		

N

0 95 190 380 570 Meters

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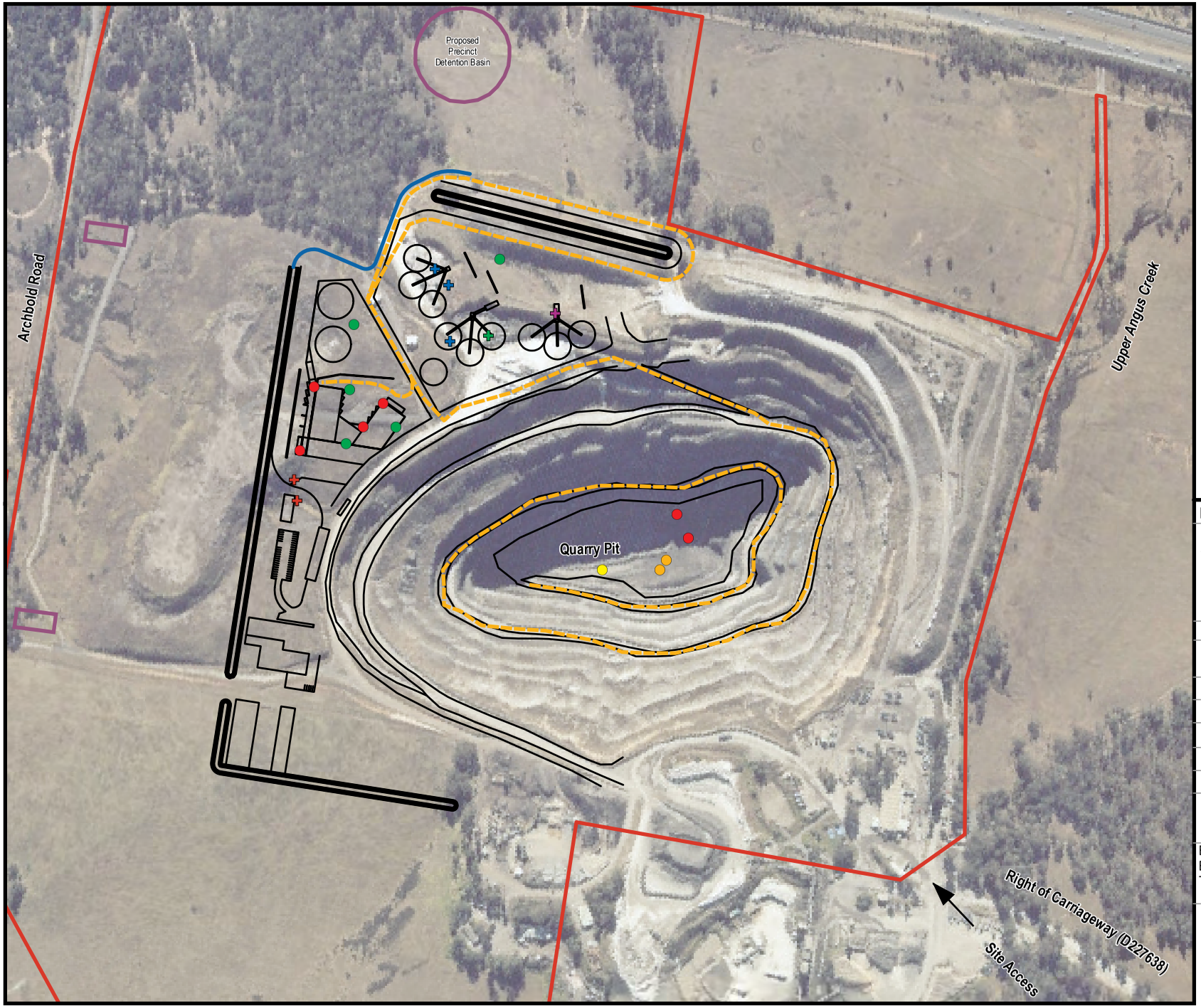
ERM



Legend

- Excavator
- Compactor
- Bulldozer
- Loader
- Forklift
- Mobile Crusher
- Mobile Screens
- Stationary Crusher
- Visual Barrier Wall
- Dump Truck and Water Cart Route
- Site Design
- Detention Basins
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	Equip location source change	11-01-08	JS
R2	Visual Bound+DT Route Change	08-05-08	JS

Figure 10.5

Indicative Plant and Equipment Operating Locations

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse Buisiness Centre		
Drawing No:	0071234_GIS15_R2	Suffix No:	R2
Date:	08/05/2008	Drawing size:	A4
Drawn by:	JS	Reviewed by:	JK
Source:	VGT Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

N

0 25 50 100 150 Meters

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ERM

10.4.3 Evening, Night-Time And Morning Shoulder Period

The noise modelling results for operations during calm weather conditions in the evening, night-time and morning shoulder period (between 6am and 7am, as defined in the INP), are summarised against Project specific criteria in *Table 10.4*. The results indicate that under calm weather conditions, relevant criteria will be met at all of the assessment locations for the duration of operations.

Under various weather conditions, noise levels experienced at a particular location may increase or decrease from those experienced during calm weather conditions. To address the 'worst case' conditions for noise propagation, DECC require assessment of noise levels under 'INP Weather Conditions'. This is wind speeds lower than 3m/s which occur in a particular direction for more than 30% of the time, thereby increasing received noise levels, and/ or the presence of a temperature inversion. Prevailing INP weather conditions for the site were identified based on a review of wind data collected at Horsley Park and assessment of local atmospheric stability.

To assess the worst case scenarios, noise levels from the Project were assessed under moderate inversion (3°C/100m) conditions during the night and morning shoulder period, and during identified prevailing wind conditions during the evening and night. The modelling results are also included in *Table 10.4*.

The results in *Table 10.4* show that noise levels for all stages of the Project operations are predicted to meet the relevant Project specific noise criteria at assessed sensitive receivers under all meteorological conditions during the evening, night-time and morning shoulder period.

Table 10.4 Predicted Evening, Night time and Morning Shoulder Noise Levels (7pm to 7am)

Assessment Location ID	Bearing from Site	Predicted $L_{eq,15minute}$ Noise level, dB(A)									Criteria, dB(A)[2]
		Calm Weather			Prevailing Wind			3°C/100 m Temperature Inversion			
		Year 5	Year 13	Year 20	Year 5	Year 13	Year 20	Year 5	Year 13	Year 20	
						Evening[1]					
R1	SW	<35	<35	<35	<35	<35	<35	-	-	-	44*
R2	W	<35	<35	<35	<35	<35	<35	-	-	-	44*
R3	N	43	43	44	45	45	47	-	-	-	50
R4	NE	42	42	42	49	50	49	-	-	-	50
R5	ENE	37	36	<35	43	43	44	-	-	-	50
R6	School - W	<35	<35	<35	-	-	-	-	-	-	45 (when in use)
R7	School - N	<45	<45	<45	-	-	-	-	-	-	45 (when in use)
						Night-time[1]					
R1	SW	<35	<35	<35	<35	<35	<35	<35	<35	<35	42
R2	W	<35	<35	<35	<35	<35	<35	<35	<35	<35	42
R3	N	35	39	43	42	40	45	43	41	45	45
R4	NE	<35	38	42	44	45	46	43	42	45	45
R5	ENE	35	36	37	40	39	42	39	39	40	45
R6	School - W	<35	<35	<35	-	-	-	-	-	-	45 (when in use)
R7	School - N	<45	<45	<45	-	-	-	-	-	-	45 (when in use)
						Morning Shoulder[3]					
R1	SW	<35	<35	<35	-	-	-	36	37	40	43
R2	W	<35	<35	<35	-	-	-	<35	<35	37	43
R3	N	42	43	44	-	-	-	44	44	46	49
R4	NE	42	42	42	-	-	-	45	45	45	49
R5	ENE	36	36	37	-	-	-	40	40	41	49
R6	School - W	<35	<35	<35	-	-	-	-	-	-	45 (when in use)
R7	School - N	<45	<45	<45	-	-	-	-	-	-	45 (when in use)

- Not Applicable

1. Weekdays and Saturdays: Evening 6pm – 10pm; Night 10pm - 7am. Sundays: Evening 6pm - 8am; Night 10pm - 8am.
2. Applicable project specific design criteria are the lower of the intrusiveness and amenity criteria in each instance. In accordance with the DECC's Application Notes for the INP, adjustments have been made to the Project specific noise criteria to account for daytime noise levels being quieter than evening periods.
3. The Amenity Criteria for the morning shoulder (6am-7am) is based on the 'mid-point' between the originally derived day and night recommended acceptable noise levels, to account for steadily rising background noise levels due to traffic.

10.4.4 Sleep Disturbance

Although site operations will generally not occur during the night time, approximately once per week waste may be received at the site after 10pm from time to time. There is a potential for sleep of nearby residents to be disturbed by transient noise such as truck start up, brake release and heavy door slams during night time waste receival activities.

While there are uncertainties regarding the specific activities which will occur after 10:00 pm , as a worst case, the noise assessment has been conducted in accordance with the INP assessing all plant equipment operating simultaneously over a one-fifteen minute period.

Scheduling activities (modelled) to occur during the night period include waste handling and waste recovery and items used to assess these activities included:

Table 10.5 Scheduling of Activities

o	CAT Dozer D8R	o	HITACHI AH 500 Dump Truck
o	Hitachi ZX230 Excavator	o	CAT 320 CL Excavator
o	CAT 320 CL Excavator	o	Hyster Forklift
o	IVECO T2700 Water Cart	o	Hyster Forklift
o	Hyundai 14LC7 Excavator	o	CAT996 Loader

Using the ENM, night-time maximum noise levels (L_{max}) for the identified L_{max} noise sources associated with truck movements under INP weather conditions were calculated at assessment locations. The results are compared against the sleep disturbance criteria in *Table 10.6*. The criteria are from the ENCM which indicates that to prevent sleep disturbance, the $L_{1,1min}$ (which in this case is conservatively approximated by the L_{max}) noise level from an intrusive source should not exceed the background noise level by more than 15 dB.

Table 10.6 Predicted L_{max} levels from Night-time Operations

Assessment Location		External L_{max} Noise Level From On-Site Trucks, dB(A)		
ID	Bearing from Site	Moderate Inversion (3°C/100 m)	Prevailing Winds LA10 (source to receiver)	Sleep Disturbance Noise Criteria ($L_{1,1min}$), dB(A)
R1	SW	<35	35	55
R2	W	<35	<35	55
R3	N	41	38	56
R4	NE	44	45	56
R5	ENE	<35	36	56

1. Criteria are from the ENCM, which states that to prevent sleep disturbance, $L_{1,1minute}$ noise from a source should not exceed the existing background noise by more than 15 dB

The modelling results in *Table 10.6* indicate the worse case maximum noise emission scenarios during night time operations under INP weather conditions. The results identify that the noise emission comply with the night-time operational criteria as well as meeting the relevant Lmax sleep disturbance goals. Therefore noise emissions are predicted to remain below the sleep disturbance noise criteria at all assessment locations. Therefore night-time operations are not expected to cause sleep disturbance.

10.4.5 Road Traffic Noise

In accordance with ECRTN criteria for an arterial road or freeway, peak $L_{eq,15hr}$ and peak $L_{eq,9hr}$ traffic noise levels generated from traffic on Wallgrove Road and the M4 Motorway for the day (7am to 10pm) and night (10pm to 7am), were predicted using the US Environment Protection Agency's method.

For the assessment of road traffic noise, the following conservative assumptions were made:

- a worst case traffic generation scenario occurs, whereby 2 million tonnes of waste is transported onto the site, 1.6 million tonnes (80%) of which is recycled and transported back off-site (refer *Table 10.7* for assumed vehicle movements);

- all site traffic travels along both Wallgrove Road and the M4 Motorway, in one direction to and from site;

- traffic numbers have been modeled based on 350 working days per annum which is consistent within the number on working days specified within Appendix G - Traffic Impact Assessment Report (Volume 2).

- for assessment of daytime noise, all daily movements (refer *Table 10.7*) assumed to occur during the daytime period between 7am and 10pm; and

- for assessment of night-time noise, one quarter of medium and heavy vehicle movements for daily waste deliveries (approximately 120 movements) occur during the night period between 10pm and 7am. This would include deliveries during standard operating hours between 6am and 7am, as well as movements associated with the occasional delivery of waste after 10pm.

Expected traffic noise levels were calculated for a representative residence off Wallgrove Road (façade 35m from the road) and off the M4 Motorway (façade 75m from the road) and are presented in *Table 10.7*. Noise predictions were made with and without the contribution from Project traffic, to identify the potential change to traffic noise levels resulting from the Project.

Table 10.7 Predicted Traffic Noise –Wallgrove Road (35m from road) and M4 Motorway (75m from road)

Location	Assessment Period	Traffic Noise, dB(A)			Criteria, dB(A)
		Existing	Project Only	Existing + Project	
Wallgrove Road – 35m setback	Day, $L_{eq(15hour)}$	53	51	55	60
	Night, $L_{eq(9hour)}$	48	44	50	55
M4 Motorway – 75m setback	Day, $L_{eq(15hour)}$	54	47	55	60
	Night, $L_{eq(9hour)}$	50	42	51	55

1. Existing traffic noise was established by analysis of L_{Aeq} logging data. Logger data from M2 was used for the M4 traffic noise contribution, and data from the logger at M1 was taken as a conservative traffic noise contribution for Wallgrove Road.
2. Modelled traffic speeds were 100km/h on the M4 Motorway and 80km/h on Wallgrove Road.
3. Traffic data sourced from *Table 10.x*.
4. $L_{Aeq,15hr}$ and $L_{Aeq,9hr}$ criteria are ECRTN criteria for land use developments with potential to create additional traffic on existing freeways/ arterials.

The results in *Table 10.7* show that the predicted traffic noise from existing traffic plus additional vehicle movements from the Project would remain below the relevant ECRTN criteria at the nearest receivers to Wallgrove Road and the M4 Motorway during the day and night. Therefore no significant road traffic noise impacts are anticipated. Additionally, the ECRTN stipulates that traffic arising from a development should not lead to an increase in existing noise levels of more than 2 dB. As shown in *Table 10.7*, Project traffic will not increase existing noise levels by more than 2 dBA.

10.4.6 Cumulative Noise

There is potential for noise emissions from the Project to contribute to existing industrial noise levels and potentially increase cumulative noise experienced at sensitive receivers. However, noise monitoring identified the acoustical environment of the surrounding community to be dominated by traffic from the M4 Motorway and existing industrial noise at receivers west and the north of the site is minimal. Hanson operations adjacent to the site are the main source of existing industrial noise in the area.

Based on daytime attended noise measurements, the industrial noise contribution was conservatively estimated to be 10 dB(A) less than the background noise level obtained from unattended measurements. To determine the potential cumulative industrial noise levels, the Project noise emissions were added to the estimated existing industrial noise emissions. The results are presented in *Table 10.8* for calm and noise enhancing weather conditions, for the worst case noise generating stage of the development, i.e. Year 20. Cumulative impacts are assessed by comparison against the amenity criteria.

Table 10.8 Cumulative Impacts

Assessment Location		Period	Predicted $L_{eq,15minute}$ Noise level LAeq, dB(A)			Amenity Criteria, dB(A) LAeq
ID	Bearing from Site		Calm Weather	Prevailing Wind	Inversion	
R1	SW	Day	36	-	-	60
		Evening[1]	36	36	-	50*
		Night[1]	36	36	36	45
R2	W	Day	36	-	-	60
		Evening[1]	36	36	-	50[2]
		Night[1]	36	36	36	45
R3	N	Day	45	37	-	60
		Evening[1]	45	47	-	50[2]
		Night[1]	43	45	45	45
R4	NE	Day	43	-	-	60
		Evening[1]	43	49	-	50[2]
		Night[1]	42	45	45	45
R5	ENE	Day	40	-	-	60
		Evening[1]	39	45	-	50[2]
		Night[1]	36	42	41	45

1. Weekdays and Saturdays: Daytime 7am – 6pm; Evening 6pm – 10pm; Night 10pm - 7am. Sundays: Daytime 8am - 6pm; Evening 6pm - 8am; Night 10pm - 8am (INP)
2. In accordance with the DECC's Application Notes for the INP, adjustments have been made to the Project specific noise criteria to account for daytime noise levels being quieter than evening periods.

Table 10.8 shows that cumulative industrial noise impacts are predicted to be negligible, with noise levels remaining below the amenity noise goals during all modelled weather conditions.

10.5 MANAGEMENT/ MITIGATION MEASURES

Given the site's location near to residences, due consideration was given from the outset to minimising potential noise impacts to the surrounding neighbours. The Project design incorporates the following noise mitigation measures, which were included in the noise modelling:

- restriction of normal hours of operation to 6am to 10pm, with landfilling operations further restricted to the hours between 6am and 6pm (receipt of material would only occur after 10pm on occasion); and
- construction of impervious barriers at various positions around the facility, including 10 m high barriers to the north, north-west, west and south of the main area of operations and retention of the existing earth mound to the north-east of the quarry pit.

In addition, it is recommended that the following noise mitigation measures be included in a Noise Management Plan prepared for the site, potentially as part of the overall WMP:

- all on-site, fixed and mobile diesel powered plant, excluding road vehicles, are to be correctly fitted and maintained in accordance with the manufacturer's specifications. Particular attention is to be given to engine exhaust systems and the care and maintenance of mufflers.

To reduce construction noise experienced at the nearby residences, the following ENCM time limits for construction activities where construction noise is audible at residential premises will be adhered to:

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

10.6 CONCLUSION

Noise levels generated by the Project during construction and operations are not predicted to exceed relevant DECC criteria at sensitive receivers and can be managed by implementation of management measures outlined in *Section 10.5*. No adverse cumulative impacts from Project noise plus existing industrial noise in the area are predicted. Night-time operations are not expected to cause sleep disturbance and no significant noise impacts from road traffic generated by the Project are predicted.

11 TRAFFIC AND TRANSPORT

This Chapter provides an assessment of impacts of the Project upon traffic and transport, taking into consideration the existing traffic conditions and predicted traffic generation for construction and operation. Mitigation measures are included to ensure identified potential impacts are appropriately managed.

11.1 INTRODUCTION

The Project will generate light, medium and heavy vehicle traffic on the surrounding road network associated with deliveries of waste loads, dispatch of recycled products, service and maintenance activities and general deliveries of fuel and supplies. Some light vehicle traffic will also be generated associated with movements of staff, visitors and subcontractors to and from the site.

A traffic impact assessment has been undertaken for the Project by Transport and Traffic Planning Associates (TTPA). The Traffic Assessment critiqued potential traffic impacts associated with construction works and operations. This Chapter sets out the key findings of the assessment. The full assessment is presented in Appendix G, *Volume 2* of this EAR.

11.2 METHODOLOGY

The assessment addresses the Director General's requirements and issues raised by DECC, DoP and Blacktown City Council, specifically addressing traffic generation under different operational scenarios and the predicted traffic impacts on the existing road network including the intersection of Old Wallgrove Road and Wallgrove Road. The impact assessment addresses the traffic and transport issues associated with the Project in the following manner:

- Discussion of the existing traffic and transport situation based upon the previous use of the quarry by Hanson Construction Materials Pty Ltd and the accessibility of the existing traffic network;
- Identification of the surrounding land uses and predicted traffic impacts on the existing transport network;
- Assessment of the existing transport network and the predicted traffic volumes associated with construction and operation of the Project; and
- Recommendations proposed to ensure that the transport network can be constructed to service the predicted traffic volumes and connect to the future transport network envisaged by the Eastern Creek Precinct Plan and SEPP 59.

11.3 EXISTING TRAFFIC AND TRANSPORT NETWORK

11.3.1 Existing Road Network

M7 Motorway

The M7 is a tolled highway connecting the M2 in the north with the M5 in the south with an interchange for the M4.

The privately owned and operated Motorway, which forms part of the Sydney Orbital Route and connects between the South-Western Freeway at Prestons and the M2 Motorway at Seven Hills has 2 lanes in each direction with a 100 kph speed limit.

M4 Motorway

The M4 Motorway is a State Road and major arterial route connecting between metropolitan Sydney and the Blue Mountains. It is a dual carriageway with 4 to 6 lanes This Motorway has sections of 4 and 6 lanes divided with a variable speed limit including section of 80 and 100 kph speed limit

Great Western Highway

The Great Western Highway is a State Highway and arterial route which functions as a major east-west regional link and provides connection between metropolitan Sydney and Penrith. It has a 4 to 6 lane divided carriageway and a variable speed limit between 60 and 80 kph.

Archbold Road

Archbold Road is a minor collector road that passes over the M4 and connects to the Great Western Highway at its northern end via a recently installed traffic signal controlled intersection. It connects to a private road at its southern end. Archbold Road is currently gated to the north of the M4 bridge and at its southern end and so is generally unable to be used to gain access to the site. It has two lanes and a speed limit of 50 kph.

Wallgrove Road

Wallgrove Road is a State Road and sub-arterial route connecting over the M4 to the Great Western Highway. Access is currently restricted to the south of the M4.

Old Wallgrove Road

Old Wallgrove Road is a local road which connects to Wallgrove Road at its eastern end and terminates in Horsley Park at its southern end. This road has been nominated as the major access to the Eastern Creek Precinct Stage 3 from the east.

The principal existing traffic controls on the road system in the vicinity of the site comprise traffic signals at its intersection with Old Wallgrove Road, the M7 ramp, Wonderland Drive, Great Western Highway and GIVE WAY sign control on the private right-of-way at Old Wallgrove Road.

Vehicle access to/from Old Wallgrove Road is facilitated by the traffic signals at the Wallgrove Road intersection and the ramps to/from the M7. These connections along with the new interchanges between the M7 and M4 and Great Western Highway ensure ready access to/from the arterial road system.

The RTA has also approved 'B Double' truck routes along Wallgrove Road and Old Wallgrove Road.

11.3.2 Existing Traffic Conditions

The opening of the Westlink M7 Motorway has resulted in significant relief to the road network which serves Eastern Creek. In particular, it has allowed for the redistribution of traffic flows out of Wallgrove Road and eased conditions at the major M4 and Great Western Highway intersections.

Vehicle access to/from Old Wallgrove Road is facilitated by the traffic signals at the Wallgrove Road intersection and the ramps to/from the M7. These connections along with the new interchanges between the M7 and M4 and Great Western Highway ensure ready access to/from the arterial road system.

11.3.3 Existing Transport Services

Rail services are available at Rooty Hill Station which is some 4 kms from the site. The only existing bus service in the vicinity of the site is the Busways Route 739 which connects between Mount Druitt and Minchinbury. This service runs along McFarlane Drive, with 30 minute peak frequencies and this is located within convenient walking distance of the site.

11.3.4 Existing Traffic Volumes

The traffic assessment was undertaken using the expected traffic generation associated with the proposed facilities, comparing them to the known traffic generation from the quarry. The established traffic movements for the Pioneer Quarry per annum are shown in *Table 11.1.*

It should be noted that because the quarry was at the end of its extractive life and other uses, Pioneer Quarrying (Hanson) who previously owned the quarry, were operating at reduced levels and the 2006 traffic movements were significantly less than the annualised frequency shown in *Table 11.1.*

Table 11.1 Traffic Generation produced by Pioneer Quarrying Activities

Land Use	Trip Generation
Quarry	70,000
Aggregate storage and distribution	45,000
Premix concrete	80,000
Asphalt	115,000
Recycled products	20,000
Logistics	60,000
Total	390,000 tpa

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The main sources of local traffic around the site have been associated with previous quarrying activities at the site and the current traffic volumes generated by operations at the adjacent Hanson site. The results of traffic surveys undertaken at the Wallgrove Road/Old Wallgrove Road and Old Wallgrove Road/Quarry Road intersections during the morning and afternoon are shown in *Table 11.2*.

Table 11.2 Existing Traffic Volumes at the Wallgrove Road and Old Wallgrove Road Intersection

Road Network	Directional traffic	Morning (am) vehicle Movements	Afternoon(pm) vehicles Movements
Wallgrove Road	Northbound	737	1169
	Right-turn	11	3
	Left-turn	132	32
	Southbound	906	640
	Right-turn	157	43
	Left-turn	114	-
Old Wallgrove Road	Eastbound	26	24
	Right-turn	52	80
	Left-turn	87	97
	Westbound	54	14
	Right-turn	11	9
	Left-turn	35	4
Old Wallgrove Road	Eastbound	104	148
	Left-turn	14	4
	Westbound	168	48
	Right-turn	42	29
Quarry Road	Right	10	4
	Left	46	56

11.4 FUTURE TRAFFIC AND TRANSPORT NETWORK

11.4.1 Eastern Creek Precinct Plan

The Eastern Creek Precinct Plan identified in *State Environmental Planning Policy No.59* outlines the future road network for the Eastern Creek Precinct. An indicative layout is provided in *Figure 5* of the Traffic Impact Assessment, Appendix G, *Volume 2*. Access road connections for the area will involve:

- Four (4) connections along Wallgrove Road including the existing Old Wallgrove Road and Wonderland Drive connection;

- connection along Archbold Road to Great Western Highway and potential ramp connection to/from the M4.

The exact outcome in relation to the major road network connections is still subject to assessments and negotiations involving the RTA, Blacktown City Council and the Department of Planning (DoP). However, the proposed road position remains unchanged and there has been no agreement, undertaking or understanding for redirection of the future access road closer to the quarry than as is indicated in the Precinct Plan.

Old Wallgrove Road will become a 'Sub-Arterial Road' while a 'Main Collector Road' will extend westerly and then northerly linking to Archbold Road.

There will be a number of 'Standard Collector Roads' including the existing Quarry Road (private right of carriageway (ROW)) route past the site which will connect to Old Wallgrove Road to the south-east and Archbold Road to the north-west. The Precinct Plan envisages that the standard collector road including the existing Quarry Road (private ROW) route past the site will have a road reserve of 23.75 metres, with a carriageway width of 5.5 metres (1 travel lane including a parking lane in each direction) and a pedestrian pathway of 3.75 metres and a pedestrian/cycle way of 4.5 metres.

Sims Varley Consultants was employed by Council and the RTA to assess the traffic implications of the proposed development within the Eastern Creek Precinct and identify a road network which would support the future development of the Precinct.

The projections identified in Sims Varley assessment were that there will be some 30,500 employees within the precinct and there will be some 8,700 vehicle trips per hour (vtph) generated in the morning peak and some 10,000 vtph in the afternoon peak.

The road network traffic modelling undertaken included numerous potential scenarios in relation to road links and connections with the arterial road system. The modelling indicated a potential total vehicle flow along the collector road fronting the site of some 1,000 vph (two-way) during the morning and afternoon peak periods (including the projected total site generation).

Currently no built infrastructure or detailed design has been completed for those elements of the Precinct Plan Stage 3 road system that affect the Project site. Consequently, an operational traffic assessment about roads which do not exist is considered speculative.

An operational traffic assessment for an access way onto the Stage 3 road system will be submitted when the following conditions are satisfied:

- An application is made to construct the stage 3 road system by the then owner of the non operational land; and
- when the Precinct road through the adjacent Australand site is constructed and its egress point from the Precinct is known.

11.5 PREDICTED TRAFFIC AND TRANSPORT IMPACTS

11.5.1 Surrounding Land Uses

An understanding of the future road network proposed for the Eastern Creek Precinct and its impact on the Wallgrove Road and Old Walgrove Road intersection is essential as well as an understanding of known future impacts to the road network from surrounding sites. Known traffic impacts to the road network include the Hanson site immediately adjoining the Project site and the Erskine Park Link an RTA project to link Erskine Park Road to Old Walgrove Road. Through an understanding of the future traffic impacts an assessment of the road network capacity can be established.

Hanson Construction Material Pty Ltd Development Proposal

Hanson Construction Materials Pty Ltd leases the southern part of the Pioneer site and has submitted a Development Application to the DoP for concept approval to develop their site for future concrete batching works.

The existing vehicle movements for the Hanson development during the morning and afternoon peak periods is a two-way total of 116 vtph in the morning peak and 93 vtph in the afternoon. The proposed development projects a two-way total of 156 vtph in the morning peak and 125 vtph in the afternoon peak. The projected increase in traffic generation is substantially less than that assessed for that part of the Pioneer site under the Precinct Plan Assessment.

Erskine Park Link

Also relevant to the potential future road network outcome is the Erskine Park Link Road Network Concept and this proposal by the RTA is subject to a current Major Project Application (06/166) which is currently advertised for comment.

The Link includes:

- An east-west link route connecting Mamre Road and Erskine Park Road to Old Wallgrove Road interchange and the M7 Motorway.

- Eastern and western north-south link roads connecting the Erskine Park Link Road to the South West Precincts; and

- A northern access road to Archbold Road connecting to Erskine Park Link Road to the M4 Motorway and Great Western Highway.

The principal differences between the proposed road networks is the extension to the south of Archbold Road and the introduction of the Erskine Park Link Road to meet Old Wallgrove Road.

11.5.2 Impact on the Proposed Road Network

Vehicle access for the Project will involve a number of elements as well as timing/outcome scenarios, namely:

- the access intersections on Old Wallgrove Road (ie Wallgrove Road and Quarry Road);

- use of the existing roadway constructed within the Registered ROW connecting between Old Wallgrove Road and the site boundary;

- use of the section of existing haulage road within Lot 11 558723 (under a Registered ROW benefiting the proponent), Lot 1 400697 and Lot W 419612 ("Haulage Road") which runs along the southern side of the quarry wall; and

- ultimate access connection to the proposed new 'collector' roadway as prescribed in the Precinct Plan.

Old Wallgrove Road / Wallgrove Road Intersection

The existing access intersections on Old Wallgrove Road comprise the traffic signal controlled Wallgrove Road intersection and the GIVE WAY sign controlled T Junction of Quarry Road. These intersections will be upgraded in the future to accord with the Precinct Plan/ Erskine Park Link Road Network schemes. However the timeframe for the undertaking of these works is not established.

The geometry and nature of these existing intersections is suitable for the types of vehicles associated with the proposed development (given the longstanding uses on the site (with heavy vehicles etc) and the other industrial uses in the area which access these intersections which are subject to an RTA approved B Double route.

Existing Registered Right-of-Carriageway

The road proposed under this Project to enter and exit the facility is the existing road which is located as shown on the architectural plans within Annex C. This existing roadway lies within the registered Right of (Carriage) Way (ROW) connecting to Old Wallgrove Road and is a heavy duty bitumen sealed 'industrial style' roadway. The roadway is some 8.0 metres wide, within a ROW some 10.5 metres wide, and is relatively straight and level (slight downgrade towards the east). The roadway, which has been well maintained and is in good condition, has a number of speed control devices (speed humps) which act to constrain undue vehicle speeds and has suitable sight distances to enable safe overtaking of slow heavy vehicles if necessary. It is apparent that this section of roadway will be appropriate and suitable for the Project (ie heavy vehicles and public access). The roadway has been subject to constant use, including heavy vehicles, for many years without any apparent operational or safety problems.

Council has recently expressed the view to the Department of Planning that the ROC only be used until such time as the alternative Precinct plan road is constructed through the Australand land.

The Applicant supports this view and understands that Council has approved a Voluntary Planning Agreement with Australand which generally encompasses this outcome.

The Applicant notes that Collector roads are generally to be provided as part of subdivision works funded by developers and are not included in S94 Contributions Plans.

The proponent will keep and maintain the current road as a two lane carriageway and will seal it with bitumen and mark it with centerline and appropriate signage until the precinct road is constructed. This road is not a permanent road, nor is it proposed as a replacement for the site of the road proposed in the Precinct Plan.

The proponent proposes that the access road that passes close to the southern crest of the quarry will have safety bunds constructed along its northern boundary and that the measures outlined in the geotechnical quarry slope stability assessment report (Appendix K, *Volume 2*) will be carried out.

Traffic Lights at Old Wallgrove Road intersection with the Right of Carriageway.

The applicant understands that the cost of the installation of traffic lights at the intersection of Old Wallgrove Road and the Right of Carriageway (Private Road) or the road which replaces it will be included as part of the costs encompassed by a VPA or the s94 Contributions Plan expected to be published in early 2009.

Existing Haulage Road

The existing section of haulage road running along the southern side of the quarry wall is unsealed and in a poor state of repair and it will be appropriate for a sealed industrial style pavement to be constructed for this section of access. The upgraded roadway should accord with the requirements of AS 2890.2 and be 7.0 metres wide with appropriate widening on bends in accordance with AS 2890.2. This road is a private road for use by the proponent or for persons authorised by the proponent (customers, agents, contractors, employees etc).

A geotechnical investigation has been undertaken with respect to the stability of the quarry wall and recommendations made in relation to stability of the quarry wall to support the roadway. The geotechnical quarry slope stability assessment (Appendix K, *Volume 2*) provides generally for remedial stabilisation measures of the haul road within the quarry lip and also areas adjacent to the top of the quarry.

The proponents propose that the access road to its facility have safety bunds constructed along its northern boundary and that the measures outlined in the geotechnical quarry slope stability assessment be carried out.

Design of the roadway should include the provision of a guard rail along the quarry wall section (ie northern side) to accord with the criteria specified in the RTA Road Design Guide. A central 'barrier' line should also be installed (to prevent overtaking) and a signposted speed limit of 40 kph applied.

11.5.3 Internal Site Circulation

The proposed internal road system is identified on the Site Layout Plan (*Figure 3.3*) and will involve a system of 8 metre wide roadways providing access to the various elements of the development including weighbridges, workshop, Materials Processing Centre, Waste Transfer Station, waste drop-off zone, landfill, administration building and parking areas.

The roadways have been designed to rationalise and facilitate the 'flow' of materials. The main circulation roadways from the MPC will operate with a one-way traffic flow with two-way connectors to/from the drop-off zone and landfill etc. The proposed arrangement represents a very 'logical', efficient and relatively conflict free system for vehicle activity.

To facilitate traffic management and to observe occupational health and safety requirements, advisory (directional) signage as well as regulatory (one-way etc) signage will be provided including a 20kph speed restriction.

The design of the access roads, manoeuvring and carpark areas will be suitable for the intended traffic movements and will accord with the requirements of:

- AS 2890.1 and 2;
- Austroads;
- NSW WorkCover; and
- Council's Development Control Plans.

There is no cross over of traffic proposed between Hanson's facility and that of the proponent. Hanson accesses its asphalt area from within its own site and not via the proponent's road.

11.5.4 Traffic Projections and Limitations

Planning for the road system to serve development within the precinct has comprised a number of separate studies including the Sims Varley study discussed previously and the *Western Sydney Employment Hub Proposed Erskine Park with Road Network Working Paper № 2 Traffic Study* prepared by Maunsell/AECOM in May 2007.

The project site forms part of the Fitzpatrick and Pioneer sites referenced in the Sims Varley assessment and the assessed employee density was 48.8 persons per hectare with each person generating 0.286 vtph in the morning and 0.329 vtph in the afternoon.

The operational area of the RRF and landfill will be some 46.52 ha and putting aside any normal reduction in relation to 'developable land' (which is difficult to define in this case) the traffic generation projection using the Precinct Assessment criteria would result in 2,148 employees (based on 46.52 ha of developable land with an employee density was 48.8 persons per hectare) with a predicted morning peak of 614 vtph and afternoon peak of 707 vtph.

The Maunsell Study undertaken for the RTA adopted a projected traffic generation characteristic for the developed industrial lands of 15 vtph per ha for the morning and afternoon peak periods. The adopted traffic generation for development of the site on this basis was relatively consistent with the Sims Varley estimate with 44 hectares producing 660 vtph.

11.5.5 Proposed Traffic Volumes

Construction

The total construction process will take approximately six (6) months and will involve 30 workers with work undertaken Monday – Friday (7.00am to 6.00pm) and Saturday (7.00am to 1.00pm). Vehicle access during this period will be along the existing access road to/from Old Wallgrove Road. The volume of vehicle movements will vary during the process; however this will not exceed the future operational movements at any time.

Whilst detailed construction planning and programming will be undertaken after approval has been obtained, construction traffic is expected to be associated with three main over-lapping phases: pre-construction, general construction and commissioning.

- Pre-Construction (nominally 6 weeks): Due to the general absence of infrastructure currently on site it is expected that materials transport off-site will be limited to small quantities of commercial waste. There is not expected to be any spoil removal from the site with excavation activities occurring for the installation of services, and road upgrades. It is expected that traffic will include light vehicle movements for 15 workers on-site at one time and an average of 8 deliveries per day with heavy rigid vehicles and concrete trucks (max of 15 per day). Some oversize and curfew based movements are likely for the delivery of major plant, equipment and temporary amenities;

- General Construction (nominally 14 weeks): This phase would involve up to 30 workers on-site at one time and an average of 12 deliveries per day of construction materials and equipment using heavy rigid vehicles, semi-trailers and concrete trucks with occasional low-loader and oversized vehicles. During key construction stages and major concrete pours, the frequency of concrete and other trucks may increase to approximately 40 per day;

- Commissioning (nominally 4 weeks): This phase would involve approximately 40 workers on-site at one time (light vehicle traffic) to ensure plant and equipment are set up and working effectively. There are likely to be an average of five (5) deliveries per day with heavy rigid vehicles and occasional semi-trailer use (max 10 deliveries per day). Some oversize and curfew based movements are also likely for site demobilisation following construction involving the removal of major plant, equipment and temporary amenities.

Due to the following factors, impacts from construction traffic are anticipated to be minimal and are not expected to affect the capacity of the surrounding road network:

- relatively small volume of construction traffic to be generated, which will be no greater than that associated with the former sites quarrying activities. Heavy vehicles will generally be restricted to approved B-double routes, including along Wallgrove Road and Old Wallgrove Road;

- the impact would be short-term, as the construction period is only anticipated to last for six months; and

- construction traffic will generally be restricted to day shift hours between 7.00am and 6.00pm.

The existing private access road more than adequately accommodated the former movements of vehicles accessing the site (including a significant percentage of heavy vehicles). It is apparent that the access movements during the construction phase can be suitably accommodated on this existing roadway particularly with the advantage provided by the traffic signal control at the Wallgrove Road intersections.

Operations

Vehicle access via the existing right-of-carriageway will be utilised until the future precinct access road system is available. The Landfill will have a projected life of 20 years while the RRF will be ongoing. There will be approximately 54 staff employed on the site along with contractors as necessary, operating 7 days per week (6.00am to 6.00pm). The RRF may receive materials after 10.00pm infrequently from essential works such as night road works.

The assessed vehicle movements which will be generated by the operation of the RRF and landfill will vary depending on the level of material recovered (and not used for landfill). These movements will include receipt of waste lands, dispatch of recycled products, general site delivery and the light vehicle movement of staff, contractors and visitors. Details of the minimum and maximum vehicle movement scenarios are provided summarised in *Table 11.3*.

Table 11.3 Projected Maximum and Minimum Traffic Volumes

	Light	**Medium**	**Heavy**	**Total**
Minimum Resource Recovery Rate				
Peak hour	18	23	43	84
Daily	196	222	430	848
Annual	68,600	77,700	150,500	296,800
Maximum Resource Recovery Rate				
Peak hour	20	26	50	96
Daily	220	254	498	972
Annual	77,000	88,900	174,300	340,200

The projected traffic generation outcome for the proposed development will therefore only be some 13 - 15% of that adopted in the Precinct Study and the RTA study. It is therefore apparent that the particular 'nature' of this proposed development is such that it will be a very low traffic generator in any context.

If the projected traffic movements of the Project are combined with that projected for the Hanson development the worst case (maximum) outcome for the morning and afternoon peak periods (ie total movement on the Quarry Road access) will be for the Project 96 movements in the am peak and 96 movement in the pm peak with Hanson contributing 156 movements in the am peak and 125 movements in the pm peak. These combined movements will equate to a total movement of 252 vehicles in the am peak and 211 in the pm peak.

The inbound and outbound trips will be relatively equal (directionally) and it is apparent that this demand will only be some 10% of that available on the 2 lane access road which has a capacity (two-way) of some 2,500 vtph.

The road system and intersections will ultimately be upgraded to accommodate the traffic demands of development in the area in line with the criteria established in the Precinct and RTA documents. However there is a need to consider the traffic implications of development on the site in relation to the existing access intersection arrangements. In this regard, the combined traffic demands of the proposed development and the proposed Hanson development have been considered in relation to the existing (surveyed) background traffic demands and intersection geometry/control arrangements.

It is apparent that the performance of these intersections during the peak traffic periods will be satisfactory. Equally, because the traffic generation of the proposed developments on the site will only be a fraction of that assumed in the road planning studies it is quite apparent that the operation of the future (upgraded) intersections with development in the precinct will also be satisfactory.

Accordingly, both the existing and proposed road systems in the precinct will more than adequately cater for the traffic generated by the proposed development.

11.6 MITIGATION MEASURES

Assessment in relation to the potential traffic implications of the proposed redevelopment has concluded that the internal access and external road systems will be suitable for the traffic needs and circumstances related to the Project. This outcome is largely due to:

- the existing provisions for the historical uses on the site involving heavy vehicle activity; and

- the traffic generation outcome with the proposed development being of a relatively low order and significantly less than that foreseen in the studies undertaken for the planning of the road system to serve development in the area.

Nonetheless, there are a number of amelioration measures relative to each element of access and circulation which will be necessary to ensure appropriate and safe traffic outcomes.

11.6.1 Access Road - Contractual Right Of Way

Proposed Road Network

In order for the road network to accommodate the predicted traffic volume the following works are required to the existing contractual Right Of Way (ROW):

- construct a sealed industrial standard road pavement generally 7.0 metres wide along the existing section of 'haulage road' (AS 2890.2 for design and Council standards for construction);
- install guard rail along the northern side of the road along the edge of the quarry road to RTA standard for design;
- install 'barrier' centreline along the roadway with 40 kph speed restriction and appropriate lighting.

Internal Circulation

- construct a sealed industrial standard road pavement (Council design standard);
- provide appropriate directional and regulatory signposting;
- provide appropriate lighting along the internal road network;
- provide appropriate fencing and barriers to avoid any safety issues in relation to the quarry wall (vehicular and pedestrian);
- provide paved parking areas and line marked areas (AS 2890.1 design standard); and
- ensure that the design provides for the access and maneuvering for all vehicles accessing the site (AS2890.2 design standard).

The proposed internal traffic flow for delivery and pick up of different material types at the facility is identified in *Section 5.2 – Internal Circulation* of the Traffic Impact Assessment (Appendix G, Volume 2).

Future Road Network

The Eastern Creek Precinct Plan identifies a 'standard collector road' through the south-western corner of the site. The future access way to the site is expected to be as indicated in the Precinct Plan.

12 VISUAL AMENITY

This chapter identifies the visual catchments surrounding the project site. The construction and operational impacts of the project are outlined and mitigation measures proposed to limit the visual impact to regional and local settings.

12.1 INTRODUCTION

The objective of this visual assessment is to determine the extent to which the Project will impact on the existing visual landscape, within the site's regional and local landscape setting.

12.2 METHODOLOGY

The methodology used in this visual assessment included:

- characterisation of the visual character of the regional and local landscape and the site and identification of potential viewing points, based on a site inspection and analysis of still photographs, aerial photographs and topographic maps;
- analysis of the proposed site layout to identify planned changes to the visual character of the site; and
- development of management measures to minimise the potential for adverse visual impacts.

The impact assessment is based on the visual absorption capacity of the area surrounding the site and the visual sensitivity of the receivers within that setting.

The visual absorption capacity is the level of contrast of the proposed development to the visual setting within which it is to be placed. A high visual absorption capacity exists where there is minimal contrast and a high level of integration. Conversely, a low visual absorption capacity will occur when the Project has a high visual contrast to the surrounding landscape and there is little or no visual screening, resulting in a more extensive visual impact.

The visual sensitivity is a measure of the level of concern attached by surrounding land users to a change in the existing viewscape and is dependent upon visibility and distance from critical viewing areas. The visual sensitivity of a receiver is also influenced by land use, degree of exposure to the style of development and the length of viewing time.

12.3 EXISTING LANDSCAPE

12.3.1 Regional Setting

The visual landscape of the region surrounding the site is highly variable. It is gently undulating to flat land and reflects:

- low density residential suburbs;
- commercial and industrial development;
- small rural allotments with residences;
- tracts of undeveloped land which are cleared or support remnant vegetation;
- waterways and associated riparian vegetation corridors; and
- transport and utilities infrastructure including the M4 and Westlink M7 Motorways, which are major regional road networks, shared regional cycle and pedestrian pathways and electrical transmission lines.

Other landscape features include Eastern Creek Raceway and Prospect Reservoir, located approximately 2.5 km and 3.9 km to the east of the site, respectively.

12.3.2 Local Setting

The visual character of the locality is variable. As discussed in *Section 1.3*, the site is surrounded by urban areas, industrial development, transport and utilities infrastructure and undeveloped cleared land and woodland areas.

The six lane M4 Motorway and an associated landscaped buffer run adjacent to the northern site boundary, beyond which are low density residential areas of Minchinbury and an industrial area. The landscaped buffer is approximately 20 m wide to the south of the M4 and 50 m wide to the north.

The residential areas are characterised by urban streets and predominantly single and semi-detached dwellings of brick veneer and tiled roof construction, with associated gardens, garden sheds, swimming pools and fencing.

Visual elements of the industrial area are large steel clad sheds, which are dominant features in the local viewscape, and associated sealed car and truck parking and hardstand areas.

The channel of Upper Angus Creek originates adjacent to the eastern site boundary and runs in a northerly direction into an artificial channel through Minchinbury. It is flanked by sparse trees and by undeveloped cleared land which extends east and is backed by a vegetated woodland area.

The Hanson site to the south-east of the quarry pit includes administration buildings, car parking areas, site roads, asphalt batching plant, stockpiles, a crushing plant and associated infrastructure.

To the south and west are undeveloped grazing lands associated with the Ropes Creek regional open space corridor. These lands are cleared; with patches of trees and regional high voltage overhead electrical transmission lines which are dominant visual features of the locality. Ropes Creek flows in a northerly direction to the west of the site and its riparian zone is densely vegetated. Archbold Road runs adjacent to the western site boundary. The residential suburb of Erskine Park is located approximately 800 m to the west. An industrial facility and the Sydney West Substation are located approximately 500 m and 1 km to the south-east, respectively.

12.3.3 The Site

Visual features of the site itself are the former quarry pit, associated unsealed roads, steep banked overburden stockpiles up to 30m in height to the north and west of the quarry pit and a weighbridge shed and two abandoned tin farm sheds to the west of the quarry pit. The south of the site slopes gently toward a minor tributary of Ropes Creek, which is flanked by scattered stands of trees. Stands of trees are visible along the western site boundary and in the south-eastern, north-western and north-eastern corners of the site, including a densely vegetated woodland area in the north-west. There is a dam in the north-western corner of the site. The remainder of the site is gently undulating cleared grazing land.

12.3.4 Visual Catchment

The visual catchment is defined as the area in which the development will be visible, and is limited by distance, topography and the presence of any screening features such as vegetation. Distant views where a wider landscape is viewed and details are obscured are less significant than closer views.

The area from which the proposed area of operations is visible is depicted in *Figure 12.1*. Currently, the Hanson site is the only receiver which can experience uninterrupted views across the area where the majority of operations are to be focussed. Due to distance, topography and intervening structures, these views are only possible from the western edge of the Hanson site.

Interrupted views of the proposed locations of the OSD basin and the north and north-west berms and visual barriers can be experienced from the M4 and from a small number of residences in Minchinbury. The nearest residences are located approximately 120m from the northern site boundary, however views from these residences are fully screened by vegetation and the M4 embankments (refer *Photograph 12.1*). *Photograph 12.2* provides a view toward Minchinbury from near the proposed location of the northern berm and visual barrier and shows that very few residences will have views into the site, due to the presence of screening features.

Some residences in Erskine Park will have distant obscured views of part of the internal road network through a narrow gap between the west and south berms. Otherwise, there are no views into the proposed area of operations from the west, including from Archbold Road due to shielding by overburden stockpiles (see *Photograph 12.3*) and dense Cumberland Plain Woodland vegetation, or from the south due to an intervening east west ridge (see *Photograph 12.4*). There are no receivers with elevated views of the site.

Legend

- Visual Catchment Boundary
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	20-11-07	JS
R1	Labels Edited	06-02-08	RPC

Figure 12.1
Visual Catchment of Proposed Area of Operations

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Business Centre EA		
Drawing No:	0071234s_GIS05_R1	Suffix No:	R1
Date:	06/02/2008	Drawing size:	A4
Drawn by:	RPC	Reviewed by:	JK
Source:	LHBC		
Scale:	Refer Scale Bar		

N

0 50 100 200 300 Meters

Environmental Resources Management Australia Pty Ltd
Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888

ERM

Photograph 12.1

Facing South toward Site from Minchinbury

Photograph 12.2

View from the Proposed Location of the North Berm, to Michinbury to the North

Photograph 12.3

Facing East toward Site from Archbold Road

Photograph 12.4

Facing North towards Proposed Area of Operations from the Southeast of the Site

Photograph 12.5

Existing Industrial Facilities in the Minchinbury Industrial Area, to the Northwest of the Site

Photograph 12.6

View across the Site from the M4 Motorway

Photograph 12.7

Views across the Site from the Western Edge of the Hanson Site

Photograph 12.8

Weighbridge Shed on the Site

12.4 IMPACT ASSESSMENT

12.4.1 Construction Impacts

As outlined in *Section 3.2*, construction works will be temporary, taking place over an estimated period of six months. During this time additional equipment such as cranes and excavators will be present on the site. The majority of construction activities will take place behind the berms or overburden stockpiles, which will shield inward views. As construction activities will be concentrated in areas where operations will be focussed, potential visual impacts associated with construction and operations have been considered below. Impacts can be minimised by implementation of mitigation measures included in *Section 12.5*.

12.4.2 Operational Impacts

Built elements constructed for the Project, including steel clad sheds, parking and hardstand areas and internal roads, will be similar in appearance to those associated with existing industrials areas throughout the region. In addition, there are several major roads throughout the region subject to high traffic volumes, including heavy vehicles, so Project traffic is not expected to noticeably impact visual amenity of the region.

Table 12.1 summarises receivers where viewscapes may change due to the Project and assesses the potential impact on the basis of their visual absorption capacity and visual sensitivity. The components of the Project which will alter the existing viewscapes are described below. Potential impacts from site lighting are discussed in *Section 12.4.3*.

It should be noted that if the land to the south and west of the proposed area of operations is subdivided, regraded and developed in the future, up to eight metres of the top of the MPC/ WTS structure may be partially visible above the berm, to these areas and to Erskine Park. This would depend on final RLs of surrounding development (which are expected to be lower than the proposed area of operations for the Resource Recovery Facility and Landfill Facility). However if visible, this would have negligible impact on visual amenity at these locations due to the following:

- the RRF structure will be similar in appearance to existing industrial facilities in the locality and will use muted colours;

- views from Erskine Park will be obscured by distance (located further than one kilometre from the operations area), vegetation and potentially by future industrial facilities within the Precinct; and

- views from the land surrounding the proposed area of operations are not considered significant as this land is zoned as industrial and so future land uses would likely be for industrial use, with structures that are similar in appearance to the MPC/ WTS.

Visual Barriers and Amenity Berm Reshaping and Landscaping

Overburden material surrounding the pit and adjacent to the proposed area of operations will be reshaped to form the north, west and south earthern amenity berms. This will include raising the overburden stockpiles to the north of the pit by up to five metres in some sections and reducing it by up to two metres in other sections, and potentially reducing the height of the stockpiles to the west by up to 11 m in some places. In addition the north-west berm will be constructed as a visual barrier wall to a height of approximately 10 m, which will eliminate any impact on the small area of woodland vegetation within the EEC. The north-west visual barrier will be largely shielded from potentially sensitive receivers by the remnant woodland vegetation. The north-west visual barrier wall will be coloured to conform with the surrounding vegetation and the amenity berms will be landscaped by planting native vegetation.

Processing and Administration Area

This area is located in a depression and is to be shielded by earthern berms and overburden stockpiles, as well as by a ridgeline to the south, which will limit inward views. The proposed layout of the processing plant and associated infrastructure can be seen on *Figure 3.2*. The following elements of the processing and administration area will constitute a change to the existing viewscape:

- materials stockpiles to heights less than the berms and typically with diameters of approximately 35 m;
- processing infrastructure including crushers and screens;
- drop off faces up to seven metres high which will appear as stepped earth embankments;
- administration centre which will be a building with dimensions of 26 x 14 x 7 m;
- workshop which will be a steel shed with estimated dimensions of 78 x 33 x 8 m;
- MPC/ WTS which will be a steel clad shed with approximate dimensions of 110 x 80 m and an irregular roof with a maximum height of 17 m;

- rain water tanks;
- wheel wash; and
- sealed car and truck parking areas.

These elements will not be visible from off-site locations, other than at the adjacent Hanson site.

Landfill Facility

The visual appearance of the quarry pit will be altered as landfilling occurs, eventually completely filling the void and creating a final landform consistent with surrounding lands (refer *Section 3.9*). This is expected to constitute a positive impact on visual amenity. As landfilling progresses closer to the surface, some views of landfilling operations, plant and equipment in the base of the pit will exist from the western edge of the Hanson site. Activities within the pit will not be visible from other receivers.

On-Site Detention Basin

The OSD basin to be constructed in the northern portion of the site will appear as a naturalised pond, similar in appearance to the existing dam in the north-west corner of the site. It is expected to constitute a positive visual change.

General Site Movements

Trucks associated with waste deliveries, dispatch of waste and recycled products and movement of waste materials around the site and to and from the landfill facility, along with front end loader movements around the drop off zone will be the most common vehicle movements visible across the site. Other movements will include the water carts and smaller utilities transporting personnel to and from activity areas.

Table 12.1 Receiver Locations, Changes to Viewscapes Resulting from the Project and Impact Assessment

Receiver	Changes Resulting from the Project	Visual Absorption Capacity	Visual Sensitivity	Impact Assessment
Road users on the M4 (refer to *Photograph 12.6*)	• Berm reshaping and landscaping; • Water tanks; • OSD basin; and • General site movements.	High	Low	Users of the M4 are considered to have a low visual sensitivity given that their views will be brief as the speed limit is 100 km per hour and will be partly obscured by an existing corridor of trees. *Photograph 12.6* depicts the existing view of the site from the M4. It is not expected that the reshaping of the berms or the construction of the north-west visual barrier wall would be noticeable to motorists and proposed landscaping would increase the visual amenity of the berms and the colouring of the barrier wall will compliment the surrounding vegetation. The OSD basin is expected to be a positive addition to the viewscape. Vehicles may be viewed travelling around the ring road on the northern side of the north berm, however given that receivers are on a major road; this is not expected to have a significant impact.
Road users and residents of Minchinbury (refer to *Photographs 12.1* and *12.2*)	• Berm reshaping and landscaping; • Water tanks; • OSD basin; and • General site movements.	High	Moderate	Residents and road users of Minchinbury have a moderate visual sensitivity given the overall sensitivity assigned to views from residences and the proximity of these areas to the site. However only a limited number of locations within Minchinbury have views across the site, due to screening by vegetation bordering the M4, garden and site vegetation and the intervening M4 embankment (see *Photographs 12.1* and *12.2*). Residences with views to the site are generally those located at higher elevations further to the north and thus have more distant views. The reshaping of the berms, construction of the north-west visual barrier and OSD basin and general site movements will not have a significant impact on these receivers due to their proximity to the site (distant views). The OSD basin and proposed landscaping of berms are expected to be positive additions to the viewscape.

Receiver	Changes Resulting from the Project	Visual Absorption Capacity	Visual Sensitivity	Impact Assessment
				Furthermore, these locations have significant existing views of road traffic on the M4. Management measures provided in *Section 12.5* will be implemented to minimise potential visual impacts.
Residents of Erskine Park	• General site movements	Low	Low	Residents in Erskine Park are considered to have a low visual sensitivity as they will only be able to view a very small part of the operational area of the site and views will be obscured by distance (located further than one kilometre from the proposed area of operations) and vegetation within the suburb and around Ropes Creek. Vehicles will be viewed travelling along internal site roads for brief periods of time as they pass between the southern and western berms. However due to the brevity of these views, screening, distance and the fact that these residences have existing views of vehicle movements along roads, this will not significantly impact upon their visual amenity.
Hanson site (refer to *Photograph 12.7*)	• Processing and administration area; • Berm reshaping and landscaping; • Water tanks • Landfill Facility; and • General site movements.	High	Low	The Hanson site will have distant views of the main area of operations and views of the landfill facility from their western area of operations. Due to the industrial nature of the site, and the fact that many elements including sheds, stockpiles, crushing facilities and truck movements will be similar to those at the Hanson site, the visual impact is not likely to be significant. The visual impact of in-pit activities is not expected to differ significantly from previous in-pit quarry operations conducted by Hanson. Filling and rehabilitation of the quarry pit is expected to have a positive visual impact.

12.4.3 Site Lighting

Site operations will generally be undertaken until 10 pm and from time to time may be conducted later than 10pm. To ensure that night-time operations are carried out in a safe and efficient manner, site lighting is required. There will be no lighting of the pit. Lighting that may be visible from off-site will be located at the following places:

- MPC/WTS facility and processing/ stockpiling areas;
- along internal access roads and from vehicle headlights; and
- other infrastructure zones frequented by staff including car parks, workshop, administration offices and weighbridges.

Light spill beyond the main operational area of the site will be restricted by screening features including the berms and overburden stockpiles, and by distance. Other than at the Hanson site, it will generally be seen as a low distant glow. It is unlikely to produce additional glare to an extent that would cause a reduction in the vision of motorists along Archbold Road or the M4. Some lighting of internal roadways and operational areas will be visible to the Hanson site, however site buildings will provide some shielding and this facility already has considerable night time lighting so the impact will be minimal. In general, lighting will be restricted to the minimum necessary for safety and efficiency purposes and will be directed into the site through the use of directional lighting equipment and shielding.

It should be noted that the site is adjacent to the existing built up area of Minchinbury, with associated lighting from buildings and street lighting, and to the Hanson site which has considerable night time lighting.

Subject to implementation of the mitigation measures discussed in *Section 12.5*, lighting from the Project is expected to have a low visual impact on the surrounding area.

12.5 MANAGEMENT/ MITIGATION MEASURES

Visual impacts of the Project will be minimised by implementation of the following management measures:

- material stockpiles, waste, plant, equipment and vehicle parking will be restricted to designated areas, including during construction;
- buildings to be constructed using muted colours as used for the weighbridge shed depicted in *Photograph 12.8*;
- where possible, highly reflective materials/ colours are not to be used on the site, unless necessary for safety reasons;
- landscaping works to be undertaken in a timely fashion along internal roadways, on berms and around the administration building, with landscaped areas to be maintained throughout operations;
- lighting to be kept to a minimum necessary to safely carry out operations;
- lighting to be directed away from residences through the use of directional lighting equipment and shielding; and
- external lighting to be designed in adherence with relevant Australian Standards, including AS4282-1977 '*Control of Obtrusive Effects of Outdoor Lighting*' and AS1158 '*Lighting for Roads and Public Places*'.

12.6 CONCLUSION

There are a limited number of receivers with views across the site. Changes to viewscapes resulting from the Project will be relatively minor and its visual character will be similar to other industrial facilities in the locality. Retention of much of the site's existing landscape features, shielding of the main area of operations by berms and implementation of management measures discussed in *Section 12.5* will minimise potential impacts to visual amenity. The Project is expected to have a low/negligible visual impact on the viewscapes from residences in Minchinbury.

13 ECOLOGY

This Chapter provides an assessment of potential impacts of the Project upon threatened species, populations and/ or endangered ecological communities identified at and surrounding the site. It also identifies appropriate mitigation measures.

13.1 INTRODUCTION

Keystone Ecological (2007) completed an ecological assessment of a proposed bulk earthworks facility and use of the site as a materials processing centre (MPC), waste transfer station (WTS) and general solid waste (non putrescible) landfill within the existing quarry void. The Keystone Ecological (2007) assessment was for a preliminary Project design which had a larger development footprint and involved partial removal of areas of two Endangered Ecological Communities (EECs). Since the time of this assessment, some elements of the Project design have been removed to aviod impacts to the EECs identified on the site. Otherwise the development footprint is unchanged.

The overall aim of the ecological assessment was to determine the extent of potential impacts of the Project on threatened species, populations and ecological communities listed under State and Commonwealth Legislation and to ensure appropriate safeguards and strategies are put in place to avoid, mitigate and/or ameliorate potential impacts on ecological resources. The full methodology employed by Keystone Ecological (2007), lists of species identified at the site and assessments of the significance of impacts on threatened species and Endangered Ecological Communities (EECs) identified as occurring or potentially occurring at the site are presented in *Annex D*.

13.2 METHODOLOGY

The Keystone Ecological (2007) assessment included vegetation mapping, assessment of fauna habitat value and flora and fauna surveys targeting threatened species having potential to occur at the site. To obtain information on flora and fauna species and vegetation communities likely to occur on the site or surrounding area, background literature and vegetation maps were reviewed and database searches undertaken. The following information sources were used:

- DECC Wildlife Atlas Database search for threatened species listed under the TSC Act previously recorded within a 10km radius of the site (the 'locality');
- Department of the Environment, Water, Heritage and the Arts (DEWHA) online search for Matters of National Environmental Significance (NES) under the EPBC Act recorded within the locality;

- Native Vegetation of the Cumberland Plain (NPWS, 2002);
- The Native Vegetation of the Cumberland Plain, Western Sydney (Tozer, 2003);
- Eastern Creek Precinct Flora and Fauna Study – Report to Blacktown Council (Australian Museum Business Services (AMBS), 2002); and
- Rare Bushland Plants of Western Sydney (James, McDougall and Benson 1999).

Field surveys were conducted across the site on 7 and 12 December 2005 and 24 and 27 January 2006. Further site assessment was carried out in January, February and March 2007. A detailed description of field survey methods is provided in *Annex D*. In summary, random meander walking transects according to the methodology of Cropper (1993) were used to sample flora species across the entire site (refer *Figure 13.1*). All species encountered along these transects were recorded. Fauna surveys included spotlighting, call detection and playback, specific habitat searching, including for hollow-bearing trees that may be used by birds, reptiles and arboreal mammals, and visual observations for fauna and signs of their presence e.g. tracks and scats.

The impact assessment prepared by Keystone Ecological (2007) considered the removal of some small areas identified as EEC within the site however, the current proposal has been altered slightly and no areas identified as EEC's would be removed as a result of the current proposal. The Keystone Ecological (2007) report addressed considerations under Section 5A of the EP&A Act, so where necessary further assessment was conducted to address any additional assessment requirements under Part 3A of the EP&A Act.

13.3 EXISTING ENVIRONMENT

13.3.1 Vegetation

The majority of the site is cleared, containing open grassland dominated by weed species. Large areas of the site have been highly disturbed by quarrying and bulk earthworks and all original vegetation has been removed from the quarry and overburden stockpiles. This is typical of the vast majority of the proposed area of operations. Natural vegetation on the site is restricted to a few small disturbed woodland remnants, located along the western site boundary and in the south-eastern, north-eastern and north-western corners of the site.

Of the natural vegetation on the site, the dominant vegetation community is Shale Plains Woodland. Keystone Ecological (2007) identified this community to be representative of *Cumberland Plain Woodland* (CPW) which is listed as an EEC under the NSW TSC Act and the Commonwealth EPBC Act. Its occurrence across the site is depicted in *Figure 13.1*. Keystone Ecological (2007) identified this community to be dominated by a sparse tree cover of *Eucalyptus moluccana* (Grey Box) with occasional *Eucalyptus tereticornis* (Forest Red Gum), to 20 m in height, many of which are young. The lower stratum is limited however, when it is present, it is dominated by *Bursaria spinosa* (Blackthorn), *Dillwynia sieberi* (Prickly Parrot-pea) and the introduced *Lycium ferocissimum* (African Boxthorn). All remnants are disturbed by past clearing and weed invasion. The riparian corridor identified in Figure 6.1 will not be altered by the proposal. As stated in Section 6.4.6 no stormwater will be directed to new discharge points, including the bushland area, and therefore will not have an effect on these areas.

A small area of vegetation classified as Alluvial Woodland was identified along the tributary of Ropes Creek within the southern part of the site. This community falls within the non-operational lands and does not form part of this project. On this basis this community will not be modified by this proposal. This community was identified by Keystone Ecological (2007) as being representative of the EEC *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-east Corner bioregions*. It is characterised by a low cover of trees to 12 m dominated by *Casuarina glauca* (Swamp Oak) with occasional Grey Box. This vegetation community is seriously impacted by introduced weed species, notably *Juncus acutus* and the noxious weeds *Ligustrum lucidum* (Broad-leaved Privet), *Cortaderia selloana* (Pampas Grass), African Boxthorn and *Parietaria judaica* (Pellitory).

Flora species previously identified at the site are listed in *Annex D*.

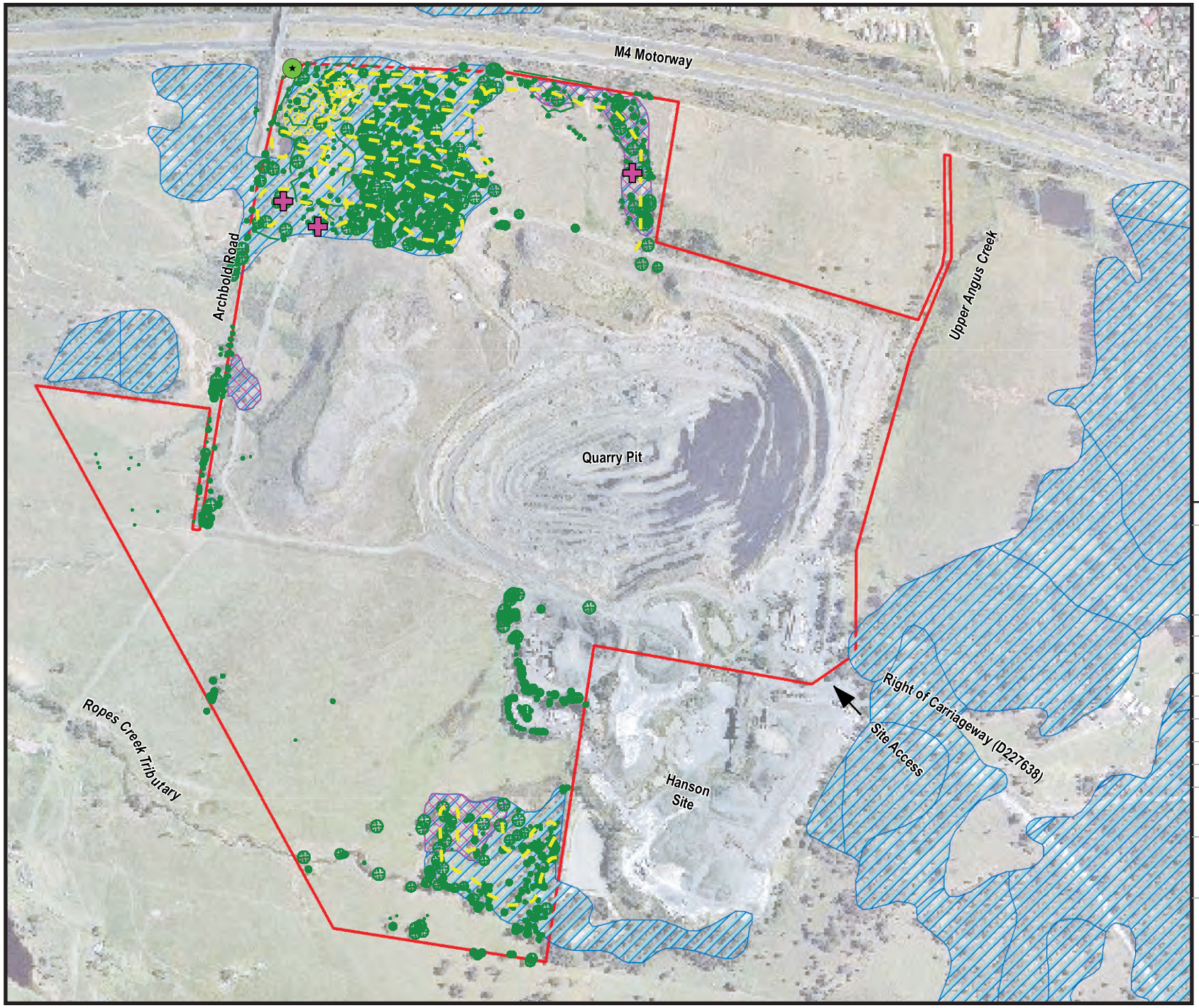
13.3.2 Fauna Species

A total of 36 native fauna species have been recorded within the site during surveys conducted by Keystone Ecological (2007) and AMBS (2002). These include 2 species of amphibians, 3 species of reptiles, 24 species of birds and 6 mammal species. Discarded shells of the *Meridolum corneovirens* (Cumberland Plain Large Land Snail), which is a listed endangered species under the TSC Act, were recorded within the vegetation remnant on the north-western part of the site. Seven introduced species were recorded within the site. A list of fauna species previously recorded at the site is included in *Annex D*.

13.3.3 Fauna Habitat

A number of habitat features of importance to native fauna species were identified by Keystone Ecological (2007). These are predominantly located within the woodland communities identified on the site (Keystone Ecological, pers comm.).

The canopy trees, shrubs and other understorey species present at the site provide blossom, nectar and pollen. The dominant eucalypt on the site is Grey Box, a summer flowering species. Forest Red Gum also occurs on the site but in lower numbers. This species flowers from late winter to early summer, when other resources are relatively scarce. These foraging resources may be exploited by many bird species, arboreal mammals such as gliders and possums and the threatened *Pteropus poliocephalus* (Grey-headed Flying-fox).



Legend

- Site Boundary
- Trees defined by CAD
- Vegetation Meander
- Hollow-bearing/dead trees
- Cumberland Plain Snail shells
- ANAbat & call playback location

Vegetation Communities

- Alluvial Woodland
- Shale Plains Woodland

Figure 13.1

Site Vegetation Map Showing Location of Meandes and Observed Cumberland Plain Large Land Snail Shells

Client:	ThaQuarry Pty. Ltd.	
Project:	Light Horse Business Centre	
Drawing No:	0071234s_EA_16	
Date:	16/04/2008	Drawing size: A4
Drawn by:	ML	Reviewed by: -
Source:	Keystone Ecological (2007)	
Scale:	Refer to Scale Bar	

N

0 200m

Environmental Resources Management Australia Pty Ltd
Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888

ERM

Sheltering sites are provided by fallen timber, and clumps of grasses and graminoids. These sites may be exploited by small birds, small reptiles, small terrestrial mammals and their prey. Sheltering and breeding sites are provided in the top canopy in the form of hollows for birds, bats, possums and gliders. However the site provides few hollows, due to the predominance of young trees and there is little fallen timber, most of which is within the remnant woodland in the north-western corner of the site.

The existing dam in the woodland area in the north-west of the site would provide a significant source of water for fauna species as well as a potential breeding site for amphibians (Keystone Ecological, 2007). However, it should be noted that the pH of the dam water was very alkaline (refer to the Groundwater Assessment contained within Appendix C, Volume 2 of this EAR), which may preclude its use by many species of fauna.

13.3.4 Habitat Connectivity

Analysis of aerial photography indicates that remnant vegetation on the site is largely isolated from other remnant vegetation in western Sydney. Surrounding lands are principally cleared grazing, residential and industrial lands. The vegetated areas that once existed to the east have now been cleared for a business park, which has interrupted potential connectivity to vegetation along Eastern Creek and around Prospect Reservoir. The developed suburbs and industrial areas of Minchinbury are located directly to the north. There are undeveloped grasslands extending for more than two kms to the south, but these are largely devoid of woody vegetation (and therefore have limited functionality as a wildlife corridor) and are zoned for future industrial development as part of SEPP 59. The only potential connectivity with any other vegetated land is directly to the west, toward Ropes Creek.

The distances between the vegetated areas and the nature and intensity of the intervening development make it unlikely that the remnant vegetation on-site will play a wildlife corridor function for anything but the most adaptable and mobile species such as common birds or bats.

13.3.5 Threatened Species and EECs

Flora

No threatened flora species were recorded on the site during field surveys. Database searches identified a number of flora species listed as vulnerable or endangered under the EPBC Act and/ or TSC Act and previously recorded within the locality. None of these were recorded on the site. However it was considered that suitable habitat existed on the site, within the areas of CPW, for five of these species, namely *Marsdenia viridiflora* subsp. *Viridiflora, Hypsela sessiliflora, Pimelea spicata, Acacia pubescens* and *Grevillea juniperina* subsp. *Juniperina*. The riparian zone of the Ropes Creek tributary was also considered to provide potential habitat for *Hypsela sessiliflora*.

Fauna

A search of the DECC Wildlife Atlas database and the Protected Matters Search Tool identified 20 fauna species listed as endangered, vulnerable and/or migratory under the TSC Act and/ or EPBC Act and recorded within the locality. Of these, only the Cumberland Plain Large Land Snail was recorded on the site, with shells identified in the vegetation remnant in the north-western portion of the site, as indicated on *Figure 13.1*.

However, it was considered by Keystone Ecological (2007) that potential habitat existed on the site for a further ten of these species, namely the *Litoria aurea* (Green and Golden Bell Frog), *Lophoictinia isura* (Square-tailed Kite), Grey-headed Flying-fox, *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat), *Mormopterus norfolkensis* (Eastern Freetail-bat), *Chalinolobus dwyeri* (Large-eared Pied Bat), *Falsistrellus tasmaniensis* (Eastern False Pipistrelle), *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat), *Myotis macropus* (Large-footed Myotis) and *Scoteanax rueppellii* (Greater Broad-nosed Bat). The potential habitat for these species was identified to be within the woodland areas and/ or the dam on the site. In addition, the open areas adjacent to the woodland areas were considered to provide potential foraging and breeding habitat for the Eastern Freetail-bat and potential foraging habitat for the Eastern Bentwing-bat.

Endangered Ecological Communities

Vegetation communities considered representative of two EECs (CPW and *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast*, *Sydney Basin and South-east Corner bioregions*) were identified within the site.

The CPW community on the site occurs as four small vegetation remnants, the largest of these being a patch of approximately 8.3 ha in the north-western corner of the site. This incorporates the area identified as a conservation area in the Precinct Plan (BCC, 2005). Gravel roads pass through the southern, western and northern portions of this community. A narrow band of similar vegetation (2.2 ha) is located to the east of the conservation area, a small patch (0.03 ha) alongside Archbold Road to the south and a patch (0.6 ha) in the south of the site associated with riparian vegetation of the Ropes Creek tributary. These remnants are disturbed by past clearing and weed invasion. A description of their constituent vegetation is provided above.

The remnant in the north-western portion of the site was assessed by Keystone Ecological (2007) to be of higher quality than the other three remnants due to its larger size and lower level of fragmentation. The three smaller remnants were considered to be of lower quality due to their younger age, size, level of weed infestation and extent of fragmentation. Significance assessments conducted by Keystone Ecological (2007) concluded that their removal would not have a significant impact upon this EEC. Since the time of the Keystone assessment, the Project design has been altered such that these areas will not be removed.

The EEC *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-east Corner bioregions* identified in the southern portion of the site was seriously impacted by weed invasion.

13.4 IMPACT ASSESSMENT

13.4.1 Threatened Species and EECs

Flora

No threatened flora species were recorded on the site during field surveys. Database searches identified a number of flora species listed under the EPBC Act and TSC Act as occurring within the local area. Assessments of significance for those species considered to have potential habitat within the site concluded that the Project was unlikely to significantly impact these species. This was largely due to retention of the highest quality habitat within the conservation area in the north-west of the site. The Project will retain this conservation area i.e. highest quality habitat and as discussed above. Areas of CPW will not require removal for the Project.

Fauna

Several shells belonging to the endangered Cumberland Plain Large Land Snail were identified on the north-western portion of the site within the CPW remnant. An assessment of significance concluded that the Project was unlikely to have a significant impact on the Cumberland Plain Large Land Snail largely due to the retention of the identified habitat within the conservation area. No other threatened fauna species were identified on the site however, database searches identified several species listed under the EPBC Act and TSC Act as occurring within the local area. Assessments of significance concluded that the Project was unlikely to have a significant impact on those species with potential habitat on the site. This was largely due to the majority of wooded areas on the site being retained, inclusive of the three hollow bearing trees identified on the site, and the dam will not be impacted.

Endangered Ecological Communities

The assessment of significance conducted by Keystone Ecological (2007) considered removal of the three smaller areas of CPW from the site (2.83 ha) and retention of 8.3 ha of CPW within a conservation area in the north-western portion of the site.

Keystone Ecological (2007) concluded that the removal of 2.83 ha of CPW was unlikely to result in a significant impact on this community. As noted the current proposal would not result in the removal of areas mapped as CPW.

The assessment of the potential impact to CPW under the Commonwealth EPBC Act 1999 (refer *Annex D*) concluded that a referral to the Commonwealth Minister for the Environment was not required.

The area of *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-east Corner bioregions* in the south of the site will not be removed for the Project, and is located more than 350 m from the proposed area of operations. The Project is not predicted to alter drainage patterns of this area. For these reasons the Project is not expected to impact this community.

13.4.2 Assessment of Significance

Keystone Ecological (2007) assessed the impact of the Project on locally occurring threatened flora and fauna species and EECs under Section 5A of the EP&A Act. The significance assessments are included in *Annex D*. It was concluded that the Project was unlikely to have a significant impact on those species and EEC's under consideration. However, this EA is being prepared under Part 3A of the EP&A Act and in accordance with DECC/ DPI (2005) Guidelines, requires an alternate set of questions to be answered when considering potential impacts on locally occurring threatened species and communities.

Upon examination of the two sets of assessment criteria it appears that the matters to be considered under Part 3A are largely addressed within the assessment conducted under Section 5A and included in *Annex D*. In common with requirements under Part 3A, the assessments in *Annex D* describe the relevant threatened species and EECs and provide assessment of how the Project is likely to affect habitat connectivity, critical habitat, the lifecycle of threatened species and/or populations, and the habitat of threatened species, populations or ecological communities. There are some additional matters which require consideration under Part 3A of the EP&A Act and these are addressed in *Section 13.4.3* below.

It should be noted that the significance assessments under Section 5A included in *Annex D* considered a more extensive development impact than will occur for the Project. This included removal of CPW, potential removal of one hollow bearing tree, removal of one small dam and activities within the riparian zone of the Ropes Creek tributary. However, as discussed in *Section 13.2*, the outcomes of the Keystone Ecological (2007) assessments are considered relevant to this EA due to the following:

- impacts to ecological resources will be significantly less than those assessed by Keystone Ecological (2007), due to the smaller development footprint;
- no notable alterations to habitat at the site have occurred since the time of the Keystone Ecological (2007) assessment;
- site investigations and assessment were undertaken as recently as 2007; and
- matters to be considered under Part 3A are addressed in the assessment conducted under Section 5A, with the exception of those additional matters assessed in *Section 13.4.3.*

13.4.3 Part 3A Matters

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The following species and populations, identified as having the potential to occur on or adjacent to the site, are restricted to the Cumberland Plain of NSW and would be considered to be near the limit of their known distributions:

- *Marsdenia viridiflora* Subsp. *Viridiflora* population in the Bankstown, Blacktown, Canden, Cambelltown, Fairfield, Holroyd, Liverpool and Penrith LGA's;
- *Hypsela sessiliflora;*
- *Pimelea spicata;*
- *Acacia pubescens;* and
- *Grevellia juniperina* subsp *juniperina.*

None of the above species were recorded at the site however, it is considered likely that potential habitat areas on the site would be retained within the conservation area.

How is the proposal likely to affect current disturbance regimes?

a) modifies frequency and intensity of fires;

b) modifies flooding flows.

Given the site's location it is unlikely that it would currently be subject to specific fire and flooding regimes. It is considered unlikely that the Project would alter the frequency and intensity of fires, and it is not expected to modify the current nature of flooding flows.

As discussed above, the other matters requiring consideration under Part 3A of the EP&A Act are generally addressed under the Part 5A assessment previously undertaken and provided in full in *Annex D*.

Draft Guidelines for Threatened Species Assessment

In regards to addressing the key thresholds set out in Step 5 of the *Draft Guidelines for Threatened Species Assessment under Part 3A of the Environmental Planning and Assessment Act 1979* (DECC and DPI, 2005), it is concluded that the Project:

- will not significantly impact on biodiversity values of the site;

- will not reduce the long-term viability of a local population of any threatened species, population or endangered ecological community;
- will not accelerate the extinction of threatened species, populations or ecological communities; and
- will not adversely affect critical habitat.

13.5 MANAGEMENT/ MITIGATION MEASURES

Measures recommended by Keystone Ecological (2007) to mitigate potential impacts to flora and fauna associated with construction and operations for the Project are described below.

- A Vegetation or Bushland Management Plan to be developed for the retained CPW remnant in the north-west corner of the site. Such a management plan should include a monitoring component so that the success or otherwise of the retention of these communities can be judged and ameliorative actions identified.
- Plant species used for landscaping should be restricted to locally-native species from local provenance that are appropriate to the locally occurring vegetation types and / or those introduced species that do not have known potential to become environmental weeds.
- Species used for landscaping should not be dominated by nectar-producing plants (e.g. *Grevilleas*) as they have the potential to favour large aggressive honeyeaters (e.g. Noisy Miners) that deter other species of birds.
- During and after construction works, appropriate silt traps must be used to ensure that there is no siltation of downslope environments.
- The vegetated berm surrounding the development should have breaks in the plantings of at least 20 m wide. To minimise and manage the bushfire risk they may pose to adjacent developed areas, these breaks should be located at intervals so that no continuous area of vegetation is greater than 1 ha.
- Hollow-bearing trees should not be removed from the site unless there is a safety imperative that has been determined by a qualified arborist.

- If a hollow-bearing tree is to be removed, it must be felled in the presence of and under the advice of a suitably-qualified and experienced zoologist or animal handler to minimise harm to any fauna that may use the hollow. Artificial nest boxes should be installed in retained mature trees to mitigate their removal and enhance the habitat for microchiropteran bats and other hollow dwellers (the number of nest boxes installed should equal the number of hollows that are removed and boxes are to be installed prior to any trees being removed).

In addition, it is recommended that:

- removal of any endemic tree species characteristic of CPW (Grey Box and Forest Red Gum) should be offset by replacing with the same species on-site. At least two seedlings should be planted for every tree removed to account for death of trees through natural attrition and herbivory; and

- the Plan of Management to be prepared for the conservation area in the north-west of the site, should include measures to avoid potential impacts to the existing dam in the north-west of the site, including limiting site personnel access to this area and prohibition of water extraction from the dam.

13.6 CONCLUSIONS

The site is highly disturbed and the majority of native vegetation has been removed. The Project is unlikely to have a significant impact on threatened species, populations and/ or EECs identified as occurring or potentially occurring at and surrounding the site. This is largely due to the fact that potential habitat is largely restricted to the woodland areas/ EECs on the site. The majority of these areas will be retained and the most significant woodland area is to be managed as a conservation area.

14 HERITAGE

This Chapter provides an assessment of potential impacts of the Project upon heritage values, including Aboriginal sites and historical heritage items of significance identified on and surrounding the site. It also identifies appropriate measures to mitigate potential impacts.

14.1 INTRODUCTION

This assessment addresses both historic and Aboriginal heritage. It takes into account the presence of any individual heritage items or artefacts on or surrounding the site. It also considers the potential for heritage values that are unrelated to specific registered heritage sites, for example Aboriginal community feeling or historical use of a site or place.

14.2 METHODOLOGY

Preparation of the heritage assessment included the following:

- review of site specific background information, including the Heritage Conservation Strategy prepared for the site by McDonald (2005), the legislative and regulatory framework relevant to the Project and the Precinct Plan, to identify heritage constraints and management requirements;
- review of the Blacktown LEP 1988 and database searches of the State Heritage Inventory, National Heritage List, Commonwealth Heritage List, Register of the National Estate and National Trust Register, undertaken on 11 October 2007, to identify heritage listed items on the site and surrounding area;
- analysis of the Project design to identify potential heritage impacts; and
- development of mitigation/ management measures to ensure that the identified potential impacts are appropriately managed.

It should be noted that the results of field-based investigations previously conducted at the site are included in the McDonald (2005) report and that consultation with Aboriginal stakeholders was undertaken during development of the Heritage Conservation Strategy. Relevant constraints and management recommendations identified by McDonald (2005) have been incorporated into the Precinct Plan. Therefore the approach to the Aboriginal heritage assessment was based on review of site specific information already available and additional field-based investigation was not deemed necessary at this stage.

As discussed in *Section 5.3.3*, the only Aboriginal stakeholders identified in the local area are the Deerubbin Local Aboriginal Land Council (DLALC), Darug Custodian Aboriginal Corporation (DCAC), Darug Tribal Aboriginal Corporation (DTAC) and Darug Aboriginal Cultural Heritage Assessments (DACHA). Each of these groups was contacted by phone and fax in December 2007 and provided with details of the Project and planned future involvement of Aboriginal stakeholders.

14.3 EXISTING ENVIRONMENT

14.3.1 Historic Heritage

Context

The development of the Blacktown area dates from 1791 when the first land grant was made in Prospect Hill. In these early days of European occupation, land in the Eastern Creek region was used mainly for grazing and some large scale vegetation clearance took place. The area experienced some residential/ commercial growth from the 1850s and 1860s and has experienced significant growth associated with large residential and industrial releases since the 1950s. Historically, the site itself has been used for livestock grazing and for quarrying activities. Development and operation of the Pioneer Quarry commenced at the site in the 1950s and associated quarrying and processing activities continued until 2006.

Historic Heritage Items Identified in the Vicinity of the Site

No items listed on the National Heritage List, Commonwealth Heritage List or the Register of the National Estate are located in the vicinity of the site. The NSW Heritage Office's State Heritage Inventory, the Blacktown LEP 1988 and the National Trust Register were searched for items within the suburb of Eastern Creek, which includes the site, and for items within the adjacent suburb of Minchinbury. This search identified five items of historical heritage significance. A description of these items and their location relative to the site is provided in *Table 14.1*.

Table 14.1 Items of Historic Heritage Significance Located in the Vicinity of the Site

Item	Location	Distance from Site
Southridge (homestead)	87 Old Wallgrove Road, Eastern Creek	1520 m south-east
Milestones (Sandstone obelisks with embedded notations indicating distances in Roman numerals)	Great Western Highway	1 km north (minimum.)
Minchinbury Winery (former winery)	Minchin Drive, Minchinbury	400 m north-east
Row of Olives (trees)	Minchin Drive, Minchinbury	550 m north-east
Site of former Bungarribee Coach House	Doonside Road, Eastern Creek[2]	> 3 km north-east

1. State Heritage Register, LEP and National Trust Register search areas comprised the suburbs of Eastern Creek and Minchinbury.
2. Although the Bungarribee Coach House is listed by the National Trust as being in Eastern Creek, the Heritage Office and geographical reference have indicated that this item is located in the adjacent suburb of Doonside.

The Precinct Plan identifies three additional items which have no formal heritage listing but which are considered to have potential heritage significance, as they potentially contain subsurface archaeological remains of former houses. These items are the Mount Capicure archaeological site, Worker's Cottage archaeological site and Lucan Park/ Roberts Homestead. These items are located in excess of 1.2km south-east of the southern site boundary and will not be impacted by the Project.

In summary, no items of historical heritage significance were identified at or adjacent to the site. The identified heritage items are in excess of 400 metres from the site boundary and further than 800 metres from the proposed area of operations.

14.3.2 Aboriginal Heritage

Context

Prior to European occupancy, the Eastern Creek region was home to the Wawarawarry Clan of the Darug people. Aboriginal sites have been recorded in the area and provide evidence of Aboriginal occupation. It is the variety of site types which has the potential, through their content and arrangement across the landscape, to provide details which will enhance understanding of Aboriginal occupation on the Cumberland Plain (Blacktown City Council (BCC), 2005). The most common site type on the Cumberland Plain is open artefact scatter/ open campsite, followed by scarred trees (McDonald, 2005). Twenty surface open sites, 21 surface isolated relics and a scarred tree with open artefact scatter have been recorded within SEPP 59 lands.

Landscapes and topographic elements that are rare across the Cumberland Plain represent higher value landscapes, in terms of local conservation requirements. Aboriginal sites located in these landscapes would have intrinsically higher conservation potential, since the number of such sites likely to be remaining in the Cumberland Plain is low. BCC (2005) identify the high value landscapes to be:

- shale hillslopes (particularly in Minchinbury and to a slightly lesser degree, Ashfield);
- first order tributary creeklines; and
- shale ridges and low ridgetops (particularly in Minchinbury and Bringelly).

It is likely that a variety of sites and types of evidence will be present across the Eastern Creek Precinct as a whole, because of the range of environmental landscapes present, a relatively large proportion of which are undisturbed (BCC, 2005).

The predictive model for the site (McDonald, 2005) suggests the most common archaeological evidence at the site would be artefact scatters, as multiple finds (open sites) or as a single occurrence (isolated finds). The site is dominated by hillslopes, with some low ridge tops and streams, some of which are in good condition and thus have potential to yield Aboriginal sites of relatively high conservation value. However large areas of the site have been heavily disturbed by past vegetation clearance, earth movements, vehicle access tracks, animal grazing and over 50 years of quarrying activities, which reduces the potential for intact archaeological evidence to be present. In particular, the area of the site to be disturbed for the Project has been largely denuded of native vegetation and incorporates the excavated quarry pit, roads, regraded surfaces and large volumes of stockpiled overburden material.

Heritage Values

Two isolated finds and one open scatter comprising of three artefacts have previously been recorded at the site (McDonald, 2005). The scientific significance of these sites cannot be easily assessed on the basis of surface manifestations. Therefore McDonald (2005) did not assess their scientific significance, but instead assigned a ranking of archaeological potential. The open scatter was recorded in a highly disturbed area with low archaeological potential. The isolated finds were on the boundary between a highly disturbed area with low archaeological potential and a minimally disturbed area with relatively high archaeological potential. The public significance of these sites is assessed as generally being low on the basis of their poor surface manifestations (McDonald, 2005). The cultural significance of sites was not assessed in the McDonald (2005) report.

However this can be determined based on consultation with Aboriginal stakeholders, to be undertaken as part of the management approach to Aboriginal heritage (refer *Section 14.5*).

The recorded sites provide "windows" of visibility into the broader distribution of artefacts, otherwise hidden by topsoil and vegetation. Aboriginal heritage sites with archaeological evidence are all of value to the Aboriginal community through the tangible connection that they represent with pre-European Aboriginal land use. However Aboriginal heritage constraints are defined by archaeological patterning or sensitivity as well as specific "site" locations.

The Precinct Plan includes a sensitivity map for Aboriginal heritage values (refer *Figure 14.1*), which assigns ratings of high, moderate and low archaeological sensitivity to the site, dependent on the potential of an area to contain intact archaeological deposits of high significance. Determination of archaeological sensitivity for the Precinct Plan was based on recommendations of McDonald (2005) and is based on land use, level of post European settlement disturbance, provision and representation of the range of landscapes present within the SEPP 59 lands and the predictive model of Aboriginal site occupation on the Cumberland Plain. It should be noted that the high value landscapes identified above are reflected in the sensitivity mapping. As such there are hillslopes and first and second order streams with low levels of existing disturbance present in the high sensitivity zones. The overriding aim is the preservation of a representative sample of intact landscapes, to ensure that a range of human responses, as represented by the archaeology, can be protected.

Legend

- Visual Barrier Wall
- Site Design
- Detention Basins
- Site Boundary
- High Sensitivity
- Moderate Sensitivity
- Low sensitivity

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	07-12-07	JS
R1	Layout Edits	03-01-08	JS
R2	Zone + Layout Edits	07-01-08	JS
R3	Layout Edits	07-02-08	RPC
R4	Bern + Vis Boundary	0/-05-08	JS

Figure 14.1

Sensitivity Map - Exisiting Aboriginal Heritage Values

Client:	ThaQuarry Pty. Ltd		
Project:	Light Horse Business Centre EA		
Drawing No:	0071234_GIS10_R4	Suffix No:	R4
Date:	08/05/2008	Drawing size:	A4
Drawn by:	JS	Reviewed by:	JK
Source:	vgt Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

N

0 50 100 200 300 Meters

Environmental Resources Management Australia Pty Ltd
Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888

ERM

Lands in the north-western and south-eastern corners of the site are within high sensitivity zones. These areas have a low level of existing disturbance and are considered to have a high potential to contain intact archaeological deposits. The high sensitivity zone in the north-western corner is included in the conservation area designated in the Precinct Plan. No works are proposed as part of this Project within either of the two high sensitivity zones of the site.

The land to the north and south of the quarry pit has moderate sensitivity. It is considered that there is some requirement for further investigation of archaeological sites/ features within these areas if they are to be disturbed.

The quarry pit and surrounding overburden stockpiles have low sensitivity. These areas have been comprehensively disturbed by sub-surface soil removal or rearrangement and have limited or no potential for archaeological sites of Aboriginal significance. No further archaeological investigation is required in these areas and no Aboriginal heritage constraint is posed to development.

Review of the McDonald (2005) report did not identify any Aboriginal cultural heritage values or sensitivity associated with the site, except for the identified sites.

14.4 IMPACT ASSESSMENT

The desktop heritage assessment did not identify any items of historical heritage significance at or adjacent to the site. The nearest identified historical heritage items are in excess of 400 m from the site boundary and will not be impacted by the Project.

As shown in *Figure 14.1*, the majority of the development will occur within an area which has been heavily disturbed by historical quarrying and earthmoving activities and is classified as having low archaeological potential or Aboriginal significance. Significant intact Aboriginal heritage sites or values are unlikely to be present in this area and thus are unlikely to be impacted by development activities.

The OSD basin, some drainage works, truck parking area and southern bund are to be constructed in moderate sensitivity zones. This land is outside the defined conservation area and riparian zones and thus is identified by McDonald (2005) as suitable for development, subject to implementation of appropriate management measures, as identified in *Section 14.5*.

As shown in *Figure 14.1*, a small part of the north-western visual barrier wall is to be constructed within an area immediately adjacent to the designated conservation area, which is classified as having high archaeological potential or Aboriginal significance. However the Project has been designed to avoid and retain the majority of areas of high archaeological potential/ Aboriginal significance on the site, including the conservation area, and thus impacts on Aboriginal heritage values of this area will be minimal and restricted to a small area. Potential impacts will be managed by measures outlined in *Section 14.5*.

Aboriginal heritage sites have been recorded at the site. The registered sites are to be relocated in the presence of representative(s) from local Aboriginal groups, to reconfirm their specific location. In addition, there is potential for previously unrecorded sites to be present. If there are sites present within the area to be disturbed by the Project, there is potential for them to be impacted during construction works.

Based on the sensitivity mapping and the significance assessment in the McDonald (2005) report, any individual heritage sites to be removed in the areas of low and moderate sensitivity are unlikely to have high archaeological potential or public significance. The cultural significance of sites will be determined by consultation to be conducted with Aboriginal stakeholders, as set out in *Section 14.5*. Any individual heritage sites removed during construction in the small area of the high sensitivity zone, may potentially have high archaeological significance. Impacts will be managed by measures outlined in *Section 14.5*.

14.5 MANAGEMENT/ MITIGATION MEASURES

The Project is not expected to impact upon items of historical heritage significance therefore no mitigation measures are warranted. However as a precaution, in the unlikely event that previously unrecorded relics (non-Indigenous heritage items) are encountered during construction, works will cease immediately at that location and the NSW Heritage Office will be notified and advice sought as to the appropriate course of action.

As discussed in *Section 14.4*, the Project has been planned to minimise impacts to areas of moderate and high archaeological sensitivity and avoid the conservation area. The majority of the development will occur within the highly disturbed, low sensitivity zone.

The management approach for Aboriginal heritage is based on the sensitivity mapping and management principles defined in the Precinct Plan.

To mitigate the potential destruction of individual heritage sites from this area and from areas to be disturbed within the moderate and high sensitivity zones, consultation with the local Aboriginal community will occur prior to commencement of groundbreaking works. As noted in *Section 14.4*, previously identified sites would need to have their location confirmed. Representative(s) from the DLALC, DTAC, DCAC and DACHA will be invited to monitor a horizon topsoil stripping and collect any surface artefacts. Accordingly, two weeks notice of construction works should be given to these groups, to allow organisation of Aboriginal site monitors.

For areas to be disturbed within the moderate sensitivity zone, subsurface investigation within the impact zone, by way of archaeological salvage excavation, will be undertaken prior to commencement of groundbreaking works, to properly assess the scientific significance of these areas. This will mitigate loss of heritage material and provide archaeological evidence and context for the conservation area.

Where possible, test pit excavations will be sited so as to represent a range of landscapes and target any landscapes that are absent from the conservation area. Within each of the areas of moderate sensitivity that are to be impacted, test pits should be placed at ten metre spacing along a single transect and excavated to the sterile B horizon clay. If artefact densities from any one pit are greater than 20 per square metre, then the pit should be expanded to recover further artefacts. Subsequent to excavation, an analytical report assessing the attributes and spatial distribution of all artefacts, along with excavation methodology, Aboriginal landscape use and Aboriginal community involvement should be prepared.

In accordance with *Section 9.2.5* of the Precinct Plan, a conservation management strategy will be developed for the conservation area. This can be included in an overall Plan of Management to be prepared for the conservation area. It will include strategies and protocols to ensure the ongoing protection, enhancement, and management of Aboriginal heritage values on that land, ensure the conservation outcome is managed appropriately and that the Aboriginal heritage values are identified and maintained. Consultation will be undertaken with DLALC, DTAC, DCAC and DACHA during development of this strategy, to ensure that cultural and contemporary social values for the area continue to be considered and they will be asked to provide recommendations for inclusion in the strategy.

The low sensitivity zone is considered to have minimal potential for discovery of intact archaeological evidence and in accordance with the Precinct Plan, no further archaeological work is required in this zone.

14.6 CONCLUSIONS

Based on the results of this heritage assessment, the Project is not expected to impact on known historical heritage items or values however mitigation measures are proposed to manage any historical heritage item uncovered during construction works.

The majority of the development will be within areas assessed as having low archaeological potential. The Project has been planned so that it avoids the designated conservation area and impacts to areas of medium archaeological sensitivity are minimised. Development in the medium sensitivity zone will be restricted to stormwater drainage works and an OSD basin, part of the amenity berm and the truck parking area.

Appropriate mitigation measures will be in place to address potential impacts to Aboriginal heritage sites and values. This will include involvement of Aboriginal stakeholders, salvage excavation, monitoring of groundbreaking works and collection of artefacts. In addition, a management strategy will be developed to ensure Aboriginal heritage values of the conservation area are preserved.

15 HAZARDS AND RISK

This Chapter provides an assessment of potential hazards and risks associated with the Project. Mitigation and management measures are recommended which address the identified hazards and risks.

15.1 INTRODUCTION

Key potential hazards and risks identified in relation to the Project are the presence of soil contamination, bushfire hazard presented to proposed site structures from surrounding vegetation and potential instability of the quarry pit walls. A preliminary contamination assessment, bushfire hazard assessment, geotechnical assessment and an assessment of risks in the quarry, have previously been conducted for the site and are presented as supporting technical reports. Key outcomes of these studies are presented in this Chapter. The accompanying chapters of this report address other environmental risks associated with the Project, including the risk of flooding and surface and groundwater quality.

A Section 169(2) certificate obtained for Lot 2 of DP 262213, which covers the majority of the site, indicated that Council has not adopted any policies to restrict development of the land by reason of the likelihood of landslip, tidal inundation, subsidence or acid sulphate soils (Douglas Partners, 2006). Therefore these hazards are not considered to apply to the site and have not been assessed.

As discussed in *Section 4.3.3*, the project is not considered to be a 'potentially hazardous' industry as it will not exceed the SEPP 33 threshold limits for volumes of Class 3 (diesel) dangerous goods stored on-site or vehicle movements to be generated for transportation of dangerous goods associated with the Project. It is considered to be a 'potentially offensive' industry under SEPP 33 as in the absence of mitigation measures it has potential to emit polluting discharges. The 'potentially offensive' aspect of the development is assessed in the accompanying chapters in Part C of this EAR and as outlined in *Section 4.3.3*, it is not likely to be considered an offensive industry.

15.2 METHODOLOGY

The assessment of hazards and risks associated with the Project and development of mitigation measures to address these was based on a review of the following recent assessments undertaken at the site:

- Holmes Fire and Safety (2007) *Bushfire Hazard Assessment for Materials Processing Centre, Waste Transfer Station and general solid waste (non putrescible) Landfill on Archbold Road, Eastern Creek (contained within Appendix I, Volume 2 of this EAR)*;

- Pells Sullivan Meynink Pty Ltd (2006) Letter Re. *Long Term Risks in Quarry*, dated 11 December 2006 *(contained within Appendix L, Volume 2 of this EAR)*;

- Douglas Partners (2006) *Report on Preliminary Contamination Assessment on Stockpiled Material and General Land Quality, Light Horse Business Centre, Quarry Road, Eastern Creek (contained within Appendix J, Volume 2 of this EAR)*;

- Jeffery and Katauskas Pty Ltd (2007) *Report to Light Horse Business Centre on Preliminary Geotechnical Assessment for Proposed Development at Archbold Road, Eastern Creek, NSW*; and

- Jeffery and Katauskas Pty Ltd (2008) *Geotechnical Quarry Slope Stability Assessment Existing Quarry, Archbold Road (contained within Appendix K, Volume 2 of this EAR).*

These assessments were undertaken subsequent to the cessation of quarrying activities at the site and are considered to be suitable for the purpose of this EA.

15.3 SOIL CONTAMINATION

15.3.1 Existing Environment

No notices or orders to investigate or remediate have been issued for the site under the *Contaminated Land Management Act*, 1997.

Based on past land use, Douglas Partners (2006) identified contaminants that could potentially be present at the site to be:

- fertilisers and pesticides from historical agricultural activities; and

- heavy metals, petroleum hydrocarbons (TPH), mono - aromatic hydrocarbons (BTEX), polycyclic aromatic hydrocarbons (PAH), solvents and asbestos, associated with dumping of material on overburden stockpiles.

In addition, CH2M Hill Australia Pty Ltd (2004) identified that the central portion of Lot 2 of DP 262213 may have been contaminated by quarrying operations e.g. from oil spills, and illegal dumping may have taken place. However it was concluded that, with the exception of the Hanson Asphalt Batching Plant, the majority of Lot 2 of DP 262213 poses a low potential for residual contamination to be present.

The preliminary contamination assessment conducted by Douglas Partners (2006) included analysis of soil samples collected from test pits up to three metres in depth. There were 17 test pits excavated in the overburden

stockpiles to the west of the quarry pit and four in the natural in-situ material along the western portion of the site.

Screening of samples with a photoionisation detector indicated the absence of volatile compounds in the soil samples.

Soil TPH, BTEX, PAH, polychlorinated biphenyl (PCB), organochlorine pesticide, organophosphate pesticide and phenol concentrations were below the practical laboratory quantification limit. Heavy metal concentrations were within the DECC (1998) Health Based Investigation Level (HIL) (soil) criteria for residential sites with accessible soil. This is the most sensitive land use category and is more stringent than for commercial or industrial land use, as would apply to this Project. Therefore, existing site soils sampled are not considered to be contaminated by the chemicals or heavy metals analysed. No signs of anthropogenic inclusions were noted during the field work and therefore asbestos was not analysed.

Heavy metal and PAH concentrations of the overburden stockpile material were also within Australian 'Background Ranges' given in the National Environment Protection Council (1999) Schedule B(1) *Guideline on the Investigation Levels for Soil and Groundwater*. The overburden stockpile material was therefore considered to be consistent with VENM material.

One sample from the stockpiled material had a nickel concentration of 100 mg/kg which is above the DECC (1998) provisional phototoxicity-based (toxicity to pants) investigation level of 60 mg/kg. However, as discussed above, this nickel concentration is within the HIL (soil) criteria for residential sites with accessible soils of 600 mg/kg and from a contamination perspective any type of land use is allowable. The nickel concentration is consistent with that recorded in natural breccia collected from the quarry by Australian Defence Industries Services (ADI Services) (1998). Nickel is a common element in basic igneous rocks and local dolerites are understood to have concentrations greater than 360 mg/kg. On this basis, the soil nickel content is considered to be representative of background concentrations of the natural source material within the quarry and does not indicate contamination (Douglas Partners, 2006).

Stage One, Two and Three environmental investigations were undertaken at the site by ADI Services in 1994, 1995 and 1998 respectively. These investigations covered additional lands to the south of the Douglas Partners (2006) study area.

ADI Services (1995) sampling results indicated that, in addition to elevated nickel concentrations, sediments along drainage lines at the northern end of the overburden stockpiles and drainage lines and two dams within and down-gradient of Hanson's current area of operations contained chromium, barium and manganese concentrations above the ANZECC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*.

ERM (2004) concluded that the elevated soil heavy metal concentrations recorded can be attributed to high regional background concentrations and associated runoff of sediments from the quarry area containing elevated background concentrations of these metals.

Soil and sediment sampling conducted at the site by ADI Services (1995) and (1998) also revealed TPH, BTEX, PAH, ethyl-benzene and zinc contamination within an area in the east of the site. This contaminated area is leased by Hanson and is outside the proposed development footprint.

15.3.2 Impact Assessment

Past site investigations have found assessed contaminant concentrations to be below the adopted threshold criteria for both the stockpiled and in-situ material, other than within the areas of the site leased by Hanson, which are outside the development footprint for the Project. On this basis, the stockpiled material, which was sourced as VENM from the quarry is considered suitable for re-use as fill. The site is considered suitable for commercial/industrial use (Douglas Partners, 2006) and contaminated soil is not expected to be disturbed during construction works. However, it is noted that the contamination assessment of the stockpiled material was limited to the top 2.8 m of the stockpile.

If not appropriately managed, leaks or spills during construction and operations for the Project have potential to cause contamination of site soils.

15.3.3 Management/ Mitigation Measures

As discussed in *Section 15.4.1*, the results of previous site investigations indicate that contaminated soils are not expected to be encountered during construction works. As a precaution, if material different to that described in the Douglas Partners (2006) test pit logs, or showing signs of contamination (identified by odours, stains, or anthropogenic inclusions) is encountered, additional soil testing will be initiated to ascertain the presence of any contamination. Irrespective, if stockpiled material is to be excavated for any off-site use, it is recommended by Douglas Partners (2006) that prior to removal, additional samples are collected and analysed on a regular basis.

Following the removal of the stockpiled material it is recommended that additional field work and laboratory analysis and reporting are undertaken to a level commensurate with the site area intended for redevelopment and according to relevant published guidelines.

As identified in *Section 15.3.1* the risk of soil contamination by spills will be minimised throughout the Project by implementation of appropriate procedures for safe handling and storage of fuel and chemicals and spill response procedures.

15.4 BUSHFIRE HAZARD

The site inspection and assessment conducted by Holmes Fire & Safety (2007) (Appendix L, *Volume 2*) gave consideration to NSW Rural Fire Surface (RFS) (2001) *Planning for Bushfire Protection*, Australian Standard AS 3959: *Construction of Buildings in Bushfire Prone Areas* and the *Rural Fires Regulation, 2002*. It should be noted that RFS (2001) document has been superseded by RFS (2006) *Planning for Bushfire Protection*. The content of the two documents is similar and assessment against RFS guidelines is not a formal requirement for the Project as it is not classified as an Integrated Development. Therefore the Holmes Fire and Safety (2007) assessment is still considered relevant. However, where appropriate ERM has updated the mitigation measures to reference the most recent publications.

15.4.1 Existing Environment

An extract from Council's bushfire prone land map included in the BCC (2005) *Precinct Plan* identifies an area of bushfire prone land – vegetation category 2 (low risk) adjacent to the eastern site boundary, beyond which is bushfire prone land – vegetation category 1 (high/ medium risk). No bushfire prone land is formally identified on the site, however the *Precinct Plan* requires a bushfire hazard assessment be prepared for development directly adjacent to land identified on Council's bushfire prone land map.

The bushfire hazard assessment prepared by Holmes Fire and Safety (2007) identified that the following areas of vegetation pose a potential fire risk to proposed site buildings:

- unmanaged grassland vegetation adjoining the site to the east, south and west and in the western and southern portions of the site;
- the woodland area in the north-west site corner;
- riparian vegetation of the Ropes Creek tributary; and
- proposed landscaped areas.

The woodland and riparian areas are identified by Holmes Fire and Safety (2007) to be within the medium bushfire attack category. The bushfire attack category of other areas assessed is low.

15.4.2 Impact Assessment

Vegetation surrounding the proposed area of operations poses a potential low to moderate fire risk to proposed site buildings. If a bushfire spread to site buildings, there is potential for damage to property and/ or personal injury. As such it is recommended by Holmes Fire and Safety (2007) that the development maintain Asset Protections Zones (APZs) between bushfire hazards and buildings. Required APZs were determined by Holmes Fire and Safety (2007) based on the bushfire threat posed by surrounding vegetation and the effective slopes (i.e. gradient between proposed development and hazardous vegetation which will most significantly influence fire behaviour), and are set out in *Section 15.5.2*.

Adherence to the recommended APZs will provide sufficient protection to development aspects Holmes Fire and Safety (2007). In addition, the development is to be surrounded by earthern embankments, which will minimise the bushfire threat posed by surrounding vegetation.

Holmes Fire and Safety (2007) assessed the bushfire threat to the development posed by the proposed landscaped berms to be low. Therefore APZs are not required for these areas. However, landscaped areas should be designed and managed in accordance with relevant requirements outlined in *Section 15.5.2* to ensure they do not pose a fire hazard.

Emergency access is available through the existing road network which provides alternate access/ egress points, via Old Wallgrove Road to the east and Archbold Road to the west. The evacuation capability of the site is considered by Holmes Fire and Safety (2007) to be adequate. Due to the spatial separation between these points, with grassland and the proposed area of operations intervening, a bushfire event would not concurrently cut access and egress from both of these points (Holmes Fire and Safety, 2007).

15.4.3 Management/ Mitigation Measures

To help protect site buildings from any potential fire hazard posed by surrounding vegetation, the APZs recommended in *Table 15.1* will be provided and maintained. This includes a 10m Inner Protection Area (IPA) along the eastern, southern and western site boundaries adjacent to the adjoining unmanaged grassland vegetation, a 20m IPA adjacent to the riparian zone vegetation in the south of the site and a 20m IPA adjacent to the woodland community in the north-west of the site, in addition to the earthern berms. The RFS (2001) does not define APZs for industrial developments and therefore APZs given in *Table 15.1* were developed by Holmes Fire and Safety (2007) based on minimum RFS (2001) APZ requirements for residential developments within Bushfire-prone areas.

An APZ is a buffer zone between a bush fire hazard and buildings, which is managed progressively to minimise fuel loads and reduce potential radiant heat levels, flame, ember and smoke attack (RFS, 2006). For forest and woodland vegetation, the APZ consists of an IPA and an Outer Protection Area (OPA). APZs for other vegetation classification are managed as for an IPA.

Table 15.1 APZ requirements (Holmes Fire and Safety, 2007)

Potential Bushfire Hazard	Recommended APZ	Justification of Recommended APZ
Grassland vegetation adjoining site to east, south and west	10m IPA + 1.8m non-combustible radiant heat fence or earthern embankment (rock and soil) with a minimal basal width of 10m. If over 20m separation, the latter is not required.	Non-residential nature of Project. NB the Project design provides over 20 m of separation so a radiant heat fence or earthern embankment is not required.
Woodland in the north-west corner of site	20m IPA + appropriate construction standards and berms.	The small size and isolated nature of this remnant vegetation pocket, along with the non- residential nature of the Project.
Riparian vegetation of Ropes Creek tributary in the southern portion of the site	20m	Non-residential nature of the Project and the narrow width of these vegetation fingers.

The APZs will be managed in accordance the RFS (2005) *Standards for Asset Protection Zones*. The design and management of the IPAs should ensure that:

- there is minimal fine fuel at ground level;
- any vegetation within the IPA does not provide a path for the transfer of fire to the development i.e. does not touch or overhang the building, form a continuous canopy, retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period and is far enough from the building that it will not ignite the building by direct flame contact or radiant heat emission;
- no stockpiles of green and wood waste, wooden sheds, combustible material storage areas and stacked flammable building materials are located within them.

Buildings, structures and land uses that are permitted within APZs include those that can be used to create reduced fuel areas and water supply points.

To further minimise the risk of bushfire impacting the development, the following measures should be adhered to:

- internal site roads should have access available to both Old Wallgrove Road and Archbold Road and should be constructed (as a minimum) in accordance relevant requirements outlined in Section 4.1.3 of RFS (2006);

- electricity transmissions lines should be installed underground (where possible);

- reticulated or bottled gas shall be installed and maintained in accordance with AS/NZS 1596-2002: *Storage and Handling of LP Gas* and the requirements of the relevant authorities. If gas cylinders are to be kept close to buildings, the release valve must be directed away from the building and away from any hazardous materials such as firewood, so that it does not act as a catalyst to combustion;

- a reticulated hydrant supply should be installed in accordance with the requirements of AS 2419.1 (1994). Hydrants should be installed at regular intervals throughout the internal road network and should be readily accessible without having to leave the sealed internal road network;

- a dedicated static water supply of at least 10,000 litres should be provided for fire fighting activities, with a 65mm Stortz coupling provided to draw water from this supply. If the storage is also required for alternate uses, the draw off for these uses will need to be above the 10,000 litre line;

- future landscaping design for the site should, where appropriate, adhere to the performance requirements of an IPA or OPA. Generally, there should be an area of either low cut grass or managed gardens with appropriate mulch around any future construction. Future landscaping should use flora species that are considered fire resistant and do not create excessive fine fuel loadings and shrubs should be located away from windows. Further detail on landscaping within bushfire-prone areas is provided in Sections A5.3 and A5.4 of RFS (2006);

- roof gutters and valleys to all buildings should be leaf proofed by the installation of an external gutter protection shroud or a gutter system that denies all leaves from entering the gutter and building up on that gutter. Any material used in such a system should have a flammability index of no greater than 5 (as measured against AS 1530.2);

No buildings for this Project are proposed to be constructed within 30m of vegetation in the medium bushfire attack category i.e. woodland area in the north-west of the site and the riparian area in the south, and therefore specific construction standards for bushfire prone areas need not be adhered to. However, if in the future a building is to be constructed within 30 m of areas in the medium bushfire attack category, it should adhere to a Level 1 Construction Standard under Australian Standard AS3959: *Construction of Buildings in Bushfire-Prone Areas*.

In the future if any building is to be constructed adjoining the woodland vegetation in the north-west of the site, the following measures must be adhered to:

- a fire hose reel should be provided to each of these buildings that is capable of reaching all extremities of the proposed building. Should the hose not reach all extremities of the building an additional hose reel shall be installed achieve full coverage. The fire hose reel should be regularly maintained;

- the fire hose reel should be connected to a dedicated static 10,000 litre water supply. This fire hose reel is to be driven by a petrol pump. The dedicated static water supply can be provided as part of the domestic supply provided the draw off for domestic purposes is above the 10,000 litre water line;

- a fire fighting pump of between 5-9 HP should be provided to service the fire fighting hose reel. The manufacturer or distributor should be consulted to establish what size engine and pump is adequate to pressurize the system; and

- the pump should be housed in well-ventilated shed or small insulated shelter in an easily accessible area on the protected side of the building. The pump should be able to be operated by all site personnel that use the building (key start ignition system is preferable) and should be checked weekly during the fire danger period.

Buildings will be required to be equipped in accordance with Building Code of Australia (BCA), however, Emergency Response Procedures should be developed for the occurrence of a fire. These can be included in the management plan to be developed for the Project.

15.5 PIT WALL STABILITY

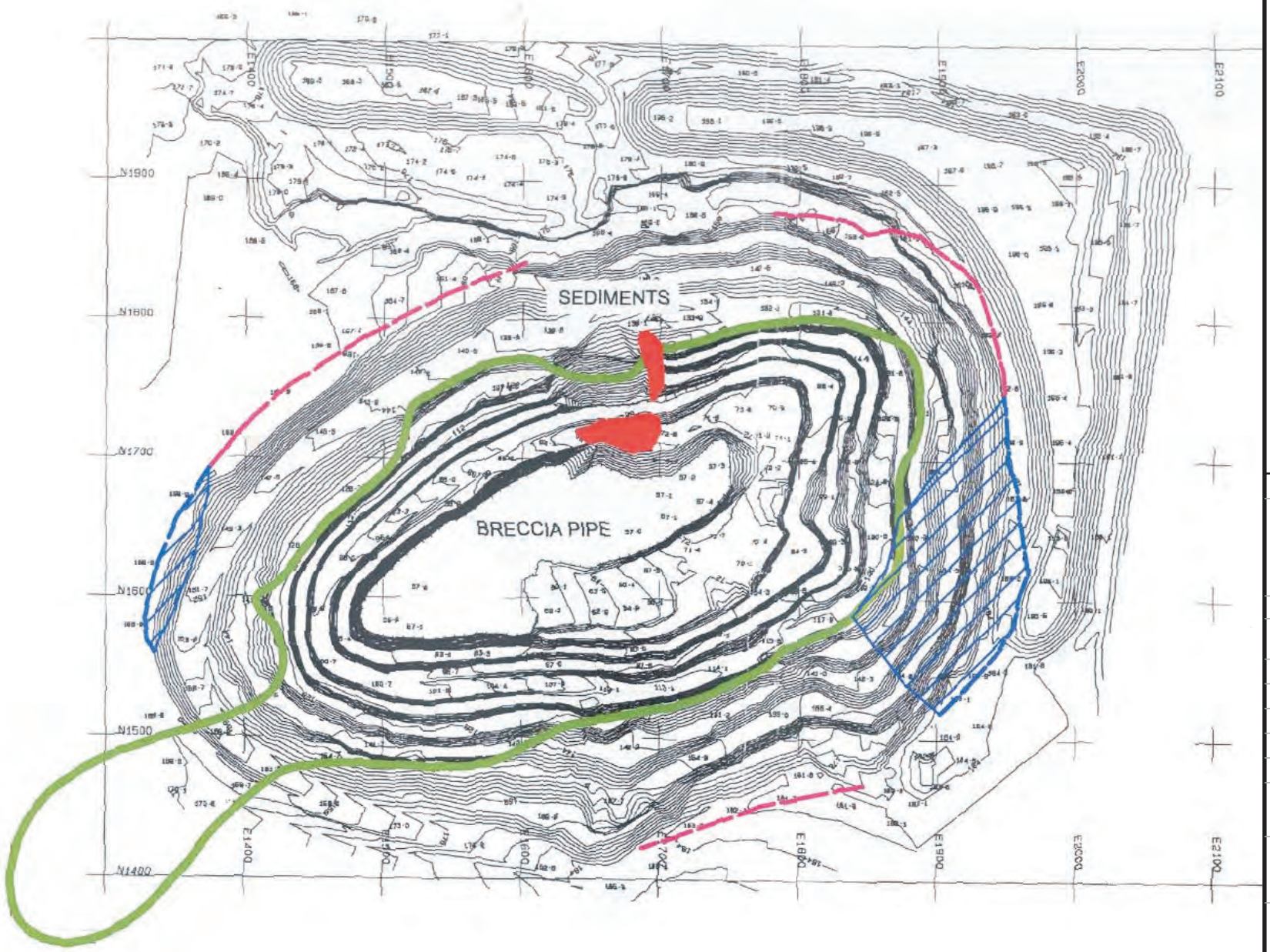
15.5.1 Existing Environment

The upper slopes of the quarry pit (four to five bench levels) comprise sediments (predominately shale, with a strong sandstone bed in the upper part of the east and west walls) (Pells Sullivan Meynink Pty Ltd, 2006) (Appendix L, *Volume 2*). Slopes in the lower part of the pit are comprised of volcanic breccia.

Pells Sullivan Meynink Pty Ltd (2006) conducted an assessment of long term risks associated with the quarry. The predominant risk identified was potential instability of the near surface slopes. The shale slopes are prone to slow degradation, which results in loss of bench crest, subsequent narrowing of the overlying berm and shale rill accretion at the bench toe below. This can potentially create a rill slope and eventually result in outward lateral migration of the quarry crest location. The distance from the crest to where future cracking and/ or failure may extend to is shown in *Figure 15.1*. Where the strong sandstone bed occurs (in the east and west walls), undercutting by the degrading shale could result in the potential for sudden failure of the undercut sandstone and block fall out. In addition, there is a large block on the point of fall out in the upper north wall.

A moderate scale instability occurred in the upper north wall in 2001 (refer *Photograph 15.1*), primarily triggered by surface water. The ground surface has been reshaped to direct water away from the back of the failure. However, it is anticipated that further break up of the large blocks and washing out of fines from the failure mass will result in the majority of the failed material moving to the catch bund, which was constructed directly below the failed mass. In the longer term there is potential for incipient structures nearby to open up and increase the extent of the instability.

With regard to the lower pit slopes, there is evidence of undercutting of the toe of the east wall (refer *Photograph 15.2*), which could result in long term failure of the bench. The lower breccia walls have largely been developed by pre-splitting, are generally steep and show evidence of ongoing degradation. Therefore there is potential for rock falls, the majority of which are likely to be minor and caught by berms. However, as is typical of hard rock mining, there is a risk of some rocks not being caught on the berm. There is also some potential for block fall-out, particularly near the breccia/ sediment contact.



Legend

- Potential for Crest to Eventually Regress to this Distance
- Potential for Sudden Cracking/Failure to this Distance
- Potential for Rock Falls from Sandstone Ledge
- Long Term Potential for Increase in Extent of 2001 Instability

Figure 15.1

Long Term Risks in Pit

Client:	ThaQuarry Pty. Ltd.	
Project:	Light Horse Business Centre	
Drawing No:	0071234s_EA_08	
Date:	01/01/2008	Drawing size: A4
Drawn by:	GC	Reviewed by: JK
Source:	Pells Sullivan Meynink Pty Ltd (2006)	
Scale:	Not to Scale	

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ERM

Photograph 15.1

Upper North Wall, showing area of instability which initially failed in 2001.

Source: Pells Sullivan Meynink Pty Ltd (2006)

15.5.2 Impact Assessment

Potential instability of the steep pit walls poses a potential risk to development near the quarry crest and for rock falls in several areas of the quarry. Jeffery and Katauskas Pty Ltd (2008) assessed the condition of the pit wall and summarised the risks in *Table 15.2* below.

Table 15.2 Quarry Slope Types and Typical Instabilities

SLOPE TYPE	TYPICAL IDENTIFIED FORMS OF SLOPE INSTABILITY	COMMENTS
SHALE/SOIL	Weathering and erosion of slope face leading to formation of 'talus' slopes at the base of the face.	Benches and catch bunds satisfactorily collecting debris
SHALE/SOIL WITH LANDSLIP FEATURES	Near surface rotational failures within steep soil (including fill) and weathered shale slopes.	Smaller features contained on berm below. Larger features within the upper quarry slope have breached the catch bund.
SHALE WITH SANDSTONE 'CAP'	Preferential weathering and erosion of shale below sandstone cap leading to undercutting of sandstone and collapse of blocks of sandstone.	Blocks and material captured by catch bund at base of slope.
XW BRECCIA	Weathering and erosion of slope face leading to formation of 'talus' slopes at the base of the face. Occasional near surface slumping also evident.	Material collecting over about a 3m width extending out from the base of the face.
FRACTURED BRECCIA	Weathering and erosion of fractured faces leading to localised collapse of near surface of face.	Material collecting over about a 2m width extending out from the base of the face. Blocks less than 1m maximum dimension.
INTACT BRECCIA	Spalling of isolated blocks of rock (defect controlled). Localised sliding failure of distinct wedges formed by unfavourable orientated defects.	Site experiments indicate blocks come to rest within 2m of the base of the face below. Blocks less than 1m maximum dimension typically observed.

SLOPE TYPE	TYPICAL IDENTIFIED FORMS OF SLOPE INSTABILITY	COMMENTS
NORTH FACE LANDSLIP	Near surface slumping at the contact between the breccia and shale. Likely to have been controlled by increased rates of weathering concentrated along the contact defect leading to strength reduction together with increased pore water pressures within the slope. Landslip material continues to travel downslope and collect in the berm below (RL85m). Larger blocks within the landslip degrading. Backscar regressing – tension cracks have developed in the haul road since last PSM visit in December 2007.	PSM have been providing advice to Hanson over a number of years since the original slump occurred in 2001. Berm and catch bund below (RL85m) full of debris. Larger blocks (maximum dimension about 1.5m) roll downslope, 'overtop' the catch bund and impact haul road below.

- Table sourced: Jeffery and Katauskas Pty Ltd (2008) Geotechnical Quarry Slope Stability Assessment Existing Quarry, Archbold Road.

15.5.3 Management/ Mitigation Measures

Jeffery and Katauskas Pty Ltd (2008) identified mitigation measures for reducing risk impacts associated with the identified quarry slope types in Table 15.2. The key mitigation measures are discussed below and are summarised within *Table C* of the Jeffery and Katauskas Pty Ltd (2008) Geotechnical Quarry Slope Stability Assessment Existing Quarry, Archbold Road contained within *Volume 2* of this EAR. The mitigation measures include:

Catch Bunds:

- the existing catch bunds adjacent to the haul roads are to be cleared of debris;
- any new haul roads accessing the pit to have catch bunds provided; and
- benches above the haul road within the quarry should be provided with catch bunds to control debris that may otherwise impact on the haul road.

Safety Bunds and Haul Road Drainage:

- safety bunds along the haul roads to be maintain and repaired were required;
- any existing roads above the quarry (such as the access road that passes close to the southern crest of the quarry) should be provided with similar safety bunds;
- safety bunds to be provided along the downslope side of the proposed access road leading down into the pit from the access point at the north-western corner of the pit; and
- the haul road should be re-graded to direct surface run-off to the bases of the adjacent high side of the haul road face.

Slope Re-grading:

- over the western and south-eastern corners of the quarry crest, sandstone capping to shale slopes is likely to collapse over time. The impact on the crest areas may be controlled in one of two ways;
- lay back the sub-vertical sandstone face to an angle of 45^0. Provide a new safety bund set-back of 1 metre from the crest of the new slope;
- provide a new safety bund set-back of 1 metre from the trace of the zone of influence line project up from the base of the sandstone face at an angle of 45^0; and
- relocate existing power poles to align with the access point to site and weighbridges.

Landslip re-profiling along the northern quarry face:

- landslip was identified along the northern quarry face. The landslip debris would need to be cleared and the crest area of the landslip re-profiled. The re-profiling would impact on the existing fill slope to the north, the shale and soil slopes above and the proposed access road into the quarry leading down from the RRF;
- the expected on-going movement of the landslip will need to be monitored. It is recommended that two inclinometers are installed in boreholes and monitored on a monthly basis and after prolonged or heavy rainfall events; and
- the tension crack noted in the haul road should be backfilled to prevent ingress of water into the landslip.

Scaling off:

- the fractured breccia faces and intact breccia faces adjacent to the haul road should have all potentially loose blocks and fragments scaled off prior to commencement of landfilling; and

- a geotechnical inspection should be undertaken every 6 months to monitor the pit walls and any scaling off of loose material undertaken during 6 monthly inspections.

Lower portions of the pit:

- Further geotechnical assessment of the lower portion of the pit will be required following pumping out of the water currently in the quarry.

15.6 CONCLUSIONS

No contaminated soils have previously been recorded at the proposed area of operations and soil contamination is not expected to pose a constraint to Project activities. This will be confirmed by additional testing to be undertaken as recommended. Stockpiled material surrounding the quarry pit can be re-used as VENM fill.

Fuel, chemical storage, handling procedures and spill response measures will be put in place and this will minimise the risk of soil contamination occurring during Project construction and operation phases.

Provided the recommendations in *Section 15.4.3* are implemented, Holmes Fire and Safety (2007) is of the opinion that, despite not being a legal requirement, the Project achieves the intent of the general requirements for Integrated Development as set out in RFS (2001) *Planning for Bushfire Protection*.

The steep pit walls are potentially unstable which poses a potential risk to any development near the quarry crest and for block fall out and rock falls in several areas of the quarry. This risk can be managed by measures outlined in *Section 15.5.3* including stabilising pit walls prior to commencement of in-pit activities. In the longer term, filling of the pit will eliminate this risk.

The operational activities of the RRF and landfill will be undertaken in accordance with the relevant and applicable occupational health and safety requirements to safeguard site staff, visitors, contractors and the public.

16 WASTE MANAGEMENT

This Chapter identifies waste streams that will be produced by the Project and details procedures to be implemented to manage these waste streams.

16.1 INTRODUCTION

The Project will involve handling of up to two million tonnes of waste per annum at the site. Management procedures for waste to be processed through the RRF and landfill facility including the classification, unloading, sorting, processing, storage and disposal of waste loads are detailed in Chapter 3. These procedures have been developed in accordance with best practice to maximise resource recovery and minimise biodegradable material from being landfilled in accordance with relevant legislative requirements.

This Chapter outlines the general waste management strategy for waste handling, procedures and disposal during (1) the construction stage and (2) the operational stage of the Project. Waste streams which will be generated during construction phase may include:

- General waste produced by staff and construction workers;
- Recyclable waste including paper, cardboard and plastics;
- Wastewater and sewage;
- Industrial waste;
- Green & timber wastes;

Waste stream which will be generated by staff, contractors, agents, invitees other than customers during the operational phases of this Project may include:

- general waste produced by operational staff;
- recyclable waste including paper, cardboard and plastics; and
- wastewater and sewage.

The local community identified potential health issues associated with the handling of asbestos waste, green wastes and putrescible waste as key areas of concern (refer to *Section 17.8.2*). Putrescible wastes will not be accepted at the site and staff generated putrescible waste will be sent off site to an appropriate landfill facility. An overview of the safe handling of different types of waste during the stages of the project is outlined below.

16.2 WASTE MANAGEMENT STRATEGY

16.2.1 Overview

Light Horse Business Centre proposes a waste management strategy for the construction and operational phases of the Project which has been developed in accordance with the following waste policies and procedures:

- waste management hierarchy established under the *Waste Avoidance and Resource Recovery Act 2001* i.e. avoidance – resource recovery - disposal;
- NSW Waste Avoidance and Resource Recovery Strategy 2007, which emphasizes a life cycle approach to waste and identifies the following key areas:
  - preventing and avoiding waste;
  - increasing recovery and use of secondary materials;
  - reducing toxicity in products and materials; and
  - reducing litter and illegal dumping;
- EPA *Environmental Guidelines: Solid Waste Landfills*;
- DECC *Environmental Guidelines: Assessment, Classification & Management of Liquid and Non-Liquid Wastes*; and
- POEO Act 1997.

The implementation of the proposed Site Environmental Waste Management Plan will allow for greater opportunities for recycling through the Resource Recovery Facility. The specific waste management procedures to be implemented are summarised below. The SEWMP will have two sections: an LEMP and EWMP.

16.2.2 Construction Waste

During the construction stage of the Project the resource recovery facility and landfill facility will not accept any waste loads, therefore any waste generated during the construction phase will need to be collected and disposed of to appropriate off-site locations. The following waste management measures are detailed below.

General Waste Loads

- provision of waste disposal containers for the collection and disposal of all industrial waste generated on site.

Industrial waste including paint tins, building material packaging, solvents, and chemicals shall be collected within clearly labelled industrial waste bins on-site which will be collected by a licensed contractor for disposal at a landfill capable of accepting these types of wastes;

- provision of waste bins for disposal of items such as food scraps and food packaging. These non-recyclable general waste loads will be collected and disposed of at an appropriately licensed landfill. All other general waste including recyclable food packaging such as aluminium cans, plastic wrappers, and paper products will be collected in separate general waste bins and disposed of to a resource recovery facility for recycling;

- separate clearly labelled green waste bins will also be provided for any vegetation waste to be collected and transported to a resource recovery facility which can process green waste for re-use for landscaping purposes;

- portable self-contained toilets will be provided on site which will dispose of effluent waste loads to the local sewerage system or collect effluent waste within septic tanks for collection and disposal by a licensed contractor;

- all liquid wastes will be collected on site and following consultation with the relevant Authority will be disposed of appropriately; and

- all waste receptacles will be colleted and disposed of regularly, to mitigate against overflowing.

Sediment and Soil Erosion Management

- undertake regular waste clearing and wetting down of exposed construction areas to limit sediment erosion and waste contamination of construction areas. Construction areas include but are not limited to embankment and excavation areas, stockpile areas, site facility and storage areas and temporary work areas;

- all vehicles entering and exiting the site will travel through a temporary wheel wash area to contain sediments on site;

- rehabilitate or revegetate construction areas on completion or where prompt revegetation cannot be completed, implement erosion control measures including siltation fencing until revegetation is completed;

- limit flow velocities in drainage systems by implementing sediment and waste collection barriers in order to minimise possible scouring and to encourage precipitation of particulates in run off;

- maintain vegetation in and adjacent to drainage lines;

- remove silt build-up following large storm events;

- provide an access track where practicable, along the toe of embankments to allow access for maintenance;

- protect ongoing earthworks by temporary berms and drains to prevent the scouring of unconsolidated earthworks. Typically, diversion drains are constructed at the end of each day;

- conduct a detailed site inspection after a significant rain event to confirm that erosion control safeguards are working effectively; and

- conduct regular inspections of all soil erosion safeguards to ensure they are working effectively.

Dust Management

- use a water tanker to suppress dust on site during construction periods and at other times as necessary on public roads where these have been disturbed during construction works;

- restrict concrete dust generation by the use of water sprays;

- remove mud from wheels and bodies of haulage equipment before they enter public roads and ensure loads are fully covered;

- remove mud spilt on public roads by construction equipment;

- service and maintain all plant and equipment powered by internal combustion engines to ensure exhaust emissions comply with regulations; and

- visually monitor and record dust emissions to ensure emission comply with regulatory requirements.

Water Management

- prior to major surface disturbance install drainage structures for waterways, catch drains which intercept flow, and sediment traps and basins to allow existing water flows to pass through the disturbed areas without mixing with unfiltered run-off from the disturbed areas. Construct graded contour drains or diversion channels around disturbed areas to ensure that all stormwater is directed away from disturbed areas;

- keep sedimentation basin in a drawn-down state by preferential use of the water by tankers for dust suppression;

- monitor and test water quality if required;

- install silt fences and hay bales where required downstream of disturbed areas, base of embankments, existing drainage lines, earthworks stockpiles;

- inspect silt fences regularly to confirm that they are not partially buried and still in good condition;

- conduct a detailed inspection after any significant rain event to check status of safeguards and confirm that siltation barrier are functional and that the sedimentation basins are not compromised;

- conduct regular inspections of all water management safeguards and complete checklist;

- collect water generated from concrete batching plants in sedimentation basins and recycle for dust suppression;

- wash out concrete delivery vehicles and wash down plant items a minimum of 20m from stormwater drainage systems and natural water courses;

- fuel and service all plant / equipment on a safe area away from any water course;

- check levels of any site septic system for pump out, check for spillages from the septic system and locate portable toilets in bunded areas away from watercourses; and

- sediment loaded water to be treated (flocculation) before discharge to second basin.

16.2.3 Operational Waste

Waste received during the operation of the RRF and landfill will be in compliance with waste avoidance policies and licences issued by the DECC. Waste loads will follow a waste management procedure which includes the classification of waste, sorting, recovery, recycling and disposal of waste. The management of waste loads is detailed within Chapter 3 and will be incorporated into the Waste Management Strategy to be employed during the operational phase of the Project.

Waste Classification and Identification

Incoming waste will be categorised at Weighbridge One (1) in accordance with DECC's Material Composition Codes. Non-complying materials will be identified during the classification process.

As outlined in *Section 3.4.1*, classification will be based on advice from the carrier, inspection of the carrier's documentation prepared in accordance with the DECC (2008) *Waste Classification Guidelines* and verification of this information by visual inspection using the weighbridge camera. If waste loads are identified as not complying with general solid waste (non putrescible) license standards (including putrescible waste) waste loads will be rejected and directed off site.

A spotter at the second checkpoint i.e. the respective unloading areas, will inspect all loads tipped to ascertain that the material conforms to the material classification identified at Weighbridge One. The spotter will identify any non-complying material that was not detected at Weighbridge One. Non-complying materials identified e.g. putrescible, liquid and hazardous chemical waste, will be recorded as a rejected load and the non-complying waste reloaded by the waste carrier and directed off-site.

In the event that non complying material is identified after the carrier has left the site, this material will be quarantined in appropriate receptacles at the WTF for off- site disposal at an appropriate facility. Quarantined material will be sent off site when the receptacle is full or if not full, at least once per week.

The public concern raised regarding putrescible waste has been addressed since the Project includes a general solid waste (non putrescible) landfill which does not allow putrescible waste loads.

Asbestos Waste and Asbestos Contaminated Materials

Strict guidelines and procedures for the identification, storage, handling and disposal of asbestos waste and asbestos contaminated materials will be documented in the WMP for the site. Asbestos waste disposal will meet EPL conditions and Clause 42 of the Protection of the Environment Operations (Waste) Regulation 2005 NSW. During operation of the Project all staff will be trained in accordance with the Industry Asbestos Awareness Course and will receive regular retraining.

Asbestos waste will be identified by the classification and spotting process described in *Section 3.4.1*. Complying waste containing asbestos removed from mixed loads will be quarantined and sent for disposal to landfill. Large waste loads containing only asbestos will be sent directly to landfill to minimise unnecessary handling of the waste. Asbestos waste delivered to the site and bonded asbestos recovered from mixed waste will be wetted and sealed in heavy duty plastic bags, in accordance with licence requirements. Upon receipt (if asbestos is in small quantity (small sealed bags) capable of being handled), bagged asbestos waste will be placed in designated clearly labelled, leak proof, sealed containers at the WTF for disposal at the landfill, and in accordance with procedures to be included in the WMP. Where practicable, stabilised asbestos waste received at the site that is in bonded matrix form and soil contaminated waste will be kept covered at all times.

Asbestos waste sent to landfill will be placed to a depth of at least 0.5 m from the landfilled surface on the same day it is received. Loads which have some loose fibres or are friable will require separate burial and accordingly will be placed in pre-prepared trenches and immediately covered. They will be unloaded in such a manner as to avoid creation of dust. All asbestos waste processed at the site will be in accordance with the DECC asbestos waste requirements for a general solid waste (non putrescible) licensed landfill.

Putrescible Waste

Putrescible waste commonly referred to as household waste will not be accepted at the site. If concealed and identified by the spotter it will be recorded as a rejected load and the carrier directed to take the waste off-site. In the event that putrescible waste loads are identified after the carrier has left the site, this material, along with putrescible waste generated at the site e.g. by employees, will be stored in separate clearly labelled rubbish bins in the quarantine area of the WTF. The waste will be collected by a licensed contractor when the bins are full or if not full, at least once per week, for disposal at an appropriate off-site facility. No putrescible material will be landfilled at the site.

Green Waste

Segregated green and wood waste loads, along with green and wood waste recovered by sorting at the MPC will be tipped at the respective stockpiles adjacent to the work floor for processing (refer to *Figure 3.2*) .

Green waste will be shredded and stockpiled in windrows, which will be turned every two weeks or as required if the temperature in the pile gets over 70 Degrees Celsius. The composting process will be aided by spraying the stockpiles with water collected from a sump at the green/ wood waste stockpiles. No putrescibles, biological materials or animal products will be used for the composting process. After a composting period of eight weeks the product will be blended, tested and available for sale as mulch. The composting process may be accelerated with the use of the oxidizing agent Biomagic that will be used for control odour within the leachate collection system.

Timber waste material will be chipped and stockpiled in windrows for testing, blending and resale as woodchip.

Should the recycled mulch or woodchip fail testing, it will be reprocessed and retested. If it still fails testing, the materials will be quarantined at the WTF and be disposed of appropriately.

Some mixed loads will contain green waste. These mixed loads may be too mixed to viably extract all green waste; therefore some green waste may be landfilled within mixed loads.

Recycled woodchip and mulch which complies with the exemptions under clause 51A of the *POEO regulations* 2005 (NSW) will be sold direct from the stockpiles or blended with recycled or VENM soil/sand to provide an organic soil mix.

Wastewater

Wastewater will be generated by the Project from the following sources:

- drive through wheel wash facility;
- wash down of hard stand areas at the MPC;
- composting operations;
- landfilling operations; and
- sewage from amenities.

Wastewater from the wheel wash facility will be directed though settling ponds to settle suspended solids, prior to reuse or disposed of to sewer through a trade waste agreement with Sydney Water Corporation if unsuitable for reuse.

Wastewater from composting operations at the green waste stockpiles and from wash down areas of the MPC will be directed to a sump and re-circulated via spray mists on the green waste stockpiles. Excess water in the sump will be directed to the leachate treatment plant to be treated, reused and or disposed of, as appropriate.

Sludge from the site sumps and settling dams will be periodically removed and disposed of on-site at the adjoining landfill.

The wastewater management system has been designed to maximise recycling and beneficial use of site water. The site water management strategy includes recycling of adequately treated stormwater and leachate for dust suppression and irrigation, as appropriate.

Sewage will be managed by new sewerage facilities and infrastructure as required by the Project. Sewage will be disposed of via St Mary's reticulated sewage system.

16.3 CONCLUSION

Waste generated by the Project will be dealt with by the management procedures for waste detailed within the site Environmental Waste Management Plan (EWMP).

Depending on the nature of the waste it will either be recycled or landfilled on-site or sent to an appropriate off-site facility for recycling or disposal. The EWMP will be prepared in accordance with the principles of key waste policies and guidelines. Its implementation will ensure that the identified waste streams are appropriately managed, including reduction at source, reuse and recycling, where possible and practicable, and appropriate disposal. This will include procedures for safe handling and disposal of asbestos waste. Implementation of the EWMP will enable compliance with relevant guidelines and regulatory requirements and minimise the potential for adverse impacts. The wastewater management system will be designed to maximise the recycling and beneficial use of site water.

17 SOCIOECONOMIC IMPACT ASSESSMENT

This Chapter provides a demographic profile of the community surrounding the site and identifies potential social and economic impacts of the Project and associated mitigation measures, including the proposed strategy for ensuring ongoing community engagement.

17.1 INTRODUCTION

The aim of the socioeconomic impact assessment was to identify any changes (both positive and negative) to ways of life, culture, community, political systems, environment, health and wellbeing and fears and aspirations of people in the surrounding local and regional communities, that could potentially result from the Project. In addition, the assessment aims to identify means for minimising any negative impacts identified. The assessment considered the different types and levels of impact, including long and short term, direct, indirect and cumulative, and actual and perceived issues.

17.2 METHODOLOGY

Quantitative and qualitative baseline information, including stakeholder input was used to predict and assess the potential socioeconomic impacts of the Project. Recent census data obtained from the Australian Bureau of Statistics (ABS) was used to build a social and economic profile of the community immediately surrounding the site i.e. the community most likely to be directly impacted by the Project, as well as for the wider Blacktown LGA. To identify potential actual and perceived impacts of the Project, including community concerns and views, the following information sources were reviewed:

- studies relating to the impacts of landfill facilities on house prices;
- BCC's development plans and future population and economic projections e.g. Eastern Creek Precinct Plan;
- Sydney's Metropolitan Strategy 2007;
- information on the Project scope and inputs supplied by the proponent;
- resident correspondence with members of the Project team received in response to distribution of the information pamphlet by the proponent (refer *Annex B*);
- media publications relating to the Project prepared and publicised by the proponent;

- web based articles posted by local resident groups;
- social research into community perceptions conducted in October 2007 through two focus groups comprised of randomly selected Minchinbury residents.

A description of community consultation undertaken by the proponent prior to ERM involvement for this Project is included in *Section 5.3*.

Issues raised by Minchinbury residents at the focus group meetings conducted by ERM are identified in *Table 5.1* and discussed in *Section 17.4*. To retain the confidentiality of focus group participants, notes from these meetings are not included in this EAR.

17.3 COMMUNITY PROFILE

As outlined in *Section 1.3.1*, the site is located in the suburb of Eastern Creek, which is part of the Blacktown LGA. The closest residential area to the site is Minchinbury, which is also part of Blacktown LGA, located approximately 36 km from Sydney. Blacktown falls within the Greater Western Sydney Region of NSW and the wider Sydney Statistical Division.

Minchinbury covers an area of 4.44 km² and is bounded by the Great Western Highway to the north, Wallgrove Road to the east, the M4 Western Motorway to the south and Ropes Creek to the west. Minchinbury is a mix of residential housing to the east and industrial areas to the west. Focus Group participants described the area as quiet, but developing.

17.3.1 Demographics

Blacktown City is one of the fastest growing centres in the region and is presently the most populous City in NSW (Blacktown Social Plan, 2006). The 2006 census recorded a population of 271,709, which constituted a population increase of 6.1% since 2001, comparable with the population increase experienced for Sydney as a whole over this time. The previous censuses in 1996 and 1991 recorded larger increases of 10.4% and 21% respectively.

In contrast the population of Minchinbury has remained stable since 2001, increasing by just 35 people (0.7%) between 2001 and 2006, to 5280 people.

Table 17.1 provides a comparison of the age profile of the population of Minchinbury with that of the broader Blacktown LGA and Sydney. It shows that the age structure of Blacktown LGA's population is comparable with Sydney as a whole, though with marginally more persons under the age of 18 and less persons over the age of 60. Minchinbury has a younger population than both the Blacktown LGA and Sydney, with a notably lower proportion of its residents aged 50 or older. In particular, the proportion of 5-17 year olds in Minchinbury was markedly higher than for the broader statistical divisions at the time of the 2001 and 2006 censuses.

Table 17.1 Age Profile of Minchinbury, Blacktown LGA and Sydney, 2001 and 2006

Age	Minchinbury		Blacktown LGA		Sydney	
	2001	2006	2001	2006	2001	2006
0-4	8.9%	7.3%	8.7%	8.2%	6.7%	6.6%
5-11	15.9%	12.4%	12%	11.6%	9.5%	9.1%
12-17	11.1%	12.9%	9.2%	9.2%	8.0%	7.9%
18-24	8.2%	11%	10.3%	10.1%	9.9%	9.9%
25-34	14.3%	12%	16.1%	15.3%	16.0%	15.3%
35-49	26.9%	25.7%	22.2%	22.1%	22.6%	22.5%
50-59	9.2%	11.1%	10.6%	11.5%	11.4%	12.2%
60-69	3.4%	4.8%	5.8%	6.5%	7.1%	7.8%
70-84	1.8%	2.4%	4.5%	4.8%	7.3%	7.3%
85+	0.1%	0.3%	0.6%	0.7%	1.4%	1.6%

Source: ABS, 2006

Table 17.2 shows that 89% of Minchinbury's households are families, which is significantly higher than for Blacktown LGA and Sydney. Only 0.8% are group or shared households. Of the family households in Minchinbury, the greater majority (62.9%) are couples with children, which is more than 13% higher than for Sydney and almost 10% higher than for Blacktown LGA.

Table 17.2 Household and Family Composition, 2006

	Minchinbury	Blacktown LGA	Sydney
Lone household	8.7%	15.9%	21.6%
Group household	0.8%	2.2%	3.9%
Family household:	89%	78.1%	78.1%
Couple no children	*21.4%*	*25.4%*	*33.2%*
Couple with children	*62.9%*	*53.3%*	*49.3%*
One parent	*14.9%*	*19.8%*	*15.6%*
Other	*0.8%*	*1.5%*	*1.9%*

Source: ABS 2006

Based on the data presented in *Tables 17.1* and *17.2*, Minchinbury can be characterised as an area primarily made up of families with children under 18.

17.3.2 Housing

Table 17.3 shows the majority of Minchinbury residents live in a separate house that is owned or in the process of being purchased. There are substantially more residents occupying separate houses and that are in the process of purchasing their house than for the broader statistical regions of the Blacktown LGA and Sydney. The high percentage of houses in the process of being purchased fits with the typical residential profile of young families with children.

Table 17.3 Housing Characteristics (Type of dwelling and ownership), 2006

	Minchinbury	Blacktown LGA	Sydney
Separate	97.5%	83.8%	61.7%
Semi-detached, row/terrace etc	2.3%	10.7%	11.8%
Flat/Unit	0.3%	4.7%	25.7%
Other	0%	0.8%	0.7%
Fully Owned	24.6%	23.5%	30.1%%
Being Purchased	57.2%	40.0%	31.1%
Rented	14.4%	29.8%	29.7%
Other	0.2%	0.4%	0.7%
Not stated	3.8%	6.3%	8.4%

Source: ABS 2006

17.3.3 Employment

Information relating to employment in Minchinbury is not yet available from the 2006 census. The 2001 census recorded an unemployment rate of 4.6% in Minchinbury, which is lower than for the Blacktown LGA in general (7.7%) and Australia (7.4%). This is consistent with employment data presented in the Minchinbury community profile and social plan.

In 2001, Minchinbury recorded a higher proportion of employed persons working full time (66.7%) than Blacktown LGA (64.3%) and Australia (59.8%). The dominant occupation was Intermediate Clerical, Sales and Service Workers (13.4%) followed by Tradespersons and Related Workers (9.1%) and Intermediate Production and Transport Workers (9%). This was similar to occupational trends for the Blacktown LGA as a whole. The top three industries employing Minchinbury residents at the time were manufacturing (19%), followed by retail trade (14%) and property and business services (9%). This data indicates that there is reasonable potential for residents of Minchinbury to be employed at the proposed waste management and landfill facility.

Whilst Minchinbury has a relatively high employment rate, residents involved in the focus meetings expressed concern regarding the lack of local employment opportunities. This view is supported by census data which shows that a high number of Minchinbury households own two or more cars and 62.9% of residents drive to their place of work. This indicates that residents may have to travel outside the local area to work. Blacktown Council is encouraging employment and business opportunities and initiatives within the local area with the aim of promoting local employment opportunities. The project site and surrounding area is zoned as light industrial and strategic planning controls for the Eastern Creek Precinct aim to create a hub of future employment for Western Sydney, including the local suburbs of Minchinbury, Mount Druitt and Eastern Creek.

17.3.4 Income

Data presented in *Table 17.4* shows Minchinbury has a higher median income in all instances than both the Blacktown LGA and Sydney.

Table 17.4 Median Weekly Income (Minchinbury, Blacktown and Sydney)

	Minchinbury	Blacktown LGA	Sydney
Median Individual Income ($/Week)	530	473	518
Median Household Income ($/Week)	1,386	1,105	1,154
Median Family Income ($/Week)	1,404	1,188	1,350

Source: ABS 2006

17.3.5 Summary

The above analysis of 2001 and 2006 census data obtained from the ABS indicates that residential areas in the suburb of Minchinbury are dominated by family households with children under 18. The majority of residents live in a separate house, which they own or are in the process of buying. Employment and income levels are higher than average and residents are more likely to work outside the local area in the manufacturing and retail industries.

There has been little change in the total population of Minchinbury in the last five to seven years. Newly arrived families with young children recorded in the 2001 census have now matured and there are a larger number of young people aged between 10 and 19 years of age living in the area.

17.4 IMPACT ASSESSMENT

17.4.1 Overview

A review of background material from sources identified in *Section 17.2* indicates that the key anticipated socioeconomic impacts resulting from the Project relate to:

- noise;
- human health and contamination including dust;
- odour;
- traffic and access;
- visual amenity;
- regulation and monitoring;
- local employment generation; and
- property prices.

Sections 17.4.2 and *17.4.3* provide assessment of the predicted impacts of the construction and operational phases of the Project on each of these aspects. The community profile is used as a basis for this assessment and assists in determining the significance of impacts on the population surrounding the site.

17.4.2 Social Impacts

Noise

Potential increased noise levels resulting from the Project has been highlighted as a major concern for residents. Noise from the M4, Great Western Highway and Eastern Creek racetrack currently impacts residents and causes disturbances at all times of the day. Residents have expressed concerns about current noise levels and concern regarding additional traffic and machinery noise at any time of day, but especially after the hours of 6pm. Any additional noise disturbance is viewed as unacceptable.

Significant noise generating activities have been historically conducted at the site associated with over 50 years of quarrying activities including blasting, truck movements and crushing. Modeling of noise levels predicted to be generated by the Project was undertaken (refer to the *Noise Impact Assessment within* Appendix F, *Volume* 2). Modeling results indicate that construction and operational noise levels from the Project are not predicted to exceed the relevant criteria at sensitive receivers assessed, including the residences of Minchinbury, during the daytime, evening or night time. These criteria are designed to preserve community amenity and therefore the noise impact upon Minchinbury residents will not be significant. The Project is not predicted to cause sleep disturbance and road traffic noise generated will be negligible. Furthermore, cumulative noise impact from the Project and existing industry will be negligible.

Health and Contaminants

The Minchinbury Residents Group (MRG) have identified potential long and short term health issues as a major community concern associated with the Project. Specific areas of concern relate to air pollution (dust), asbestos, vermin infestation, 'production of dangerous by-products' and contamination of local waterways and soil. Some of these issues were reiterated during the focus group meetings when residents expressed concern over the disposal of contaminated material and impacts on health, particularly of young children, from dust and air pollution.

As outlined in *Chapters 6, 7* and *8* respectively, the Project is not predicted to result in significant dust deposition within Minchinbury or soil and water contamination. Due to high existing short-term particulate matter concentrations at nearby residences, there is potential for adverse short-term air quality impacts. However suitable dust management and monitoring systems will be in place to minimise this potential (refer *Chapter 9*).

The facility will not accept putrescible waste which will minimise the potential for vermin infestation nor will it accept chemicals or hazardous materials. 'Dangerous by-products' are will not be produced and this public perception is believed to be derived from a lack of information about the Project.

Leachate will be adequately treated, propensity for gas generation reduced greatly by minimising landfilling of biodegradable material and the provision for gas extraction.

As discussed in *Section 3.4.1* asbestos handling and disposal will be strictly regulated to avoid potential health problems and waste management procedures will be in place to ensure no prohibited materials are sent to landfill. Proposed mitigation and management measures for public safety and to further address vermin are included in *Section 15.3.3*.

Subject to implementation of mitigation measures recommended in this EAR, the Project is not expected to adversely affect the health of residents or waterways and soils surrounding the site

Odour

Odour has been highlighted by the MRC as a concern. However as discussed in *Chapter 9*, odour impacts from this Project will not be a significant and an oxidising agent can be used on composting green waste to minimise odour generation from this source if required.

Traffic and Access

Minchinbury is a quiet residential area with narrow streets and no through traffic. Anecdotally the area is currently used by a small number of heavy vehicles, which contribute to the perceived increasing traffic congestion problems the area is experiencing. Access to the site and the potential for the Project to increase traffic numbers in Minchinbury are major concerns for the community. In particular, Focus Group participants expressed concern that the Old Quarry Road, which runs to the east of the quarry pit, would be opened allowing trucks and traffic under the M4 and through Minchinbury.

The preferred access option identified by focus group participants was via Wallgrove Road i.e. bypassing Minchinbury, which is consistent with the current proposal and will help ensure distribution of site traffic into Minchinbury and associated impacts are negligible. Access via Archbold Road, consistent with future provisions of the Precinct Plan was identified by focus group participants as a secondary option.

As discussed in Chapter 11, the Project will not increase traffic numbers on roads surrounding the site during operations. However, except on occasion to access essential services, this traffic will largely avoid residential streets of Minchinbury. It will generally be restricted to roads through residential areas and the major networks including the M4 and M7 which are already subject to high traffic volumes, including heavy vehicles.

Focus Group participants expressed concern about additional traffic damaging local roads and requested frequent road maintenance to cope with increased numbers and usage. The traffic assessment conducted for the Project (refer *to Chapter 11*) indicates that the proposed traffic volumes along the existing road network through Quarry Road and the Old Wallgrove Road and Wallgrove Road intersection will not exceed the previous traffic volumes produce by the quarrying operations. The road network will not rely upon the local road network within Minchinbury for access and egress from the site.

Visual

Minchinbury residents have expressed concern that the Project would adversely affect existing views from residences located closest to the site. As discussed in Chapter 12, no operational areas of the site will be visible from Minchinbury except for the berms and OSD basin. These will be visible from a limited number of Minchinbury residences, however views will be distant and these items are not expected to significantly impact visual amenity of these residents. Subject to implementation of recommended management measures, including landscaping, the Project is expected to have a low impact on the visual amenity of Minchinbury residents.

Regulation and Monitoring

The MRG and Focus Group attendees expressed concern that should the Project be approved, the site may be used as a domestic tip in the long term and there would be a 'free for all'.

There were concerns that site operations would not be regularly monitored, or that monitoring would be conducted by a body with a vested interest in the continued site operation i.e. producing bias in monitoring.

Unregulated disposal of waste, rezoning and fear of being given misleading information about future site uses were all listed as major community concerns. These perceived issues compounded and increased resident concerns about all other Project impacts.

These concerns related particularly to the potential for disposal of contaminants and refuse at the site, leading to health impacts and adversely impacting community amenity.

The community fears regarding regulation and monitoring are in part stemmed from problems surrounding the existing landfill located on the southern side of Minchinbury, which is currently being used as a general waste site. Operations of this Project will be regulated and transparent monitoring undertaken to ensure future Project performance including environmental performance. This will include regulation by DECC to ensure operations comply with license conditions. It would appear that community concerns surrounding regulation and monitoring are perceived impacts largely derived from a lack of information. Therefore it is recommended that clear transparent community communications will be required to address these concerns, particularly in relation to regulation and monitoring of license conditions. The proposed communication strategy is outlined in *Section 17.5.3*.

17.4.3 Economic Impacts

Employment & Income

Direct employment opportunities to be provided by the Project are as follows: Approximately 10-30 personnel will be employed during the construction phase and 49 full time staff and up to 10 contractors at any one time during operations. Operational staff will be a mix of manual, skilled labour and managerial positions including mechanics, weighbridge operators, plant operators, foremen, sales personnel, labourers, drivers and managers. Long term indirect employment opportunities are expected to be significantly higher following completion of filling and rehabilitation of the quarry pit, at which time the area may be redeveloped, if appropriate. It is still recommended that where possible staff for construction and operation of the facility be sourced locally.

The site is located within a larger light industrial area created as part of Council's planning strategy. The zoning is part of the wider Sydney Metropolitan Strategy to establish local employment lands within the region. Development of the area will contribute to addressing issues such as lack of available local employment identified in the Blacktown Social Plan. In the long term, industrial development of the site and surrounding area should attract businesses to the area and thus increase employment opportunities for the local population. As such, the Project will form part of the broader employment generating development to be undertaken in the area.

Construction materials and services, and operational staff may be sourced locally. This would have a knock on effect on local spending and ultimately the local economy. The Project will have a positive impact on the income of the surrounding area in both the long and short term.

Property Prices

An impact of the Project on house prices is a major concern for residents of Minchinbury, including the focus group participants.

An economic study has not been prepared as part of this EAR since it has been demonstrated that the Project will not have adverse impacts on surrounding residents with respect to noise, dust, odour and that the landform and M4 which act as a barrier between housing and the site and shield the site visually from Minchinbury. This was enforced during the focus group meetings when participants were shown an aerial photo of the site and it was revealed that the majority of participants were not aware of the quarry's existence or of how close they lived to the site.

Impacts on Community Infrastructure

Regional and local contributions will be provided as part of this Project in consultation with DoP and Blacktown City Council.

Due to the nature of the operation and the aspects of the site (quarry) a relatively small number of persons will be employed in comparison to neighbouring industrial land, some of which may be from the local area. Additionally the site's accessibility means that employees could easily travel to and from the site from other areas of Sydney. Therefore it is unlikely that there would be a significant impact on service demand for housing, schools, hospitals, health care facilities and other community infrastructure in the Blacktown LGA and broader Sydney region of NSW.

17.5 MANAGEMENT/ MITIGATION MEASURES

17.5.1 Noise

Noise mitigation measures have been incorporated into the Project design and the draft statement of commitments to help ensure community amenity is preserved. This includes limiting the hours of operation, siting of operational areas, and construction of amenity berms and containment of the MPC / WTS area behind the amenity berms.

17.5.2 Health and Contaminants

Dust mitigation measures to be implemented and measures to minimise potential for soil and water contamination. Management measures to address safe handling and disposal of asbestos waste and control of materials sent to landfill have been identified in Chapters 3 and 16 and will be included in the SEWMP consisting of the LEMP and EWMP) for operations at the landfill and resource recovery facility.

Measures to control vermin will be incorporated into the SEWMP developed for the site as well as re-emphasise that the facility is not a putrescible facility. This will include ensuring the site is generally maintained in a clean and tidy manner and use of physical and chemical pest control measures if vermin problems arise.

In line with DECC requirements, the proponent will address site safety issues through the use of bunding and fencing to stop trespassing and illegal dumping. The site will be locked outside of operating hours. A security service will be contracted to regularly patrol the site after hours.

Odour

Odour management is discussed in *Chapter 9*.

Traffic and Access

The Project is not expected to have a significant impact on traffic within Minchinbury and uses the community's preferred access option. Impacts from traffic numbers and heavy vehicles on local roads will be further minimised by implementation of a traffic management plan. This plan will include mitigation measures identified in *the Traffic Impact Assessment Report prepared by* Transport and Traffic Planning Associates Pty Ltd (2008).

Visual

Mitigation measures to minimise impacts of the Project on the visual amenity of Minchinbury residents are identified in *Chapter 12*.

Regulation and Monitoring

Monitoring will be undertaken as set out in Chapters 6 to 10 of this EAR. This will include periodical monitoring inclusive of anticipated inspections by the regulatory body, DECC, supplemented by on staff monitoring e.g. records of waste sent to landfill audited as part of licensing requirements. The aim of monitoring will be to make sure that the proposed environmental measures are implemented and effectively identify any issues promptly, so that a response can be initiated and thus minimise environmental impacts.

Regular transparent communication will be required during the approvals process, construction works and at the commencement of operations in regard to site usage, the approvals process and operational monitoring to address these concerns. It will need to demonstrate that the site is operating within a clearly prescribed set of parameters designed to manage the potential health and safety risks. Community concerns regarding impacts of the Project can also be addressed through provision of information. Communication with the local community will be conducted by DoP through the approval process and DECC through the public display of reporting on licenses issued for the Project.

17.5.3 Economic

Employment and Income

Two questions that arose from the focus groups were "what is this going to do for Minchinbury?" and "how will Minchinbury benefit from this new development?" Employment and income are two areas that have the potential to result in positive outcomes for the local community and should be enhanced through use of local services and spending in the local area where possible.

17.5.4 Communication

Background research for this socioeconomic assessment identified a high degree of concern about future operations at the site. Many of the issues raised in this Chapter can be addressed through the sharing of information with the community. As part of dispelling these fears and in its role as a 'good neighbour', it will be necessary for the proponent to provide regular clear transparent information to the local community regarding the Project and the approvals process, including long term plans. There are a number of ways this information could be disseminated. The preferred options identified by Focus Group participants were via a website, the local MP and regular letters to residents.

As such, the Project communication strategy for the local community will involve:

- development of a complaints handling procedure;
- distribution of an information pamphlet, via a letter box in Minchinbury prior to commencement of construction works for the Project, providing details about proposed construction activities, timing and duration and outlining the complaints handling procedure;
- distribution of a second information pamphlet prior to commencement of operations, providing Project details, dedicate staff to facilitate public calls about the Project and details on where the site license can be viewed on the EPA website, to enable interested parties to view the Project's regulatory framework;
- provision of regular Project updates to the local MP and Council during the approvals process, construction works and at the commencement of operations; and
- posting a dedicated page on the company website which provides Project details.

17.6 CONCLUSIONS

Community consultation undertaken for this EA identified a general acceptance that Minchinbury is developing and changing and there are both positive and negative impacts associated with this. There is concern that this Project will not be adequately controlled and will come at the expense of Minchinbury residents.

Many potential issues identified in this socio-economic assessment result from a lack of knowledge about the Project and suspicion of regulatory bodies. There is a general feeling that the community are not a priority and their opinions do not hold as much sway as economic and political issues or interests. These concerns will be addressed through ongoing provision of clear transparent information about the Project to the community. Project issues identified by Minchinbury residents, including dust, noise, traffic, odour, hours of operation, and visual amenity are manageable and will be mitigated by measures included in the Project design and in the draft Statement of Commitments for the Project (refer *to Chapter 19*).

18 GREENHOUSE GAS EMISSIONS

This Chapter estimates greenhouse gas emissions from the Project, makes recommendations for minimising emissions and assesses the impact of anticipated emissions.

18.1 INTRODUCTION

Emissions of greenhouse gases will result primarily from activities associated with the Project that consume energy. This section outlines the approach used to estimate emissions of greenhouse gases and provides an interpretation of their impact. Other activities that will result in emissions of greenhouse gases, such as landfilling and composting operations, are discussed in this report.

In the context of this assessment, greenhouse gas emissions refer to the six direct greenhouse gases regulated by the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol:

- carbon dioxide (CO_2);
- methane (CH_4);
- nitrous oxide (N_2O);
- hydrofluorocarbons (HFCs);
- perfluorocarbons (PFCs); and
- sulphur hexafluoride (SF_6).

18.2 METHODOLOGY

The Project will consume energy and release greenhouse gases, predominantly carbon dioxide (CO2) through the combustion of fossil fuels. In addition, some methane will be generated from composting and landfilling operations, however this is expected to be minimised through the RRF which will divert for reuse materials that might otherwise be landfilled and contribute unnecessarily to methane production.. Greenhouse Gas Legislation and Guidance

The two international frameworks addressing the issue of climate change are the UNFCCC and the Kyoto Protocol.

These frameworks guide the reporting of greenhouse gas emissions internationally, and form the basis of the approach to estimating greenhouse gas emissions. Other relevant legislation and standards include:

- World Resources Institute (WRI) The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, 2004;

- National Greenhouse Accounts (NGA) Factors (available at http://www.greenhouse.gov.au/workbook/);
- Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks 2005 series;
- AGO (2005) National Greenhouse Gas Inventory;
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007; and
- 2002 Draft NSW Energy and Greenhouse Guidelines in EIA (Department of Infrastructure Planning and Natural Resources, Department of Energy, Utilities and Sustainability).

These documents provide further guidance with respect to estimating and assessing impacts of greenhouse gases.

18.2.1 Global Warming Potential

The global warming potential of various gases has been defined as the warming effect relative to CO_2. The purpose of this is to enable comparison of the effects of individual substances on the climate. This enables the effect of the various greenhouse gases to be converted into the equivalent quantity of CO_2 required to give the same effect in absorbing solar radiation ($CO_{2\text{-}e}$).

The various greenhouse gases absorb radiation at different wavelengths and with different efficiency. Further, the lifetime of the gases in the atmosphere must be taken into account, as the longer they remain in the atmosphere, the greater their overall effects. The lifetime chosen to express global warming potential is typically 100 years.

The National Greenhouse Accounts (NGA) Factors, 2008 adopts the following Intergovernmental Panel of Climate Change (IPCC) 1996 global warming potential values for a 100-year time horizon:

- carbon dioxide: 1
- methane: 21
- nitrous oxide: 310
- hydrofluorocarbons: 140 – 11,700 (depending on the molecule)
- perfluorocarbons: 6,500 – 9,200 (depending on the molecule)
- sulphur hexafluoride: 23,900

Using these values, CH_4 therefore has a global warming potential 21 times greater than CO_2 and N_2O 310 times greater than CO_2.

18.2.2 Direct and Indirect Emissions

Emissions of greenhouse gases from the facility can be categorised as 'direct' and 'indirect' emissions.

The National Greenhouse Accounts (NGA) Factors, 2008 adopts the emissions categories of the international reporting framework of *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (WRI/WBCSD). These emission categories are as follows:

- ***Scope 1*** covers direct emissions from sources within the boundary of an organisation such as fuel combustion, manufacturing and landfill processes.

- ***Scope 2*** covers indirect emissions from the consumption of purchased electricity, steam or heat produced by another organisation. Scope 2 emissions result from the combustion of fuel to generate the electricity, steam or heat and do not include emissions associated with the production of fuel. Scopes 1 and 2 are carefully defined to ensure that two or more organisations do not report the same emissions in the same scope.

- ***Scope 3*** includes all other indirect emissions that are a consequence of an organisation's activities but are not from sources owned, or controlled, by the organisation.

Sources of greenhouse gases from the Project include:

- Scope 1 or direct emissions will result from the combustion of fossil fuels (e.g. diesel and fuel oil) in equipment used on site, and from decomposition of organic material as part of landfill and composting operations.

- Scope 2, indirect emissions, will result from electricity consumption from processing, administration infrastructure and other associated activities on-site.

- Scope 3 emissions considered as part of this assessment constitute indirect emissions from associated off-site contractor road transport movements and the extraction of raw fuels to supply liquid fuels and electricity for use on-site.

Consistent with the methodologies described in *Section 18.1.4*, Scope 3 emissions which are not included in greenhouse gas calculations for this assessment are:

- employee business travel;

- employees commuting to and from work;

- extraction, production and transport of other purchased materials and goods; and

- out-sourced activities.

18.2.3 Estimating Emissions

Emission factors for calculating emissions of greenhouse gases are generally expressed in the form of a quantity of a given greenhouse gas emitted per unit of energy (kg CO_2-e /GJ), fuel (t CH_4/l diesel) or a similar measure.

Emission factors are used to calculate greenhouse gas emissions by multiplying the factor (e.g. kg CO_2/GJ energy in petrol) with activity data (e.g. kilolitres x energy density of petrol used).

Table 18.1 details the greenhouse gas emission sources included in this assessment.

Table 18.1 Greenhouse Gas Emission sources included in this Assessment

Scope 1 –direct emissions	Scope 2 –indirect emissions from purchased energy	Scope 3 – other indirect emissions
Diesel combustion on-site (equipment usage)	Electricity Usage	Emissions associated with diesel consumption from transport of product
Decomposition of organic material in composting and landfill operations		Indirect emissions from fuel extraction and transmission line loss associated with electricity supply
		Indirect emissions from fuel extraction associated with diesel fuel supply

Of the emissions sources identified in *Table 18.1*, it is important to note that Scope 1 and 2 sources are those under direct management control of the Project. That is, measures can be implemented as part of the Project which will directly effect emissions associated with these sources e.g. in the case of electricity usage, through reducing consumption.

Scope 3 sources are not under direct management control and therefore the opportunity to reduce emissions from these sources is less direct.

The inclusion of Scope 3 emissions results in inconsistencies in international greenhouse gas emission reporting, in that it can result in 'double counting' of emissions. This assessment therefore provides emission estimates of Scope 3 emissions to provide context regarding these emissions and an indication of emissions magnitude with respect to Scope 1 and 2.

Table 18.2 details the emission estimates for Scope 1 sources.

Table.18.2 Scope 1 (Diesel Consumption) Emission Estimate

Diesel Emissions	Activity Level (Litres/ annum)	Emission Factor [1] (t $CO_{2\text{-}e}$/kL[2])	Estimated Emissions (t CO_2/annum)

Diesel Emissions	Activity Level (Litres/ annum)	Emission Factor [1] (t CO_{2-e}/kL[2])	Estimated Emissions (t CO_2/annum)
Vehicles working in the vicinity of the landfill	455,760	2.7	1,231
Loader and excavators handling waste at transfer station.	132,000	2.7	356
Material processing centre PC and Hand Unload Area	520,140	2.7	1,404
Segregated Material Processing	485,760	2.7	1,312
Major Plant	344,000	2.7	929
Total			**5,232**

1. All emission factors from. National Greenhouse Accounts (NGA) Factors, 2008

Table 18.3 Scope 1 (Landfill) Emission Estimate

Landfill Emissions	Maximum Possible Activity Level (Tonnes of Waste/annum)	Emission Factor[2] (t CO_{2-e}/t waste)	Estimated Emissions (t CO_2/annum)
Commercial and Industrial Waste	1 million	1.66	1,660,000
Total			**1,660,000**

1. All emissions factors from National Greenhouse Accounts (NGA) Factors, 2008.

Assuming all waste is classified as Commercial and Industrial (C&I) waste, not a mix of C&I and Construction and Demolition (C&D) waste.

Assuming maximum predicted waste to landfill scenario.

As highlighted by *Tables 18.2* and *18.3*, emissions associated with material to landfill represents the most significant Scope 1 source of greenhouse gas emissions. Diesel consumption associated with 'major plant' activities largely represents the on-site consumption of diesel to generate electricity. In the future this equipment may be connected to the electricity grid.

18.2.4 Fugitive Emissions From Composting

Fugitive methane emissions from decomposition of organic matter in windrows are highly variable depending on the nature of the material being composted and the composting process employed. The National Greenhouse Accounts (NGA) Factors do not provide an emission factor for composting of garden waste to produce compost. In addition, the Intergovernmental Panel on Climate Change (IPCC) does not provide any methodology to estimate emissions from composting of biomass in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Composting of biomass residues accelerates the natural decomposition process. Decomposition occurs through aerobic and anaerobic pathways, producing a mixture of CO_2 and CH_4 emissions. In a well-managed compost operation, the emissions are primarily CO_2 because of frequent aeration of the material. The compost product, which contains approximately 50 percent of the original biomass carbon, is then spread where it continues to decompose, although no longer at an accelerated pace.

In general, it is considered that the composting of green waste, rather than disposal in a landfill, reduces the generation of methane emissions and promotes the beneficial use of green waste. In short, by composting these materials, a stable, soil conditioner that may have nutrient value is produced from materials that have been diverted from landfills. Most composting operations are likely to function both as a source of GHGs and as a means to avoid GHG release at different stages of their operations.

18.2.5 Fugitive Emissions From Landfill Operations

The landfill will be categorised as a Class 2 landfill, with no putrescible waste to be landfilled. However, a small volume of biodegradable materials may be landfilled which result in production of greenhouse gases over time. One of the objectives of the Project is to maximise recycling at the RRF and to minimise biodegradable material to landfill.

The *Australian Methodology for the estimation of Greenhouse Gas Emissions and Sinks 2006 (Waste)*[3] describes methane generation in landfills as follows.

The components of landfilled waste that contain significant fractions of biodegradable carbon are food waste, garden and green waste, paper and textiles and wood. Methane is not generated immediately upon disposal of waste on land but after a lag of about a year as the waste degrades to the stage at which methane generation commences. Over several decades, as the waste decays, methane is generated and passes through the landfill into the atmosphere. Landfill waste decays and emits methane, depending on its composition and the landfill conditions.

[3] http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.htm

Methane emissions in one year depend on the stock of organic material present in the landfill, which has been deposited over many preceding years.

As described earlier, one of the key objectives of the Project will be to maximise recycling of biodegradable material and minimise the proportion to landfill. If it is considered that the final composition of material sent to landfill will be similar in nature to construction and demolition waste, an approximation of biodegradable material to landfill can be obtained from *Australian Methodology for Greenhouse Gas Emissions and Sinks 2006 (Waste)*. This information indicates that biodegradable material comprises approximately 11% of construction and demolition waste, and that over half of that is wood. Recent research on the decay of wood products in Australian landfills demonstrated that wood products may decay much more slowly than previously thought.

The NGA Factors 2008 provide weighted averaged emission factors for MSW, C&I and C&D. These are simplified categories which provide a representation of emissions from these wastes. The facility is anticipated to landfill between 0.4 and 1 million tonnes of waste annually. On-site waste to be landfilled comprises a mix of C&I waste (NGA emissions factor 1.66) and C&D waste (NGA emissions factor of 0.25). Given the difficulty in determining ratios of waste types and total annual volume to be landfilled, the maximum predicted waste to landfill scenario (1 million T/annum) and the highest emission factor (C&I waste: 1.66 t $CO_{2\text{-}e}$/t waste) has been used for the purposes of this assessment. Based on this highest emission scenario, it is estimated that the site emits 1,660,000 tonnes $CO_{2\text{-}e}$/annum.

Table 18.3 details the emission estimates for Scope 2.

Table.18.4 Scope 2 Sources Emission Estimate

Source (Electricity Consumption)	Activity Level	Emission Factor (t CO_2/MWh)	Estimated Emissions (t CO_2/annum)
Workshop	96 MWh / annum	0.893	86
Office, Amenities	5 MWh / annum	0.893	5
Pumps, Weighbridge, Sprinklers and Treatment	130 MWh / annum	0.893	116
Total			**207**

1. Scope 2 NSW & ACT emission factor for consumption of purchased electricity National Greenhouse Accounts (NGA) Factors,.

Table 18.4 details the emission estimates for Scope 3, including fuel combustion from off-site transportation and indirect emissions associated with the extraction (and transmission loss in the case of electricity supply) of fuels to supply diesel and electricity.

Table.18.5 Scope 3 Sources Emission Estimate

Source	Activity Level[1]	Emission Factor	Estimated Emissions (t CO_2/annum)
Emissions associated with diesel consumption from transport of product	1,268,820litres/annum[3]	3.0 $tCO_{2\text{-}e}$/kl[4]	3,806
Indirect emissions for fuel extraction associated with diesel fuel supply	1,937,660 litres/annum	0.2 $tCO_{2\text{-}e}$/kl[5]	387
Indirect emissions for fuel extraction and transmission line loss associated with electricity supply	231/MWh annum	0.17 $tCO_{2\text{-}e}$/MWh[2]	39
Total			**4,232**

1. Assuming 30km round trip and consumption of 0.285 l/km AGO Factors and Methods Workbook 2006
2. Scope 3 diesel fuel combustion emission National Greenhouse Accounts (NGA) Factors.
3. Scope 3 diesel fuel combustion emission factor National Greenhouse Accounts (NGA) Factors.

Table 18.5 summarises the estimated Scope 1, 2 and 3 emissions. Diesel consumption at the site represents, by far, the most significant source of greenhouse gas emissions.

Table.18.6 Summary Greenhouse Gas Emissions

Source	Estimated Emissions (t CO_2/annum)	
Scope 1 – diesel consumption in on-site equipment and processing	5,232	
Scope 1 – Emissions from landfilling construction and demolition waste	1,660,000	
Total Scope 1		**1,665,232**
Scope 2 – electricity consumption	207	
Total Scope 2		**207**
Total Scope 1+2		**1,665,439**
Emissions associated with diesel consumption from transport of product	3,806	
Indirect emissions for fuel extraction associated with diesel fuel supply	387	
Indirect emissions for fuel extraction and transmission line loss associated with electricity supply	39	
Total Scope 3		**4,232**

18.3 IMPACT ASSESSMENT

The project is anticipated to receive of up to 2,000,000 tonnes per annum of material.

Annual emissions of greenhouse gases (Scope 1 and 2) are estimated to be 1,665,439 $tCO_{2\text{-}e}$ per annum. Given the difficulty in determining ratios of waste types and total annual volume to be landfilled, the maximum predicted waste to landfill scenario (1 million T/annum) and the highest emission factor (C&I waste: 1.66 t $CO_{2\text{-}e}$/t waste) has been used for the purposes of this assessment. Based on maximum capacity intake, the greenhouse intensity of the project therefore equates to approximately 0.833 $tCO_{2\text{-}e}$/t of material received. It is expected that this estimate is an overstatement due to a significant amount of material being recycled, and a significant component of landfilled material being closer in nature to construction and demolition waste rather than construction and industrial waste.

These scope 1 and 2 emissions represents a contribution of 0.105% to the State's reported greenhouse gas emissions in 2005[4] and less than 0.03% of Australia's reported greenhouse emissions in 2005[2].

Based on the magnitude of emissions estimated from the Project, there will be no direct measurable environmental effect due to the emissions of greenhouse gases from the project. The effects of the emissions from the Project would be unmeasurable.

The effects of global warming and associated climate change are the cumulative effect of many thousands of such sources and it is the cumulative effects that ultimately bring about climate change.

This highlights the problem of dealing with climate change on a project-by-project basis. With the exception of ensuring that developments employ methods and equipment that are as energy efficient as possible.

The Project has identified the most energy efficient methods and equipment that can be applied at this facility and efficiency of equipment will be a key consideration in procurement of additional equipment. Greenhouse gas emissions and intensity of production will be monitored, through on-site consumption of diesel and electricity on an annual basis.

In addition, the composting of green waste, rather than disposal in a landfill, reduces the generation of methane emissions and promotes the beneficial use of green waste.

[4] NSW reported emissions of 158,248,820 tCO_2 and Australia reported emissions of 559,074,490 tCO_2. Reporting year 2005, Kyoto framework, Australian Greenhouse Emissions Information System http://www.ageis.greenhouse.gov.au/

18.4 MINIMISING ENERGY CONSUMPTION AND GREENHOUSE GAS EMISSIONS

To ensure that energy consumption and greenhouse gas emissions are minimised, the following management measures will be undertaken:

- efficiency of all new mobile and fixed equipment will be considered during procurement for both diesel and electric powered equipment;
- an internal review will be conducted annually to identify techniques to minimise energy use and assess if equipment is operating at optimum energy levels;
- equipment will be maintained to retain high levels of energy efficiency; and
- the inventory of emissions developed for this assessment will be regularly updated and maintained.

These greenhouse mitigation and monitoring programs will be used throughout the life of the Project.

Energy use from the site is not expected to result in equivalent stationary energy consumption in excess of 10 GWh per year. Therefore, the development of a Energy Saving Action Plan is not required.

18.5 CONCLUSIONS

Greenhouse gas emissions will result primarily from activities associated with the Project that consume energy. When compared to the reported greenhouse gas emissions for 2005, the Project is predicted to contribute less than 0.003% of NSW annual emissions. Management and monitoring measures presented in *Section 18.3* will be implemented to minimise greenhouse gas emissions from the Project.

19 DRAFT STATEMENT OF COMMITMENTS

This chapter provides a summary of the major commitments of the proponent for the Project.

19.1 INTRODUCTION

The commitments detailed in this section have been compiled based on the environmental assessments undertaken during the preparation of this EA. They constitute a commitment from the proponent, inclusive of the allocation of responsibilities and timing, to implement measures to minimise all potential environmental impacts that have been identified through this EA and ensure that the project is environmentally, socially and economically sustainable.

The Draft Statement of Commitments is detailed within *Table 19.1* below.

Table 19.1 Draft Statement of Commitments

Item	Commitment	Responsibility	Timing
1. Scope of Development			
	The proponent will carry out the approved aspects of the development is accordance with the EA lodged with the DoP prepared by ERM February 2008.	LHBC	At all times
2. Statutory Requirements			
	The proponent will obtain and maintain all licences, permits and approvals as required.	LHBC	At all times
3. Construction and Operation EMP			
	A Construction Environmental Management Plan (CEMP) and an Operational Environmental Management Plan (OEMP) will be developed and approved by the Director- General and will respectively: • describe all activities to be undertaken on the site during construction and operation; • describe the work program outlining relevant timeframes that must be met during construction and operation; • detail statutory and other obligations that must be met during construction and operation, including all approval and agreements required from authorities and other stakeholders; • describe the roles and responsibilities for all relevant personnel involved in construction and operation; • detail the environmental management procedures, monitoring and reporting to be implemented during the construction and operation phases and timing and triggers for their implementation; • detail what incident management procedures will be in place during construction and operation; • detail procedures for community consultation and complaints handling during construction and operation; and • be made available for public viewing after approval from the Director-General.	LHBC / Director-General	CEMP – prepared prior to commencement of any site activity and implemented for the duration of construction. OEMP – prepared prior to commencement of operations and implemented for the duration of operations.
4. Construction Environmental Performance			
4.1 Surface Water			
4.1.1	Preparation of an Erosion and Sediment Control plan and a Stormwater Management Plan prepared in accordance with DECC (2006) *Managing Urban Stormwater: Harvesting for Reuse* guidelines and will be adhered to and include: • Installation of temporary erosion and sediment control structures and sediment fences to prevent the movement of sediment from construction areas; • Minimisation of time excavated surfaces are left exposed; • Restriction of traffic to defined internal roads; • Ensuring any chemical (diesel for operating machinery) are stored on site and appropriately bunded in sealed containers; • Regular inspection and maintenance of erosion / siltation control devices to ensure effectiveness for the entire	LHBC/Construction Contractors	Detailed design phase and during construction

Item	Commitment	Responsibility	Timing
	construction period; • regular inspection of the stormwater treatment measures and site drainage system (including sumps, pipelines, pumps, bunds, tanks, oil/ water separators, sediment traps and storages), during the construction period with maintenance works triggered as required; • Installation of an on-site detention (OSD) basin with a volume of 5362m^3 on the northern portion of the site next to the M4 to allow for the retention and storage of surface water flows from the pit and operational areas to contain runoff for the 1 in 100 year rainfall event; • If required a surface stormwater pond will be placed adjacent to OSD basin to receive water pumped from the in pit clean operational stormwater pond. Mixing with the OSD basin will be prevented with the use of appropriate surface grading and bunding; • Development of a settling basin at the detailed design phase for pre-treatment before entry to the OSD basin to provide further attenuation and capture of sediment that may reach the OSD detention basin.		
4.2 Groundwater			
4.2.1	The existing nine (9) bore wells are to be prepared for monitoring by a suitably qualified expert. This will require BH01 deep well to either be unblocked or another BH01 deep well constructed for monitoring.	LHBC/Construction Contractors	During Construction
4.3 Leachate			
4.3.1	A detailed design specification for the leachate collection system shall be prepared to the satisfaction of NSW Benchmark Techniques and DECC.	LHBC	Prior to construction
4.3.2	A detailed design specification for the leachate treatment system shall be prepared to the satisfaction of Sydney Water and DECC.	LHBC	Prior to construction
4.3.3	A S.73 Trade Waste Certificate shall be gained from Sydney Water Corporation to determine disposal quantity and quality of leachate to Sydney Water Corporation sewage system.	LHBC	Prior to construction
4.3.4	The leachate collection and treatment system shall be constructed in accordance with the detailed design specifications, EPL and Trade Waste Agreement with Sydney Water Corporation.	LBHC	During construction
4.4 Air Quality			
4.4.1	A gas management system shall be developed at the detailed design stage and implemented at the relevant stages and then maintained as filling of the pit occurs over the life of the landfill and beyond as required.	LHBC	Prior to commencement of landfilling
4.4.2	The *Construction Environmental Management Plan* to be developed for the Project and will include the following dust	LHBC/Construction Contractor	Throughout construction

Item	Commitment	Responsibility	Timing
	mitigation and monitoring measures to minimise particulate matter emissions during the construction phase: • use of water carts and watering of exposed surfaces when necessary. This could include spray mists and sprinkler systems for crushing, grinding and chipping operations and on all material stockpiles; • minimising dust generating activities on days of extreme unfavourable weather conditions when there is a high risk of dust generation e.g. dry, windy conditions; • defining of trafficked areas; • imposition of site vehicle speed limits; • stabilising exposed areas as quickly as possible; • construction of perimeter berms around the main area of operations to provide a barrier for dust emissions; • cleaning spills of potentially dust materials immediately; • wheel wash for all vehicles travelling off-site; and • sealing of operational surfaces at the RRF.		
4.5 Noise			
4.5.1	To reduce construction noise experienced at the nearby residences, the following DECC Environmental Noise Control Manual (ENCM) time limits for construction activities where construction noise is audible at residential premises will be adhered to: • Monday to Friday, 7am to 6pm;	LHBC/Construction Contractor	During construction

Item	Commitment	Responsibility	Timing
	• Saturday, 8am to 1pm (or 7am to 1pm if inaudible at residential premises); and • No construction on Sundays or public holidays.		
4.5.2	Construction of impervious noise barriers at various positions around the facility, including 10 m high barriers to the north, north-west, west and south of the main area of operations and retention of the existing earth mound to the north-east of the quarry pit.	LHBC/Construction Contractor	During construction
4.5.3	The following measures will be implemented as part of the CEMP: • Informing potentially affected residents in advance as to the extent and timing of potentially nosier construction activities and responsibly advising when noise levels during such works may be relatively high.; • Where known to be readily available, deploying equipment having lower noise emission levels; • Maintain construction equipment to ensure rated noise emission levels are not exceeded; • Provide a contact telephone number via which the public may seek information of make a compliant. A log of complaints should be maintained and actioned by the site supervisor in a responsive and timely manner; and • Undertake construction activities in accordance with DECC (2000) *Industrial Noise Policy* (INP).	LHBC/Construction Contractor	During construction
4.6 Traffic			
4.6.1	An operational traffic assessment for access way onto the Precinct Plan Stage 3 road system will be submitted.	LHBC	• When an application is made to construct the stage 3 road system by the then owner of the non operational land, and

Item	Commitment	Responsibility	Timing
			• when the Precinct road through the adjacent Australand site is constructed and its egress point from the Precinct is known.
4.6.2	The following construction to be undertaken to the existing contractual ROW and completed prior to operations: • construct a sealed industrial standard road pavement generally 7.0 metres wide along the existing section of 'haulage road' (AS 2890.2 for design and Council standards for construction); • install guard rail along the northern side of the road along the edge of the quarry road to RTA standard for design; • install 'barrier' centreline along the roadway with 40 kph speed restriction and appropriate lighting.	LHBC/Construction Contractor	During construction
4.6.3	The following construction to be undertaken for the internal site road network and completed prior to operations; • construct a sealed industrial standard road pavement (Council design standard); • provide appropriate directional and regulatory signposting; • provide appropriate lighting along the internal road network; • provide appropriate fencing and barriers to avoid any safety issues in relation to the quarry wall (vehicular and pedestrian); • provide paved parking areas and line marked areas (AS 2890.1 design standard); and	LHBC/Construction Contractor	During construction

Item	Commitment	Responsibility	Timing
	• ensure that the design provides for the access and maneuvering for all vehicles accessing the site (AS2890.2 design standard).		
4. 7 Visual Amenity			
4.7.1	The site will be maintained in an orderly manner and the material stockpiles, waste, plant, equipment and vehicle parking will be kept to designated areas.	LHBC/Construction Contractor	Throughout construction
4.7.2	LHBC will install outdoor lighting in accordance with Australian Standards, AS4282-1977 '*Control of Obtrusive Effects of Outdoor Lighting*' and AS1158 '*Lighting for Roads and Public Places*'. The lighting will be kept to the minimum necessary to safety and efficiency purposes and will be directed away from residences and roads through the use of directional lighting equipment and shielding.	LHBC/Construction Contractor	During Construction
4.7.3	LHBC will construct building elements using muted colour tones which blend into the surrounding natural environment	LHBC/Construction Contractor	During Construction
4.7.4	LHBC shall undertake landscaping works prior to operation of the RRF facility. Landscaping shall be undertaken along internal roadways, on berms and around the administration building.	LHBC/Construction Contractor	During Construction
4.7.5	The north-western visual barrier wall shall be coloured using green tones which compliment the surrounding vegetation.	LHBC/Construction Contractor	During Construction
4.8 Ecology			
4.8.1	Fencing is to be constructed around the identified Endangered Ecological Communities on site to restrict vehicular and pedestrian access.	LHBC/Construction Contractor	Prior to construction
4.8.2	As part of the ECMP all stockpiled materials are not to be located in close proximity to the EECs or any individual native trees on site.	LHBC/Construction Contractor	Throughout construction
4.9 Aboriginal Heritage			
4.9.1	Two weeks notice will be given to the Deerubbin Local Aboriginal Land Council (DLALC), Darug Custodian Aboriginal Corporation (DCAC), Darug Tribal Aboriginal Corporation (DTAC) and Darug Aboriginal Cultural Heritage Assessments (DACHA) prior to construction to allow organisation of Aboriginal site monitors to inspect horizon top soil stripping and collect any surface artefacts within the operational areas of the site.	LHBC, DLALC, DCAC, DTAC and DACHA	Two weeks prior to horizon topsoil stripping within the operational areas of the site

Item	Commitment	Responsibility	Timing
4.9.2	Should LHBC uncover previously unrecorded relics (non-Indigenous heritage items) during construction, works will cease immediately at that location and the NSW Heritage Office will be notified and advice sought as to the appropriate course of action.	LHBC	During construction
4.9.3	Areas to be disturbed within the moderate and high sensitivity zones, subsurface investigation within the impact zone, by way of archaeological salvage excavation including test pits, will be undertaken prior to commencement of groundbreaking works, to properly assess the scientific significance of these areas.	LHBC	Prior to construction works
4.10 Hazards and Risk			
4.10.1	Relevant standards and requirements relating to fire/ emergency measures and procedures will be adhered.	LHBC/Construction Contractor	During Construction
4.10.2	Additional soil testing of stockpile materials will be initiated to ascertain the presence of any contaminants prior to its use for capping; as amenity berms or transportation off site.	LHBC	During construction
4.10.3	Prior to removal of stockpiles from the site additional samples are collected and analysed on a regular basis.	LHBC	Prior to removal of stockpile materials
4.10.4	Following the removal of the stockpiled material additional field work and laboratory analysis and reporting are to be undertaken to a level commensurate with the site area intended for redevelopment and according to relevant published guidelines.	LHBC	Once stockpiles have been removed, prior to construction of the RRF
4.10.5	The risk of soil contamination by spills will be minimised throughout the Project by implementation of appropriate procedures for safe handling and storage of fuel and chemicals and spill response procedures.	LHBC/Construction Contractor	During Construction
4.10.6	Electricity transmissions lines should be installed underground (where possible)	LHBC/Construction Contractor	During Construction
4.10.7	Reticulated or bottled gas shall be installed and maintained in accordance with AS/NZS 1596-2002: *Storage and Handling of LP Gas* and the requirements of the relevant authorities.	LHBC/Construction Contractor	During Construction
4.10.8	A reticulated hydrant supply should be installed in accordance with the requirements of AS 2419.1 (1994). Hydrants should be installed at regular intervals throughout the internal road network and should be readily accessible without having to leave the sealed internal road network.	LHBC/Construction Contractor	During Construction
4.10.9	A dedicated static water supply of at least 10,000 litres should be provided for fire fighting activities. If the storage is	LHBC/Construction Contractor	During Construction

Item	Commitment	Responsibility	Timing
	also required for alternate uses, the draw off for these uses will need to be above the 10,000 litres.		
4.10.10	The landslip along the northern face of the pit shall be stabilised and monitored as specified within the Jeffery and Katauskas Pty Ltd (2008) Geotechnical Stability Assessment.	LHBC	During Construction
4.11 Waste management			
4.11.1	A Construction Waste Management Plan (CWMP) shall be prepared to ensure that all general wastes produced during the construction phase are disposed of off-site to appropriate waste facilities. The CWMP shall be made available to all construction staff to ensure waste is managed appropriately during construction.	LHBC	During construction
4.12 Socio-economic			
4.12.1	Where possible, LHBC will locally source jobs created for construction.	LBHC/Construction Contractor	On hiring of construction staff
4.12.2	Preparation of Local Communication Strategy for the dissemination of information regarding the Project to the local community.	LBHC	To be prepared prior to construction and implemented during construction
5. Operational Environmental Performance			
5.1 Surface Water			
5.1.1	A detailed stormwater management plan shall be developed and include the requirements set out in the Surface Water Report prepared by Storm Consulting dated April 2008, which will include management for spills from drainage lines, sediment traps, check dams, erosions control, bunds infiltration areas, sediment fences, filters and all other erosion and sediment control devices.	LHBC	Prior to commencement of operations
5.1.2	Water sampling at the OSD basin and in pit stormwater pond to be conducted quarterly for the first 12 months of operations and six-monthly for following years to ensure re-used/released water is of the appropriate quality for end-use in accordance with ANZECC guidelines and relevant NSW guidance and the sites Environmental Protection Licence. Water sampling shall test for compliance with specified water quality standards for discharge. Sampling requirements will include TSS, turbidity, ammonia, Biochemical Oxygen Demand, TN and TP.	LHBC	Monitoring to occur on a quarterly basis for the first 12 months and then six-monthly for all following years of operation.
5.1.3	An OSD basin and Gross Pollutant Trap Cleaning Program to be implemented to provide more frequent monitoring	LHBC	Cleaning Program to be implanted on a quarterly

Item	Commitment	Responsibility	Timing
	as site settles from development. The Cleaning Program will include: • sediment and weed removal from the OSD basin and its associated sediment control/stilling basin; and • checking integrity of in-pit stormwater basin, plus sediment removal. A maintenance and monitoring check-sheet shall be developed that allows for the data entry, location of stormwater management devices on-site (e.g. based on a map with numbered locations), type of monitoring (visual, water sampling, etc), outcome (e.g. all clear, device needs cleaning), actions taken, and any follow up required.		basis and monitoring and recording to be undertaken in compliance with the Environmental Protection Licence issued for the Project.
5.1.4	Periodic removal of sediment and other materials from site storages and sediment traps and waste oil and sludge from the oil / water separators and wheel wash sediment separator, immediate stabilisation and disposal at an appropriate off-site facility. Storage dams will have markers that indicate when sediment is to be removed so that minimum storage requirements can be maintained.	LHBC	As required during operations
5.1.5	Diesel fuel will be stored in bunded above ground double skin diesel fuel tanks located near the workshop. The tanks will be designed and manufactured in accordance with AS1940 and AS1692. Any refuelling facilities or fuel/ chemical (including oil and lubricant) storages, are to be located in covered, bunded areas or self bunded storage containers, designed to prevent the entry of stormwater and capable of containing the full storage volume of the container plus an additional 10%.	LHBC	Tanks to be installed prior to operations. Management of tanks to occur throughout operations
5.1.6	Potential spills will be contained, in the first instance, by bunding and grading to sumps with backup containment created by the main storage basins. Spill kits will be available on-site and staff will be trained in their use to contain spills and prevent them from entering the stormwater drainage system. Runoff from areas where spills can occur will not be discharged off-site.	LHBC	Training of staff to occur within the first 6 months of operation. Spill maintenance to occur throughout operations
5.2 Groundwater			
5.2.1	A groundwater monitoring program is to be prepared to the satisfaction of DECC and the Environmental Protection Licence (EPL) issued for the Project to satisfy reporting requirements.	LHBC	Prior to operation

Item	Commitment	Responsibility	Timing
5.2.2	Water quality samples shall be taken from all nine (9) bore wells to establish the base water quality standard for groundwater quality monitoring. The base water quality samples are to be provided to DECC satisfaction.	LHBC	Prior to operation
5.3 Leachate			
5.3.1	The LEMP will set out leachate management to maintain the collection and treatment system. Visual inspections of the leachate collection system (sump and riser) shall be undertaken quarterly for the first 18 months of initial operations and if no adverse impacts of operations is observed, will be reduce to every 6 months throughout the life of the Landfill and RRF. Visual inspection shall also occur proceeding significant rainfall events. Submission of water quality monitoring results shall be submitted to the relevant authority as required by the EPL.	LHBC	Preparation of the management plan prior to operations. Monitoring to be conducted throughout the life of the Project.
5.3.2	The leachate collection system shall be monitored for clogging every year throughout the life of the landfill and RRF. The system shall be unclogged as required to maintain the level of leachate within the pit below the regional groundwater table.	LHBC	During operations
5.4 Air Quality			
5.4.1	A real-time dust monitoring and reactive control system will be implemented to identify activities that may lead to off-site air quality impacts. The dust monitoring can be used to assess compliance with DECC ambient air quality criteria. A minimum of one real time monitor (e.g. DustTrak, TEOM, E-Bam, E-Sampler) will be used to identify real-time impacts and delineate short term particulate matter concentrations and thus trigger required maintenance/ repairs or development of engineering solutions.	LHBC	Throughout operations
5.4.2	Monitoring will be undertaken as per DECC (1996) *Environment Guidelines: Solid Waste Landfills* for the gas management system. Unless otherwise approved by DECC, monitoring will be conducted monthly for initial operations, and if no adverse impacts are observed, will be reduced to quarterly after six months of operations and to annually after 18 months of operation. Monitoring would include a walkover along chimneys with monitoring of landfill gas (methane and hydrogen sulfide) undertaken using a suitable LFG monitor e.g. GA 2000, capable of reading % gas and % LEL. Monitoring shall also include recording of odour observations including the monitoring of BioMagic key odour	LHBC	Initial monitoring to be conducted monthly and reduce to monitoring annually after 18 months where no adverse impacts are observed. Monitoring to be conducted throughout operations

Item	Commitment	Responsibility	Timing
	sources to minimise emissions.		
5.4.3	An Air Quality Management Plan (AQMP) shall be prepared which will be included in the LEMP and EWMP to be developed for the Project, with a focus on activities which generate the most significant emissions – in this instance those associated with haulage movements and transfer and loading activities.	LHBC	Prepared prior to commencement of operations and implemented for Throughout operations
5.5 Noise			
5.5.1	On-site plant and equipment are to be properly maintained to ensure rated noise emission levels are not exceeded.	LHBC	Throughout operations
5.5.2	With the application of reasonable and feasible mitigation, operational noise levels at residences will not exceed 55bB(A)$L_{eq,15min}$.	LHBC	Throughout operations
5.5.3	A contact telephone number will be provided on a sign on the site fence for the public to seek information or make a noise complaint.	LHBC	Throughout operations
5.5.4	A log of noise complaints will be maintained and actioned in a responsive manner.	LHBC	Throughout operations
5.5.5	Normal hours of operation between 6am to 10pm, with landfilling operations further restricted to the hours between 6am and 6pm (receivable material would only occur after 10pm on occasion). A public notice shall be posted on the site fence informing the public when waste will be received after normal hours of operation.	LHBC	Throughout operations
5.6 Traffic			
5.6.1	• The existing contractual ROW and internal site road network to be maintain at all times to the Australian Standards for roadway design AS 2890.1 and AS2890.2.	LHBC	Throughout operations
	• Regular monitoring of the road network is to be undertaken throughout the life of the landfill and the ongoing operation of the RRF. Any reported damage to the road network is to be recorded and repaired within a timely manner.	LHBC	Throughout operations
5.7 Visual Management			
5.7.1	Where possible, use of highly reflective external materials/ colours on the site will be avoided unless necessary for	LHBC	Throughout operations

<table>
<tr><th>Item</th><th>Commitment</th><th>Responsibility</th><th>Timing</th></tr>
<tr><td></td><td>safety reasons.</td><td></td><td></td></tr>
<tr><td>5.7.2</td><td>LHBC will operate outdoor lighting in accordance with Australian Standards AS4282-1977 'Control of Obtrusive Effects of Outdoor Lighting' and AS1158 'Lighting for Roads and Public Places'. The lighting will be kept to the minimum necessary to safety and efficiency purposes and will be directed away from residences and roads through the use of directional lighting equipment and shielding.</td><td>LHBC</td><td>Throughout operations</td></tr>
<tr><td>5.7.3</td><td>LHBC will maintain building elements using muted colours which blend into the surrounding natural environment.</td><td>LHBC</td><td>Throughout operations</td></tr>
<tr><td>5.7.4</td><td>The site is will be maintained in an orderly manner and the material stockpiles, waste, plant, equipment and vehicle parking will be kept to designated areas.</td><td>LHBC</td><td>Throughout operations</td></tr>
<tr><td>5.7.5</td><td>LHBC shall maintain landscaped areas on site throughout operations.</td><td>LHBC</td><td>Throughout operations</td></tr>
<tr><td colspan="4">5.8 Hazards and Risks</td></tr>
<tr><td>5.8.1</td><td>The risk of soil contamination by spills will be minimised throughout the Project by implementation of appropriate procedures for safe handling and storage of fuel and chemicals and spill response procedures.</td><td>LHBC</td><td>Throughout operations</td></tr>
<tr><td>5.8.2</td><td>Provide and maintain Asset Protection Zones (APZs) as follows:
<table>
<tr><th>Potential Bushfire Hazard</th><th>Recommended APZ</th><th>Justification of Recommended APZ</th></tr>
<tr><td>Grassland vegetation adjoining site to east, south and west</td><td>10m IPA + 1.8m non-combustible radiant heat fence or earthern embankment (rock and soil) with a minimal basal width of 10m. If over 20m separation, the latter is not required.</td><td>Non-residential nature of Project. NB the Project design provides over 20 m of separation so a radiant heat fence or earthern embankment is not required.</td></tr>
<tr><td>Woodland in the north-west corner of site</td><td>20m IPA + appropriate construction standards and berms.</td><td>The small size and isolated nature of this remnant vegetation pocket, along with the non- residential nature of the Project.</td></tr>
</table></td><td>LHBC</td><td>Establish APZs prior to operation.

Maintain APZs throughout operations</td></tr>
</table>

Item	Commitment			Responsibility	Timing
	Riparian vegetation of Ropes Creek tributary in the southern portion of the site	20m	Non-residential nature of the Project and the narrow width of these vegetation fingers.		
5.8.3	Emergency Response Procedures including evacuation procedures shall be developed for the occurrence of a fire.			LHBC	Prior to operation
5.8.4	Geotechnical inspections of the pit shall be undertaken every 6 months and any identified stability issues rectified as required. All geotechnical inspections shall be documented and reported as part of a management plan of the pit integrity.			LHBC	Throughout landfilling
5.9 Waste Management					
5.9.1	A Site Environmental Waste Management Plan (SEWMP) shall be produced to manage general waste streams produced during operations. The SEWMP shall be made available to all operational staff upon commencement of employment. The SEWMP shall ensure putrescible waste and recycling waste receptacles are provided within the RRF and associated buildings. The SEWMP will ensure that all putrescible waste shall be collected and disposed of off-site.			LHBC	Throughout operations.
5. 10 Greenhouse Gas					
5.10.1	Inventory of emissions will be prepared and maintained to monitor greenhouse gas throughout the life of the Project.			LHBC	Throughout operations
5.10.2	Undertake an internal review annually to identify techniques to minimise energy use and assess if equipment is operating at optimum energy efficiency. Internal review to address inventory of emissions levels.			LHBC	Annually, throughout the life of the Project
5.10.3	Energy efficiency to be a priority for of all new mobile and fixed equipment during procurement for both diesel and electric powered equipment..			LHBC	Procurement of mobile and fixed equipment
5.10.4	All greenhouse gas producing equipment will be maintained to retain high levels of energy efficiency.			LHBC	Throughout operations
5.11 Health and Safety					

Item	Commitment	Responsibility	Timing
5.11.1	LHBC will implement health, safety and risk management plans for the Project.	LHBC	Throughout operations
5.12 Socio- economic			
5.12.1	Where possible LHBC will locally source staff.	LHBC	On hiring of operational staff
5.12.2	Preparation of Local Communication Strategy for the dissemination of information regarding the Project to the local community.	LBHC	Throughout operations

20 CONCLUSION

The proponent seeks project approval for the development of a Resource Recovery Facility (RRF) and general solid waste (non putrescible) landfill at their Eastern Creek site located in the local government are of Blacktown, NSW, which is capable of accepting up to 2 million tonnes of waste per annum, 80% of which is to be processed through the RRF and 20% sent to the landfill. The use of the site is consistent with the Eastern Creek Precinct Plan and will contribute to the employment generation within the Precinct.

The preparation of the project has involved input from a range of disciplines including engineering, water, acoustics, heritage, planning, air, traffic, socio-economic, geotechnical and ecology. The project has evolved in response to consideration of the suitability of the site in terms of location, justifiable demand and technical investigations to ensure that the proposal does not adversely impact the environmental features of the site and surrounds.

The environmental assessment for the project has shown that with the implementation of recommended mitigation and management measures and monitoring programs throughout the construction and operational phases of the project, the proposal is not expected to have an unacceptable impact on groundwater, surface water, air quality, odour, traffic, ecology, heritage and visual amenity. The project will also have positive impacts on Minchinbury and Eastern Creek and the wider Blacktown region in terms of socio-economic considerations.

Measures were developed to mitigate potential environmental impacts identified during the environmental assessment and are included in the draft statement of commitments provided in Section 19.1. The proponent is committed to implementing these measures during the detailed design, construction and operation phases of the project, as applicable.

PART E – REFERENCES AND ABBREVIATIONS

REFERENCES

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ERM (2007) **Section 160 Application for PAD Y (45-5-3021), Kellyville** Prepared for Brown Consulting, November 2007.

Hazelton P, Bannerman S and Tillie P (1989) **Penrith 1: 100 000 Soil Landscape Series Sheet 9030** Soil Conservation Service of NSW, Sydney

Jeffery and Katauskas Pty Ltd (2007) **Report to Light Horse Business Centre on Preliminary Geotechnical Assessment for Proposed Development at Archbold Road, Eastern Creek, NSW** Prepared for Light Horse Business Centre, May 2007.

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NSW Rural Fire Service (2006) **Planning for Bushfire Protection NSW** Rural Fire Service, NSW.

ABBREVIATIONS

Acronym	Meaning
ABS	Australian Bureau of Statistics
AHD	Australian Height Datum
ARI	Average Recurrence Interval
APZ	Asset Protection Zone
AQMP	Air Quality Management Plan
BCC	Blacktown City Council
bgl	below ground level
BH	Bore hole
BTEX	Benzene, Toluene, Ethylene, Xylene
C&D	Construction and Demolition
C&I	Commercial and Industrial
CPW	Cumberland Plain Woodland
DADI	Dial-a-Dump Industries
DGRs	Director General's Requirements (DoP)
DoP	NSW Department of Planning
DP	Deposited plan
DWE	Department of Water and Energy (formerly Deptment of Natural Resources
EA	Environmental Assessment
EAR	Environmental Assessment Report (this document)
ECRTN	Environmental Criteria for Road Traffic Noise
EEC	Endangered Ecological Community
ENCM	Environmental Noise Control Manual
EP&A Act	Environmental Planning and Assessment Act, 1979 (NSW)
EPA	NSW Environment Protection Authority (within the Department of Environment & Conservation)
EPBC Act	Environment Protection & Biodiversity Conservation Act, 1999 (Cwlth)
ERM	Environmental Resources Management Australia Pty Ltd
EWMP	Environmental Waste Management Plan
GWh	Gigawatt hours
HIL	Health based Investigation Level
INP	Industrial Noise Policy
kL	kilo litre (1000 litres)
LHBC	Light Horse Business Centre
LALC	Local Aboriginal Land Council
LEMP	Landfill Environmental Management Plan
LGA	Local Government Area
MPC	Materials Processing Centre
mtpa	million tonnes per annum
OSD	On Site Detention
PAH	Poly Aromatic Hydrocarbons
POEO Act	Protection of the Environment Operations Act, 1997 (NSW)
PCB	polychlorinated biphenyl
PFM	Planning Focus Meeting
PM_{10}	particulate matter less than 10 microns
RBL	Rating Background Level
RRF	Resource recovery facility
RTA	Roads and Traffic Authority
SEPP	State Environmental Planning Policy
SEWMP	Site Environmental Waste Management Plan
tpa	tonnes per annum
TPH	Total petroleum hygrocarbons
TSC Act	Threateed Specieis Conservation Act, 1995 (NSW)

Acronym	Meaning
TSP	Total suspended particulates
VENM	Virgin Excavated Natural Material
VKT	Vehicle kilometres travelled
VPA	Voluntary Planning Agreement
WTS	Waste Transfer Station
XP-RAFTS	hydrology model

PART F – ANNEXES

Annex A

Director General's Requirements

Table .A.1 Director-General's Requirements

Requirement	Chapters/Sections Addressed
General Requirements	
Executive Summary	Executive summary provided to EAR
Detailed description of the project including the:	
• need for the project;	Sect 1.5
• alternatives considered;	Chap 2
• plans for any proposed building works, including the proposed design of the landfill and its associated leachate and gas management systems and	Chap 3
• various components and stages of the project.	Sect 3.2.2
Consideration of any relevant statutory provisions, including whether it is consistent with the objects of the Environmental Planning and Assessment Act 1979	Chap 4
General overview of the environmental impacts of the proposal, identifying the key issues for further assessment, and taking into consideration any issues raised during consultation.	Chap 5
Assessment of the key issues specified below and any other significant issues identified in the general overview of the environmental impacts of the proposal (see above), which includes: • a description of the existing environment; • an assessment of the potential impacts of the project, including any cumulative impacts; and • a description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage, and/or monitor the impacts of the project.	Chapters 6 to 18 identify the key issues and environmental impacts and Chapter 19 outlines the measures that would be implemented to avoid, minimise, manage and monitor the impacts.
Draft Statement of Commitments, outlining environmental management, mitigation and monitoring measures.	Chap 19
Conclusion justifying the project, taking into consideration the environmental impacts of the proposal, the suitability of the site, and the costs and benefits of the proposal.	Chapter 20 provides a conclusion for the project and Sect 1.5 outlines the need for the project.
A signed statement from the author of the EA certifying that the information contained in the report is neither false nor misleading.	Signed statement provided at the front of the EAR

Requirement	Chapters/Sections Addressed
Key Issues	
Strategic Planning: • demonstrate that the proposal is generally consistent with the Eastern Creek Precinct Plan (Stage 3), and justify any inconsistencies between the project and the precinct plan.	Sect 4.3.6
Planning agreement/developer contributions: • review the project against any existing, draft or likely requirements for the provision of regional and local infrastructure in the Western Sydney Employment Hub, and in consultation with the Roads and Traffic Authority, Blacktown City Council and any relevant service providers; and • describe what contributions would be made towards the provision of this infrastructure; and justify these contributions.	Sect 4.5.3 and Annex I includes the Draft Voluntary Planning Agreement.
Waste Management: • describe what measures would be implemented to control the inputs and outputs of the facility; and demonstrate that all reasonable and feasible measures would be implemented to maximise resource recovery from the waste stream.	Sect 3.4 and Chap 16
Odour and Air Quality: • No requirements are specified in the revised DGRs therefore the requirements in the original DGRs dated 25/06/06 have been relied upon: • Assess odour and dust generation .	Chap 9
Greenhouse Gas and Energy: • Calculate the Scope 1 & 2 emissions of the project, and • Describe what measures would be implemented to ensure the proposed operations on site are energy efficient.	Chap 18
Noise- including: • construction; • operational, and • traffic noise.	Chap 10
Soil and Water: • a rigorous assessment of the potential impacts of the project on surface and ground water resources; • a detailed water balance for the project , outlining the measures that would be implemented to minimise water use on site during construction and operations; • the proposed erosion and sediment controls during construction; • the proposed stormwater and leachate management systems during operations; • the identification of suitable cover material for the operations and the proposed arrangements for stockpiling and using this material; and • consideration of any potential drainage, flooding, soil contamination and salinity impacts.	Chapters 6, 7 & 8 detail the water balance for the project through an assessment of the surface water, groundwater and leachate issues including salinity, flooding, drainage, contamination. Water balance modelling is provided within the

Requirement	Chapters/Sections Addressed
	surface water , groundwater and leachate technical reports contained within Volume 2 Appendix A, B and D respectively. Sect 3.4 identifies stockpiling and processing procedures. Chap 16 addresses sediment control and erosion control
Traffic and Transport: • details of the traffic volumes likely to be generated during construction and operations; • an assessment of the predicted impacts of this traffic on the safety and performance of the surrounding road network, in particular the Old Wallgrove Road/ Wallgrove Road intersection; • an assessment of the potential parking demand of the project; and • detailed plans of the proposed layout of the internal road network and any parking on site in accordance with the relevant Australian standards.	Chap 11
Visual: • demonstrate that all reasonable and feasible measures have been implemented on site to minimise the visual impacts of the project on the residential area to the north of the site as well as the other sites in the Eastern Creek area that are likely to be redeveloped in the next few years.	Chap 12
Flora and Fauna: • particularly on any threatened species, populations or ecological communities and their habitats.	Chap 13
Hazards and Risks: • particularly in relation to fire management.	Chap 15
Heritage: • both Aboriginal and non-Aboriginal.	Chap 14
Rehabilitation and Final Landform: • a justification for the proposed final land form taking into consideration the strategic land use planning objectives for the area; and • a detailed description of how the site would be progressively rehabilitated and integrated into the surrounding landscape; • the measures that would be put in place to ensure sufficient financial resources are available to implement the proposed rehabilitation measures; and • the ongoing management of the site following the cessation of	Sect 3.9

Requirement	Chapters/Sections Addressed
landfilling activities.	
Consultation	
During the preparation of the Environmental Assessment, you should undertake an appropriate level of consultation with the relevant local, State or Commonwealth government authorities, service providers, community groups or affected landowners. In particular you should consult with: • Department of Environment and Conservation; • Department of Water and Energy; • NSW Roads and Traffic Authority; • Sydney Water Corporation; and • Blacktown City Council. The consultation process and the issues raised must be described in the EA.	Chap 5
State Government Technical and Policy Guidelines	All applicable technical and policy guidelines have been addressed within the EAR and Technical Reports

Table A.2 ***Key Inadequacies Raised by DoP on the 26 June 2007, prior to the reissuing of the Revised DGRs***

Requirements	EAR Chapters/Sections addressing the key issues
General Requirements	
All components of the project have not been adequately identified. The draft Environmental Assessment must be updated to: • provide a clear outline of what the proposal involves, including definitions and estimated quantities of all materials to be accepted and proposed processing operations for each of the materials;	Chap 3
• provide further details, including detailed maps, plans and estimated timings of all stages of the project;	Chap 3
• ensure that the scope of the project states no putrescible waste will be accepted on site;	Stated throughout EAR and within Technical Reports
• ensure that the project overview is consistent with that outlined in all specialist studies (for example the hours of operation in the original Environmental Assessment differed to those assessed in the Environmental Noise Assessment);	All project descriptions are consistent
• include a breakdown of land area for all operations;	Chap 3
• include estimated timings for the provision of road infrastructure;	Chap 11
• outline access arrangements to the sales and distribution centre;	Chap 3 & Chap 11

Requirements	EAR Chapters/Sections addressing the key issues
• include details of the temporary building's, including how long it is proposed they be used for;	No temporary buildings proposed
• include detailed design of the proposed landfill; and	Chap 3
• include details of the proposed leachate and gas management systems.	Chap 8 & Chap 9
Key Issues	
Strategic Planning:	
• include an assessment of the proposed buildings against the requirements of the Eastern Creek Precinct Plan (Stage 3). It is not sufficient to state that none of the buildings are permanent and therefore do not need to be assessed against the requirements of the precinct plan, all buildings regardless of their intended life, need to be assessed against the requirements of the precinct plan.	Chap 4
• include an assessment of the proposed landscaping (including open space provisions and car parking) against the requirements of the Eastern Creek Precinct Plan (Stage 3). It is not sufficient to state that this is only applicable for warehouse developments, all developments within the area need to address all requirements of the precinct plan.	Chap 4
Planning agreement/developer contributions:	
• address the requirements regarding the provision of infrastructure and services outlined in the Eastern Creek Precinct Plan (Stage 3). The Precinct Plan outlines the general services and infrastructure works and arrangements that are required for development of land within the Precinct, including your site;	Sect 4.5.3
• provide information regarding any agreements you propose to enter into in relation to regional transport or the provision of infrastructure (other than just stormwater services and local roads);	
• outline any existing agreements/contributions with other agencies;	
• include provisions for increased traffic. It is not sufficient to state there is an existing use on site, quarrying activities have ceased and this proposal does not relate to continuation of quarrying activities; and	
• provide a monetary value for all proposed works in kind.	
Waste management:	
• include clear information on what recycling activities are proposed and wastes to be accepted;	Chap 3 and Chap 16
• include more information on stockpile quantities of waste/recycled products;	
• provide details of all infrastructure on site;	
• provide details of the proposed composting activities on site; and	
• address the issues raised by DECC.	
Air quality and Greenhouse gas emissions, odour and dust generation:	

Requirements	EAR Chapters/Sections addressing the key issues
• include a greenhouse gas assessment consistent with the Australian Greenhouse Office's Factors and Methods Workbook (this should include quantitative analysis of the scope 1 and 2 emissions of the project, and • qualitative analysis of the impacts of these emissions); • include an assessment for all activities (eg composting, movement of overburden) for which approval is sought; • include a strong justification for the assumptions in the odour assessment; • provide sufficient detail on an air quality monitoring program; and • address the issues raised by DECC.	Chap 18 Chap 9
Noise: • include an assessment of all noise sources associated with the project; • provide details and assessment of the proposed hours of operation; • ensure the Noise Impact Assessment is undertaken in accordance with the NSW government's Industrial Noise Policy; and 1. address the issues raised by DECC.	Chap 10
Soil and water: **2.** provide a more detailed Soil and Water Management Plan; 3. include a water balance for the for the proposed leachate management system; 4. address the issues raised by DECC and *5.* address the issues raised by DWE.	Chapter 6, 7 & 8 Section 16.2
Traffic and transport: • include provisions for increased traffic. It is not sufficient to state there is an existing use on site, quarrying activities have ceased and this proposal does not relate to continuation of quarrying activities; • include a more detailed assessment of the different access options, including a detailed assessment of each and a justification for a preferred option; • include as assessment of construction traffic; and • include more detail on predicted impacts with the Old Wallgrove Road Wallgrove Road intersection.	Chap 11

Table A.3 Key Issues Raised during Adequacy Review on the 20 June 2008

COMMENT	RESPONSE
Department of Planning – Attachment A	
1) Project Application The proposal as outlined in the EA, includes access to the site via the existing access way over the neighbouring Hanson site. Land owners consent from Hanson is therefore required, so that the Minister is able to determine this project.	This matter has been addressed in the following location in the EAR: Section 3.5.3 – Site Access
Please ensure that the same name of the Proponent is used in the project application and in the EA	This matter has been addressed in the following location in the EAR: Section 1.2 – Proponent
2) Project Description Project Description and Plans The project description provides insufficient details about the proposed site access, internal road network and circulation, car parking areas, and layout and scale of the materials processing centre (including windrows), waste transfer station, and material stockpiles and sale area. Please revise the project description so all proposed components are clearly identified in text and on clear, scaled plans. A scaled, site layout, outlining all proposed components, should also be provided.	This matter has been addressed in the following locations in the EAR: Section 3 – Project Description Section 3.5 – Site Infrastructure Figure 3.3 – Site Layout Annex C – Architectural Plans
The EA should also be updated to identify existing authorised and unauthorized works on the site and identify how the illegal works would be dealt with and certified.	This matter has been addressed in the following locations in the EAR: Section 1.3.3 – Site Infrastructure Annex C – Architectural Plans
An update on the status of subdivision applications before Blacktown City Council (Council) should also be provided.	This matter has been addressed in the following location in the EAR: Section 1.3.2 – Site Subdivision

COMMENT	RESPONSE
Site Access Use of the existing right of carriage way to access the site is contrary to the SEPP 59 - Eastern Creek Precinct Plan (Stage *3)* (Blacktown City Council, 14 December 2005) and is not supported by the Department or the Roads and Traffic Authority (RTA). The EA should therefore be updated to clearly identify site access from the Stage 3 road plan.	This matter has been addressed in the following location in the EAR: Section 3.5.3 – Site Access
Site Infrastructure- The Department of Environment and Climate Change (DECC) and Council have requested further details of the proposed water management systems, including the regional basins required under the precinct plan and the temporary basins required to service the site. Council has indicated that 2 regional detention basins are required to be provided as the proposed operational area is located over both the Quarry catchment and the Quarry North Catchment in the Precinct Plan.	This matter has been addressed within the addendum letter to The Surface Water Management Report prepared by Storm Consulting, submitted within Volume 2 of the EAR. To further clarify this issue the Surface Water Management Report has calculated the stormwater discharge from the 'proposed areas of operation' and designed the stormwater system to flow to one regional detention basin located adjoining the M4 Motorway. The proposed location of the second regional detention basin within SEPP 59 is adjacent to Ropes Creek Tributary and is located outside the 'proposed areas of operation'. It is agreed that a second regional detention basin will be required when the non-operational lands are development and should be a requirement of any future development of those lands.
Additionally, details of infrastructure connections, including agreements with the relevant infrastructure suppliers, should be provided.	This matter has been addressed in the following location in the EAR: Section 3.6 – Utilities and Services
Project Staging- The landfill design and the assessment has been based on a scenario whereby 1,300,000 tonnes of waste per annum (.t.p a.) would be recovered and 700,000 tpa would be landfilled. The EA, however, seeks approval for a variety of waste recovery and landfilling scenarios ranging from the best case of 400,000 tpa of waste being landfilled, to the worst case scenario of up to 1,0000,000 tpa of waste	This matter has been addressed in the following location in the EAR: Section 3.1.1 – Operational Scenarios

COMMENT	RESPONSE
being landfilled. The EA must be updated to identify the different design, staging and associated impacts of each of these scenarios.	
3) Strategic Issues -Justifiable Demand Justifiable demand The EA does not include a detailed justifiable demand analysis, as required under Clause 123 of State Environmental Planning Policy (Infrastructure). In particular, the EA does not contain a detailed analysis of: existing and future construction and demolition (C&D) waste and commercial and industrial (C&I) waste generation rates within the site's likely waste catchment; the capacity of existing landfills in this region; and the demand for this proposed C&D and C& I waste landfill. The Department and the DECC, therefore request that the EA be revised to include this analysis.	This matter has been addressed in the following location in the EAR: Section 1.7 – Justifiable demand
4) Environmental Impacts - Air quality, noise and soil and water The environmental assessment reports have been based on different waste disposal scenarios and vehicle movement estimates. The EA should be updated so that the different waste scenario impacts are assessed and a consistent vehicle movement estimate is used. A justification should be provided if only one scenario is to be assessed and different vehicle movement estimates are to be used.	This matter has been addressed in the following location in the EAR: Section 3.1.1 – Operational Scenarios
Air Quality and Odour- The air quality assessment has been based on 1,000,000 tpa of waste being landfilled and on 148,400 vehicle movements/annum, which is inconsistent with vehicle movement estimates in the traffic assessment (296,800 - 340,200 vehicle movements/annum) and the noise assessment (354,780 vehicle movements per annum). This is of particular concern, as the air assessment identified vehicle movements as the primary source of dust generation.	This matter has been addressed in the following location in the EAR: Section 9.4.2 – Air Quality Impact Assessment The inconsistency exists in terms of terminology only and not the calculations or modelling performed. Holmes Air Science states that "there will be a total of 148,400 vehicle movements at the site per year". This statement should more correctly read "a total of 148,400 vehicles accessing the site per year and a total 148,400 vehicles exiting the site. This equates to a total of 286,800 vehicles movement/annum which is consistent with the traffic assessment and other traffic number related assessments in the EA.

COMMENT	RESPONSE
Please therefore revise the assessment to identify the impact of different waste disposal scenarios and the impact from the highest estimated number of vehicle movements (namely the worst case). In the event, that a lower number of vehicle movements is used, please provide a justification.	
Noise – The operational noise assessment has been based on 700,000 tpa of waste being landfilled and on 354,780 vehicles movements/annum. Please revise the assessment to identify impacts of different scenarios and justify the estimated number of vehicles movements used in the assessment.	This matter has been addressed in The Traffic Report prepared by ERM which has been updated to clarify the worst case scenario for noise. It should be noted that: • The expected Operational Noise effects of landfilling vary considerably dependent upon the depth of the Pit at which work is being done. • As filling is progressively completed the depth changes and so does the potential effect of the operational noise. Noise impacts associated with Years 5, 13 and 20 of operation have therefore been modelled. • The number of vehicles estimated in the noise Report is consistent with that in the Traffic Report as it is based on 350 operational days and not 365 which was assumed by Council.
Additionally, please include the following information: • details and scheduling of activities to be undertaken after 10pm. Whilst the noise assessment states that activities after 10pm would occur once a week, the traffic assessment indicates that it would occur once every 10 weeks;	This matter has been addressed in the following location in the EAR: Section 10.4.4 – Noise Impact Assessment The worst case scenario for noise would be activities occurring after 10pm once a week and this is only done to show worst case for noise, however in reality activities after 10pm would occur on a needs basis once every 10 weeks as stated by the traffic report. The noise report aimed to show that even if activities after 10pm occurred every week the noise impact would still comply with the guidelines.
• a map and table identifying the addresses of each of the sensitive receivers and their distance from the site;	This matter has been addressed in the following locations in the EAR: Figure 10.1 – Sensitive receiver and noise monitoring locations Figures 10.2, 10.3 and 10.4 – Daytime Operational Noise Levels (Years 5, 13

COMMENT	RESPONSE
	and 20 respectively) These figures have been amended to include street names and the two neighbouring schools within Erskine Park and Minchinbury. Since this information will ultimately be placed on public exhibition, it is considered inappropriate to include the names and addresses of each of the sensitive receivers. The figures have been updated with additional identification markers to further clarify the location of noise modelling.
• clarify why R2 located to the west of the site has been used to represent noise levels at R3-R5 north of the site.	This matter has been addressed in the following locations in the EAR: • Appendix F - Addendum to Noise Report.
• noise levels at James Erskine Primary and Minchinbury Primary; and	This matter has been addressed in the following locations in the EAR: • Appendix F - Addendum to Noise Report.
Soil and Water - The soil and water management assessment has been based on 700,000 tpa of waste being landfilled. Please revise the assessment and the design of the soil and water management system. so it is based on a maximum input rate of 1.000.000 tonnes of waste being landfilled: as outlined in the submission from the DECC.	This matter has been addressed in the following locations in the EAR: Section 8.2 – Leachate Management and within The Groundwater and Leachate modelling included within Volume 2 of the EAR which has been revised to consider a maximum input rate of 1 mtpa.
The EA should also include all technical reports and water balance data requested by the DECC and Council.	This matter has been addressed in the following locations in the EAR: Volume 2 – Technical Reports
Traffic - Please refer to the 'site access' comments, on the previous page. The traffic assessment has been based on two scenarios: 400,000 tpa of waste being landfilled generating 296,800 vehicle movements per annum; and,	This matter has been addressed in the following locations in the EAR: Section 3.1.1 – Operational scenarios

COMMENT	RESPONSE
1,000,000 tpa of waste being landfilled generating 340,200 vehicle movements per annum. Please clarify why inconsistent vehicle movement estimates have been used in other section of the assessment.	
The traffic assessment should be updated to include: • an operational traffic assessment for a new access way onto the Stage 3 road system; and an analysis of construction vehicle movement numbers, vehicle types and impacts.	This matter has been addressed in the following locations in the EAR: Section 11.4 – Future Traffic and Transport Network Section 11.4.1 - Eastern Creek Precinct Plan Statement of Commitments part 4.6.1
• an analysis of construction vehicle movement numbers vehicle types and impacts.	This matter has been addressed in the following locations in the EAR: Section 11.5.5 – Traffic volumes
5) Site Rehabilitation Insufficient information has been included about the final landform and site rehabilitation. Please update the EA to include: details and plans of the final landform, evidence that the land would be suitable for proposed end uses including industrial and commercial users, • measures that would be put in place to ensure sufficient financial resources are available to implement rehabilitation measures.	This matter has been addressed in the following locations in the EAR: Section 3.9 -Landfill Closure Strategy This matter has also resulted in the inclusion of the Site Extraction and Rehabilitation Plan prepared by Hyder Consulting within Volume 2 of the EAR. This matter has been addressed in the following locations in the EAR: Section 3.9 – Landfill closure strategy
6) Project Contributions Section ***4.5.3*** contains limited details and commitment regarding contributions. The RTA has requested that regional contributions be provided for the upgraded road network, and Council has requested that local contributions is required for all new developments at Eastern Creek. Please therefore revise this section to outline precisely what contributions would be paid for the provision of local and regional infrastructure, how these contributions would be paid, and the reasons these contributions are justified.	This matter has been addressed in the following locations in the EAR: Section 4.5.3 – Section 94 Contributions Annex I – Draft Voluntary Planning Agreement Identifies the contributions and infrastructure the proponent specifically offers to build and dedicate to council in and around the area of the development

COMMENT	RESPONSE
As outlined in the assessment requirements, the Proponent is advised to consult directly with the RTA, Council and the Department.	(roads, detention basin etc).
7) EA Structure In order to provide a clear structure and understanding of the content of the EA, the Department recommends that: the two parts of the EA be labeled Volume 1 and 2; the appendices be numbered; a contents page be provided that identifies all sections of the EA, including the appendices; a glossary be provided that includes all abbreviations used in the EA; the EA refers to the Department of Water and Energy (DWE) and the DECC, instead of the Department of Natural Resources (DNR). Please note that the DNR has been replaced by the DWE and the DECC; and the correct Director General's requirements be included in the EA.	To improve clarity, recommendations regarding the structure of the documents have been adopted throughout Volumes 1 and 2 of the EAR.
Department of Environmental and Conservation NSW	
In the draft EA there is conflicting information about the amount of waste which is likely to be disposed of at the landfill facility, The draft EA states that between 400,000 tonnes per annum and 1 million tonnes per annum may be disposed of into the landfill. However, calculations in-"Leachate Collection System - Concept design" report by ERM are based on an annual waste disposal rate of 700,000 tonnes per annum.	This matter has been addressed in the following locations in the EAR: Section 8.2 – Leachate Management \ Infilling procedure and landfill leachate generation Appendix D – Leachate Collection System Assessment Best and worst case scenarios for landfilling have been assessed based upon the maximum input for the proposed landfill.
The final EA should specify a maximum input rate for the proposed landfill and all designs (eg. Surface water management scheme, Leachate collection, extraction, treatment and disposal systems) should be based on this input rate. This information is critical In order for the DECC to assess whether the proposed environmental control and management infrastructure for storm water and Leachate is appropriate.	This matter has been addressed in the following locations in the EAR: Section 8.2 – Leachate Management\Infilling procedure and landfill leachate generation Appendix D – Leachate Collection System Assessment
The electronic and paper copies of the spreadsheet for the water balance in the surface water management	This matter has been addressed in the following location in the EAR:

COMMENT	RESPONSE
report (by Storm Consulting) was not provided with the draft EA. This information is necessary for the DECC to verify that the design requirements for the sedimentation basins are adequate.	Annex J – Water Quality Model
The justifiable demand analysis for the proposed landfill was brief and did not contain detailed analysis of waste generation rates within the potential catchment for this facility, the capacities of other landfills within the same waste catchment. The analysis did not contain any current or market based assessment of the demand for non-putrescible landfill capacity in its waste catchments. The justifiable demand analysis seemed to be based on the simple premise that the nearby Enviroguard Landfill at Erskine Park will soon close and that demand would automatically transfer to the proposed new landfill. It is recommended that a more detailed justifiable demand analysis be submitted with the final E A.	This matter has been addressed in the following location in the EAR: Section 1.7 – Justifiable demand
The final EA must provide sufficient information (including the above requested information) to enable a full assessment of the development against DECC's statutory responsibilities and enable the DECC to provide its recommendations regarding the proposal.	The revised EAR clearly expresses the extent and nature of the project as proposed by the proponent and assesses the associated environmental impacts. The EAR also contains the necessary technical detail required for appropriate subject matter experts to make an informed assessment of the likely impacts of the project. It is considered that the EAR is suitable for public exhibition and subject to comment from the community and regulators as part of the Part 3A assessment process.
The DECC requests that the proponents provide four **(4)** hard copies and one electronic copy of the final EA when lodging the application to enable DECC to assess the proposal.	Noted.
BLACKTOWN COUNCIL –Attachment A1	
1. The extent of works is not entirely clear (i) The figure 3.3 - Site layout does not show the extent /limit of site works to facilitate the development.	This matter has been addressed in the following locations in the EAR: Section 3 – Project Description Annex C – Architectural Plans
(ii) This figure 3.3 is not supported with a detailed survey of existing levels and also indicates the proposed	This matter has been addressed in the following locations in the EAR:

COMMENT	RESPONSE
levels over the proposed site layout	Section 3 – Project Description Annex C – Architectural Plans
(iii) This is to also show the transition back to natural ground outside the black perimeter line.	This matter has been addressed in the following locations in the EAR: Figure 8.3, 8.4, 8.5 and 8.6 – Concept Landfill Plans for Years 0, 5, 13, 20.
(iv) The barrier treatment proposed to prevent the development expanding beyond the limits suggested in the site layout figure 3.3.	This matter has been addressed in the following locations in the EAR: Section 2.3.2 – Design options It is proposed that existing berms along the northern and eastern boundaries of the property will be maintained but reshaped in accordance with the dimensions and details shown in the EAR. New berms along the western and southern boundaries to the size and shape indicated in the EAR will delineate the operational from the non –operational land. The proposed development will be wholly contained within the berms which create substantial boundaries between the working and the fallow or 'natural' land. The only works to be undertaken outside the berms includes the OSD basin which is site infrastructure detailed within SEPP 59 –Eastern Creek Precinct Plan.
(v) The EA must make it clear that any site preparatory works will be limited to the area in Figure 3.3 (in modified form).	This matter has been addressed in the following locations in the EAR: Section 3.5.1 – Site Facilities and Processing Equipment With the exception of the berm creation, reshaping activities at all other site

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	preparatory works will be contained within the proposed areas of operation.
(vi) The full and true extent of works are not known	This matter has been addressed in the following locations in the EAR: Section 3 – Project Description Annex C – Architectural Plans
(vii) The concept land fill plans at Figure 8.3, 8.4 and 8.5 are misleading.	This matter has been addressed in the following locations in the EAR: Figures 8.3, 8.4, 8.5 – Concept Landfill Plans
2. Site Access Issues	This matter has been addressed in the following locations in the EAR: Section 1.3.2 - Site Features/Hanson Construction Materials Lease
(i) The impact of the Hansen Lease is not explained… …especially the redirection of site access to the edge of the quarry wall which has not been supported with Ecological - Mines Engineering reporting, no buffer has been provided and no detailed drawings of this driveway at all.	This matter has been addressed in the following locations in the EAR: Section 3.5.3 - Site access Section 11.5.2 - Impact on the proposed road network/Existing Haulage Road
(ii) Further, the lease arrangement creates potential conflict matters in relation to ongoing Hansen activities crossing over Dial a dump access.	This matter has been addressed in the following locations in the EAR: Section 11.4 - Future Traffic and Transport Network Section 11.4.1 - Eastern Creek Precinct Plan Section 3.5.3 – Site Access
Occupational Health and Safety matters must be taken into account including any consultation with Workcover to prevent/reduce risk of harm to operational staff of both business.	This matter has been addressed in the following locations in the EAR: Section 11.5.3 – Internal Site Circulation Section 15.6 - Hazards and Risks
3. Noise Issues	This matter has been addressed in the following locations in the EAR: Section 10.4.4 – Noise Impacts- Volume 1
(i) Council still considers the hours of operation finish of 10pm to be excessive for truck movements, or recycling processes given the residential area is only 500m away and background noise will have dropped significantly at this time. Council considers an 8.30pm	Appendix F – Noise Impact Assessment - Figure 6.1

COMMENT	RESPONSE
finish more appropriate.	
(ii) The noise berm along the northern side of the property parallel to the M4 Motorway should be extended for the entire length of the quarry wall as this ensures minimal noise escapes and takes account of trucks going into/out of the floor of the landfill void.	This matter has been addressed in the following locations in the EAR: Section 10.4.4 – Noise Impacts- Volume 1 Addendum Letter to the Noise Impact Assessment – Volume 2
4. Section 94 Contributions (i) The extent of 'operational' verses 'non-operational' land should be clearly denoted on a plan of the land.	This matter has been addressed in the following locations in the EAR: Section 3 – Project Description Annex C – Architectural Plans
(ii) Council rejects any suggestion that this proposal does not generate the need for contributions towards 'local contributions'. Council reaffirms that all facets of the proposed development are new proposals for which no development consent exists. It is necessary therefore for the applicant to contribute pursuant to an adopted Contribution Plan in the same way as other landowners in the Eastern Creek area based on the land area subject of this proposal. This must be acknowledged in the Final Report.	This matter has been addressed in the following locations in the EAR: Section 4.5.3 – Section 94 Contributions Annex K – Draft Voluntary Planning Agreement
(iii) It is expected that Council's Contribution Plan for the Precinct 3 Eastern Creek Area should be ready for exhibition by end of 2008.	This matter has been addressed in the following locations in the EAR: Section 4.5.3 – Section 94 Contributions Annex K – Draft Voluntary Planning Agreement
(iv) See Council's previous Section 94 Developer Agreement. Comments are at xiii of Attachment A, Council's letter of 27 June 2007.	The proponent requests that if the Council's response to the draft EA is to be publicly exhibited that all parts of attachment A not relied upon in this response be removed as they cover matters not relied upon by Council, nor generally do they relate to the proposal in its current form upon which the proponent relies.
5. Licensing (i) Council's previous concerns regarding the validity of old EPA licence Nos. 5073 and 494 are still relevant	This matter has been addressed in the following locations in the EAR: Section 3.3 – Description of Waste to be Received

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and comments made in (ii) of Attachment A to Council's letter dated 29 June 2007 are to be noted accordingly. Council is concerned that at 3.3 of the draft EA the applicant is still relying on these licenses which should be renewed.	The Draft EAR has been updated to clearly state that no previous EPA licences or licences issued to third parties will be relied upon to facilitate the proposal.
6. Waste Issues (i) There is nothing in the reporting submitted that clearly precludes the filling of hazardous waste material. The reporting focuses on not being a non putrescible waste facility but this is not enough to specifically preclude hazardous waste.	This matter has been addressed in the following locations in the EAR: Section 3.3 – Description of Waste to be Received
(ii) Council has already expressed its concerns at the use of the landfill to accepting hazardous waste including asbestos especially the impact of processing material to separate asbestos from other materials, airborne dust generated from the asbestos and the transporting and compacting of asbestos in the landfill void.	This matter has been addressed in the following locations in the EAR: Section 16.2.3 - Operational Waste Stage\Asbestos Waste and Asbestos Contaminated Materials
(iii) Concern is expressed by a waste item listed in 3.3 of the draft EA that is 'non-chemical waste generated from manufacturing and services'. This can mean anything, from sludges, hospital waste and other biological wastes. This category must be clarified and explained more fully as to what exactly it intends to include.	This matter has been addressed in the following locations in the EAR: Section 3.3 – Description of Waste to be Received
7. Unauthorized Works (i) Photograph 12.4 is showing the area subject to unauthorized creek diversion works and this cannot be ignored or condoned by this proposal. To date is unaware of the applicant has restored the creek in its original configuration and this should be dealt with in the report as it impacts on the overflow lines that run into this tributary of the Ropes Creek.	This matter has been addressed in the following locations in the EAR: Section 1.3.3 – Site Infrastructure \ Unauthorised work
8. Drainage Works	This matter has been addressed in the following locations in the EAR: Addendum letter to the Surface Water Report prepared by Strom Consulting –

COMMENT	RESPONSE
The following specific additional items need to be addressed: (i) All data files used in the concept design relating to hydrology, hydraulics, water quality, water balance, flow frequency and stormwater detention / retention modelling /calculations are to be provided with the submission.	Volume 2. Modelling Appendix to the Surface Water Report prepared by Strom Consulting – Volume 2.
(ii) The hydrologic model parameters used for any existing conditions modelling shall be consistent with predevelopment rural catchments conditions.	This matter has been addressed in the following locations in the EAR: Addendum letter to the Surface Water Report prepared by Strom Consulting – Volume 2.
(iii) Calculations relating to the frequency and duration of stream forming flows need to be provided. These do not appear to have been conducted as part of the current submission.	This matter has been addressed in the following locations in the EAR: Addendum letter to the Surface Water Report prepared by Strom Consulting – Volume 2.
(iv) The assessment of pre and post development flows needs to be conducted for the full range of Average Recurrence Intervals (ARIs) from 1 year through to 100 year, and any required detention/retention storages sized accordingly. The impact of the proposed development needs to be assessed at the outlets of the precinct not just the proposed works area, to ensure that there is no adverse impact on downstream properties.	This matter has been addressed in the following locations in the EAR: Addendum letter to the Surface Water Report prepared by Strom Consulting – Volume 2.
(v) There should be no redistribution of catchment areas to other outlets as a result of the proposed development.	This matter has been addressed in the following locations in the EAR: Addendum letter to the Surface Water Report prepared by Strom Consulting – Volume 2.
(vi) Details of any overland flow paths shall be provided on the documentation.	This has been addressed in the following locations in the EAR: Section 3.2 in Site Surface Water Management Report contained with Volume 2 of the EAR. The final site design levels (to be finalised) will determine the specific

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	overland flow paths once project approval has been granted.
(vii) The documentation should also define the various stages of the development including the final landform.	This has been addressed in the following locations in the EAR: Section 3.9 – Landfill Closure Strategy – Volume 1 Inclusion of the *Extraction and Rehabilitation Plan* prepared by Hyder Consulting identifying the final landform - Volume 2.
(viii) Detailed concept plans, consistent with the stormwater modeling/calculations, clearly defining existing site levels and constraints, the full extent of works and upstream and downstream catchment areas are to be provided. The plans shall show the design levels, sizes and surface treatments of all proposed stormwater management measures and how the proposed measures fit into the existing landform and site constraints. The current figures are schematic in nature and do not contain sufficient detail to assess the application in terms of performance and safety requirements.	This matter has been addressed in the following locations in the EAR: • Section 6.3 – Stormwater Assumptions and Section 6.5 –Stormwater Impact Assessment within Volume 1 of the EAR; • The Addendum letter to the Surface Water Report prepared by Storm Consulting – Volume 2. • Draft Statement of Commitments includes *Commitment No. 4.1.1* which requires the preparation of a detailed plan prior to construction.
(ix) WSUD measures are to be incorporated into all stormwater system. Consideration should be given to the use of swales and other suitable measures within the stormwater system in lieu of piped systems where practical.	This matter has been addressed in the following locations in the EAR: Section 6.5 -Surface Water Mitigation Measures – Volume 1
(x) The requirements of the Dam Safety Committee need to be addressed in any submission. Given that the proposal includes a detention basin and is in close proximity to the M4 motorway, the impacts of a dam failure on the M4 motorway needs to be considered for events up to the PMF.	This matter has been addressed in the following locations in the EAR: Addendum letter to the Surface Water Report prepared by Strom Consulting – Volume 2.
(xi) The documentation shall be coordinated with the requirements of other disciplines such as building, planning, geotechnical including salinity and contamination, environmental and traffic, etc.	This matter has been addressed in the following locations in the EAR: Section 1.8 - Environmental assessment approach and purpose
(xii) The proposed temporary detention basin location is not clearly identified. The temporary basin shall be located clear of the proposed final basin forming part of the future Section 94 Contributions Plan.	This matter has been addressed in the following locations in the EAR: Figure 3.3 - has been updated to include the location of the proposed

COMMENT	RESPONSE
	temporary detention basin as per Appendix B of the Site Surface Water Management Report contained within Volume 2 of the EAR.
(xiii) The proposed operational area is located over both the Quarry and Quarry North catchments as defined in the precinct plan. Therefore, 2 detention basins should be provided, one for each catchment to eliminate the substantial catchment redistribution resulting from the current proposal.	This matter has been addressed in the following locations in the EAR: Addendum letter to the Surface Water Report prepared by Storm Consulting – Volume 2.
(xiv) The final detention regional trunk drainage systems will be constructed under the future s94 plan, not necessarily by the applicant as indicated neither in the EA nor under ministerial consent.	This matter has been addressed in the following locations in the EAR: Section *4.5.3* – Contributions- Volume 1 Inclusion of the draft VPA within Annex I
9. Environmental Health Issues (i) Section 3.3 of the draft EA outlines the materials that will be received at the resource recovery facility. Please specify the wastes that are expected to be reprocessed and the wastes that will be land-filled.	This matter has been addressed in the following locations in the EAR: Section 3.3 – Description of Waste to be received; Section 3.4 – Process description \ materials receivable; and Section 16.2.3 – Operational Waste Stage
(ii) Please define what is meant by the statement "non-chemical waste generated from manufacturing or services" in Section 3.3 of the EA.	This matter has been addressed in the following locations in the EAR: Section 3.4.1 - Description of Waste to be received
(iii) The draft Statement of Commitments outlines a number of management plans and monitoring events to be implemented during the construction and operation of the resource recovery facility. However, the responsibility of implementing the plans/monitoring is allocated to Light Horse Business Centre (LHBC). To ensure that the management plans and monitoring events are carried out, it is considered essential to allocate the responsibility to a specific role or position within the LHBC (eg. Environmental Manager) or LHBC could establish a committee. A committee would require LHBC to assess results of any monitoring undertaken at the site, as well as the general operation of the resource recovery facility and provide the appropriate	A Landfill Environmental Management Plan (LEMP) and an Environmental Waste Management Plan (EWMP) will be prepared as part of the Statement of Commitments. Specific roles and responsibility will be assigned for particular commitments once the parameters of the project had been finalised and approval granted.

COMMENT	RESPONSE
regulatory authority with any corrective action taken.	
(iv) Provision of a Table in the EA, outlining what comments were made on the draft EA and the section of the final EA where the comment has been addressed.	This matter has been addressed in the following locations in the EAR: Table 5.1 of the draft EAR- Volume One.
Blacktown Council – Attachment A	
i. The extent of works proposed by this EA does not reflect the works initially proposed by the applicant in the preliminary Assessment.	This matter is not relevant since subdivision and bulk earthworks do not form part of this project and the extent of works details within Section 3.1 Project Description within Volume One of the EAR is consistent with the Preliminary Assessment upon which the DGRs are based.
ii. The proposal clearly indicates that it seeks to undertake a non- putrescible class 2 inert and solid waste landfill within the existing quarry void.	Agreed
However it then indicates it wants to take green waste which is already well managed at the Waste Services Facility on the southern side of Wallgrove Road. As such there is considered to be no need to make provision to process this material at this facility.	This is a commercial issue only.
There is also the concern that the compost stockpiles arising from the processing of green waste could create odour problems which will impact on the residential area down wind from the facility.	This matter has been addressed in the following locations in the EAR: Section 9.4.2 of the Draft EAR- Volume One.
However of greatest concern is the applicant's attempt to rely on EPA licenses No. 5073 and 494 issued to the previous owner Hanson which oddly not only licensed the Ashphaltic Plant, Concrete Batching Plant, and extractive industry but also included the storage, transfer and recovery of municipal waste.	This matter has been addressed in the following locations in the EAR: Section 3.3 of the Draft EAR- Volume One.

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The POEO Act the definition of municipal waste includes: *(1) Municipal waste, being waste consisting of:* *(a) a household domestic waste that is set aside for kerb side collection or delivered by the householder directly to a waste facility, or* *(b) other types of domestic waste (e.g. domestic clean-up and residential garden waste), or* *(c) local council generated waste (e.g. waste from street sweeping, litter bins* and parks). If allowed to continue these licenses are in fact condoning the use of the facility as a non-putrescible land fill which would be clearly opposed by Council on the following grounds: • the licenses are considered to be invalid as there was never any development consent issued by Council for the filling the quarry. • None of the dust or odour reporting in the air quality impact assessment has taken putrescible land filling into account. • To permit such would be contrary to the principles of Ecologically Sustainable Development especially given that new technology exists and is already operating at the Waste Services Site at Wallgrove Road via the UR3R facility which processes municipal waste thus eliminating the need to landfill domestic rubbish ; it would be a backward step in encouraging and supporting technology and best practices in this field. As such Council strongly opposes any attempt to also use the facility, as a putrescible land fill and the applicant should be requested by DOP to delete all references to the licenses, the words "municipal wastes" and any other connotations which .suggest such in that Draft Final Assessment. DOP should not consider this as part of the proposal as this will also attract strong opposition from the community which will have to be dealt with accordingly.	
iii. The proposal is to import a maximum of 2 million tonnes of material into the site annually. This is disturbingly high which one considers that the air quality reporting is basing its volume only on 495,000 tonnes per year. Also the Noise Assessment is taking into account future access of Archbold Road which is not part of this proposal.	This matter has been addressed in the following locations in the EAR: • Volume 2 - Appendix E - Air Quality: Odour and Dust, prepared by Holmes Air Sciences, April 2008 which assesses a maximum intake of 1.6

COMMENT	RESPONSE
	Mtpa. • Volume 2 - Appendix G- Traffic Impact Assessment, prepared by Transport and Traffic Planning Associates, April 2008.
iv Council definitely considers the proposal to be a designated development pursuant to Schedule 3 of the EP & A Act as it constitutes a Waste Management Facility that is within 500m of a residential zone.	The proposal has been accepted by DoP as a major project as defined under Part 3A of the EP and A Act 1979.
Further Council refutes the applicant's claim on Page 59 of the EA that Blacktown City Council has confirmed that despite the volume, the development would not be regarded to have a significant impact on drainage or flooding on the surrounding area. The applicant has not provided evidence to support this claim. In this regard Council was asked some time ago by a consultant, whether pursuant to C1.32(1)(a)(ii) disposing of "clean fill" (such as soil, sand, gravel, bricks or other excavated or hard material) into the quarry void would impact on drainage. In response to this Council indicated that it wouldn't impact on drainage provided that the material was clean fill as stipulated above, certainly not waste, as suggested by the applicant as this could imply anything. It had to be properly compacted material and that filling would cease upon reaching the natural ground level of the immediate surrounding area. There is nothing in Appendix 9, being Council's letter to DOP on the preliminary EA that condones the use of waste.	This issue is not longer relevant to the current project. No statement has been made in the EAR committing Council to comments made previously regarding impacts on drainage.
v. Despite the Scheduled Facility ultimately being licensed by DECC, Council is still concerned at the following: • The hours of operation are excessive land fill operations until 10pm are considered unreasonable given the proximity of the site to the Minchinbury Residential Area, less than 500m away. Reasonable hours until 8:00pm would be more appropriate.	This matter has been addressed in the following locations in the EAR: Section 3.7 of the Draft EAR- Volume One. Which states the land filling operations will not continue up until 10pm.
• The proposed land filling of asbestos below 30 meters is not sufficient to guarantee that development will not intrude into this lower horizon. The applicant has failed to support the proposal with a Plan of Management to inform future developers how to proceed to develop if this 30m level is penetrated. Such a plan of management must also be registered on the title to pre-warn purchasers of the land of this ongoing obligation.	This matter has been addressed in the following locations in the EAR: Section 16.2 of the Draft EAR- Volume One.

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• There is no explanation how the applicant proposes to achieve the dust mitigation measures including the fact it does not stipulate the height of berms needed to achieve the mitigation outcomes. Also the applicant proposes unsealed internal access roads through out the development which must be sealed by the consultant to minimise dust, soil erosion and the like.	This matter has been addressed in the following locations in the EAR: Section 9.4.2 - Impact Assessment of Operational Air Quality within the Draft EAR- Volume One.
• There is also grave concern that the applicant has seen a greater value in reducing the 30m earthen berms to only 10m, to facilitate bulk earthworks, rather than to mitigate noise. The Noise Report is flawed as it factors in the existing berms some 30m high in its reporting when it should have explicitly reported on the noise impact when the berms are reduced to 10m. Council considers any 10m berm to be inadequate and this will significantly increase noise emanating from the entire operation, which will drift down wind to the residential area.	This matter has been addressed in the following locations in the EAR: Volume 2- Appendix F: Noise Impact Assessment, prepared by Environmental Resources Management, July, 2008.
• The noise report should in fact be determining the height of the berms required to satisfy the mitigation criteria.	
• Neither the air quality nor the noise assessments have recommended the preparation of Plans of Management to be endorsed by Council and/or DECC for operation on site. Further neither assessment recommends any monitoring in the first 2-3 months of operation to ascertain that approved Plans of Management are effective and workable. Council will also require further monitoring and check up after 12 months of operation. Council requires these reports to address these aspects in detail even including draft Plans of Management for perusal by Council and DECC.	This matter has been addressed in the following locations in the EAR: Statement of Commitments – Commitment No. 5.4 and 5.5 of the Draft EAR.
vi. The height of the perimeter berms also relates to the issue of screening the activities from the surrounding areas and to provide a barrier for dust control as well as noise control. Any support to 10m high berms (provided it is shown to address noise issues) will in turn mean that the maximum height of stockpiles must also be less than 10m in height to address dust and visual impact.	This matter has been addressed in the following locations in the EAR: Section 12.4.2 – Visual Assessment of Operation Impacts – Volume One of the Draft EAR.

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vii. It is not clear with regard to the proposed 30m landscape buffer whether this is inclusive of the berms or exclusive. Council is of the view that the 30m landscape buffer should be in addition to the existing or proposed berms. Further the 30m buffer would be inadequate if this is from the quarry lip when the geotechnical information indicates that all development should be restricted outside a horizontal setback distance of 40m-50m because of the over steep excavation sides of the quarry walls.	This matter relates to the previous project submitted for adequacy review. Matters of ecology have been addressed in the following locations in the EAR: Section 13.4 –Ecological Impact Assessment – Volume One of the Draft EAR. Matters of pit wall stability have been addressed in the following locations in the EAR: Section 15.5 – Pit Wall Stability - Volume One of the Draft EAR.
viii. Further with regard to the stability of the quarry walls, the applicant and Hanson have contractually agreed to relocate the proposed road /row to the closest point to the quarry lip so as to avoid the fragmentation of the Hanson land over 2 sides of a road. This is likely to be facilitated through a boundary adjustment between the 2 lots as a complying development which would preempt the Minister's decision on the final position of the Precinct Plan Road. Such complying development would be undertaken contrary to the principles in the SEPP and if done, will at their own risk. However Council would oppose the relocation of the Precinct Plan road by the applicant and Hanson to 30m from the quarry lip. Bearing in mind the geotechnical advice that no development should be within 40-50m for geological reasons Council considers the road must remain in its present location for safety and traffic reasons.	The applicant and Hanson have not contractually agreed to relocate the proposed road/ row closer to the quarry lip. All boundary readjustments to facilitate clearer delineation of ownership have been approved by Council. The location of the Precinct Road network will not be modified by the project and site access will be gained from the existing location of the row to Old Wallgrove Road.
ix. All references by the applicant, through out the reports to "a small unnamed drainage line" that drains the Hanson sediment dams to Ropes Creek" are a deliberate attempt to undermine the significance of this natural watercourse which is a tributary of the Ropes Creek. The applicant has to date, already undertaken unauthorised works in an attempt to wipe out any sign of the tributary in favour of a man-made trench to the southern most point (some 20m *off* the common boundary with Jacfin property) to maximise their development potential of the land. Any claims by Dial-a-Dump (DD) to alleged contaminated (alkaline) runoff from the Hanson sediment pond into the natural water course is a DECC matter and does not warrant redirecting the water course. Council has issued a Notice to Issue an Order on DD and the applicant has responded albeit vaguely with a view to	• No reference has been made in the Draft EAR to Ropes Creek Tributary as a 'small unnamed drainage line'. • No bulk earth works are proposed as part of this project. • The proponent has submitted to DECC a proposal to complete works to ensure continuation of the existing natural watercourse and adjacent riparian area. DECC concluded in its letter dated the 18 February 2008 that the Draft Remedial Action Plan submitted was satisfactory. A copy of DECC's response in attached to this cover letter.

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reinstating the watercourse. This is still being investigated and pursued accordingly. As such all reporting must be amended to recognise this Ropes Creek Tributary and factor it in the drainage and design plans as such. The applicant's objective is to fill the entire balance of the land and grade down and over the water course to the southern boundary Any filling of the creek or the industrial land is opposed. Council suggests that the bulk earth works be deferred for inclusion as part of the future DA for the industrial subdivision.	
x. Development Plans prepared by Stanic Harding Architects include flaws in detail.	The plans have been revised by Land Partners and submitted as Annex C to Volume One of the Draft EAR.
xi. TMS (Traffic Management Services) has reviewed Traffic Report prepared by the Mason Wilson Twiney dated May 2007. Issues have been raised.	• This matter is not relevant since the Traffic Report has been prepared by Transport and Traffic Planning Associates, April 2008 not Mason Wilson Twiney as was prepared in a previous project application.
xii. The Council's Drainage Section advise that the level of detail in the documentation does not allow for a detailed review to be carried out to assess whether the proposed stormwater management strategy achieves the required objectives, From the documentation provided, it appears that the requirements of Council's adopted Precinct Plan dated 14 December 2005 are not being met. The main short comings of the documentation provided are summarised below: Appendix 6 – Drawings; Appendix 13 _ Stormwater Management Plans.	Appendix 6 and 13 do not contain the drawings or stormwater management plans. Council's comments relate to a previous application and are not relevant to the current proposal.
xiii. With regard to the Applicant's Developer Agreement it should be noted that Council has now received tenders for the design and costings for developing a S94 Contributions Plan (CP) for the Stage 3 Precinct of Eastern Creek. It is anticipated that the CP will require developers to contribute towards local infrastructure	This matter has been addressed in the following locations in the EAR: Section 4.5.3 of the Draft EAR- Volume One.

COMMENT	RESPONSE
works required by the precinct plan. Specifically it is anticipated that the proposed CP will require contributions towards: • The acquisition of land and the carrying out of work or the purpose of upgrading Archbold Road to a main collector road standard as provided for in the precinct plan; • The acquisition of land and the carrying out of work for the purpose of upgrading Old Wallgrove Road to a sub-arterial road standard as provided for in the precinct plan; • The acquisition of land and the carrying out of work for the purpose of upgrading the "Link Road" from Old Wallgrove Road to wonderland Drive to local road standard as provided for in the precinct plan; • Trunk drainage, detention basins and riparian zones required in relation to development on the land covered by the precinct plan.	
Due to the uncertainty of Regional Infrastructure and the anticipated timing of preparing a CP of this magnitude, Council has been prepared to offer developers the opportunity to enter into Voluntary Planning Agreements (VPAs) with Council. These agreements provide developers the opportunity to develop their land ahead of the proposed CP. These VPAs also fully satisfy the requirements of SEPP59. In principle, the VPA gives the developer a mechanism to provide Council with a form of security (bank guarantees) for their future S91 contributions. Any stormwater precinct works constructed by the developer or land dedicated to Council can be deducted from the amount of security required. The security required under the VPAs can be staged or limited to the developable area of the subject development. Once the CP is finalised, Council is obligated under the VPA to release the security for amount held in excess of the developer's contributions obligation, required by the adopted CP, back to the developer.	Discussions with Council have occurred regarding the preparation of a Draft VPA. A Draft VPA will be submitted within Annex I of the Draft EAR – Volume One.

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Council has strong concerns that any VPAs for this precinct that are made with other consent authorities, may prevent Council collecting sufficient funds to deliver the required local infrastructure identified by the precinct plan. If Council is not party to these agreements, it has limited opportunities in the future to levy developers who enter into agreements with other consent authorities Therefore, to ensure Council is afforded the opportunity to collect sufficient funds to deliver local infrastructure to the Stage 3 Precinct of Eastern Creek, it is recommended that Blacktown City Council be included in a tripartite agreement between with the proponent and the Minister for Planning. Alternatively, and to ensure equity with other developers in the precinct, any VPA that Council is not party to, should require the developer to enter into the same arrangements, consistent the other Stage 3 Precinct to which Blacktown City Council is a party.	
xiv. In addition Council considers that the MPC and Sale Centre, Fabrication Shop, Administration Centre together with the filling of the quarry *void* all new uses that generate the need for S94 Contributions. The only thing that enjoys existing use rights is the extractive industry - 'being the mining of material out of the quarry. As such the entire operation as proposed is not one which is entitled to any credit for contributions. As outlined *above* the Sales and Distribution/MPC and associated administration and work shops could operate without any relationship to the quarry filling at all any will continue to operate in perpetuity regardless of the 20 year life of the *void.* As for the filling of the quarry. This is a commercial operation and rehabilitation was *never* approved as part of the quarry at anytime in the past as such no credit applies.	The sales and distribution centre no longer forms part of the proposal. Existing use rights have not been relied upon with respect to this project. The matter of Section 94 contributions has been addressed in the following section of the EAR: • Section 4.5.3 – Section 94 Contributions - Volume One of the Draft EAR. • *Annex I*: Voluntary Planning Agreement – Volume One Draft EAR.
Roads and Traffic Authority	
RTA has concerns regarding the existing Right of Way servicing the site. RTA wish to see this Right Of Way extinguished and permanent access gained via the ultimate road network as soon as it is possible for the proponents to do so. The proponent should carry out investigations into this as part of this application.	This matter has been addressed in the following locations in the EAR: Section 3.5.3 of the Draft EAR- Volume One

COMMENT	RESPONSE
The proponent should carry out investigations into this as part of this application.	The traffic assessment EA Vol 2, pages 21-22, indicates that traffic volumes are likely to be significantly less than those suggested in the Sims Varley and Maunsell studies for the Eastern Creek Employment Precinct based upon the lower per hectare employment levels at the site, thus leading to a minor impact upon traffic flows in the area.
The proponent should contribute toward the upgrading and provision of the regional road network as they will still be generating traffic through this network through increased development.	This matter has been addressed in the following locations in the EAR: Section 4.5.3 of the Draft EAR- Volume One
Department of Water and Energy	
From Figure 1.2 in the draft Environmental Assessment (EA) it would appear Upper Angus Creek is located adjacent to the site but it is not clear if any of this creeks riparian corridor and the associated buffer is located on the subject site. Similarly, it is unclear if the degraded tributary to Ropes Creek on the southern side of the site is part of this proposal.	This matter has been addressed in the following locations in the EAR: Annex C –Architectural plans of the Draft EAR – Volume One. The architectural plans and Figure 1.2. have been revised to provide a clear site plan including the location of Upper Angus Creek and the riparian corridors.
The Department recommends the EA includes a scaled plan which shows the location of: • the site boundary • the proposal and area of disturbance • watercourses on, or adjacent to the site the riparian corridors (measured from top of bank) and buffers in accordance with the adopted SEPP 59 Eastern Creek Precinct Plan (Stage 3) (see comments below).	This matter has been addressed in the following locations in the EAR: Section 1.3.2 – Site Features of the Draft EAR.
Appendix 4 of the draft EA (page 60) refers to re-engineering the drainage line in the southern part of the site	The re-engineering of the drainage line is a recommendation designed to

COMMENT	RESPONSE
and revegetating the riparian zone. Clarification is required as to whether the proposed re-engineering forms part of the subject proposal? The draft EA provides no other details about this.	enhance the River-Flat Eucalyptus Forest found on the site. The drainage line in the southern part of the site (Ropes Creek Tributary) does not form part of the operational project area therefore the re-engineering works recommended would be a consideration for the future development of the non-operational lands. The re-engineering works do not from part of the subject proposal and as a result have not been mentioned within the draft EAR.
The Department recommends the following: • the above watercourses be remediated and/or reinstated as a natural system (not hard engineering) with fully vegetated riparian corridors. • a Works Plan is included in the EA which includes details on all stream remediation and/or reinstatement and a Vegetation Management Plan for the rehabilitation of fully vegetated riparian corridors.	The proponent has submitted to DECC a proposal to complete works to ensure continuation of the existing natural watercourse and adjacent riparian area. DECC concluded in its letter dated the 18 February 2008 that the Draft Remedial Action Plan submitted was satisfactory. A copy of DECC's response in attached to this cover letter. The acceptance by DECC of the Draft Remedial Action Plan means that a Works Plan is not required as part of this project.
The EA needs to clearly outline that the riparian corridors on the site are to be protected and enhanced in accordance with the adopted SEPP 59 -Eastern Creek Precinct Plan (Stage 3) which includes the following relevant controls: 5.6.1 (e)Development adjoining riparian corridors and trunk drainage channels (including detention basins and wetlands) must include a **10** m buffer zone consisting of a landscaped open space area that can tolerate occasional flooding 8.3.5 (b)When measured from the top of the bank on either side of the creek, development consent shall not be granted, except for development associated with the protection, enhancement and management of the riparian corridor, on land within the precinct that is within: **40** m of Ropes Creek Tributary or **10** m of Upper Angus Creek.	This matter has been addressed in the following locations in the EAR: *Table 4.2* - Assessment of the Project against Requirements of the Eastern Creek Precinct Plan (Stage 3)

COMMENT	RESPONSE
8.4.3 (d)APZ's are to be located wholly within the development site, outside of any conservation area or riparian corridor The riparian corridors should be protected and rehabilitated with fully structured local native riparian vegetation (trees, shrubs and groundcover species) at a density that would occur	
Groundwater - The EA needs to outline that the existing groundwater monitoring bores require licensing from DWE under Part 5 of the Water Act 1912 and any water extraction from the ground for reuse or disposal is also likely to require a license under Part 5 of the Water Act.	This matter has been addressed in the following locations in the EAR: Appendix C, *Volume 2*. Groundwater Assessment Report prepared by ERM dated April, 2008– Licence for Monitoring Bores. The monitoring bores do require licences under Part 5 of the Water Act 1912. A licence for the monitoring bores was gained from the Department of Energy and Water (DWE) on the 23 October, 2007. A copy of the licence issued by DWE on the 23 October, 2007 is included within the Groundwater Assessment Report prepared by ERM dated April, 2008, Appendix C, *Volume 2*.
The Department recommends the EA outlines the details of the groundwater monitoring program.	This matter has been addressed in the following locations in the EAR: The Draft Statement of Commitments - Commitment No. 5.2.1
It is also recommended the EA maps the distribution and extent of seepage zones within the pit to demonstrate the accuracy of predictions.	This matter has been addressed in the following locations in the EAR: Appendix B - Groundwater Report - Section 3.2.7

- Annex B

Community Consultation Pamphlet and Media Release

Will this generate more traffic?

Quarry trucks have been entering and leaving the quarry by a private road for most of the last fifty years with no impact on the residential area. This is largely expected to continue and overall we do not expect any increase beyond that.

What about noise?

The most effective methods of addressing noise involve distance, landscaping and landforms.
The machinery we use in processing is state of the art and when operating is quiet enough to hold normal conversation alongside.

It will be more than half a kilometre away from residential areas and surrounded by earthen banks and tree corridors. There will be no noise heard in the residential area from the landfill or from recycling activities .

We will be working with Blacktown City Council to ensure that all aspects of our proposal are worked through having regard to community interests. We intend holding an information meeting and if you have any questions we are happy to answer them and invite you to contact us.

For further information contact:

Light Horse Business Centre
PO Box 1040, MASCOT NSW 1460

Tel: (02) 9519 9999 Fax: (02) 9516 5559
email: joi@dadi.com.au

Light Horse
BUSINESS CENTRE

DIAL A DUMP INDUSTRIES

www.dadi.com.au

Printed and circulated October 2006

A Message to our Minchinbury Neighbours from

Light Horse
BUSINESS CENTRE

Old Wallgrove Road, Eastern Creek

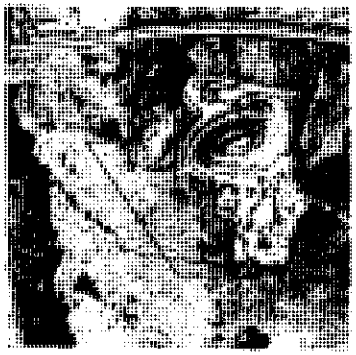
Dear Neighbours,

We are the Light Horse Business Centre and we are part of the DAD Industries Group.

DIAL A DUMP INDUSTRIES

We are a home grown Sydney business and we remove building waste and recycle it for other uses by the community.

Last year we purchased the old Pioneer Quarry which has been operating for about fifty years extracting blue metal rock used in road building.



Aerial View of the Site

The Quarry is now near the end of its life and must be filled and rehabilitated to return the landform to its pre Quarry level.

Council has zoned the land surrounding the Quarry for Industrial use and we propose to lodge a Development Application to use that land for recycling, waste transfer and landfilling.

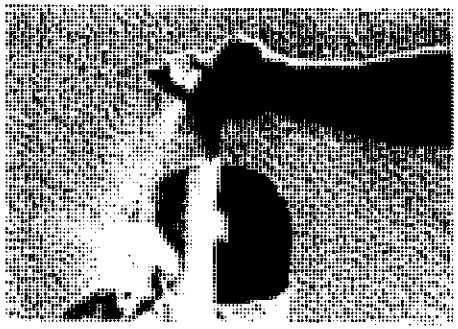
Our group of companies is a market leader in recycling of building and demolition materials and making building and landscaping products.

On the Quarry site we propose to develop a facility where brick, concrete, soil and similar waste materials are received, processed and then sold for re-use by the community.

This ensures that fewer natural resources are wasted, cheaper landscaping and building products are available for consumers and additional employment opportunities are provided in an Environmentally Sustainable Development.

Our predominant business is Recycling of building and landscaping materials. Some materials of course cannot be recycled and for them there is no other alternative but landfilling.

Recycling is an important activity in a world of shrinking resources. The more we can recover and re-use a second and third time around the less of the planet's resources we consume and the less energy we waste.



Stockpiles of Sand/Soil

We understand that you may be concerned about the impact our business proposal may have on your community and your property values.

We want to reassure you that it is our aim and intention that there will be no negative impacts for you.

Our intention is to make certain that through the development application process every step is taken to ensure that the community interests are protected.
On the contrary, there will be enhanced business and employment opportunities for young people in the area and improved infrastructure.

We will do this by ensuring that the processing facility is developed behind the existing natural hills and shielded by trees and landscaping. The facility will not be seen from Minchinbury.

It is also natural to be concerned about dust and odours as these are commonly associated in peoples' minds with Landfills.

Will the Landfill accept foodstuffs?

NO! This proposed Landfill will take predominantly building and demolition waste and **no foodstuffs, sludge or hazardous chemicals**. There is no smell from bricks and rubble and concrete and soil.

Will there be dust?

We use modern spray mist technology to efficiently use water to settle dust. We don't waste water but for the safety and convenience of our employees we make sure there is no out of control dust.

It is important to remember that the Quarry is over 150 metres deep and it will be several decades before the filled area comes anywhere near the surface. Even then the filling activity will be completely hidden from view.

Media Release

For immediate release

Light Horse
BUSINESS CENTRE

LightHorse Business Centre to be an environmentally sustainable development with real economic benefits

Proposed development will have a lesser environmental impact than the former quarrying operation

October 2006

A 123 hectare property at Eastern Creek in Sydney's Western Suburbs, the Light Horse Business Centre, is finalising plans to redevelop the site for industrial land use and an environmentally sustainable construction waste transfer and recycling facility.

The property encompasses the former Pioneer Quarry located off Wallgrove Road at Eastern Creek.[1]

The proposed waste transfer and recycling facility will be for construction waste materials only. No foodstuffs, sludge, hazardous chemicals or general domestic waste will be received or processed at the facility and the odours and community impact normally associated with tips will not be present at the site at all.

Also, the existing site, which has operated as a rock quarry for more than fifty years, already has in place effective noise and dust reduction amenities, such as 10 metre banks around the northern perimeter of the quarry. Light Horse Business Centre will be adding to these existing facilities, with the addition of landscaped corridors and an automated watering system to eliminate excess dust.

A preliminary application has been lodged with the Department of Planning.[2] Other stakeholders to this development, including Blacktown Council, have and continue to be consulted on the proposed development. Light Horse Business Centre has met with Council planners to modify its application to ensure it will continue to operate effectively with the local community, as it has for more than fifty years. For example, in response to concerns from Blacktown Council, the application has already been modified to relocate a substantial part of the facility to another part of the 123Ha site further away from the M4 motorway which separates the site from the nearest residential areas.

In addition, Light Horse Business Centre has offered to the Department of Planning and to Blacktown Council to contribute to the necessary precinct infrastructure to ensure local

[1] The quarry and surrounding lands total approximately 123 hectares and are zoned under SEPP 59 as an industrial subdivision. The quarry itself is zoned as suitable for a landfill and is currently licensed by the Department of Environment and Conservation for receipt and processing of construction waste materials.

[2] For a waste transfer and recycling facility and a class2 inert and solid waste landfill. Inert and solid waste, soils, sand, concrete and brick construction, demolition and excavation materials which will be processed and later resold through both wholesale and retail outlets. No putrescible materials or foodstuffs will be received at the facility.

amenity is retained. This includes infrastructure such as roads, upgraded services and landscaping.

At a later time the land surrounding the quarry will be developed and possibly subdivided and may in the future be resold for building factories, warehouses and industrial commercial developments. This development and building program is expected to bring with it thousands of new jobs to the local area.

The Managing Director of the Light Horse Business Centre Ian Malouf said: "We are very committed to working with all stakeholders in the precinct to bring this project to fruition, particularly local residents and Blacktown Council.

"We are very conscious and committed to our obligations to ensure the proposed development is environmentally sustainable, and preserves the amenity and infrastructure of the local community. We have significant experience and an established track record at doing this over the past twenty years.

"The potential of the commercial industrial component of our proposal will provide a real economic boost to the local area. We are working to bring this project on line rapidly."

..ends..

Contact:

Justin Kirkwood

0411 251 324

Annex C

Architectural Plans

ORIGIN OF LEVELS & COORDINATES
SSM 73008 RL 62.937 AHD
Zone 56 E256361.587,N6256884.532

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

M.G.A. NORTH (ZONE 56)

8
D P 2 4 0 1 4 3

4
D P 5 6 3 2 4 9

WOODPLAIN RESERVE

9
D P 2 4 1 8 5 9

LOT 10
DP 419612

LOT 2
DP 262213

1
D P 4 0 0 6 9 7

LOT W
DP 419612
8.54 ha
W
D P 4 1 9 6 1 2

1
D P 6 5 0 1 7 9

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

LOT 1
DP 400697
20.63 ha

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

LOT 11
DP 558723
20.9 ha

LOT 122
DP 1049623

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

Lids

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

SURVEY GRADE PLAN No.1
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

NOTES

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PPP/CF	LPL	DD/MM/YY	COMMENT

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HEIGHT DATUM: AHD	LOCAL AUTHORITY: BLACKTOWN COUNCIL
HEIGHT ORIGIN: SSM 73008 RL 62.937	SCALE: 1:3000 (A1)
MERIDIAN: 56	CONTOUR INTERVAL: ?.? Metre
CO-ORD SYSTEM: MGA	SURVEYOR: BS — DATE OF SURVEY: 01/04/05
CCAD FILE: 68124	DRAWN: LJMc — DATE: 01/08/08
AUTOCAD FILE: 71825	CHECKED: GKO — DATE: 01/08/08
ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08
PLAN NUMBER: PLAN No.1	

SHEET 1 OF 9

ORIGIN OF LEVELS & COORDINATES
SSM 73008 RL 62.937 AHD
Y256361.587,X256884.532

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

APPROXIMATE LOCATION OF FUTURE PRECINCT ROAD

M.G.A. NORTH (ZONE 56)

8
D P 2 4 0 1 4 3

9
D P 2 4 1 8 5 9

4
D P 5 6 3 2 4 9

WOODPLAIN RESERVE

FUTURE PRECINCT ROAD

LOT 2
DP 262213

1
D P 4 0 0 6 9 7

LOT W
DP 419612
8.54 ha
W
D P 4 1 9 6 1 2

1
D P 6 5 0 1 7 9

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

LOT 1
DP 400697
20.63 ha

EASEMENT FOR TRANSMISSION LINE

PRECINCT ROAD

FUTURE PRECINCT ROAD

ACCESS ROAD

FUTURE PRECINCT ROAD

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

FUTURE PRECINCT ROAD

D P 5 5 8 7 2 1

LOT 11
DP 558723
20.9 ha

LOT 122
DP 1049623

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.2
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

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PPP/CF	LPL	DD/MM/YY	COMMENT

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PLAN NUMBER: PLAN No.2	

ORIGIN OF LEVELS & COORDINATES
SSM 73008 RL 62.937 AHD
Yc296361.587,Xc256884.532

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

APPROXIMATE LOCATION OF FUTURE PRECINCT ROAD

M.G.A. NORTH (ZONE 56)

8
D P 2 4 0 1 4 3

9
D P 2 4 1 8 5 9

4
D P 5 6 3 2 4 9

WOODPLAIN RESERVE

FUTURE PRECINCT ROAD

LOT 2
DP 262213

1
D P 4 0 0 6 9 7

LOT W
DP 419612
8.54 ha
W
D P 4 1 9 6 1 2

1
D P 6 5 0 1 7 9

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

LOT 1
DP 400697
20.63 ha

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

PRECINCT ROAD

FUTURE PRECINCT ROAD

ACCESS ROAD

FUTURE PRECINCT ROAD

FUTURE PRECINCT ROAD

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

D P 5 5 8 7 2 1

LOT 11
DP 558723
20.9 ha

LOT 122
DP 1049623

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

Lots

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.2A
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

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PLAN NUMBER: PLAN No.2A	

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SSM 73008 RL 62.937 AHD
E296361.587,N6256884.532

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

M.G.A. NORTH (ZONE 56)

8
D P 2 4 0 1 4 3

WOODPLAIN RESERVE

9
D P 2 4 1 8 5 9

LOT 2
DP 262213

4
D P 5 6 3 2 4 9

LOT W
DP 419612
8.54 ha

W
4 1 9 6 1 2

1
D P 6 5 0 1 7 9

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

PRECINCT ROAD

PRECINCT ROAD

PRECINCT ROAD

PRECINCT ROAD

PRECINCT ROAD

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

D P 5 5 8 7 2 3

LOT 11
DP 558723
20.9 ha

LOT 122
DP 1049623

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.3
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

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PPP/CF	LPL	DD/MM/YY	COMMENT

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ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08
PLAN NUMBER: PLAN No.3	

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

ORIGIN OF LEVELS & COORDINATES
SSM 73006 RL 62.937 AHD
E256361.587/N6255854.532

MGA NORTH (ZONE 56)

Proposed Precinct Detention Basin (subject to council approval)

WOODPLAIN RESERVE

8
D P 2 4 0 1 4 3

9
D P 2 4 1 8 5 9

4
D P 5 6 3 2 4 9

LOT 2
DP 262213

1
D P 4 0 0 6 9 7

LOT W
DP 419612
8.54 ha
W
D P 4 1 9 6 1 2

1
D P 6 5 0 1 7 9

LOT 1
DP 650179
23.59 ha
"SUNNY P/L"

LOT 1
DP 400697
20.63 ha

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

D P 5 5 8 7 1 4

LOT 11
DP 558723
20.9 ha

LOT 122
DP 1049623

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (Light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.4
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

NOTES

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PPP/CF	LPL	DD/MM/YY	COMMENT

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e sydney@landpartners.com.au
w www.landpartners.com.au

HEIGHT DATUM: AHD	LOCAL AUTHORITY: BLACKTOWN COUNCIL
HEIGHT ORIGIN: SSM 73006 RL 62.937	SCALE: 1:3000 (A1)
MERIDIAN: 56	CONTOUR INTERVAL: ?.? Metre
CO-ORD SYSTEM: MGA	SURVEYOR: BS — DATE OF SURVEY: 01/04/05
CCAD FILE: 68124	DRAWN: LJMc — DATE: 01/08/08
AUTOCAD FILE: 71825	CHECKED: GKO — DATE: 01/08/08
ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08
PLAN NUMBER: PLAN No.4	

SHEET 4 OF 9

ORIGIN OF LEVELS & COORDINATES
SSM 73008 RL 62.937 AHD
E296301.587,N6258884.532

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

M.G.A. NORTH (ZONE 56)

Proposed Precinct Detention Basin (subject to council approval)

WOODPLAIN RESERVE

8
D P 2 4 0 1 4 3

4
D P 5 6 3 2 4 9

9
D P 2 4 1 8 5 9

LOT 2
DP 262213

LOT W
DP 419612
8.54 ha
W
4 1 9 6 1 2

1
D P 6 5 0 1 7 9

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

11
D P 5 5 8 7 2 3

LOT 11
DP 558723
20.9 ha

LOT 122
DP 1049623

EASEMENT FOR TRANSMISSION LINE

PRECINCT ROAD

PRECINCT ROAD

PRECINCT ROAD

ACCESS ROAD

PRECINCT ROAD

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

Lots

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.5
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

NOTES

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HEIGHT ORIGIN: SSM 73008 RL 62.937	SCALE: 1:3000 (A1)
MERIDIAN: 56	CONTOUR INTERVAL: ?.? Metre
CO-ORD SYSTEM: MGA	SURVEYOR: BS — DATE OF SURVEY: 01/04/05
CCAD FILE: 68124	DRAWN: LJMc — DATE: 01/08/08
AUTOCAD FILE: 71825	CHECKED: GKO — DATE: 01/08/08
ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08
PLAN NUMBER: PLAN No.5	

ORIGIN OF LEVELS & COORDINATES
SSM 73008 RL 62.937 AHD
E256361.587,N6256884.532

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

APPROXIMATE LOCATION OF FUTURE PRECINCT ROAD

M.G.A. NORTH (GRID 56)

NON OPERATIONAL AREA

WOODPLAIN RESERVE

FUTURE PRECINCT ROAD

NON OPERATIONAL AREA

8
D P 2 4 0 1 4 3

9
D P 2 4 1 8 5 9

4
D P 5 6 3 2 4 9

LOT 2
DP 262213

LOT W
DP 419612

1
D P 4 0 0 6 9 7

W
D P 4 1 9 6 1 2

1
D P 6 5 0 1 7 9

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

LOT 1
DP 400697

PRECINCT ROAD

FUTURE PRECINCT ROAD

ACCESS ROAD

FUTURE PRECINCT ROAD

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

NON OPERATIONAL AREA

FUTURE PRECINCT ROAD

11
D P 5 5 8 7 2 3

LOT 11
DP 558723
20.9 ha

NON OPERATIONAL AREA

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

LOT 122
DP 1049623

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

OPERATIONAL AREA
48.10ha

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.6
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

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AUTOCAD FILE: 71825	CHECKED: GKO — DATE: 01/08/08
ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08
PLAN NUMBER: PLAN No.6	

ORIGIN OF LEVELS & COORDINATES
SSM 73008 RL 62.937 AHD
E296361.587,N6256884.532

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

M.G.A. NORTH (ZONE 56)

8
D P 2 4 0 1 4 3

4
D P 5 6 3 2 4 9

9
D P 2 4 1 8 5 9

1
D P 6 5 0 1 7 9

WOODPLAIN RESERVE

LOT 2
DP 262213

LOT W
DP 419612

W
4 1 9 6 1 2

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

LOT 122
DP 1049623

LOT 11
DP 558723
20.9 ha

D P 5 5 8 7 2 3

EASEMENT FOR TRANSMISSION LINE

PRECINCT ROAD

ACCESS ROAD

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
- TREE D= DIAMETER TRUNK S= SPREAD OF CANOPY H= HEIGHT
- WATER HYDRANT
- STOP VALVE
- SEWER MAINTENANCE HOLE
- ELECT LIGHT POLE
- POWER POLE (light)
- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

AREA OF QUARRY VOID
TOTAL 28.69HA

AREA OF CONTRIBUTIONS
TOTAL 19.41HA

Lots

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.7
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

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ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08
PLAN NUMBER: PLAN No.7	

SHEET 7 OF 9

M4 MOTORWAY

M4 MOTORWAY

M4 MOTORWAY

ORIGIN OF LEVELS & COORDINATES
SSM 73008 RL 62.937 AHD
E296361.587,N6256884.532

APPROXIMATE LOCATION OF FUTURE PRECINCT ROAD

M.G.A. NORTH (ZONE 56)

8
D P 2 4 0 1 4 3

WOODPLAIN RESERVE

9
D P 2 4 1 8 5 9

4
D P 5 6 3 2 4 9

1
D P 6 5 0 1 7 9

LOT 3

LOT 1

LOT 4

LOT 2

LOT 3

LOT 5

LOT 1
DP 650179
23.59 ha
"SUMY P/L"

LOT 122
DP 1049623
117.4 ha
"HARTFORD LANE"

LOT 122
DP 1049623

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

EASEMENT FOR TRANSMISSION LINE

LEGEND

- BENCH MARK
- TELEPHONE PIT
- WATER METER
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- POWER POLE
- GRATE
- GAS METER
- GATE
- MAN HOLE
- TAP
- INSPECTION HOLE
- CLOTHES HOIST
- GULLY PIT

PROPOSED FUTURE BOUNDARIES (LEASE AREA)

CLIENT

LIGHT HORSE BUSINESS CENTRE

PROJECT

PLAN No.8
OF
LHBC AREA
QUARRY RD, EASTERN CREEK

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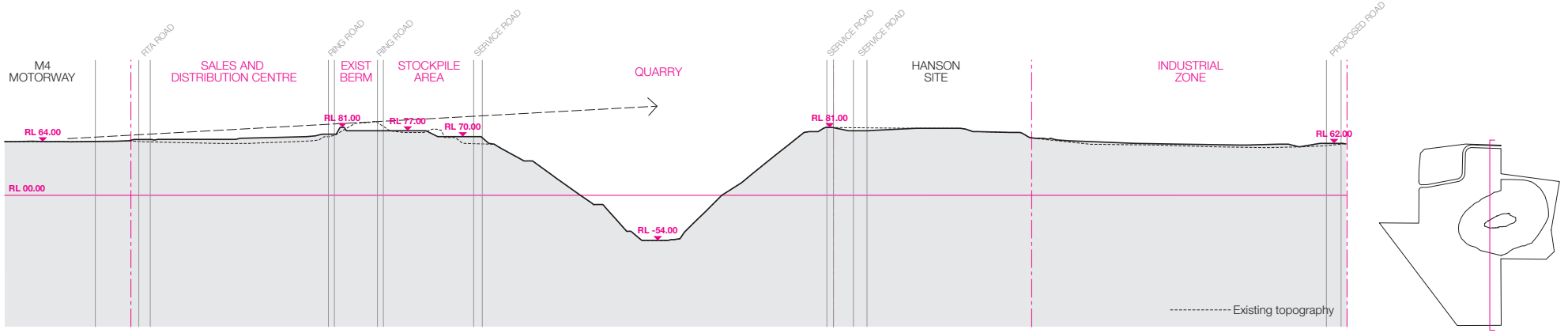
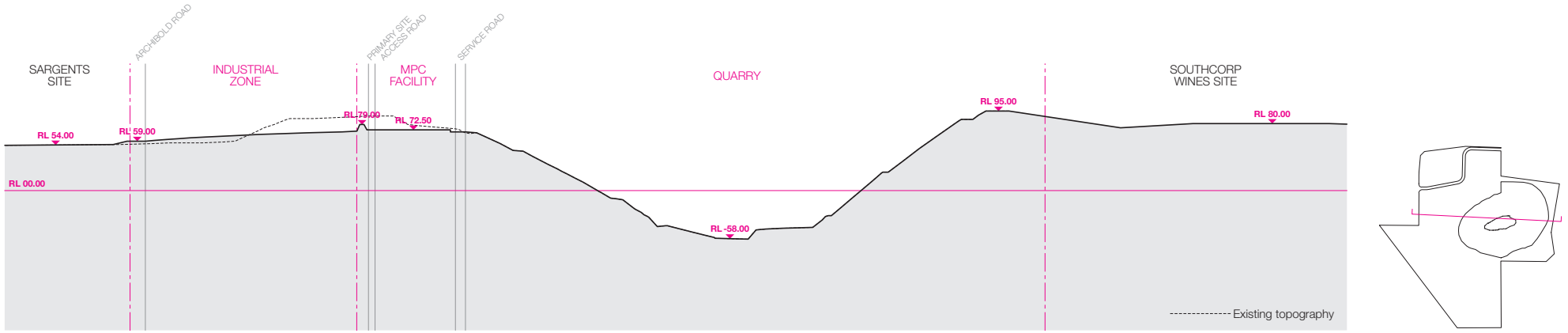
AUTOCAD FILE: 71825	CHECKED: GKO — DATE: 01/08/08
ARCHIVE FILE: 68124 &	APPROVED: GKO — DATE: 01/08/08
PLAN NUMBER: PLAN No.8	

Proposed Light Horse Business Park
Site Sections



NORTH-SOUTH SECTION 1:5000 @ A3

500m



EAST-WEST SECTION 1:5000 @ A3

500m

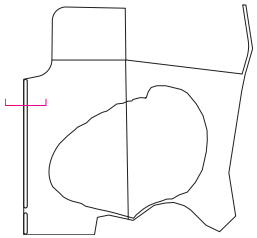
SYDNEY OPERA HOUSE 1:5000 @ A3

PROPOSAL

LIGHT HORSE BUSINESS CENTRE
DEVELOPMENT APPLICATION

STANIC HARDING
ARCHITECTS

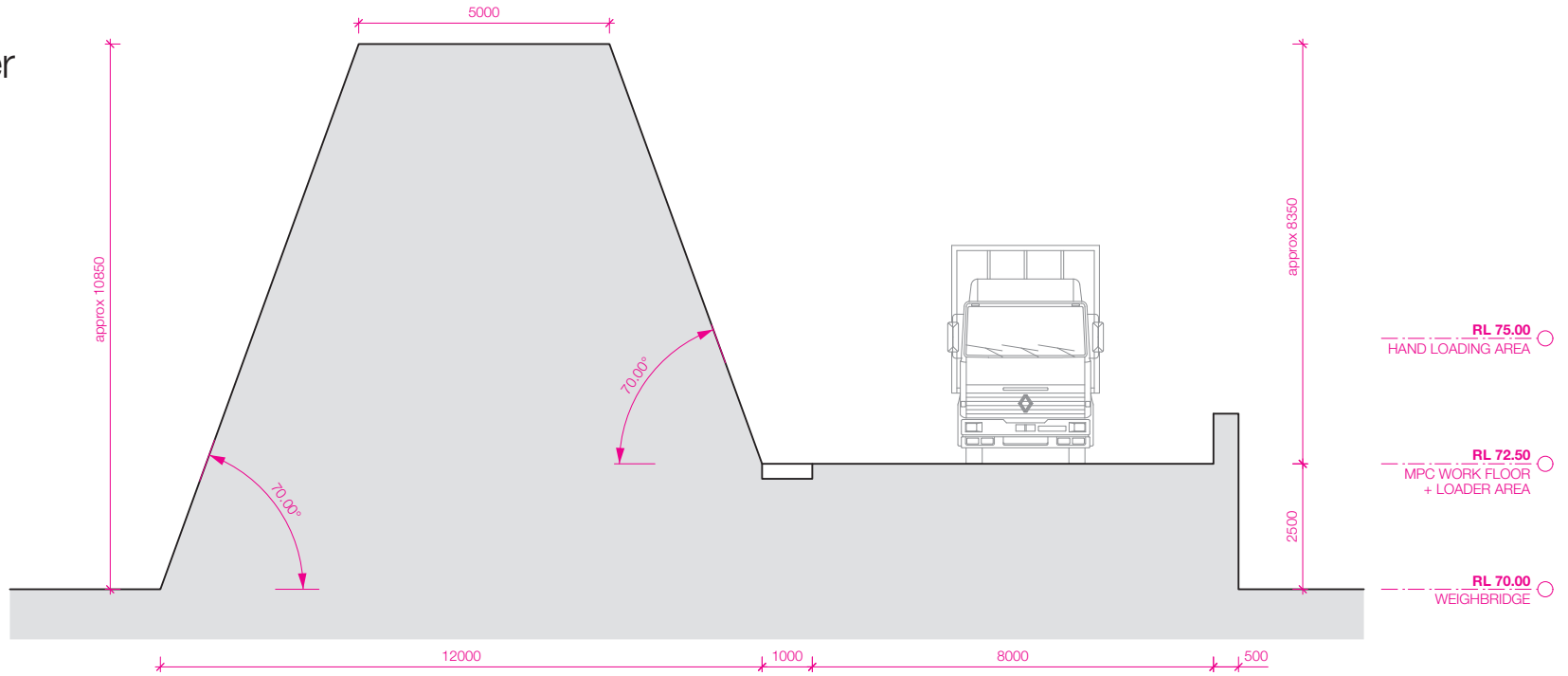
Proposed Western Perimeter Berm Sections

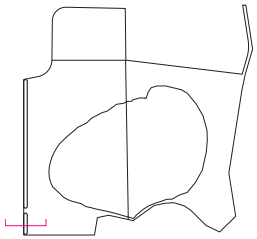


SECTION A 1:100 @ A3

5m

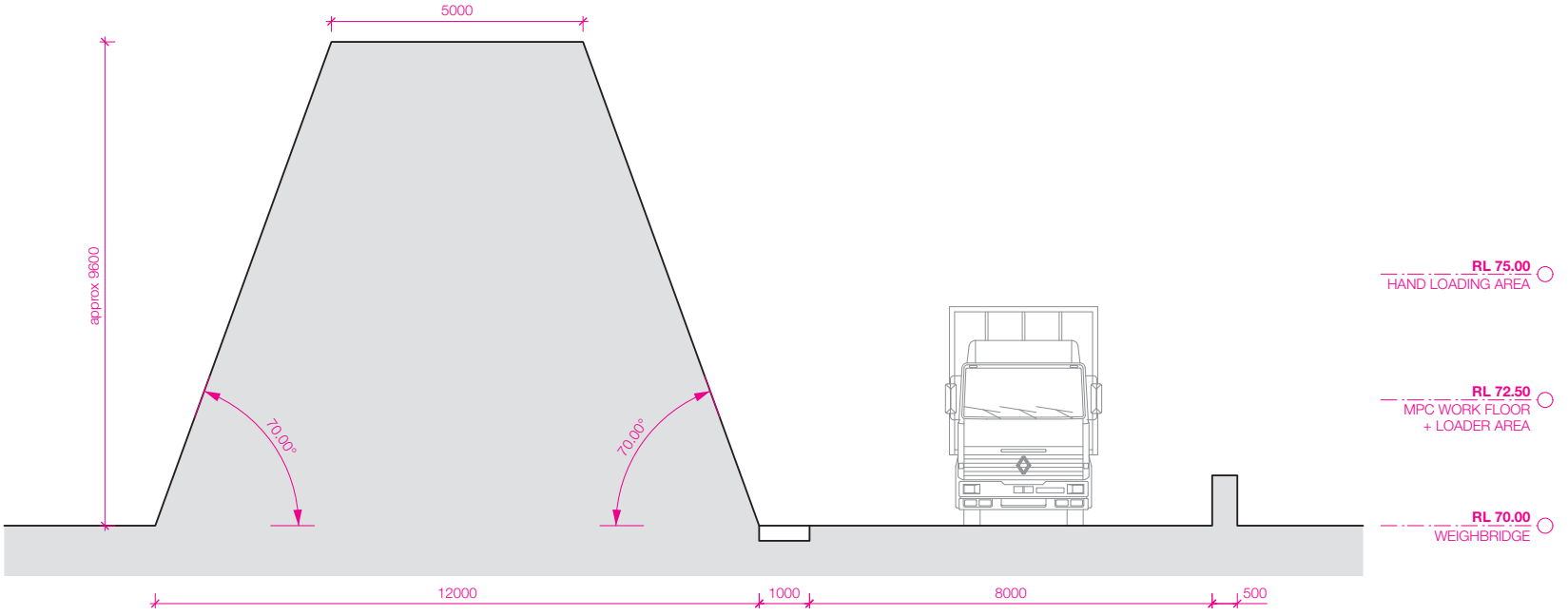
Note: Construction of perimeter berms to be as per geotechnical engineering documentation.





SECTION B 1:100 @ A3

5m

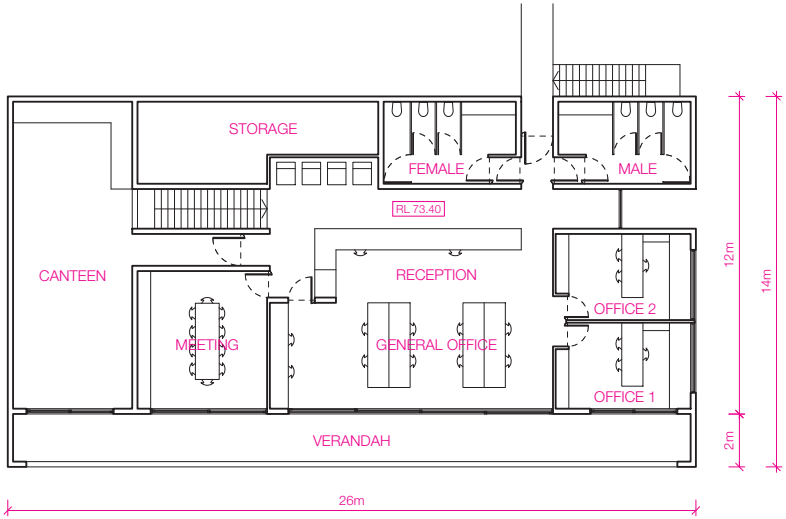


PROPOSAL

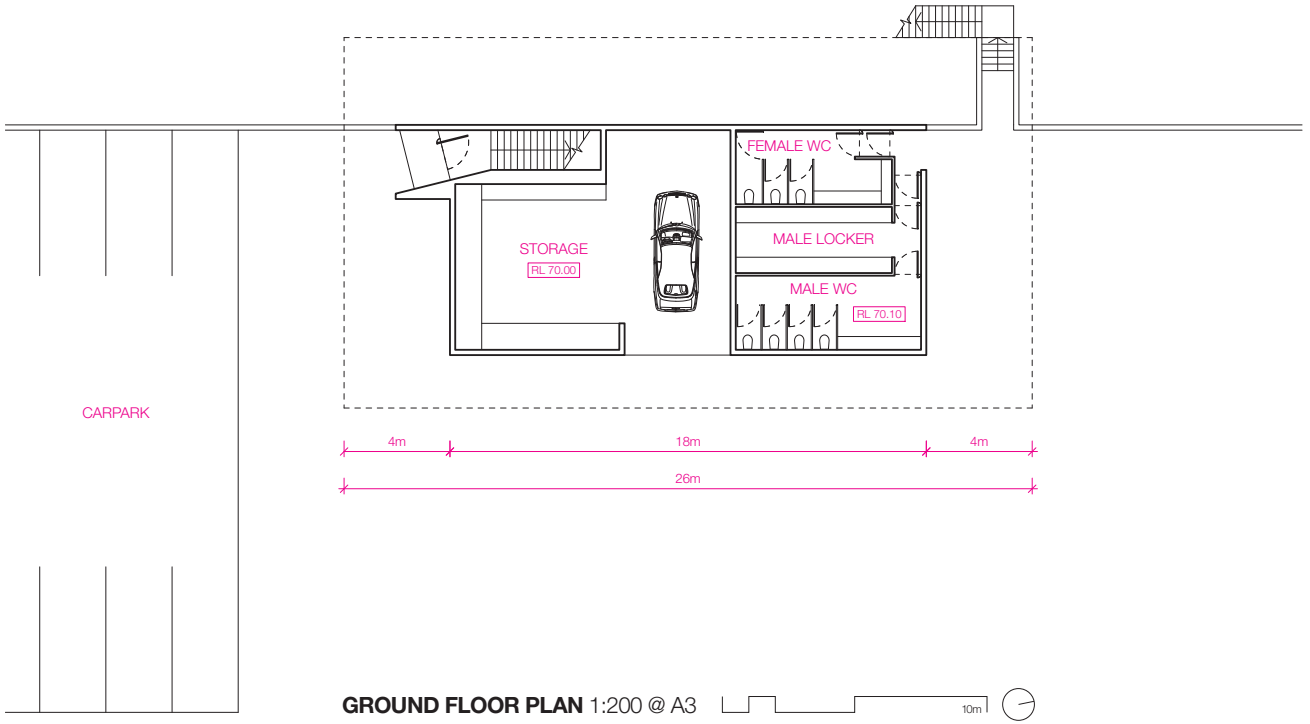
LIGHT HORSE BUSINESS CENTRE
DEVELOPMENT APPLICATION

STANIC HARDING
ARCHITECTS

Proposed Administration Centre Plans



FIRST FLOOR PLAN 1:200 @ A3



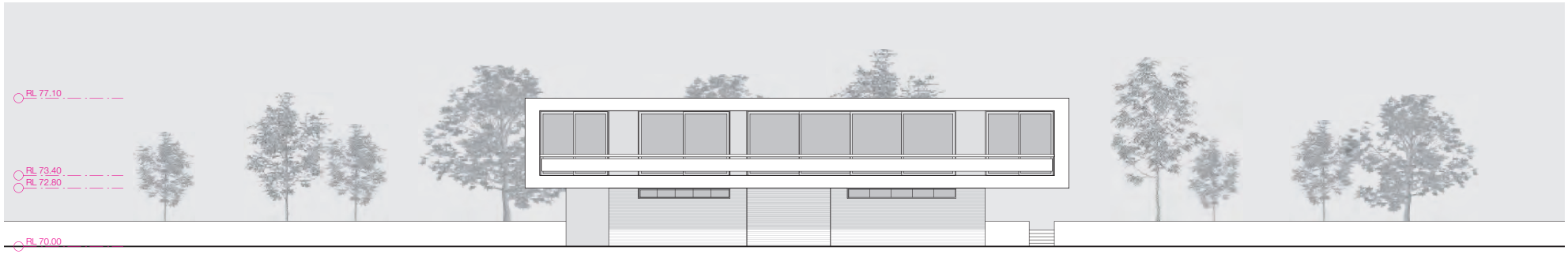
GROUND FLOOR PLAN 1:200 @ A3

ADMINISTRATION AREA

LIGHT HORSE BUSINESS CENTRE
DEVELOPMENT APPLICATION

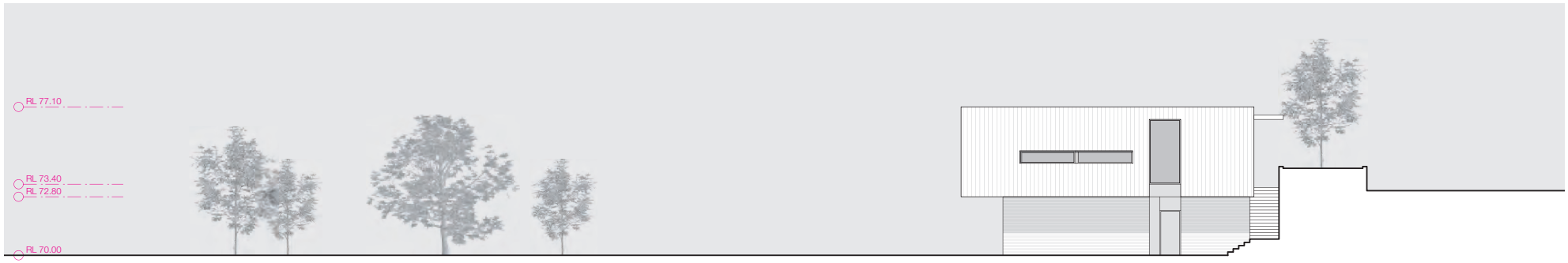
STANIC HARDING
ARCHITECTS

Proposed Administration Centre Elevations



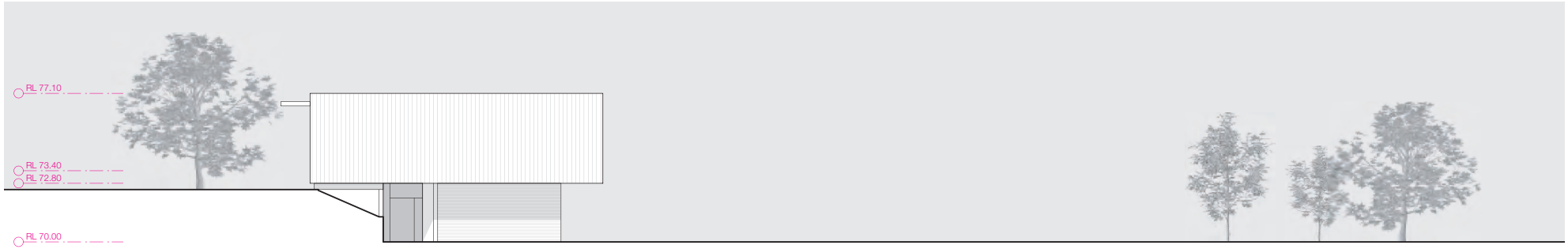
EASTERN ELEVATION 1:200 @ A3

10m



NORTHERN ELEVATION 1:200 @ A3

10m



SOUTHERN ELEVATION 1:200 @ A3

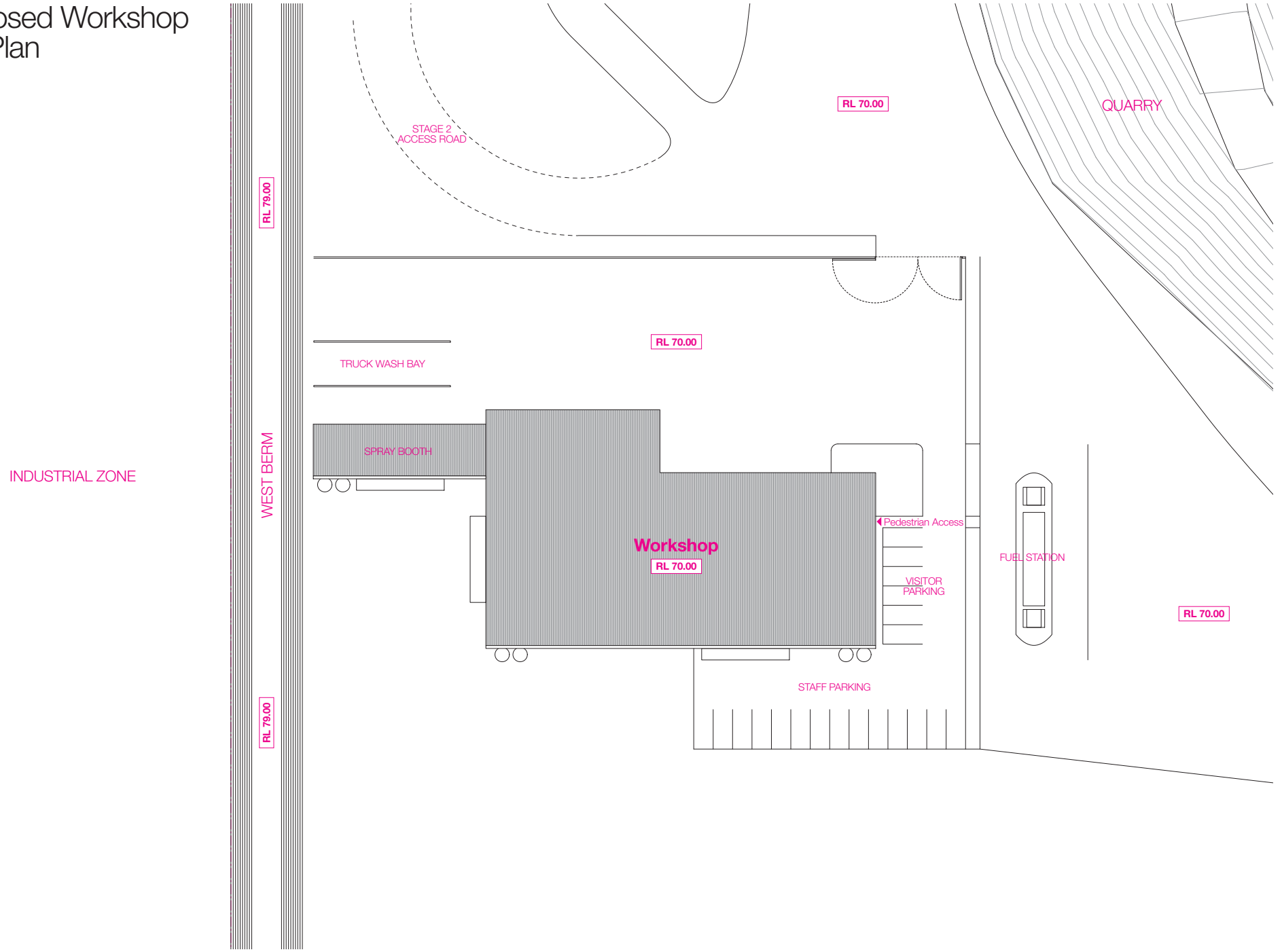
10m

ADMINISTRATION AREA

LIGHT HORSE BUSINESS CENTRE
DEVELOPMENT APPLICATION

STANIC HARDING
ARCHITECTS

Proposed Workshop Site Plan



SITE PLAN 1:500 @ A3

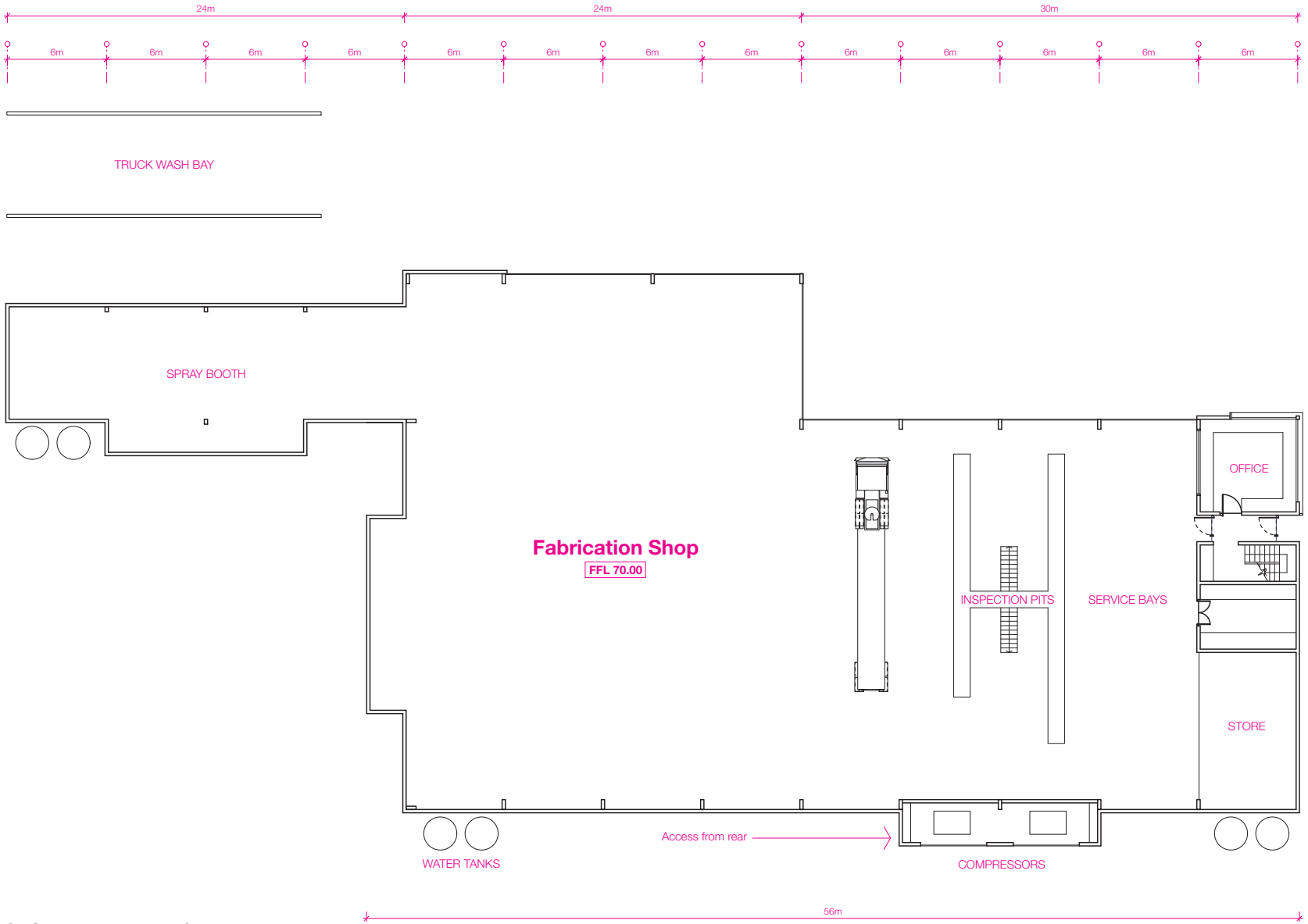
50m

ADMINISTRATION AREA

LIGHT HORSE BUSINESS CENTRE
DEVELOPMENT APPLICATION

STANIC HARDING
ARCHITECTS

Proposed Workshop
Floor Plans



GROUND PLAN 1:250 @ A3

10m

UPPER PLAN 1:250 @ A3

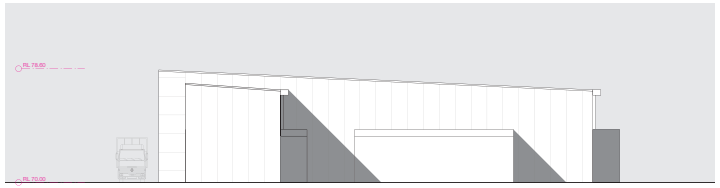
10m

ADMINISTRATION AREA

LIGHT HORSE BUSINESS CENTRE
DEVELOPMENT APPLICATION

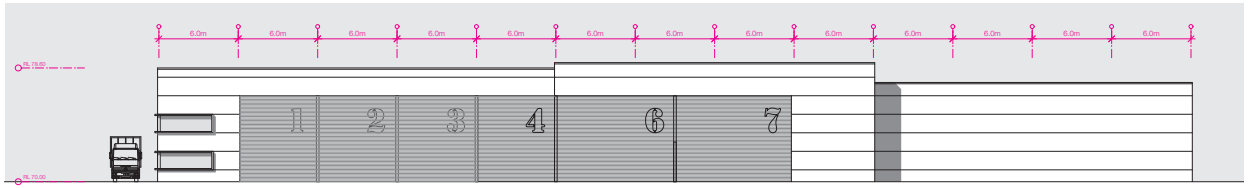
STANIC HARDING
ARCHITECTS

Proposed Workshop Elevations



WEST ELEVATION 1:400 @ A3

10m

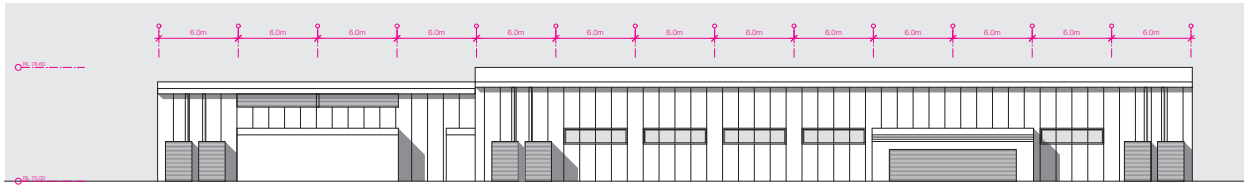


NORTHERN ELEVATION 1:400 @ A3

10m

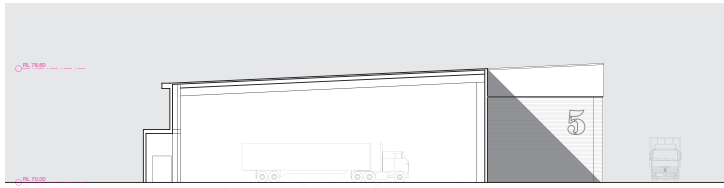
EAST ELEVATION 1:400 @ A3

10m



SOUTHERN ELEVATION 1:400 @ A3

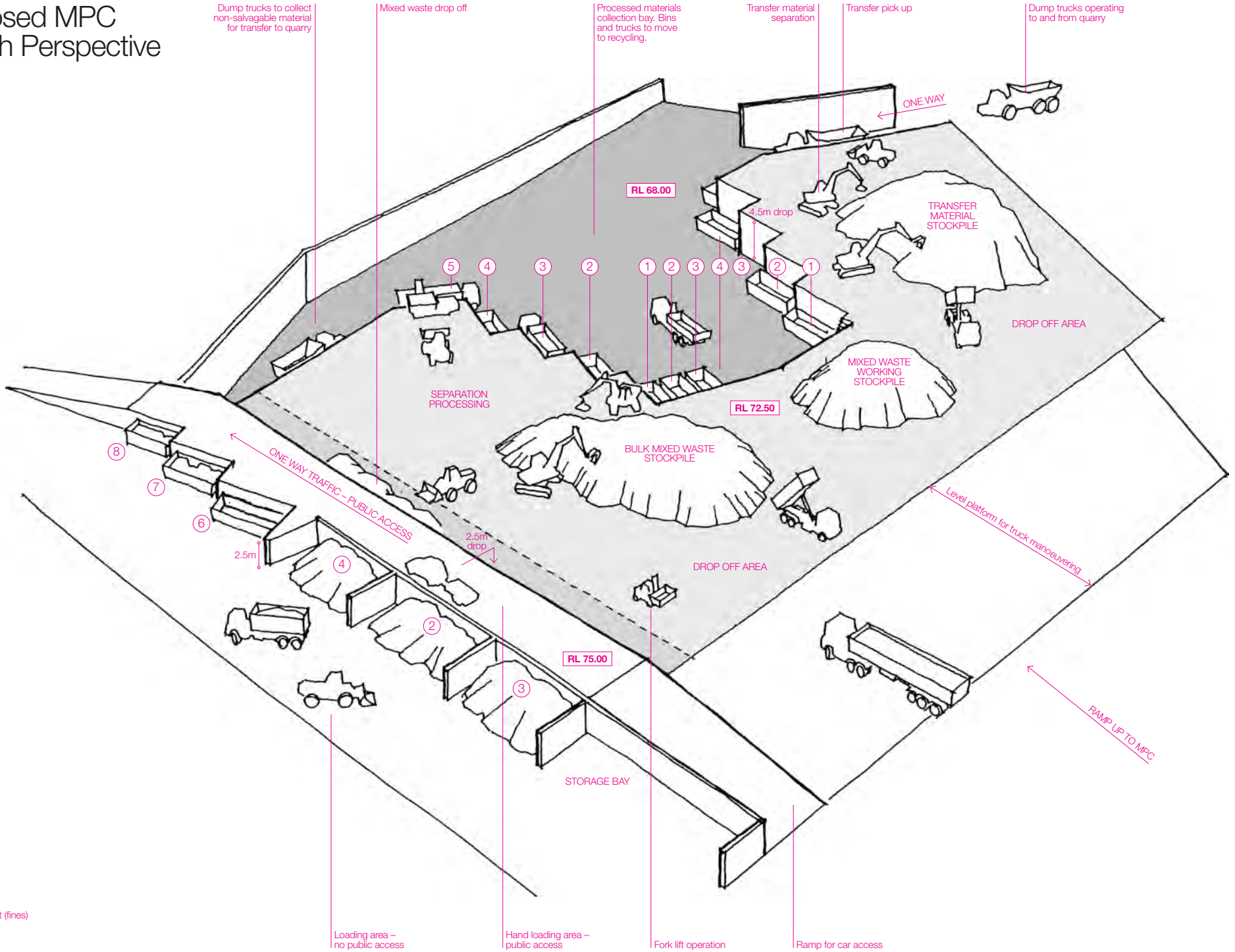
10m



SECTION 1:400 @ A3

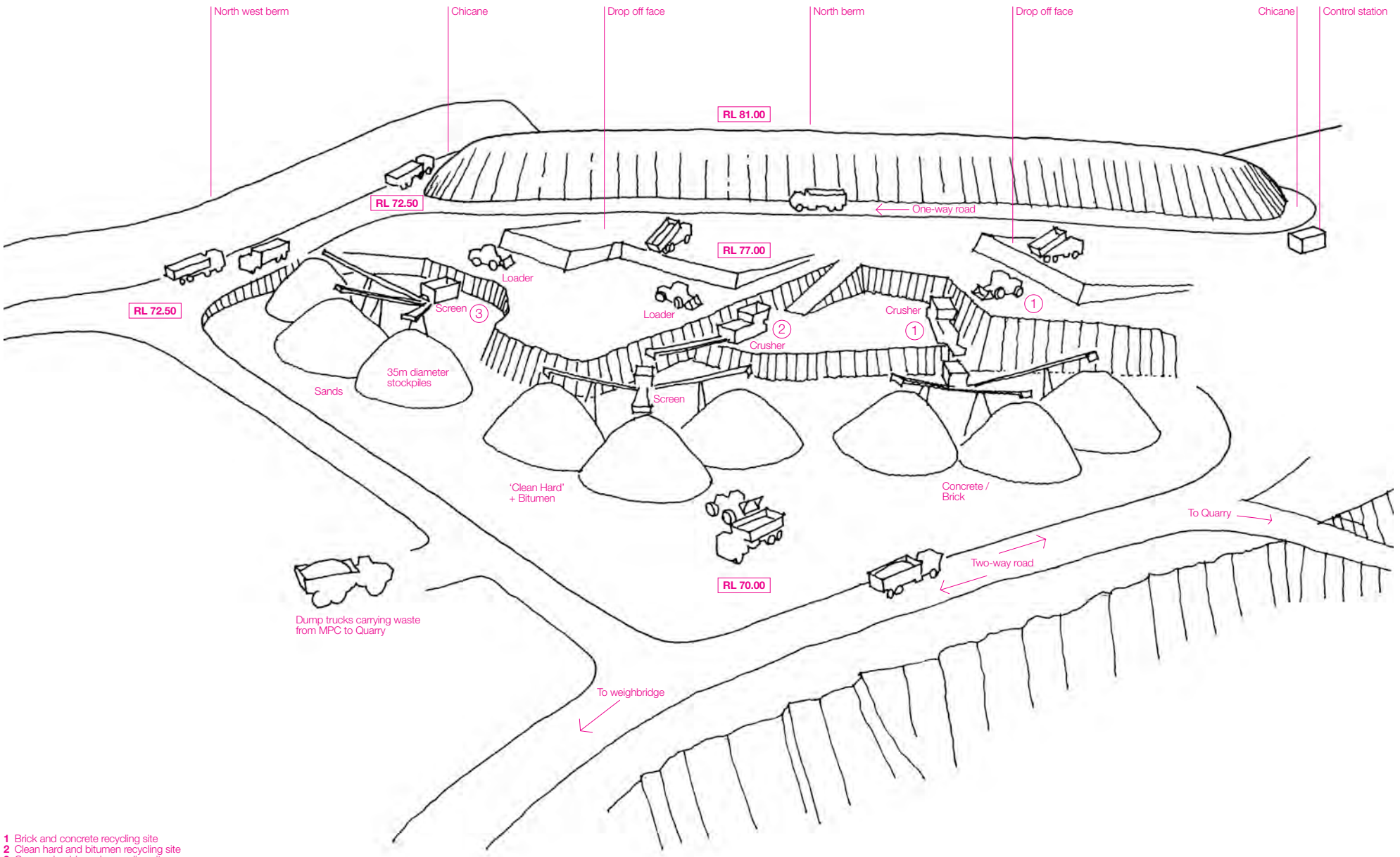
10m

Proposed MPC Sketch Perspective



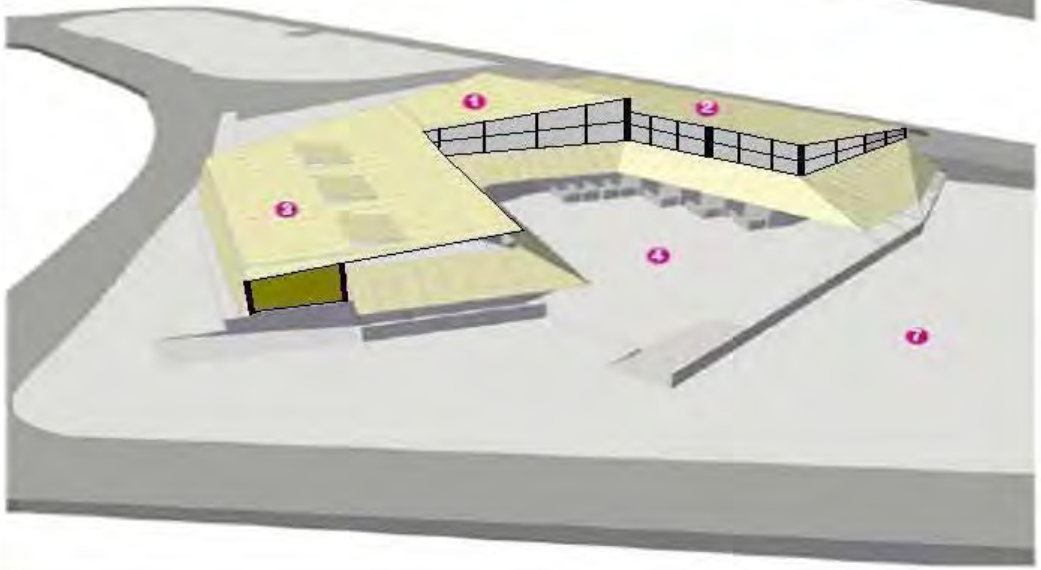
1 Steel
2 Timber
3 Green
4 Rubble
5 Screening plant (fines)
6 Cardboard
7 Plastic
8 Glass

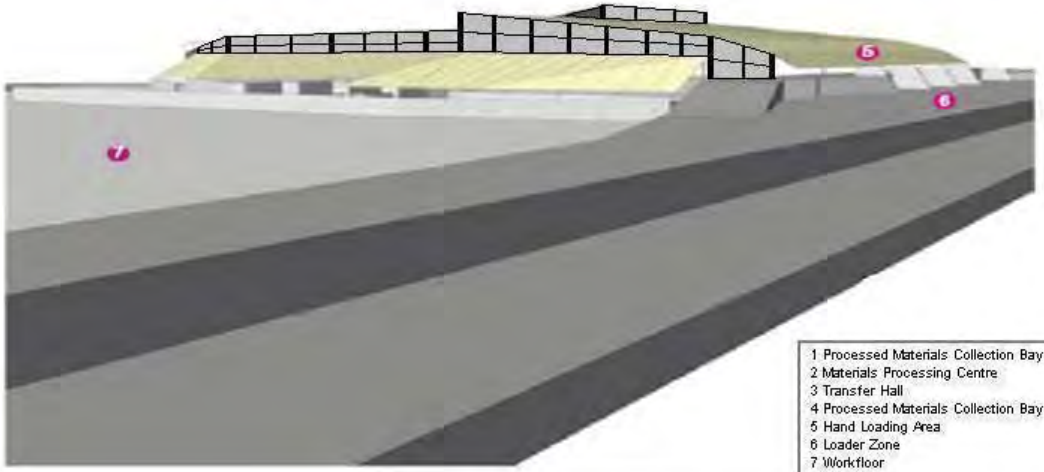
Proposed Operations Area
Sketch Perspective



1 Brick and concrete recycling site
2 Clean hard and bitumen recycling site
3 Grey and gold sands recycling site

LIGHT HORSE BUSINESS CENTRE
CONCEPT PLAN FOR PROPOSED MPC EXTERIOR PERSPECTIVE
MAY 2008

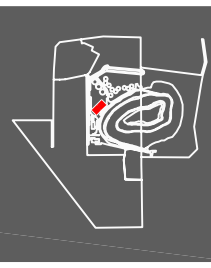




1 Processed Materials Collection Bay
2 Materials Processing Centre
3 Transfer Hall
4 Processed Materials Collection Bay
5 Hand Loading Area
6 Loader Zone
7 Workfloor
8 Ramp

MATERIALS PROCESSING CENTRE

LIGHT HORSE BUSINESS CENTRE



North-West Berm
Ring Road
North Berm
Ring Road
Drop Off Zone
GPT
Stock
RL77.00
Stock
Stock
Work Floor
RL70.00
Stock
10m Road
8m Road
Quarry
Quarry Edge
Dump Truck Weighbridge
4,200m²
Green
Timber
RL70.00
6,795m²
MPC
RL72.50
Quarry Edge
West Berm
Quarry
Administration
RL70.00
Wheelwash
Weighbridge
Carpark
20m
Future Access Road shown dotted
Existing Buildings
L
H
G
345m² B
A 1,394m²
C
F
E
J
Workshop
3,744m²
GPT
Quarry Edge
Quarry Edge
Possible Future site access maintained clear
Proposed Road as per Precinct Plan
Truck Park
4,800m²
Zone for Future Development/Sub-letting
Site Access from Quarry Road
West Berm
Hanson Site
Hanson Site

Client
Hutchinson Builders
23 Dunning Avenue
Rosebery NSW

DIAL A DUMP INDUSTRIES
THE SKY'S THE LIMIT

Project
Light Horse Business Centre
Eastern Creek NSW

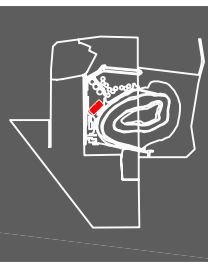
Title
Site Plan
Scale
1:2000 @ a3
Date
Nov 2008
Number
3439_SK06

0 7.5 15
37.5 75

nettletontribe

Nov 12, 2008 - 10:34am P:\3439\Sketch\3439_SK06.dwg

LIGHT HORSE BUSINESS CENTRE



BUILDING AREAS - OPTION 2

BUILDING	AREA
Upper Collection Bay	4440 m²
Lower Collection Bay	2355 m²
TOTAL	6795 m²
Under cover	7865 m²

North-West Berm
Future Road
Green
40m diameter stockpiles
35m diameter stockpiles
Timber
West Berm
Two-way Access Road
Processed Materials Collection Bay
Transfer Hall
Transfer Pickup
Landfill Collection
Materials Processing Centre
Mixed Waste
Loader Zone
Ramp Up
Ramp Down
CLOSED FACE
40m SETBACK FROM QUARRY EDGE
extent of roof over
roller shutter
steel
timber
green
rubble
tyres
RL 70.00
RL 68.00
RL 72.50
RL 75.00
RL 70.50
136000
15000
35000
Quarry Edge
Weighbridge

LEGEND
- Commercial vehicle access
- Public vehicle access
- Internal vehicle access

Client
Hutchinson Builders
23 Dunning Avenue
Rosebery NSW

DIAL A DUMP
THE SKY'S THE LIMIT

Project
Light Horse Business Centre
Eastern Creek NSW

Title
MPC Option 2
Scale
1:500 @ a3
Date
Nov 2008
Number
3439_SK08

0 7.5 15
37.5 75

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Annex D

Keystone Ecological Assessment

APPENDIX 1

FLORA DETAILS

Table 1.1: Flora species recorded on the subject site. Vegetation Community 1 = Alluvial Woodland, 2 = Shale Plains Woodland. X = recorded in this community, C = common in this community. * = introduced, w = Noxious Weed

Family		Scientific Name	Common Name	Vegetation Community	
				1	2
Acanthaceae		*Brunoniella pumilio*	Dwarf Blue Trumpet	X,C	X,C
Amaranthaceae		*Alternanthera denticulata*	Lesser Joyweed		X
Amaranthaceae	*	*Alternanthera pungens*	Khaki Weed		X
Anthericaceae		*Caesia parviflora*	Pale Grass Lily	X	X
Anthericaceae		*Tricoryne elatior*	Yellow Rush-lily		X,C
Apiaceae	*	*Hydrocotyle bonariensis*	Pennywort	X	
Asclepiadaceae	*	*Gomphocarpus fruticosus*	Narrow Leaf Cotton Bush		X
Asclepiadaceae	*	*Araujia sericifera*	Moth Plant	X	X
Asparagaceae	*	*Asparagus asparagoides*	Bridal Creeper	X	
Asparagaceae	*	*Asparagus officinalis*	Asparagus		X
Asparagaceae	*	*Protasparagus aetheopicus*	Asparagus Fern	X	X
Asteraceae		*Brachycome angustifolia*	-		X
Asteraceae		*Chrysocephalum semipapposum*	Clustered Everlasting		X
Asteraceae		*Lagenifera stipitata*	Common Lagenifera		X
Asteraceae		*Vittadinia pustulata*	-		X
Asteraceae		*Vittadinia sulcata*	-		X
Asteraceae	*w	*Ageratina adenophora*	Crofton Weed	X	
Asteraceae	*	*Ambrosia artemisiifolia*	Annual Ragweed	X	X
Asteraceae	*	*Bidens pilosa*	Cobblers Pegs	X	X
Asteraceae	*	*Bidens subalternans*	Cobblers Pegs		X
Asteraceae	*	*Cirsium vulgare*	Spear Thistle	X	X
Asteraceae	*	*Conyza albida*	Tall Fleabane	X	X
Asteraceae	*	*Hypochaeris radicata*	Flatweed	X	X
Asteraceae	*	*Senecio madagascariensis*	Fireweed	X	X
Asteraceae	*	*Senecio pterophorus*	African Daisy	X,C	X
Asteraceae	*	*Sonchus asper*	Prickly Sowthistle	X	
Asteraceae	*	*Sonchus oleraceus*	Common Sowthistle	X	
Brassicaceae	*	*Capsella bursa-pastoris*	Shepherd's Purse	X	X
Campanulaceae		*Wahlenbergia gracilis*	Native Bluebell		X
Casuarinaceae		*Casuarina glauca*	Swamp Oak	X	X,C
Chenopodiaceae		*Einadia hastata*	Berry Saltbush		X
Chenopodiaceae		*Einadia polygonoides*	-	X	X
Chenopodiaceae		*Einadia trigonos*	Fishweed	X	X
Chenopodiaceae	*	*Chenopodium murale*	Nettle-leaf Goosefoot		X
Clusiaceae		*Hypericum gramineum*	Little St Johns Wort		X
Clusiaceae	*w	*Hypericum perforatum*	St John's Wort		X
Commelinaceae		*Commelina cyanea*	Scurvy Weed	X,C	X
Convolvulaceae		*Dichondra repens*	Kidney Weed	X,C	X,C
Cyperaceae		*Cyperus gracilis*	-	X	X,C
Cyperaceae		*Fimbristylis dichotoma*	Common Fringe-rush	X	
Cyperaceae		*Gahnia clarkei*	Saw Sedge		X
Cyperaceae	*	*Cyperus eragrostis*	Umbrella Sedge	X	
Davalliaceae	*	*Nephrolepis cordifolia*	Fish-bone Fern	X	
Epacridaceae		*Astroloma humifusum*	Native Cranberry		X
Euphorbiaceae		*Phyllanthus virgatus*	-	X	X
Euphorbiaceae	*	*Chamaesyce sp.*	-	X	X
Fabaceae		*Dillwynia sieberi*	Prickly Parrot-pea		X,C
Fabaceae		*Indigofera australis*	Native Indigo		X
Fabaceae		*Glycine microphylla*	Twining Glycine	X	
Fabaceae		*Glycine tabacina*	Variable Glycine	X	X

Table 1.1 (cont'd): Flora species recorded on the subject site. Vegetation Community 1 = Alluvial Woodland, 2 = Shale Plains Woodland. X = recorded in this community, C = common in this community. * = introduced, w = Noxious Weed

Family		Scientific Name	Common Name	Vegetation Community	
				1	2
Fabaceae		*Hardenbergia violacea*	False Sarsparilla		X
Fabaceae		*Desmodium varians*	-	X	
Fabaceae	*	*Erythrina X sykesii*	Coral Tree		X
Gentianaceae	*	*Centaurium tenuiflorum*	-		X
Juncaceae		*Juncus usitatus*	Common Rush		X
Juncaceae	*	*Juncus acutus*	-	X,C	X
Loranthaceae		*Amyema* sp.	-		X
Malaceae	*	*Cotoneaster glaucophyllus*	Cotoneaster	X	
Malvaceae	*	*Sida acuta*	-	X	X
Malvaceae	*	*Malva sylvestris*	Tall Mallow		X
Malvaceae	*	*Sida rhombifolia*	Paddy's Lucerne	X,C	X,C
Mimosaceae		*Acacia elongata*	Swamp Wattle		X
Mimosaceae		*Acacia falcata*	Sickle Wattle		X
Mimosaceae		*Acacia parramattensis*	Sydney Green Wattle		X
Mimosaceae		*Acacia stricta*	Straight Wattle		X
Myoporaceae		*Eremophila debilis*	Winter Apple	X	X
Myrtaceae		*Eucalyptus moluccana*	Grey Box	X	X,C
Myrtaceae		*Eucalyptus sideroxylon*	Mugga Ironbark		X
Myrtaceae		*Eucalyptus tereticornis*	Forest Red Gum	X	X
Oleaceae	*w	*Ligustrum lucidum*	Broad-leaved Privet	X	
Oleaceae	*	*Olea europea* subsp. *africana*	African Olive	X	X
Onagraceae	*	*Ludwigia peploides*	Water Primrose		X
Onagraceae	*w	*Ludwigia peruviana*	Ludwigia		X
Oxalidaceae		*Oxalis perennans*	-	X,C	X
Phormiaceae		*Dianella longifolia*	Flax Lily		X
Phytolaccaceae	*	*Phytolacca octandra*	Inkweed		X
Pittosporaceae		*Bursaria spinosa*	Blackthorn	X	X,C
Plantaginaceae		*Plantago debilis*	Slender Plantain		X
Plantaginaceae	*	*Plantago lanceolata*	Ribwort	X	X
Poaceae		*Agrostis* sp.	-		X
Poaceae		*Aristida calycina*	Wire Grass		X
Poaceae		*Aristida ramosa*	Wire Grass		X,C
Poaceae		*Aristida vagans*	Threeawn Speargrass		X,C
Poaceae		*Austrodanthonia* sp.	Wallaby Grass		X
Poaceae		*Bothriochloa macra*	Redleg Grass		X
Poaceae		*Chloris ventricosa*	Tall Chloris	X	X
Poaceae		*Cymbopogon refractus*	Barbwire Grass		X
Poaceae		*Cynodon dactylon*	Common Couch	X,C	X,C
Poaceae		*Eragrostis leptostachya*	Paddock Lovegrass	X	X
Poaceae		*Eriochloa pseudoacrotricha*	Early Spring Grass	X,C	X
Poaceae		*Microlaena stipoides*	Weeping Grass	X,C	X,C
Poaceae		*Oplismenus aemulus*	Basket Grass	X	
Poaceae		*Paspalidium distans*	-		X
Poaceae		*Themeda australis*	Kangaroo Grass	X	X,C
Poaceae	*	*Aloe* sp.	Aloe	X	
Poaceae	*	*Briza subaristata*	-		X
Poaceae	*	*Bromus cartharticus*	Prairie Grass	X	X
Poaceae	*	*Chloris gayana*	Rhodes Grass	X,C	X,C
Poaceae	*w	*Cortaderia selloana*	Pampas Grass	X	
Poaceae	*	*Ehrharta erecta*	Panic Veldtgrass	X	

Table 1.1 (cont'd): Flora species recorded on the subject site. Vegetation Community 1 = Alluvial Woodland, 2 = Shale Plains Woodland. X = recorded in this community, C = common in this community. * = introduced, w = Noxious Weed

Family		Scientific Name	Common Name	Vegetation Community	
				1	2
Poaceae	*	*Eleusine tristachya*	Goosegrass		X
Poaceae	*	*Eragrostis curvula*	African Lovegrass	X,C	X
Poaceae	*	*Melinis repens*	Red Natal Grass		X
Poaceae	*	*Panicum maximum*	Guinea Grass		X,C
Poaceae	*	*Paspalum dilatatum*	Paspalum	X	X
Poaceae	*	*Phalaris* sp.	-	X	
Poaceae	*	*Setaria gracilis*	Slender Pigeon Grass	X,C	X,C
Poaceae	*	*Sporobolus africanus*	Parramatta Grass	X	X,C
Poaceae	*	*Vulpia myuros*	Rat's Tail Fescue		X
Polygonaceae		*Persicaria hydropiper*	Water Pepper		X
Polygonaceae		*Rumex brownii*	-	X	
Polygonaceae	*	*Rumex crispus*	Curled Dock		X
Portulacaceae		*Portulaca oleracea*	Purslane	X	X
Rosaceae	*	*Rosa rubiginosa*	Briar Rose		X
Rubiaceae		*Asperula conferta*	Common Woodruff	X	X
Sapindaceae		*Dodonaea viscosa*	Hop Bush		X
Sinopteridaceae		*Cheilanthes sieberi*	Mulga Fern		X,C
Solanaceae		*Solanum prinophyllum*	Forest Nightshade	X	X
Solanaceae	*	*Datura* sp.	Common Thornapple		X
Solanaceae	*w	*Lycium ferocissimum*	African Boxthorn	X,C	X
Solanaceae	*	*Solanum americanum*	Glossy Nightshade	X	X
Solanaceae	*	*Solanum pseudocapsicum*	Jerusalem Cherry	X	X
Stackhousiaceae		*Stackhousia viminea*	Slender Stackhousia		X
Thymeleaceae		*Pimelea latifolia* subsp. *hirsuta*	-		X
Typhaceae		*Typha domingensis*	Narrow-leaved Cumbungi	X	
Typhaceae		*Typha orientalis*	Broad-leaved Cumbungi	X	X
Urticaceae	*w	*Parietaria judaica*	Pellitory	X	
Verbenaceae	*	*Verbena bonariensis*	Purple Top	X	X

Table 1.2: Flora species of conservation significance recorded within 10 kilometres of the subject site. V = Vulnerable, E = Endangered, EPop = Endangered Population, Ext = Extinct.
Source: NPWS Atlas database, March 2007

Family	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Potential Habitat on Site	Recorded on Site
Asclepiadaceae	*Marsdenia viridiflora* subsp *viridiflora*	-	EPop	-	Present	No
Asclepidaceae	*Cynanchum elegans*	-	E	E	Not Present	No
Fabaceae	*Dillwynia tenuifolia*	-	V, EPop	V	Not Present	No
Fabaceae	*Pultenaea parviflora*	-	E	V	Not Present	No
Lobeliaceae	*Hypsela sessilifora*		E	Ext	Present	No
Mimosaceae	*Acacia bynoeana*	Bynoe's Wattle	E	V	Not Present	No
Mimosaceae	*Acacia pubescens*	Downy Wattle	V	V	Present	No
Myrtaceae	*Micromyrtus minutiflora*	-	E	V	Not Present	No
Orchidaceae	*Pterostylis saxicola*	-	E	E	Not Present	No
Proteaceae	*Grevillea juniperina* subsp. *juniperina*	-	V	-	Present	No
Proteaceae	*Grevillea parviflora* subsp. *parviflora*	-	V	V	Not Present	No
Proteaceae	*Persoonia nutans*	-	E	E	Not Present	No
Thymelaeaceae	*Pimelea curviflora* var. *curviflora*	-	V	V	Not Present	No
Thymelaeaceae	*Pimelea spicata*	-	E	E	Present	No

APPENDIX 2

FAUNA DETAILS

Table 2.1: Fauna survey effort on the subject site

Fauna Group	Survey Technique	Survey Effort and Date
Amphibians	Habitat searches and call identification	2.5 hours; 12.12.05 and 27.1.06
Reptiles	Habitat searches Spotlighting	3 hours; 12.12.05 1.5 hours; 27.1.06
Diurnal Birds	Direct observation	12 hours; 7 and 12.12.05, 24 and 27.1.06
Nocturnal Birds	Call playback Powerful Owl Barking Owl Spotlighting	45 mins; 27.1.06 1.5 hours; 27.1.06
Arboreal Mammals	Spotlighting	1.5 hours; 23.1.06
Microchiropteran Bats	Anabat II continuous recording	2 hours; 27.1.06
Megachiropteran Bats	Spotlighting	1.5 hours; 27.1.06

Table 2.2: Weather details from Penrith weather station on days of survey.
Source: Bureau of Meteorology, 2006

Date	Temperature (^{0}C)				Rain (mm)	Wind at 3 pm		Relative humidity at 3 pm (%)
	Min	Max	9 am	3 pm		Direction	Speed (kph)	
7.12.05	21.8	38.5	27.3	38.1	2.8	NW	37	17
12.12.05	14.6	28.1	20.2	27.2	0	E	7	40
24.1.06	22.5	27.2	23.6	22.9	0	S	22	77
27.1.06	21.8	35.9	22.6	33.8	0	WNW	9	56

Table 2.3: Fauna recorded on the subject site. Species listed under TSC Act (1995) or EPBC Act (1999) are indicated in bold. * = introduced species. Heard or observed = direct observation, this study; call recorded = Anabat call detector, this study; Anecdotal = reported siting by site manager, this study; X = reported for the subject site by AMBS in previous study.

Fauna Group	Scientific Name	Common Name	Nature and source of record
Gastropods	***Meridolum corneovirens***	**Cumberland Plain Large Land Snail**	**Observed,X**
Amphibians	*Crinia signifera*	Common Eastern Froglet	Heard,X
	Uperoleia laevigata	Smooth Toadlet	X
Reptiles	*Lampropholis* sp.	Skink	Observed,X
	Tiliqua scincoides	Eastern Blue Tongue	Observed
	Pseudechis porphyriacus	Red-Bellied Black Snake	Anecdotal,X
Birds	*Tachybaptus novaehollandiae*	Australasian Grebe	X
	Aythya australis	Hardhead	X
	Coturnix ypsilophora	Brown Quail	X
	Ocyphaps lophotes	Crested Pigeon	X
	*Streptopelia chinensis**	Spotted Turtle-Dove	X
	Cacatua roseicapilla	Galah	X
	Platycercus elegans	Crimson Rosella	X
	Trichoglossus haematodus	Rainbow Lorikeet	X
	Podargus strigoides	Tawny Frogmouth	X
	Malurus cyaneus	Superb Fairy-wren	X
	Manorina melanocephala	Noisy Miner	Observed,X
	Acanthiza pusilla	Brown Thornbill	X
	Pardalotus punctatus	Spotted Pardalote	X
	Rhipidura fuliginosa	Grey Fantail	X
	Rhipidura leucophrys	Willie Wagtail	X
	Grallina cyanoleuca	Australian Magpie-Lark	X
	Coracina novaehollandiae	Black-faced Cuckoo-shrike	Observed,X
	Dacelo novaeguineae	Laughing Kookaburra	Observed
	Cracticus torquatus	Grey Butcherbird	X
	Gymnorhina tibicen	Australian Magpie	Observed,X
	Corvus coronoides	Australian Raven	Heard,X
	Hirundo neoxena	Welcome Swallow	X
	*Acridotheres tristis**	Common Myna	X
	*Sturnus vulgaris**	Common Starling	X
Mammals	*Canis familiaris**	Dog	Scat,X
	*Vulpes vulpes**	European Red Fox	X
	*Felis catus**	Cat	X
	*Oryctolagus cuniculus**	Rabbit	Scat,X
	Macropus giganteus	Eastern Grey Kangaroo	Observed, scat
	Vespadelus vulturnus	Little Forest Bat	Call recorded

Table 2.4: Fauna species of conservation significance recorded within 10 kilometres of subject site. E = Endangered, V = Vulnerable, M = Migratory. Source: NPWS Atlas database, March 2007

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Potential Habitat on Site	Recorded on Site
Amphibians	*Litoria aurea*	Green and Golden Bell Frog	E	V	Present	No
Birds	*Lophoictinia isura*	Square-tailed Kite	V	-	Present	No
	Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Not Present	No
	Lathamus discolor	Swift Parrot	E	E	Not Present	No
	Xanthomyza phrygia	Regent Honeyeater	E	E,M	Not Present	No
	Pyrrholaemus saggitata	Speckled Warbler	V	-	Not Present	No
	Burhinus grallarius	Bush Stone-curlew	E	-	Not Present	No
Mammals	*Dasyurus maculatus*	Spotted-tailed Quoll	V	V	Not Present	No
	Petaurus australis	Yellow-bellied Glider	V	-	Not Present	No
	Petaurus norfolcensis	Squirrel Glider	V	-	Not Present	No
	Phascolarctos cinereus	Koala	V	-	Not Present	
	Pteropus poliocephalus	Grey-headed Flying Fox	V	V	Present	Yes
	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Present	No
	Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Present	No
	Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Present	No
	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Present	No
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Present	No
	Myotis macropus	Large-footed Myotis	V	-	Present	No
	Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Present	No
Snails	***Meridolum corneovirens***	**Cumberland Plain Large Land Snail**	**E**	**-**	**Present**	**Yes**

Table 2.5: Significant trees for retention in southern part of site. DBH=diameter at breast height, TPZ=tree protection zone, Retenyion priority 1=high, 2= medium, 3=low

Tag no	*Species*	Height (m)	DBH (cm)	TPZ (m)	Retention Priority
60	Forest Red Gum *Eucalyptus tereticornis*	30	75	7.2	3
61	Dead	18	100	N/A	2
62	Rough-barked Apple *Angophora floribunda*	22	65	6.24	1
63	Rough-barked Apple *Angophora floribunda*	8	65	6.24	1
64	Forest Red Gum *Eucalyptus tereticornis*	30	130	12.48	1
65	Grey Box *Eucalyptus moluccana*	28	85	8.16	1
66	Dead	18	50	N/A	2
67	Forest Red Gum *Eucalyptus tereticornis*	28	65	6.24	3
68	Forest Red Gum *Eucalyptus tereticornis*	25	100	9.6	1
69	Grey Box *Eucalyptus moluccana*	25	100	9.6	3
70	Forest Red Gum *Eucalyptus tereticornis*	25	35	3.36	2
70	Forest Red Gum *Eucalyptus tereticornis*	25	65	6.24	2
71	Forest Red Gum *Eucalyptus tereticornis*	20	65	6.24	2
72	Rough-barked Apple *Angophora floribunda*	20	85	8.16	1
73	Rough-barked Apple *Angophora floribunda*	18	35	3.36	2
74	Grey Box *Eucalyptus moluccana*	15	50	4.8	2
75	Dead	25	65	N/A	1
76	Dead	20	50	N/A	3
77	Forest Red Gum *Eucalyptus tereticornis*	20	100	9.6	2
78	Rough-barked Apple *Angophora floribunda*	15	50	4.8	3

APPENDIX 3

EPBC ACT (1999) ASSESSMENT

Cumberland Plain Woodland

The following criteria apply to communities listed as critically endangered or endangered under the EPBC Act (1999). Each criterion has been considered and a response provided in regard to Cumberland Plain Woodland.

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

i) reduce the extent of a community, or

Response: The area of this community to be removed as a result of the application of the Precinct Plan will total approximately 2.83 hectares. Recent mapping (NPWS 2002) indicates that 3,772 hectares of this community remains in the Blacktown LGA. Across the whole Cumberland Plain this vegetation community occupies 28,175 hectares (NPWS 2002). The area to be removed must also be considered along with the area to be retained in a conservation area (8.3 hectares) and planted in the large areas of landscaping associated with the future industrial development and as a buffer to the MPC, WTS and SWL.

The reduction of the vegetation community is negligible.

ii) fragment or increase fragmentation of an ecological community, or

Response: The vegetation on the subject site occurs as one large remnant of 8.3 hectares, approximating a square, and as three other small remnants of 0.03 hectares, 0.6 hectares and 2.2 hectares. The smallest of these occurs as a small circular area of regrowth along the eastern side of Archbold Road. The middle remnant is a highly-disturbed remnant adjoining another highly-disturbed patch of River-Flat Eucalypt Forest in the southern part of the site. The remaining area of 2.2 hectares is a narrow band of vegetation in the north eastern part of the site.

These patches are isolated from each other by exotic grasslands growing on overburden and spoil from the adjacent quarry and therefore have no potential for connectivity. They are isolated from other remnants by many kilometres of residential, industrial and rural development in all directions.

The removal of the three small remnants on the site will not further exacerbate the current fragmentation of this community on a local or regional scale.

iii) adversely affect habitat critical to the survival of an ecological community, or

Response: The habitat occupied by the vegetation to be removed by this proposal is highly disturbed with a number of weed species (some noxious) as well as a population of rabbits. Larger remnants in better condition exist in the subject site, across the Blacktown LGA and the Cumberland plain as a whole.

The 2.83 hectares to be removed does not provide habitat that is critical to the survival of this community.

iv) modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival,* including reduction of groundwater levels, or substantial alteration of surface water drainage patterns *or

Response: The proposal requires the developable areas of the site to be cleared, levelled and filled. The vast majority of the subject site already occurs on spoil and overburden from the quarry and even without development, precludes any regeneration potential across most of the site.

Movement of the storm water from the developed parts of the site will be controlled via pipes and detention basins. This will result in collected pollutants and nutrients bypassing the major remnant of this community.

v) cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species; or

Response: The proposal will reserve and manage the major occurrence of this community on site and only sympathetic activities will be conducted within its boundaries. Therefore substantial changes in species composition or functionality are not expected to occur, except in regards to the removal of weed species.

vi) cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

– assisting invasive species, that are harmful to the listed ecological community, to become established; or

– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

Response: The current vegetation on the subject site supports a number of weed species, some of them being declared noxious. Some areas are dominated by weed species, especially those near the riparian area of the small unnamed drainage line in the southern part of the site. The proposal will result in the removal of many of the weediest areas and require management of the remaining vegetation.

The proposed development is likely therefore to reduce the threat of invasive species to this community.

vii) interfere with the recovery of an ecological community.

Response: There is no recovery plan available for this community although there is are best practice guidelines for rehabilitation and revegetation in the Cumberland Plain. It is recommended that the principles inherent in that document will be applied in the large areas to be landscaped in the public spaces and as a vegetated buffer to the quarry.

Planting activities on site, along with the conservation and management of a large remnant on the subject site, are likely to significantly contribute to the recovery of the community across the Cumberland Plain.

In conclusion, it is considered that a significant negative impact is unlikely to occur in accordance with the criteria as set out by the Department of Environment and Water Resources. A referral to the Department is therefore not required.

APPENDIX 4

SECTION 5A ASSESSMENTS
"SEVEN PART TESTS"

Cumberland Plain Woodland

Cumberland Plain Woodland is listed as an endangered ecological community under the NSW Threatened Species Conservation Act (1995) and the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999).

Two forms of Cumberland Plain Woodland have been recognised — Shale Hills Woodland and Shale Plains Woodland. As its name suggests, Shale Hills Woodland occurs mainly on the elevated and sloping parts of the Cumberland Plain, chiefly in the southern half. The canopy is dominated by *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum) and *E. crebra* (Narrow-leaved Ironbark). Its shrubby understorey is dominated by *Bursaria spinosa* (Blackthorn) and other shrubs, such as *Acacia implexa*, *Indigofera australis* and *Dodonaea viscosa* subsp *cuneata*.

The habitat for Shale Plains Woodland is more abundant and so this is the most widely distributed sub-form of Cumberland Plain Woodland. The canopy is again dominated by *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum), but may be joined by other species such as *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark). *Bursaria spinosa* is again the dominant shrub species.

The ground layer may be rich in species and similar for both forms. Grasses, such as *Themeda australis* (Kangaroo Grass), *Microlaena stipoides* var *stipoides* (Weeping Meadow Grass) commonly occur with herbs such as *Dichondra repens* (Kidney Weed), *Brunoniella australis* (Blue Trumpet) and *Desmodium varians*.

Cumberland Plain Woodland is confined to the well structured clay soils of western Sydney, derived from Wianamatta shale (NSW Scientific Committee 1997). It has been estimated that this community once occupied 125,000 hectares across the Cumberland Plain, but that it now occurs in fragmented pockets across only 9% of that area (NPWS 2002a, 2002b). It is further represented across another 14% of the landscape as scattered trees (NPWS 2004).

It occurs in the local government areas of Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly. Cumberland Plain Woodland occurs in a number of conservation reserves including Scheyville National Park, Windsor Downs Nature Reserve, Leacock Regional Park and Mulgoa Nature Reserve.

Habitat for other threatened species – such as the *Pimelea spicata* and the Cumberland Plain Large Land Snail (*Meridolum corneovirens*) – is contained within Cumberland Plain Woodland. However, due to the fragmented nature and disturbance history of most of the remnants, many serious weed species also occur.

The Shale Plains Woodland form of this vegetation community occurs as a large remnant in the north western corner of the subject site as well as in three other small and disturbed fragments in the south adjacent to the riparian vegetation, the west besides Archbold Road and in the north eastern corner of the site.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to an endangered ecological community.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to an endangered ecological community.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

The extent of the community will be reduced by 2.83 hectares, being made up of three small, isolated and disturbed remnants. The majority of the occurrence of this community will be placed in a conservation area and managed as such. This is unlikely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

The proposed reservation of a large remnant of this community and its management for conservation will likely modify the composition of the ecological community in a positive way in that it shall institute the management or removal of weeds and other threatening processes.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Vegetation and habitat of approximately 2.83 hectares will be removed as part of the proposal.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

The proposal will develop a large area that is already alienated for this community as it is spoil and overburden from the adjacent quarry. Only 2.83 hectares of fragmented habitat will be further removed. The vegetation on the subject site is already highly isolated from other remnants of this and other woody vegetation by many kilometres. The site is surrounded by residential, industrial and rural development with the nearest substantial remnants being approximately 5 kilometres to the east at Prospect reservoir and 5 kilometres to the south west at Erskine Park. The narrow vegetated (but weedy) corridors associated with eastern Creek and Ropes Creek occur to the east and west of the subject site respectively, but are also isolated from it by development.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The 2.83 hectares of habitat to be lost across three remnants of 0.03, 0.6 and 2.2 hectares are of little ecological value. They support young regenerating vegetation and contain a number of weed species, some of which are declared noxious. The areas are small and isolated. They have a high edge-to-area ratio and are of little biogeographic value in the long term.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this endangered ecological community.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

A recovery plan is being prepared for this community by the Department of Environment and Conservation (NSW), but this is not yet available. The major

foundation for this plan is the mapping of all the bushland of the Cumberland Plain (NPWS 2002, Tozer 2003). One of the key actions of the recovery plan - setting best practice standards by which conservation lands are to be managed – are detailed in Recovering Bushland on the Cumberland Plain (DEC 2005). Recovery actions include detailed guidelines for bush regeneration, seed collection, revegetation activities and ecological fire management for this community.

A large remnant on the site will be placed in a conservation area and it is recommended that management actions are consistent with this plan. Also, large areas will be landscaped with species from this community. This includes the vegetated buffer to the quarry. Such landscaping activity is consistent with the recovery actions of this plan.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is listed as an endangered ecological community under the NSW Threatened Species Conservation Act (1995). It is not listed under the schedules of the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999).

River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions includes and replaces Sydney Coastal River-Flat Forest Endangered Ecological Community.

This community is associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains (NSW Scientific Committee 2004). It occurs typically as tall open forests to woodlands, although partial clearing may have reduced the canopy to scattered trees. They may also form mosaics with other floodplain communities and often fringe wetlands with semi-permanent standing water (NSW Scientific Committee 2004).

The species composition of the trees varies considerably, but the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (Forest Red Gum), *E. amplifolia* (Cabbage Gum), *Angophora floribunda* (Rough-barked Apple) and *A. subvelutina* (Broad-leaved Apple). *Eucalyptus baueriana* (Blue Box), *E. botryoides* (Bangalay) and *E. elata* (River Peppermint) may be common south from Sydney, *E. ovata* (Swamp Gum) occurs on the far south coast, *E. saligna* (Sydney Blue Gum) and *E. grandis* (Flooded Gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain (DEC 2006).

A layer of small trees may be present, including *Melaleuca decora, M. styphelioides* (Prickly-leaved Teatree), *Backhousia myrtifolia* (Grey Myrtle), *Melia azaderach* (White Cedar), *Casuarina cunninghamiana* (River Oak) and *C. glauca* (Swamp Oak) (DEC 2006).

Scattered shrubs include *Bursaria spinosa*, *Solanum prinophyllum, Rubus parvifolius, Breynia oblongifolia, Ozothamnus diosmifolius, Hymenanthera dentata, Acacia floribunda* and *Phyllanthus gunnii* (DEC 2006).

The groundcover is composed of abundant forbs, scramblers and grasses including *Microlaena stipoides, Dichondra repens, Glycine clandestina, Oplismenus aemulus, Desmodium gunnii, Pratia purpurascens, Entolasia marginata, Oxalis perennans* and *Veronica plebeia*. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs (DEC 2006).

It has been recorded from a number of local government areas including Blacktown.

This community has been extensively cleared and modified. It occurs in small (usually linear) fragments and these are nearly all impacted by weeds. Major examples once occurred on the floodplains of the Hunter, Hawkesbury, Moruya, Bega and Towamba Rivers but the remaining area is likely to represent much less than 30% of its original range (Keith 2004). Remnants of this community on the Cumberland Plain represent a major part of the extant distribution of this community (Tozer 2003).

In the lower Hunter region, about one-quarter of the original extent was estimated to have remained during the 1990s (NPWS 2000), while less than one-quarter remained on the Cumberland Plain in 1998 (Tozer 2003). In the Sydney – South Coast region, less than one-fifth was estimated to remain in the late 1990s (Tindall et al. 2004), in the Eden region about 30% was estimated to remain during the 1990s (Keith and Bedward 1999).

Small areas of the community are contained within a handful of existing conservation reserves but they are on localised, sheltered river flats between hills, rather than the large open floodplains that comprised the majority of the original habitat (NSW Scientific Committee 2004).

Current threats to this community include further clearing for urban and rural development and the subsequent impacts from fragmentation, activation of acid sulfate soils, removal of dead wood, rubbish dumping, frequent burning, flood mitigation and drainage works, grazing and trampling by stock and feral animals, changes in water quality, particularly increased nutrients and sedimentation, weed invasion and climate change.

A small remnant (2.8 hectares) of this community was recorded on the subject site in the southern part of the site along the small unnamed drainage line. The proposal is to remove this weedy and disturbed vegetation in an area totalling 0.2 hectares, re-engineer the drainage line and revegetate the riparian zone for a distance of 40 metres either side of the creekline. The extent of rehabilitated area of this community will total 3.6 hectares, thus giving a net gain of 0.8 hectares.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to an endangered ecological community.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to an endangered ecological community.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

The proposal requires the removal of 0.2 hectares of disturbed vegetation and replace it with a revegetated riparian zone of between 2.8 hectares. Together with revegetation of a detention basin with species consitent with this community, their will be a nett gain of 0.8 hectares of this community.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

The composition of the community in the extant remnant is skewed to weedy species. It is small and young and dominated by *Casuarina glauca* in the overstorey and weeds in the understorey (such as *Juncus acutus* and other exotics, some of which are noxious). The proposal would replace this disturbed vegetation with a revegetated corridor with a diverse array of species appropriate to this community. It is further recommended to put in place a management plan for its long term maintenance. This outcome would be positive in terms of species composition and would be unlikely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

The proposal includes the removal of 0.2 hectares of this community and replacing it with between 2.8 to 3.6 hectares of revegetated riparian zone. This would result in a nett gain of 0.8 hectares of rehabilitated habitat.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

The Precinct Plan intends to create a vegetated riparian corridor along the small unnamed drainage line. There is no corridor in existence now as the vegetation upstream has been removed as part of the development associated with SEPP 59 and the areas downstream are completely cleared. The proposal is consistent with the linking of potential riparian habitats towards Ropes Creek.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The area that currently supports this vegetation is of very poor quality. It has received overflow from a quarry tailings dam for many years and contains a heavy silt load and presumably a number of exotic chemicals. Water quality is visibly poor and flow rates would no longer reflect natural circumstances. Its long term viability is questionable, and the degree of active management required is great. The importance of this poor quality habitat, especially given its lack of connectivity to other riparian corridors, is low.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this endangered ecological community.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan for this community, however, the major foundation for such a plan is the mapping of all the bushland of the Cumberland Plain (NPWS 2002, Tozer 2003). One of the key actions of the recovery plan - setting best practice standards by which conservation lands are to be managed – are detailed in Recovering Bushland on the Cumberland Plain (DEC 2005). Recovery actions include detailed guidelines for bush regeneration, seed collection, revegetation activities and ecological fire management for this community.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed clearing contributes to the Key Threatening Process "Clearing of Native Vegetation". The relocation of the location of the drainage channel

contributes to the Key Threatening Process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands".

Marsdenia viridiflora subsp. *viridiflora*

Marsdenia viridiflora subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGAs is listed as Endangered under Schedule 1 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

This species is a climber with twining stems, and long, narrow leaves. The bell-shaped flowers are greenish or yellow and the fruit are pear-shaped and large, up to 8 centimetres long. As with all members of this group, it exudes a milky latex when cut or broken (Harden and Williams 1992).

Marsdenia viridiflora subsp. *viridiflora* has a wide distribution in southern Queensland but has been recorded rarely in NSW, from the botanical subdivisions of the north western and central western slopes (Harden and Williams 1992) and from a disjunct occurrence near Sydney (NSW Scientific Committee 2003).

Examples of this endangered population have recently been recorded from Prospect Reservoir, Bankstown, Smithfield, Cabramatta Creek and the former Australian Defence Industries site at St Marys (NSW Scientific Committee 2003, DEC 2006).

The species is known to occur in woodland and scrub (Harden and Williams 1992) and, on the Cumberland Plain, particularly occurs as sparsely scattered plants in open shale woodland (NSW Scientific Committee 2003, DEC 2006).

No examples of this endangered population are known from conservation reserves, but this species has been recorded from Scheyville National Park, in the Hawkesbury LGA (NPWS 2006).

Threats to this endangered population include habitat loss for urban expansion, and infrastructure development. It is also vulnerable to fire and other stochastic events due to its rarity and small size.

Potential habitat is present on the subject site for this species in the Cumberland Plain Woodland. Although it was not observed during survey, it has been reported in previous studies as occurring on the site (AMBS 2002, Conacher Travers 2003).

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to an endangered population.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the

species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

As the major area of potential habitat for this species is to be reserved in a conservation area, it is judged that the proposed removal of 2.83 hectares of marginal habitat in unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to an endangered population.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to an endangered population.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

The proposal requires the removal of 2.83 hectares of fragmented marginal habitat. The largest remnant in the best condition will be retained as a conservation area.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

Potential habitat for this species is already highly fragmented in the local area. The removal of a few small isolated remnants on the subject site will only marginally increase the degree of fragmentation of potential habitat.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The best habitat on site for this species will be retained in a conservation area.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Hypsela sessiliflora

Hypsela sessiliflora is listed as Endangered under Schedule 1 of the Threatened Species Conservation Act (1995). This species is listed as Extinct under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

This species was thought to be extinct until its rediscovery in 1999 in the Erskine Park Employment Area, Penrith LGA (Penrith City Council 2002).

Hypsela sessiliflora is a prostrate herb with small and narrow (2-4 mm long, 1-2.5 mm wide) ovate to oblong leaves. It produces a few solitary white or pale purple flowers in spring (Wiecek 1992).

Its single known location occupies an area of less than 10x15 metres NSW Scientific Committee 2003), in a damp habitat in the South Creek catchment (Penrith City Council 2002). The vegetation mapped as occurring in this area is Cumberland Plain Woodland and River-Flat Eucalypt Forest; presumably this species is within the moister habitats of the River-Flat Eucalypt Forest.

The species is not known to occur in any formal conservation reserve and is threatened by loss of habitat and hydrological disturbances and grazing (NSW Scientific Committee 2003).

Potential habitat occurs on the subject site for this species in the damper parts of the Cumberland Plain Woodland around the dams and in the riparian zone in the southern part of the site. It was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Nothing is known about the pollination, seed set, germination or conditions to encourage the continued growth of this species. However, it is probably less likely to occur in the River-Flat Eucalypt Forest in the southern part of the site given the high level of disturbance from weeds in the understorey and the dominance of *Casuarina glauca* in the overstorey. The leaf litter from *Casuarina* species are known to suppress germination of understorey species. The proposal includes rehabilitation of this type of habitat, so presumably it would enhance the potential habitat for this species. Potential habitat may also occur in damp parts of the Cumberland Plain Woodland, such as around the small dam. These areas will be part of the conservation area and so it is unlikely that the proposal will have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable

local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Very little is known about this species, but potential habitat may be within some of the 2.83 hectares of Cumberland Plain Woodland destined for removal, or within the 0.2 hectares of River-Flat Eucalypt Forest proposed for development. However, between 2.8 and 3.6 hectares of River-Flat Eucalypt Forest will be revegetated and the Cumberland Plain Woodland to be cleared is amongst the most disturbed parts of that vegetation on the subject site.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

Potential habitat for this species is presumably within the moist downslope environments. These are already highly fragmented and the vegetation on site is completely isolated. The rehabilitation of these areas will not exacerbate the fragmentation of this potential habitat.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

As this species is only known from a very small area of forest near Erskine Park, it is impossible to judge the potential or relative importance of potential habitat on the subject site.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Pimelea spicata

Pimelea spicata is listed as Endangered under Schedule 1 of the Threatened Species Conservation Act (1995). This species is listed as Endangered under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

Pimelea spicata is a small spreading or erect shrub (Harden 1990) that has a relatively scattered but restricted distribution, occurring in two disjunct areas, the Cumberland Plain and coastal Illawarra (NPWS 2004). The majority of the known populations of this species (21 of 26) occur on the Cumberland Plain from Mount Annan and Narellan Vale in the south to Freemans Reach in the north and from Penrith in the west to Georges Hall in the east. In western Sydney, *P. spicata* occurs on an undulating topography of substrates derived from Wianamatta Shale in areas supporting, or that previously supported, Cumberland Plain Woodland (NPWS 2004). This species is able to resprout after disturbance (e.g. fire, drought, mechanical damage) and it flowers sporadically throughout the year, probably in response to rainfall (NPWS 2004). Fruit production is very variable and seed is probably stored in the soil.

Although only one population occurs within a formal conservation reserve (Western Sydney Regional Park), other populations have some form of protection: one is within an area that is the subject of a formal Commonwealth Conservation Agreement, another is within Mount Annan Botanic Garden and a large population is within the lands surrounding Prospect Reservoir (DEC 2004).

Habitat loss and habitat degradation are the main threats to the survival of this species. The local extinction of at least two populations has occurred due to industrial and residential development in western Sydney (DEC 2004). Habitat degradation includes that brought about by weed invasion as well as physical disturbances such as mowing, grazing and dumping of rubbish (NPWS 2004).

This species was not recorded on the subject site. Habitat for this species occurs on the subject site in the Cumberland Plain Woodland.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

The proposed works are located principally within already alienated land. Only 2.83 hectares of habitat with marginal potential for this species will be removed. It is unlikely that it will have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable

local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Approximately 2.83 hectares of potential habitat will be removed as part of the proposal. However, these areas area small, isolated and disturbed and the habitat of highest quality and potential will be retained as a conservation area.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

Potential habitat for this species is already highly fragmented in the local area. The removal of a few small isolated remnants on the subject site will only marginally increase the degree of fragmentation of potential habitat. This fragmentation cannot be redressed, however, as the surrounding exotic grasslands are on spoil and overburden from the adjacent quarry.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The three small remnants to be removed are already highly disturbed, with low species diversity and a number of weeds, including noxious weeds. Three small poor quality remnants cannot be regarded as important habitat in the local or regional context.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Acacia pubescens

Acacia pubescens (Downy Wattle) is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is listed as Vulnerable under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

Acacia pubescens is a small, spreading bipinnate *Acacia* and is notable for its obvious hairs on its leaves and branches (Morrison and Davies 1991). This species has a highly fragmented distribution (NSW Scientific Committee No Date) as it is restricted to the Sydney area, with strongholds in the Bankstown-Fairfield-Rookwood area and Pitt Town, and outlying locations at Barden Ridge (NPWS 2003). Its eastern distributional limit is at Bardwell Valley, north western limit is at Mountain Lagoon while its south western limit is at Oakdale (NPWS 2003).

It is known from over 150 populations, but only five of these are within conservation reserves (NPWS 2003).

Its recorded habitat is open forest and woodland (Morrison and Davies 1991) on alluviums, shales, and the intergrade between shales and sandstones (NPWS 2003). Soils are characteristically gravelly, often with ironstones (NPWS 2003). This species flowers from August to October (Morrison and Davies 1991) but it is a clonal species, with recruitment more often from vegetative reproduction than from seedlings (NPWS 2003).

Potential habitat occurs for this species on the subject site in the Cumberland Plain Woodland, primarily in the remnant in the north western part of the site. It was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

The proposal requires the removal of three small remnants of marginal habitat (totalling 2.83 hectares) and the retention of a large remnant (8.3 hectares) of better quality habitat. The proposed works are located distant from the area that may provide potential habitat for this species. There are no known specific reproductive requirements for this species. It was not recorded during survey nor are there any populations known from the immediate vicinity, the closest being 6 kilometres to the east near Prospect Reservoir. The removal of such a relatively small area of sub-optimal habitat is not likely to disrupt the pollination, seed set, germination or continued growth of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable

local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

A total of 2.83 hectares of sub-optimal potential habitat will be removed in three small remnants of 0.03, 0.6 and 2.2 hectare patches.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

Potential habitat for this species is already highly fragmented in the local area. The removal of a few small isolated remnants on the subject site will only marginally increase the degree of isolation of potential habitat.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The three small remnants to be removed are already highly disturbed, with low species diversity and a number of weeds, including noxious weeds. Three small poor quality remnants cannot be regarded as important habitat in the local or regional context.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

A number of objectives and strategies for this species have been detailed in the Downy Wattle (*Acacia pubescens*) Recovery Plan (NSW NPWS 2003).

The overall objective of the recovery plan is to prevent the status of *Acacia pubescens* from becoming endangered, by reducing habitat loss and by implementing management regimes aimed at maintaining representative populations across the species' range.

Of relevance to this proposal are the following objectives and recovery actions:

Reservation or protection of *A. pubescens* populations through acquisition, rezoning, voluntary conservation agreements, property management plans or joint management agreements, development control plans or covenants. Recovery Actions include the identification of high priority areas and negotiation and liaison with relevant authorities and private landholders.

Management of threats and habitat to reduce impacts and ensure management decisions are made in accordance with the recovery objectives of the recovery plan. Recovery Actions include negotiation with authorities to implement threat and habitat management programs on public lands and ensure information is available so that informed environmental assessment and planning decisions are made.

Initiate and encourage research to understand the biology, ecology, health and distribution of the species including the range of genetic variation. Recovery Actions include performing studies into genetic variability, investigation into the cause of disease and other aspects of the species.

Although this species was not recorded on the subject site, and the subject site has not been identified as high priority are for this species, the first objective is partly served by the conservation of a large area of potential habitat.

The second objective is partly served by this assessment process with survey conducted being conducted for this species and recommendations made for minimisation of potential impact and conservation of important habitat features.

The second and third objectives are both served by the conducting of survey and the provision of data to the relevant authorities

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Grevillea juniperina subsp. *juniperina*

Grevillea juniperina subsp. *juniperina* is listed as a vulnerable species on Schedule 2 of the Threatened Species Conservation Act 1995 (NSW). It is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

This species is a broadly spreading to erect shrub, up to 3 metres high and 3 metres wide. The leaves are prickly, narrow, often bright green, up to 22mm long and clustered along short lateral branches. Flowers may be red to pinkish, yellow, pale orange or greenish and occur between July and October (Makinson 2000).

Grevillea juniperina subsp. *juniperina* is endemic to Western Sydney with its distribution centred on an area bounded by Blacktown, Erskine Park, Londonderry and Windsor, with outlier populations at Kemps Creek and Pitt Town (NPWS 2002).

There are more than 30 known populations of this species and, although relatively common within its core area, most populations are vulnerable to land use changes or disturbance as they occur on private land or in marginal habitat along roadsides (NPWS 2002).

There is only one confirmed population within a conservation reserve - one small population of 11 plants occurs within Castlereagh Nature Reserve (NPWS 2002).

G. juniperina subsp. *juniperina* has been recorded from soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence) of the Blacktown and Berkshire Park soil landscapes and typically contain lateritic ironstone gravels. It is generally found in flat or gently sloping, low-lying sites (NPWS 2002).

G. juniperina subsp. *juniperina* is known to occur within a number of endangered ecological communities - both forms of Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest (NPWS 2002).

Associated canopy species of the Cumberland Plain Woodland include *Eucalyptus tereticornis, E. moluccana, E. crebra, E. fibrosa* and *E. eugenioides;* understorey species include *Bursaria spinosa, Dillwynia sieberi, Ozothamnus diosmifolius, Daviesia ulicifolia, Acacia falcata, Acacia parramattensis, Themeda australis, Aristida ramosa, Cymbopogon refractus, Eragrostis brownii, Cheilanthes sieberi, Dianella revoluta* and *Goodenia hederacea*.

This species seems to be a pioneer species, as most populations are found in disturbed sites, particularly along roadsides. Makinson (2000 has noted that *G. juniperina* subsp. *juniperina* has a tendency to colonise mechanically disturbed areas. Plants appear to prefer relatively open conditions where understorey species such as *Bursaria spinosa* (Native Blackthorn) are sparse (NPWS 2002).

Populations are usually between 40 and 300 plants, but larger populations of thousands of plants are known to occur near Erskine Park, Mount Druitt and Marsden Park (NPWS 2002, Sinclair Knight Mertz 2000).

As the distribution of this species coincides with major growth areas in Sydney, loss, degradation and fragmentation of habitat due to clearing of native vegetation is a major threat to *G. juniperina* subsp. *juniperina*. Other disturbances also occur such as rubbish dumping, trampling, road works, dumping of fill, changes in drainage, recreational activities, weed invasion and inappropriate fire regimes.

This species was not observed on the subject site, however, it has been reported from the properties to the east of the subject site in Cumberland Plain Woodland (AMBS 2002). Potential habitat occurs on the site within this vegetation type.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

The proposal requires the removal of three small remnants of marginal habitat (totalling 2.83 hectares) and the retention of a large remnant (8.3 hectares) of better quality habitat. The proposed works are located distant from the area that may provide potential habitat for this species. There are no known specific reproductive requirements for this species. It was not recorded during survey but there are populations known from the immediate vicinity, the closest being directly to the east in the Wonderland site and 2 kilometres to the north west near Ropes Creek. The removal of such a relatively small area of sub-optimal habitat is not likely to disrupt the pollination, seed set, germination or continued growth of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

A total of 2.83 hectares of sub-optimal potential habitat will be removed in three small remnants of 0.03, 0.6 and 2.2 hectare patches.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

Potential habitat for this species is already highly fragmented in the local area. The removal of a few small isolated remnants on the subject site will only marginally increase the degree of fragmentation of potential habitat.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The three small remnants to be removed are already highly disturbed, with low species diversity and a number of weeds, including noxious weeds. Three small poor quality remnants cannot be regarded as important habitat in the local or regional context.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Litoria aurea Green and Golden Bell Frog

The Green and Golden Bell Frog is listed as Endangered under Schedule 1 of the Threatened Species Conservation Act (1995). This species is listed as Vulnerable under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Green and Golden Bell Frog is a relatively large frog (up to 100mm), with irregular large spots and stripes of gold generally on a green background (Barker et al. 1995). The groin is a distinctive turquoise blue (Barker et al. 1995). This species has a broad distribution across eastern and south eastern New South Wales and far eastern Victoria (Cogger 2000), but generally occurs in isolated coastal pockets of its former distribution (NSW NPWS 1999). There are fears that previously known highland populations are now extinct (NSW NPWS 1999).

The Green and Golden Bell Frog is found in large permanent swamps and ponds with emergent vegetation, particularly *Typha* sp and *Eleocharis* sp (Robinson 1993). It is occasionally found in unshaded ornamental ponds and farm dams (Robinson 1993), or under debris on low wet river flats (Cogger 2000). Optimum habitat includes such water bodies free of the predatory fish *Gambusia* sp, with a nearby grassy area and shelter sites such as vegetation or rocks (NSW NPWS 1999). They have also been recorded in highly disturbed sites, including building sites, brick pits, cleared land and landfill areas (NSW NPWS 1999). This species is active both day and night (Robinson 1993) and breeds in summer in warm and wet periods (NSW NPWS 1999).

Potential breeding and foraging habitat for this species occurs in the small dam in the north western parts of the site. The other dam on the site does not provide habitat as it has no appropriate associated vegetation. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Habitat features important for the life cycle of this species - the north western dam - will not be impacted upon by the proposed development. The developable area is outside of the potential habitat. Thus there is little opportunity for an adverse effect to be wrought on this species by the proposal.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

The proposed development works will not impact upon the potential habitat for this species. The dam in the north western part of the site is within the remnant to be conserved. The area of potential habitat will not be removed or modified.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

No area of potential habitat will be modified by this proposal and the vegetation remnant within which the dam occurs is to be reserved in a conservation area. The dam is currently isolated from other areas of potential habitat by roads, cleared ground, residential and industrial development. The proposal will not exacerbate this situation.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

This question is not relevant as no habitat for this species will be removed, modified, fragmented or isolated.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

A number of objectives and strategies for this species have been detailed in the Draft Recovery Plan for this species (DEC 2005). The overall objectives are to manage the threats currently impacting on the species and return the species to its former distribution and abundance, wherever possible.

Specifically, the following objectives are of relevance to this proposal:

1. increase the security of key populations by way of preventing the further loss of habitat at key populations across the species range and where possible secure opportunities for increasing protection of habitat areas;
2. ensure extant populations are managed to eliminate or attenuate the operation of factors that are known or discovered to be detrimentally affecting the species;
3. implement habitat management initiatives that are informed by data obtained through investigations into the general biology and ecology of the species through a systematic and coordinated monitoring program; and
4. increase the level of regional and local awareness of the conservation status of the Green and Golden Bell Frog and provide greater opportunity for community involvement in the implementation of this recovery plan.

All of these objectives are served by this assessment process with survey conducted for this species and recommendations made for minimisation of potential impact and conservation of important habitat features. It is also further served by recommendation of mitigative measures and the provision of data to the relevant authorities.

Further, the proposal is in concert with this recovery plan as there is no impact upon the potential habitat for this species, no disruption to its life cycle and no exacerbation of relevant Key Threatening Processes in or near its potential habitat.

Also of relevance to this species is the Threat Abatement Plan - Predation by *Gambusia holbrooki* – the Plague Minnow (NSW NPWS 2003). This threat abatement plan, which seeks to contain the spread of Gambusia and, where feasible, ameliorate the impacts of predation on threatened frogs by:

1. minimising further human dispersal of Gambusia through implementing

enhanced government regulation, public education and awareness campaigns;
2. removing Gambusia, where practical, from areas occupied by key populations of priority frog species;
3. creating supplementary Gambusia-free habitat, adjacent to Gambusia-inhabited populations of priority frog species, in areas where Gambusia removal is considered not practical;
4. collaborating with broader water reform processes that seek to rehabilitate aquatic ecosystems; and
5. informing land managers by undertaking research into the biology and ecology of Gambusia, its impacts on frogs and the efficacy of proposed control measures.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Lophoictinia isura Square-tailed Kite

The Square-tailed Kite is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Square-tailed Kite is a medium sized raptor with long wings and tail which is often seen soaring along treetops in open woodland areas throughout most of Australia (NSW NPWS 1999). Habitats include coastal forests and wooded lands of tropical and temperate Australia (NSW NPWS 1999). Records also exist from along vegetated watercourses further inland. Sightings of Square-tailed Kites are almost always solitary and usually over forest or woodlands, rarely over completely open country (Hollands 2003). This species is a specialist canopy hunter, regularly taking passerines and large insects (NSW NPWS 1999).

This species forms monogamous lifelong pairs and occupy huge territories of well over 100 square kilometres (Slater et al. 1995). During winter, this species often moves to coastal plains, where they feed on waterbirds on and around permanent wetlands (Garnett and Crowley 2000).

The subject site provides potential foraging habitat for this species in the wooded areas, principally in the Cumberland Plain Woodland. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

As the majority of the wooded country on the subject site will be reserved in a conservation area, it is unlikely that the proposal will have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Approximately 2.83 hectares of potential habitat will be removed for the proposed development.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

This is a highly mobile species that can exploit widely-separated resources. The proposed works are concentrated in the already-cleared areas. This will not significantly fragment the potential habitat for this species in the local area.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The majority of the habitat type to be removed is to be reserved on the subject site. Further, Cumberland Plain Woodland occurs across western Sydney and occupies some 28,000 hectares (NPWS 2002). The removal of 2.83 hectares in three small isolated fragments is not important in this context.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Pteropus poliocephalus Grey-headed Flying-fox

The Grey-headed Flying-fox is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is listed as Vulnerable under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Grey-headed Flying-fox is a large flying-fox with a white or greyish head, reddish mantle around the neck and thick, shaggy fur extending to the ankles (Strahan 1995). This species has a distribution along eastern coastal Australia from Rockhampton in Queensland to western Victoria (Churchill 1998). The Grey-headed Flying-fox is a common species in rainforest and wet sclerophyll forest (Strahan 1995), also frequenting mangroves, paperbark swamps and cultivated areas (Churchill 1998). It is usually seen in large, noisy colonies, or in day 'camps' usually placed close to water in gullies with dense forest canopies (Tidemann 1995). This is a highly mobile species, and camps are regularly moved in response to local food availability (Churchill 1998). Most births occur around October (Strahan 1995). They forage widely at night for rainforest fruits and native blossoms (Strahan 1995), and is likely to be an important pollinator for many native species (Tidemann 1995).

Potential foraging habitat occurs on the subject site in the flowering eucalypts of the Cumberland Plain Woodland and riparian vegetation. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

No critical life cycle features for this species were observed on or near the subject – no camps have been recorded from this area nor is there habitat on the site suitable for one. The proposal will remove very few potential food trees. It is unlikely that the proposal will place a viable local population at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

As this species feeds on native blossom, the removal of any such trees represents removal of potential habitat. Therefore, the proposal will remove approximately 2.83 hectares of Cumberland Plain Woodland and result in a nett loss of 0.8 hectares of River-Flat Eucalypt Forest.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

This is a highly mobile species that can exploit widely-separated resources. The proposed development is largely restricted to the already-cleared areas. The level of fragmentation of habitat will not be exacerbated by the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

This species has not been recorded from the site. The importance of any potential habitat that will be removed is very low as there is a preponderance of summer-flowering tree species and no species that bear soft fruits were detected on site.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Saccolaimus flaviventris Yellow-bellied Sheathtail-bat

The Yellow-bellied Sheathtail-bat is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Yellow-bellied Sheathtail-bat is distinguished by glossy black fur on the upper body and white or cream fur on the lower body (Strahan 1995). Males have a prominent throat pouch (Churchill 1998). This species is found roosting in tree hollows in a very wide variety of habitats ranging from wet forests to deserts (Menkhorst and Knight 2001). They have also been recorded roosting in abandoned nests of Sugar Gliders, in buildings or in animal burrows (Churchill 1998). It is a common species in northern Australia, however is a rare visitor to southern areas in late summer-autumn (Menkhorst and Knight 2001). Females produce two young between the months of September and March (Strahan 1995).

The subject site provides potential foraging and roosting habitat for this species, principally in the wooded areas. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Habitat features critical to the life cycle of this species that occur on the subject site include breeding sites in the form of tree hollows. While there are few hollow trees on the subject site, one of these that occurs in the north eastern remnant may be removed by the proposed works. Foraging resources will not be significantly altered by the proposal. The proposed works are not considered to impose a significant impact on the life cycle stages of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

One hollow-bearing tree may need to be removed for the proposal and a total of 3.6 hectares of potential foraging habitat maybe removed as a result of this proposal.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

This is a highly mobile species that can exploit widely-separated resources. However, the proposed development is largely restricted to the already-cleared areas. The level of fragmentation of habitat will not be significantly exacerbated by the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

It is unlikely that the small area of disturbed and isolated woodland to be removed by the proposal would constitute an important area of habitat. This species has not been recorded from the site.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Mormopterus norfolkensis Eastern Freetail-bat

The Eastern Freetail-bat is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Eastern Freetail-bat has dark brown to reddish brown fur on the back and is slightly paler below. Like other freetail-bats it has a long (3 - 4 centimetre) bare tail protruding from the tail membrane (DECC 2007).

The Eastern Freetail-bat is an insectivore but nothing specific is known about its diet (Churchill 1998). It is found along the east coast from south eastern Queensland to southern NSW (DECC 2007). They have been recorded from a wide range of habitats, including tall open forest, River Red Gum and Yellow Box woodlands, riparian open forest and dry sclerophyll forest (Churchill 1998).

Although it has been recorded roosting in the roof of a hut, under bark and the caps of telegraph poles, it is more usually found in tree hollows (Churchill 1998).

The subject site provides potential foraging and breeding habitat for this species in the forested and open areas and over the dams. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Habitat features critical to the life cycle of this species include foraging resources and breeding sites (tree hollows). None of these critical features will be significantly impacted upon by the proposal. Most of the woodland habitat will remain, the dam will be untouched and only one tree hollow may be removed. The proposed works are not considered to impose a significant impact on the life cycle stages of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Approximately 3.6 hectares of potential foraging habitat for this species will be removed or modified as part of the proposal.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

This is a highly mobile species that can exploit widely-separated resources. The proposed development is largely restricted to the already-cleared areas. The level of fragmentation of habitat will not be exacerbated by the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

A total of approximately 3.6 hectares of isolated fragments of woodland will be removed for the proposal. This is minuscule in relation to what is available in the local area and within this species distribution.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Chalinolobus dwyeri Large-eared Pied Bat

The Large-eared Pied Bat is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is listed as Vulnerable under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Large-eared Pied Bat is a wattled bat with glossy black fur and a fringe of white around the body, beneath the wings and tail membrane (Strahan 1995). Distribution records range from south eastern Queensland to New South Wales from the coast to the western slopes of the Great Dividing Range (Churchill 1998).

This species has been recorded from habitats ranging from coastal wet sclerophyll forest to dry sclerophyll and open woodland (Strahan 1995). Small groups have been observed roosting in caves and mines (Strahan 1995) and, unlike many other species, Large-eared Pied Bats roost close to the entrance (Hoye and Dwyer 1995). Twins are born in November or December (Strahan 1995).

Potential foraging habitat occurs on the subject site in the naturally-vegetated areas of the site. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Critical habitat features for this species are the caves used for roosting and breeding. There are no such features on the site. The proposal will modify or remove a maximum of 3.83 hectares of potential foraging habitat on the site. The proposal will not adversely effect the long-term viability of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Approximately 3.83 hectares of foraging habitat will be removed, comprising four small, isolated and highly disturbed remnants.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

This is a highly mobile species that can exploit widely-separated resources. The degree of fragmentation of habitat for this species will not be significantly altered by the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

There is only one record of this species within 10 kilometres of the subject site, near Marayong from January 2003. Given that it is known from over 270 sites across New South Wales, from the south coast to Queensland and west to near Walgett, it is unlikely that the disturbed small remnants on the subject site comprise important foraging habitat for this species.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Falsistrellus tasmaniensis Eastern False Pipistrelle

The Eastern False Pipistrelle is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Eastern False Pipistrelle is a large, robust bat with dark to reddish brown fur on the back, and paler grey fur on the belly (Churchill 1998). There is a characteristic notch on the outer margin of the ear, near the tip (Churchill 1998).

This species is found from south east Queensland, through New South Wales and into Victoria and Tasmania (Churchill 1998). Eastern False Pipistrelles inhabit sclerophyll forests east of the Great Dividing Range and they appear to prefer wet habitats where trees are over 20 metres high (Churchill 1998).

Eastern False Pipistrelles generally roost in small colonies in the trunks of hollow eucalypts, however, they have also been found roosting in caves and old wooden buildings (Churchill 1998). They apparently hibernate over winter in the southern parts of its range (Phillips 1995). A single young is born in December (Menkhorst and Knight 2001).

Flight is swift and direct, often just below or within the tree canopy (Churchill 1998).

Potential foraging habitat occurs on the subject site in the naturally wooded areas. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Habitat features critical to the life cycle of this species that occur on the subject site include potential breeding sites in the form of tree hollows and potential foraging habitat in the woodland. There are few hollow trees on the subject site and only one in the development area. Only one hollow tree may be removed as part of the proposal and only small areas of highly disturbed woodland will be modified or removed. The proposed works are not considered to impose a significant impact on the life cycle stages of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

One hollow tree may be removed and up to 3.83 hectares of marginal potential foraging habitat may be removed or modified as part of the proposal.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

The potential habitat on the subject site consists of small and fragmented remnants, surrounded by residential and industrial development. This is a highly mobile species able to exploit widely-separated resources. The largest vegetated remnant will be reserved in a conservation area and the proposed development is unlikely to exacerbate the current level of fragmentation of habitat.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

There are only four records of this species within 10 kilometres of the subject site. Two of these are near Prospect reservoir with the other two records south of that in the Western Sydney regional Parklands area, near Fairfield from 1998 and 1999. Given that it is known from over 530 sites throughout the coastal zone of New South Wales and that it favours wetter forests, it is unlikely that the disturbed small remnants on the subject site comprise important foraging habitat for this species.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Miniopterus schreibersii oceanensis Eastern Bentwing-bat

The Eastern Bentwing-bat is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Eastern Bentwing-bat has recently been identified as a result of revision to the taxonomy of the Common Bentwing-bat (*Miniopterus schreibersii*). The Eastern Bentwing-bat closely resembles the Little Bentwing-bat, however is larger (Strahan 1995). This species is distributed across the well-watered parts of eastern and northern Australia, however it hibernates in the southern parts of the range (Strahan 1995). Its range extends along the entire east coast of Australia, with a gap forming along the Gulf of Carpentaria, where records begin again in the Kimberley (Churchill 1998). Roost sites include caves, mines and tunnels with colonies reaching thousands in number (Strahan 1995). A single young is born in separate maternity caves November or December (Strahan 1995). This species hibernates in selected caves that are cold enough to reduce their metabolic temperatures and prolong fat reserves over winter (Churchill 1998).

The subject site provides potential foraging habitat for this species in the forested and adjacent open areas. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Critical habitat features for this species are the caves used for roosting and breeding and there are no such features on the site. The proposal will modify the potential foraging habitat on the site across approximately 3.83 hectares of disturbed vegetation remnants. It is judged that the proposal will not adversely effect the long-term viability of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Approximately 3.83 hectares of disturbed vegetation remnants that may provide potential foraging habitat for this species will be removed or modified by the proposal.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

This is a highly mobile species that can exploit widely-separated resources. However, the proposed development is largely restricted to already-cleared area that is adjacent to other cleared land. The level of fragmentation of potential foraging habitat will not be exacerbated by the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

There are eight records of this species within 10 kilometres of the subject site, the nearest being from the Wonderland site directly to the east. Given that it is known from over 1100 sites throughout the coast, tablelands and plains of New South Wales, it is unlikely that the disturbed small remnants on the subject site comprise important foraging habitat for this species.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Myotis macropus Large-footed Myotis

The Large-footed Myotis is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Large-footed Myotis is a small bat, distinguished by its large feet (Strahan 1995). This is a predominately coastal species, and rarely extends further than 100 kilometres inland (Churchill 1998). It has a distribution from the Kimberley to Victoria and South Australia and occurs inland along some major river systems such as the Murray River (Churchill 1998).

This species has been recorded from most habitat types, with proximity to water being the main habitat determinant (Churchill 1998). It roosts communally in caves, similar spaces, or among dense rainforest foliage (Strahan 1995). Roosts are usually close to water and colonies are usually made up of between 10 to 15 individuals (Churchill 1998).

They are generally torpid over winter (Richards 1995). In the southern parts of its range, a single young is born from November to December (Menkhorst and Knight 2001).

It uses its large feet to catch small fish or aquatic insects when flying over rivers and lakes, but it also forages for aerial insects (Strahan 1995).

The subject site provides marginal potential foraging habitat in the small dams in the west and north western parts of the site. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Habitat features critical to the life cycle of this species that occur on the subject site include foraging sites such as the small dams. One of these dams will be removed as part of the proposal. As there are no roosting sites on the subject site and the marginal nature of one of the small dams to be removed, it is judged that the proposed works are not considered to impose a significant impact on the life cycle stages of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

One of the two small dams will be removed as part of the development proposal. However, this provides only marginal habitat for this species.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

Foraging habitat for this species occurs in water bodies (such as dams and reservoirs). Such habitat in the local area occurs sporadically and these water features are already widely separated by residential, industrial and other development. None of the habitat with the potential to be used by this species will be further fragmented by the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

Only one of the two small dams will be removed. Such habitat is common in the rural and semi-rural areas in the local district. However, larger water

bodies (such as Prospect Reservoir) are likely to provide much more important habitat.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Scoteanax rueppellii Greater Broad-nosed Bat

The Greater Broad-nosed Bat is listed as Vulnerable under Schedule 2 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Greater Broad-nosed Bat is the largest of the broad-nosed bats, with a dark reddish-brown back and slightly paler below (Hoye and Richards 1995). It has a broad, almost bare muzzle, large eyes and well spaced ears (Strahan 1 995). The Greater Broad-nosed Bat has a distribution ranging from the Atherton Tablelands in northern Queensland, down along the coastal regions into southern New South Wales (Churchill 1998).

In the southern parts of its range, this species is only found at low altitudes (below 500m) (Churchill 1998). This species inhabits wetter forests (Strahan 1995), particularly along gullies (Churchill 1998). It roosts in trunk or branch hollows and the roofs of old buildings (Churchill 1998).

This species is usually recorded along forest edges or watercourses (Strahan 1995), flying relatively slowly with little manoeuvrability (Menkhorst and Knight 2001). They feed on slow-flying prey such as large moths hawked quite low to the ground along the edges of vegetation (Churchill 1998). They are also known to eat other bats and probably do so in the wild (Churchill 1998).

Maternity sites are formed in suitable trees and young are born in January (Strahan 1995). This species generally emerges soon after sunset, flying 3 to 6 metres above the ground (Hoye and Richards 1995).

The subject site provides potential – albeit marginal - foraging and breeding habitat for this species in the forested areas. This species was not observed during survey.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

Habitat features critical to the life cycle of this species that occur on the subject site include breeding sites (tree hollows). There are few hollow trees on the subject site and only one in the development area. Foraging habitat is considered to be of marginal potential value to this species. The proposed works are not considered to impose a significant impact on the life cycle stages of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Only one hollow tree may be removed. The largest remnant – and therefore the largest area of forest-clearing ecotone favoured by this species – will be conserved.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

The potential habitat for this species is already highly fragmented in the local area with small remnants surrounded by cleared and developed areas. None of the habitat with the potential to be used by this species will be significantly further fragmented by the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

There is only one record of this species within 10 kilometres of the subject site, near Prospect Reservoir. Given that it is known from over 390 sites across New South Wales, from the south coast to Queensland and west to near Armidale, it is unlikely that the disturbed small remnants on the subject site comprise important foraging habitat for this species.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Meridolum corneovirens Cumberland Plain Large Land Snail

The Cumberland Plain Large Land Snail is listed as Endangered under Schedule 1 of the Threatened Species Conservation Act (1995). This species is not listed under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

The Cumberland Plain Large Land Snail is found on the Cumberland Plain in remnant pockets of urban bushland, in areas associated with Wianamatta Shale and old Nepean River gravels. Current knowledge suggests that it is restricted to Cumberland Plain Woodland and Castlereagh Woodlands of Western Sydney and also along the fringes of River-Flat Eucalypt Forest, especially where it meets Cumberland Plain Woodland (NPWS 2000).

It typically occurs under logs and debris and around bases of trees or clumps of grass, burrowing into loose soil, especially in times of drought (NSW Scientific Committee 1997). Today, with much of its original habitat disturbed, the snails are also found living under piles of old building rubble, under bricks, in piles of old timber, under car bodies and sheets of corrugated iron.

The observation of only dead shells does not mean that the population is destroyed as they could be buried in the soil or hiding in inaccessible places (NSW Scientific Committee 1997).

This snail lives in a very restricted area of western Sydney between Prospect and Liverpool to the east and the Hawkesbury-Nepean River to the west, north to the Windsor-Richmond area and south to Picton.

Meridolum corneovirens, like many Australian land snails, feeds on fungi (Australian Museum no date).

A number of empty shells of this species were observed in the remnant of the north western corner of the subject site. The Wildlife Atlas database (DEC 2006) also indicates that this species has been recorded from the subject site previously in 2001.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This species was found only in the remnant of Cumberland Plain Woodland that will be reserved in a conservation area. This habitat will remain. The proposed works are not considered to impose a significant impact on the life cycle stages of this species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable

local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

This question is not relevant to a threatened species.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

This question is not relevant to a threatened species.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

Three small remnants totalling 2.83 hectares of Cumberland Plain Woodland (0.03 hectares, 0.6 hectares and 2.2 hectares) will be removed for the development proposal. These remnants are all highly disturbed and this species was not located them during survey.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

None of the habitat within which this species was detected will be further fragmented by the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The potential habitat to be removed by the proposal represent low quality habitat due to the small size and level of disturbance of the remnants. The removal of these small areas is outweighed by the retention of known habitat on the site.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this species.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

Annex E

Blacktown Council Boundary Adjustments

Civic Centre
62 Flushcombe Rd
BLACKTOWN 2148

BLACKTOWN CITY COUNCIL

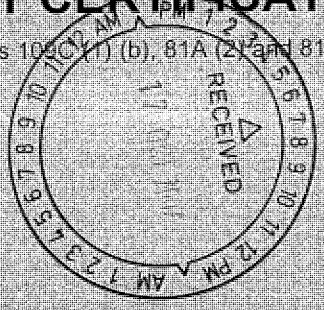
DX 8117
P.O. Box 63
BLACKTOWN 2148

Telephone: 9839-6000

Facsimile: 9831-1961

COMPLYING DEVELOPMENT CERTIFICATE No. 07-93

Environmental Planning and Assessment Act, 1979, Sections 109C(1) (b), 81A (2) and 81A (4)



ACN 114 843 453 PTY LTD & Others
PO BOX 1040
MASCOT 1460

Subject Land LOT W DP 419612 OFF OLD WALLGROVE ROAD; OLD WALLGROVE ROAD, EASTERN CREEK; RESIDUE OF LOT 1 DP 400697 AFTER EXCISION OF LOT Y DP 419949 OFF OLD; WALLGROVE ROAD; OLD WALLGROVE ROAD, EASTERN CREEK; LOT 10 DP 241859 OFF GREAT WESTERN HIGHWAY; GREAT WESTERN HIGHWAY, EASTERN CREEK; LOT 2 DP 262213; ARCHBOLD ROAD, EASTERN CREEK

Development BOUNDARY ADJUSTMENT SUBDIVISION

Building Classification N/A
(in accordance with the Building Code of Australia)

Attachments

The following attachments apply:

Conditions of Approval

Blacktown City Council certifies that:

The above development is complying development and that it carried out in accordance with the accompanying stamped plans and specifications will comply with all development standards, any standards in a DCP, and all relevant requirements of the Environmental Planning and Assessment Act 1979.

Note:
Changes to the EP&A Act now require a sign be erected on the site clearly indicating the contact details of the Principal Certifying Authority (PCA) for the project. Where Council is appointed PCA, it would be appreciated if you could arrange to affix the enclosed sign to the Principal Contractor or Owner Builder signage also required under the Act. Should any difficulties be encountered in satisfying this request, please contact Council's Development Services Unit on the above telephone number.

RON MOORE
GENERAL MANAGER

per:

DATE: 15 OCT 2007

Conditions for Subdivision - Boundary Adjustment

1. Two (2) days before any site works, building or demolition begins, the applicant must forward a Notice of Commencement of Work and Appointment of Principal Certifying Authority (form 7 of the Regulation) to Council.

2. Prior to the lodgement of the Complying Development Certificate with the Land Titles Office a Subdivision Certificate shall be submitted with Council.

3. This certificate in no way endorses the boundaries of the Conservation Area required by the Eastern Creek Precinct Plan.

4. Prior to the issue of the Subdivision Certificate, the Applicant is to obtain a Section 73 Certificate under the Sydney Water Act 1994. Applications must be made through an authorised Water Servicing Coordinator. Please refer to the "Your Business" section of the Sydney Water website (www.sydneywater.com.au) then follow the "e developer" icon or telephone 13 20 92.

5. All lots are to have access from a dedicated public road. As such, it may be necessary to create appropriate easements for Rights of Carriageway.

6. A Restriction as to User for access denial is to be created for each lot with frontage to the M4 Motorway.

These conditions are imposed for the following reasons:

(a) To ensure compliance with the terms of relevant Environmental Planning Instruments and/or the Building Code of Australia and/or Council's codes, policies and specifications.

(b) To ensure that no injury is caused to the amenity of the area, to other persons or to private and public property.

(c) It is in the public interest that they be imposed.

RON MOORE
GENERAL MANAGER

per

15 OCT 2007
Blacktown City Council

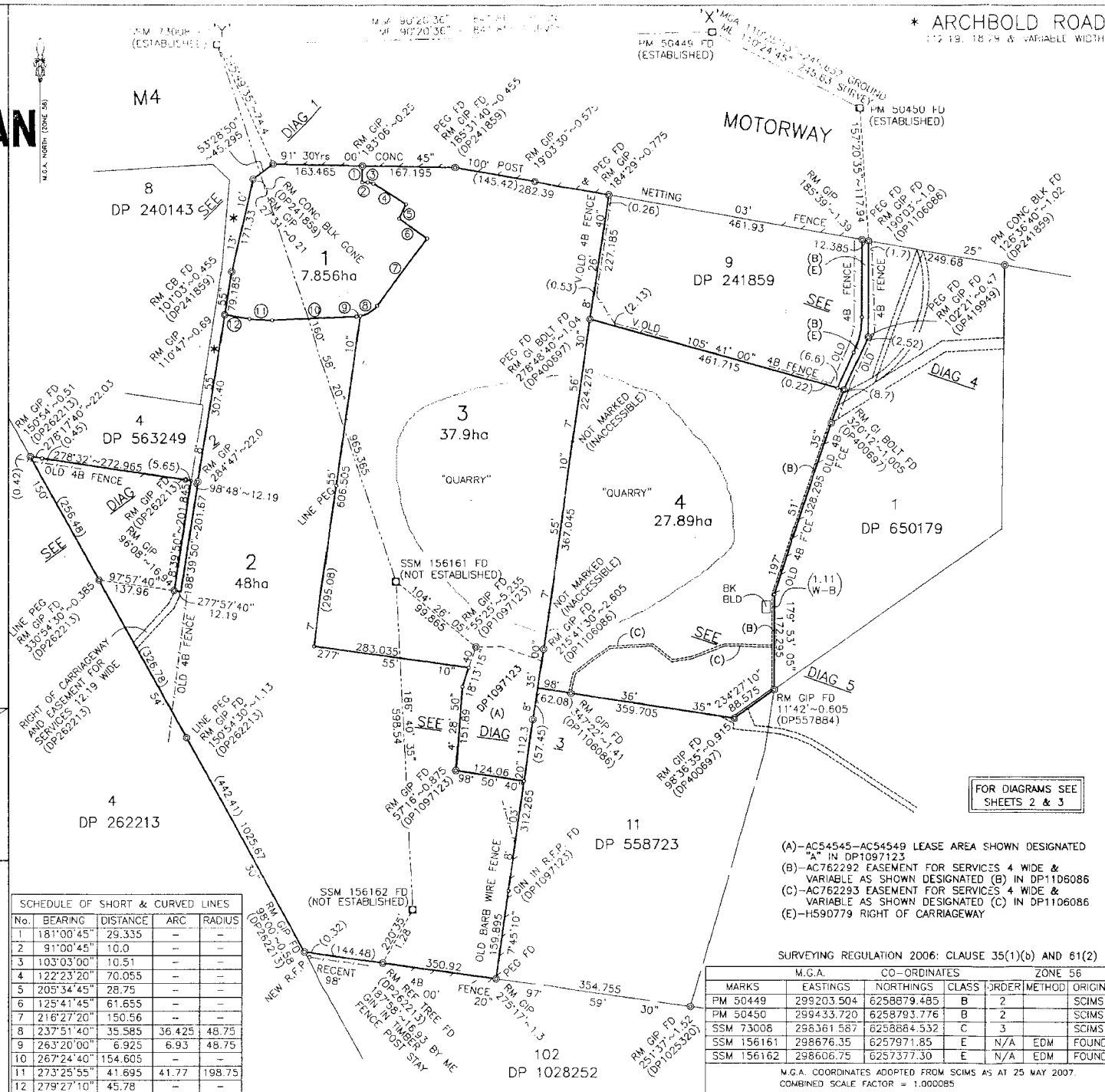
PLAN FORM 2

Plan Drawing only to appear in this space

SIGNATURES AND SEALS ONLY

APPROVED PLAN

FOR SIGNATURES AND SEALS SEE SIGNATURES FORM



SCHEDULE OF SHORT & CURVED LINES				
No.	BEARING	DISTANCE	ARC	RADIUS
1	181°00'45"	29.335	–	–
2	91°00'45"	10.0	–	–
3	103°03'00"	10.51	–	–
4	122°23'20"	70.055	–	–
5	205°34'45"	28.75	–	–
6	125°41'45"	61.655	–	–
7	216°27'20"	150.56	–	–
8	237°51'40"	35.585	36.425	48.75
9	263°20'00"	6.925	6.93	48.75
10	267°24'40"	154.605	–	–
11	273°25'55"	41.695	41.77	198.75
12	279°27'10"	45.78	–	–

(A)–AC545545–AC54549 LEASE AREA SHOWN DESIGNATED "A" IN DP1097123
(B)–AC762292 EASEMENT FOR SERVICES 4 WIDE & VARIABLE AS SHOWN DESIGNATED (B) IN DP1106086
(C)–AC762293 EASEMENT FOR SERVICES 4 WIDE & VARIABLE AS SHOWN DESIGNATED (C) IN DP1106086
(E)–H590779 RIGHT OF CARRIAGEWAY

SURVEYING REGULATION 2006: CLAUSE 35(1)(b) AND 61(2)

M.G.A. CO-ORDINATES ZONE 56						
MARKS	EASTINGS	NORTHINGS	CLASS	ORDER	METHOD	ORIGIN
PM 50449	299203.504	6258879.485	B	2		SCIMS
PM 50450	299433.720	6258793.776	B	2		SCIMS
SSM 73008	298361.587	6258884.532	C	3		SCIMS
SSM 156161	298676.35	6257971.85	E	N/A	EDM	FOUND
SSM 156162	298606.75	6257377.30	E	N/A	EDM	FOUND

M.G.A. COORDINATES ADOPTED FROM SCIMS AS AT 25 MAY 2007.
COMBINED SCALE FACTOR = 1.000085

Department of Lands Approval

I .....in approving this plan certify
(Authorised Officer)
that all necessary approvals in regard to the allocation of the land shown hereon have been given.

Signature: .....

Date: .....

File Number: .....

Office: .....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to the proposed

SUBDIVISION ..... set out herein
(insert 'subdivision' or 'new road')

SEE SIGNATURES FORM
† Authorised Person / General Manager / Accredited Certifier

Consent Authority: .....

Date of endorsement: .....

Accreditation No.: .....

Subdivision Certificate No.: .....

File No.: .....

Note:
When the plan is to be lodged electronically in the Land Titles Office, it should include a signature in an electronic or digital format approved by the Registrar-General.

† Delete if inapplicable

Registered:

Title System:

Purpose:

Ref. Map:

Last Plan:

PLAN OF SUBDIVISION OF LOT 2 IN DP 262213, LOT 1 IN DP 400697, LOT W IN DP 419612 AND LOT 10 IN DP 241859

Lengths are in metres. Reduction Ratio 1:5000

L.G.A. BLACKTOWN CITY

Locality: EASTERN CREEK

Parish: MELVILLE

County: CUMBERLAND

This is sheet 1 of my plan in 3 sheets
(Delete if inapplicable)

Surveying Regulation 2006

I, GEORGE STOJANOVSKI

of LOVEGROVE OXLEY CONSULTANTS
DX 8152 BLACKTOWN

a surveyor registered under the Surveying Act 2002, certify that the survey represented in this plan is accurate, has been made in accordance with the Surveying Regulation 2006 and was completed on 15/05/2007

The survey relates to LOTS 1, 2, 3, & 4
(specify the land actually surveyed or specify any land shown in the plan that is not subject to survey)

SEE SIGNATURES FORM
.....(Dated)
Surveyor registered under the Surveying Act 2002

Datum Line: "X" – "Y"
Type: Urban/~~Rural~~

Plans used in preparation of survey/~~compilation~~

DP 1097123 DP 419949
DP 241859 DP 1025320
DP 557884 DP 1106086
DP 400697

PANEL FOR USE ONLY for statements of intention to dedicate public roads or to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants

SURVEYOR'S REFERENCE: 70246 – CHECKLIST LJMc

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

PLAN FORM 3 — To be used in conjunction with Plan Form 2

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

OFFICE USE ONLY

APPROVED PLAN

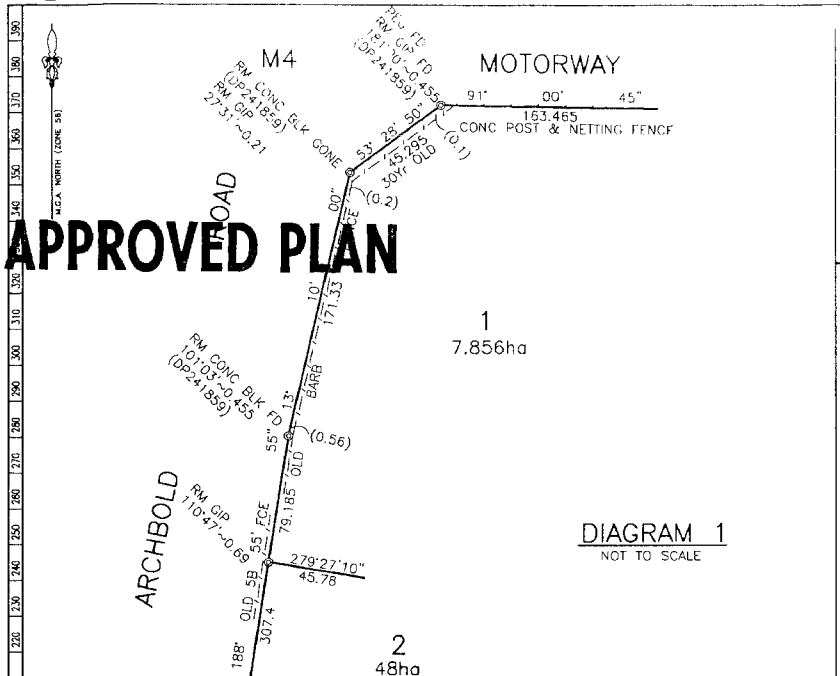


DIAGRAM 1
NOT TO SCALE

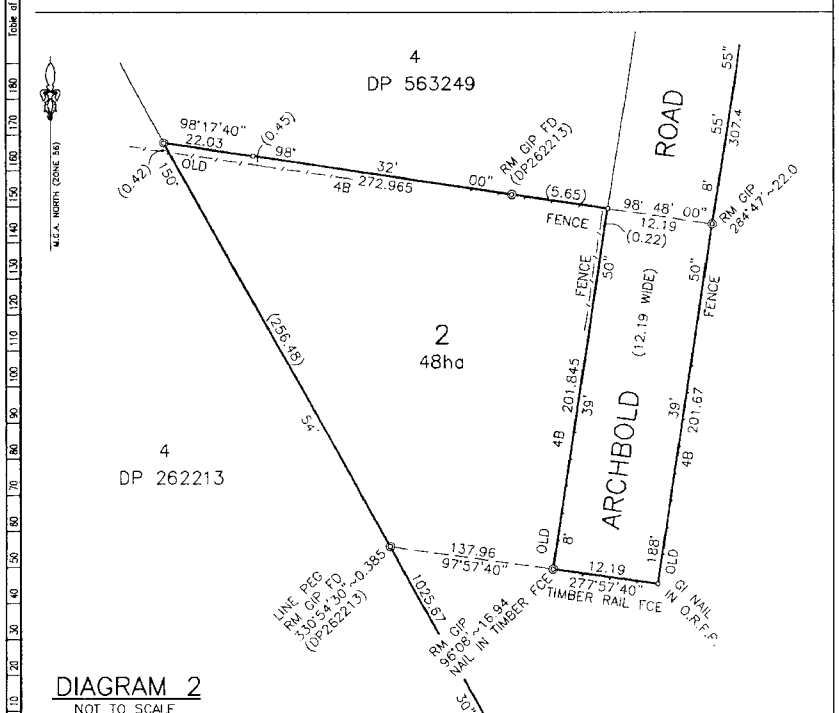


DIAGRAM 2
NOT TO SCALE

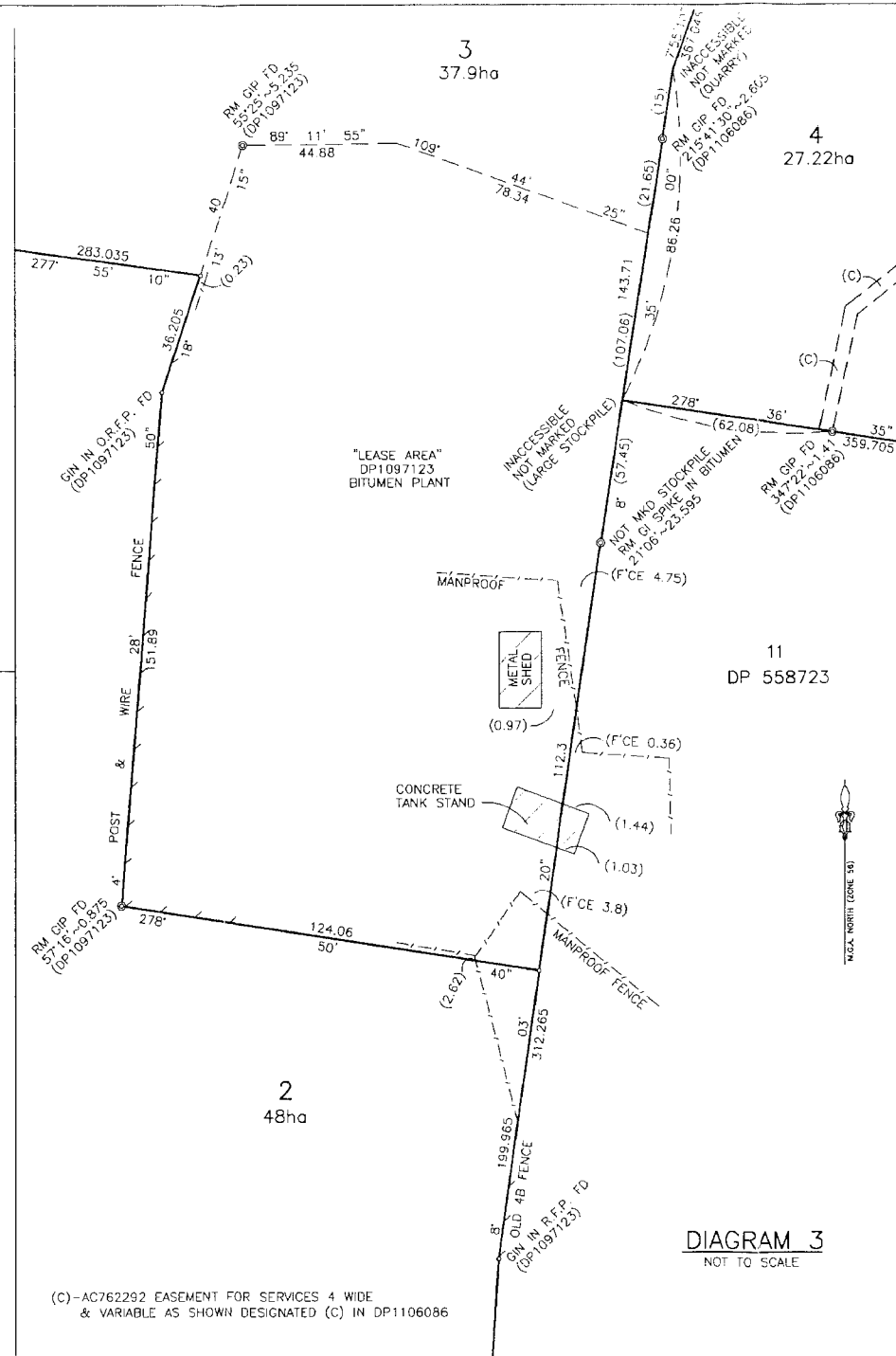


DIAGRAM 3
NOT TO SCALE

(C)-AC762292 EASEMENT FOR SERVICES 4 WIDE & VARIABLE AS SHOWN DESIGNATED (C) IN DP1106086

Registered

This is sheet 2 of my plan in 3 sheets dated 15/05/2007

SEE SIGNATURES FORM

Surveyor registered under Surveying Act 2002

This is sheet of my plan of sheets covered by my Certificate No. of

SEE SIGNATURES FORM

General Manager/Authorised Person/Accredited Certifier

For use where space is insufficient in any panel on Plan Form 2.

Reduction Ratio 1: 1000

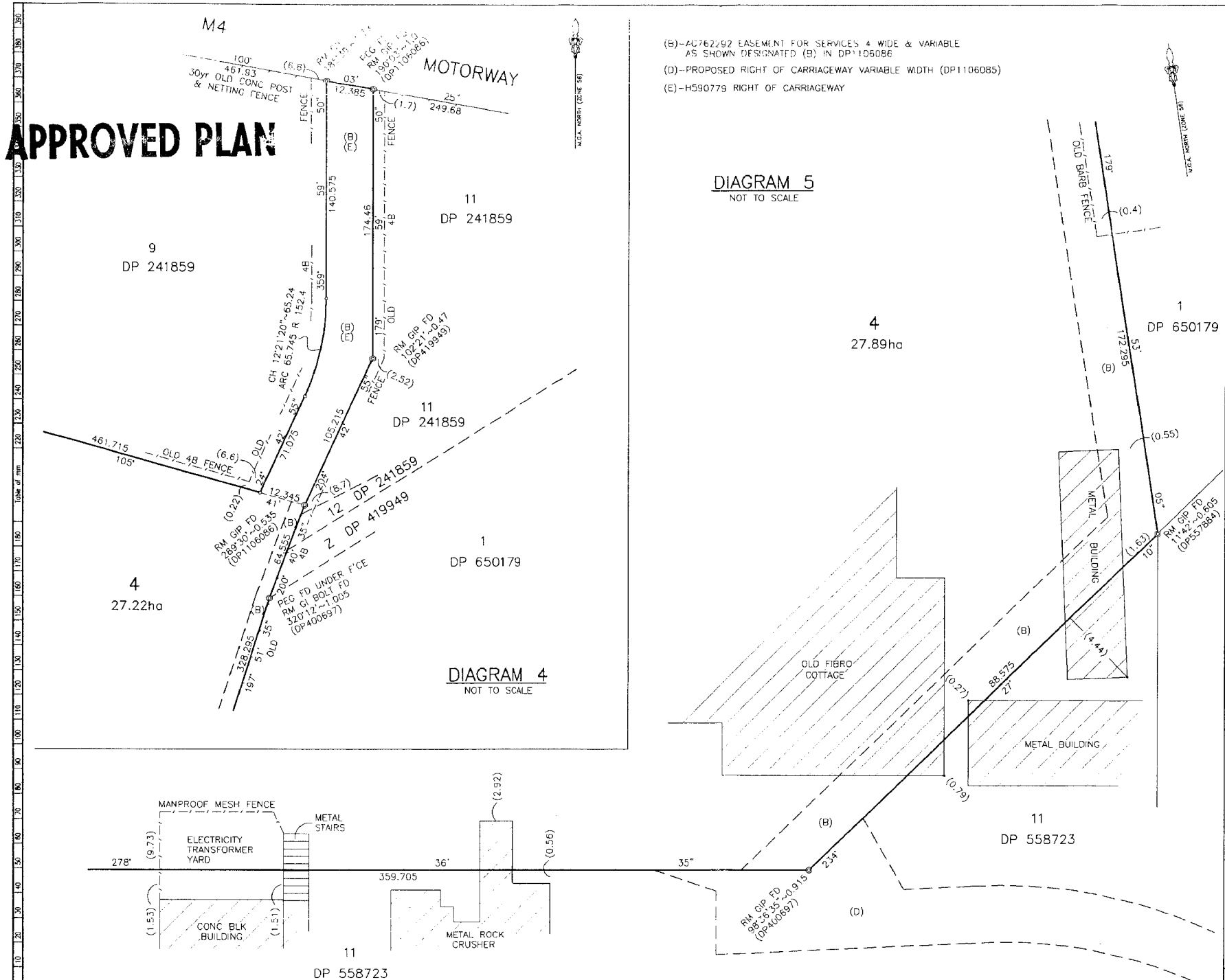
Plan Drawing only to appear in this space

SURVEYOR'S REFERENCE: 70246

PLAN FORM 3

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

OFFICE USE ONLY



Registered

This is sheet 3 of my plan in 3 sheets dated 15/05/2007

SEE SIGNATURES FORM

Surveyor registered under Surveying Act 2002

This is sheet of my plan of sheets covered by my Certificate No. of

SEE SIGNATURES FORM

General Manager/Authorised Person/Accredited Certifier

For use where space is insufficient in any panel on Plan Form 2

Reduction Ratio 1: 1000

Plan Drawing only to appear in this space

SURVEYOR'S REFERENCE: 70246

Annex F

Certificate of Title

BOX 27C
(AC449108)

NEW SOUTH WALES

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1900

TORRENS TITLE

REFERENCE TO FOLIO OF THE REGISTER	
IDENTIFIER W/419612	
EDITION	DATE OF ISSUE
3	12/7/2006
CERTIFICATE AUTHENTICATION CODE	
DVTU-BZ-LBQL	

I certify that the person described in the First Schedule is the registered proprietor of an estate in fee simple (or such other estate or interest as is set forth in that Schedule) in the land within described subject to such exceptions, encumbrances, interests and entries as appear in the Second Schedule and to any additional entries in the Folio of the Register.

REGISTRAR GENERAL

LAND

LOT W IN DEPOSITED PLAN 419612
LOCAL GOVERNMENT AREA: BLACKTOWN
PARISH OF MELVILLE COUNTY OF CUMBERLAND
TITLE DIAGRAM: DP419612

FIRST SCHEDULE

THAQUARRY PTY LTD (T AC449104)

SECOND SCHEDULE
---

1. RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2. Z560414 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE LAND SHOWN SO BURDENED IN DP644518
3. AC449107 MORTGAGE TO VALAD FUNDS MANAGEMENT LIMITED
4. AC449108 MORTGAGE TO VALAD COMMERCIAL MANAGEMENT LIMITED

**** END OF CERTIFICATE ****

1445305

BOX 27C
(AC449108)

NEW SOUTH WALES

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1900

TORRENS TITLE	
REFERENCE TO FOLIO OF THE REGISTER	
IDENTIFIER 1/400697	
EDITION	DATE OF ISSUE
3	12/7/2006
CERTIFICATE AUTHENTICATION CODE	
4P9Q-X2-QEAL	

I certify that the person described in the First Schedule is the registered proprietor of an estate in fee simple (or such other estate or interest as is set forth in that Schedule) in the land within described subject to such exceptions, encumbrances, interests and entries as appear in the Second Schedule and to any additional entries in the Folio of the Register.

REGISTRAR GENERAL

LAND

LOT 1 IN DEPOSITED PLAN 400697
AT WALLGROVE
LOCAL GOVERNMENT AREA: BLACKTOWN
PARISH OF MELVILLE   COUNTY OF CUMBERLAND
TITLE DIAGRAM: DP400697

FIRST SCHEDULE

THAQUARRY PTY LTD   (T AC449105)

SECOND SCHEDULE
----

1. RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2. D227638 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE LAND SHOWN AS SITE OF PROPOSED EASEMENT FOR ACCESS 50 LINKS WIDE IN DP431259
   Z560413 RIGHT OF CARRIAGEWAY HAS BEEN RELEASED IN SO FAR AS IT AFFECTS 1/773643
3. Z560414 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE LAND SHOWN SO BURDENED IN DP644518
4. AC449107 MORTGAGE TO VALAD FUNDS MANAGEMENT LIMITED
5. AC449108 MORTGAGE TO VALAD COMMERCIAL MANAGEMENT LIMITED

**** END OF CERTIFICATE ****

BOX 27C
(AC449108)

NEW SOUTH WALES

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1900

TORRENS TITLE

REFERENCE TO FOLIO OF THE REGISTER	
IDENTIFIER 10/241859	
EDITION	DATE OF ISSUE
3	12/7/2006
CERTIFICATE AUTHENTICATION CODE	
A9AL-R4-CL3Z	

I certify that the person described in the First Schedule is the registered proprietor of an estate in fee simple (or such other estate or interest as is set forth in that Schedule) in the land within described subject to such exceptions, encumbrances, interests and entries as appear in the Second Schedule and to any additional entries in the Folio of the Register.

REGISTRAR GENERAL

LAND

LOT 10 IN DEPOSITED PLAN 241859
AT COLYTON
LOCAL GOVERNMENT AREA: BLACKTOWN
PARISH OF MELVILLE COUNTY OF CUMBERLAND
TITLE DIAGRAM: DP241859

FIRST SCHEDULE

THAQUARRY PTY LTD (T AC449106)

SECOND SCHEDULE
---
1. RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2. H590779 RIGHT OF CARRIAGEWAY AFFECTING THE WHOLE OF THE LAND ABOVE DESCRIBED
3. M654382 COVENANT
4. DP793433 RIGHT OF CARRIAGEWAY 12.19 WIDE & VARIABLE APPURTENANT TO THE LAND ABOVE DESCRIBED
5. DP793433 EASEMENT FOR SERVICES 12.19 WIDE & VARIABLE APPURTENANT TO THE LAND ABOVE DESCRIBED
6. AC449107 MORTGAGE TO VALAD FUNDS MANAGEMENT LIMITED
7. AC449108 MORTGAGE TO VALAD COMMERCIAL MANAGEMENT LIMITED

**** END OF CERTIFICATE ****

1445303

Annex G

Transfer of Easement

Form: 01TG
Release: 2.0
www.lands.nsw.gov.au

TRANSFER
GRANTING EASEMENT

New South Wales
Real Property Act 1900

Leave this space clear. Affix additional pages to the top left-hand corner.

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

(A) TORRENS TITLE

Servient Tenement	Dominant Tenement
11/558723	W/419612, 1/400697, 10/241859, 2/262213

(B) LODGED BY

Document Collection Box	Name, Address or DX and Telephone	CODE
74S	Reference: 205315591 PATS *5963	TG

(C) TRANSFEROR

HANSON CONSTRUCTION MATERIALS PTY LIMITED (ABN 90 009 679 734)

(D) The transferor acknowledges receipt of the consideration of $ 1.00

and transfers and grants—

(E) DESCRIPTION OF EASEMENT

Right of carriageway variable as shown on Annexure B and on the terms set out in Annexure A

out of the servient tenement and appurtenant to the dominant tenement.

(F) Encumbrances (if applicable):

(G) TRANSFEREE

THAQUARRY PTY LIMITED (ACN 119 533 372)

DATE 7th July 2006

(H) Certified correct for the purposes of the Real Property Act 1900 and executed on behalf of the corporation named below by the authorised person(s) whose signature(s) appear(s) below pursuant to the authority specified.

Corporation: HANSON CONSTRUCTION MATERIALS PTY LIMITED
Authority: section 127 of the Corporations Act 2001

Signature of authorised person: Victoria Vincent
Name of authorised person: VICTORIA VINCENT
Office held: DIRECTOR

Signature of authorised person: Ian Petrovski
Name of authorised person: IAN PETROVSKI
Office held: Secretary

Certified correct for the purposes of the Real Property Act 1900 and executed on behalf of the corporation named below by the authorised person(s) whose signature(s) appear(s) below pursuant to the authority specified.

Corporation: THAQUARRY PTY LIMITED
Authority: section 127 of the Corporations Act 2001

Signature of authorised person:
Name of authorised person:
Office held: Sole Director / Secretary

Signature of authorised person:
Name of authorised person:
Office held:

This is Annexure A to the Transfer Granting Easement between Hanson Construction Materials Pty Limited as transferor and ThaQuarry Pty Limited as transferee dated

July 2006

Description of Right of Carriageway variable width (designated 'F' on the Plan)

1. Interpretation

In this Transfer, unless a contrary intention appears:

Benefited Lot includes each and every part of the dominant tenement shown so designated on the Plan and any part of it with which the right is capable of enjoyment.

Benefited Owner means the owner for the time being of the Benefited Lot, its respective successors, transferees, assigns and all persons authorised by it and any person who is entitled to an estate or interest in the Benefited Lot.

Burdened Lot includes each and every part of the servient tenement shown so designated on the Plan and any part of it with which the right is capable of enjoyment.

Burdened Owner means the owner for the time being of the Burdened Lot, its respective successors, transferees, assigns and all persons authorised by it and any person who is entitled to an estate or interest in the Burdened Lot.

Easement Site means the site of the Right of Carriageway of variable width identified as Easement 'F' on the Plan.

Plan means the plan which is Annexure B to this Transfer Granting Easement.

2. Terms of right of carriageway

(a) The Benefited Owner may:

(i) by any reasonable means (including with or without vehicles) pass across the Burdened Lot, but only within the Easement Site, to get to or from the Benefited Lot; and

(ii) do anything reasonably necessary for that purpose, including:

(A) entering the Burdened Lot;

(B) carrying out work on the Burdened Lot such as constructing, placing, replacing, repairing or maintaining trafficable surfaces, driveways and structures;

(C) taking anything required for those purposes on to the Burdened Lot; and

(D) remaining on the Burdened Lot for a reasonable time for those purposes.

(b) In exercising its powers, the Benefited Owner must:

(i) ensure that all work is done expeditiously in a proper and workmanlike manner;

(ii) cause as little inconvenience as is practicable to the Burdened Owner and any occupier of the Burdened Lot and comply with the reasonable instructions of these people (which may include instructions as to the use of specific access roads);

(iii) not interfere with or prevent in any way the concurrent use of the Easement Site by the Burdened Owner;

(iv) cause as little damage as is practicable to the Burdened Lot and any improvement on it;

(v) make good any damage to the Burdened Lot or any improvement on it caused by the Benefited Owner;

(vi) make good any collateral damage;

(vii) give the Burdened Owner reasonable notice of its intention to exercise its rights under this easement; and

(viii) do everything reasonably necessary to avoid injury and damage to persons on the Burdened Lot.

(c) The Burdened Owner and the Benefited Owner must share equally the cost of maintaining the Easement Site in good and trafficable repair. Without limiting the foregoing, the Burdened Owner must make good all damage or injury to the Easement Site caused by it.

(d) The Burdened Owner must not do or knowingly suffer to be done any act or thing which may:

(i) injure or damage the trafficable surfaces, driveways and structures on the Easement Site; or

(ii) interfere with the right of access granted to the Benefited Owner in this easement,

and if any such damage, injury or interference occurs, the Burdened Owner must immediately make good any such damage or injury or cease that interference, or pay to the Benefited Owner the cost of properly making good all such damage or injury.

Victoria Vince

Certified correct for the purposes of the *Real Property Act 1900*

Executed by **Hanson Construction Materials Pty Limited** in accordance with s127 of the *Corporations Act 2001*

Victoria Vincent

Signature

VICTORIA VINCENT

Print Name

DIRECTOR

Office held

Signature

IAN PETROVSKI

Print Name

Secretary

Office held

Executed by **ThaQuarry Pty Limited** in accordance with s127 of the *Corporations Act 2001*

Signature

Print Name

Office held

Signature

IAN MACAU

Print Name

Sole Director / Secretary

Office held

A3

SEE SHEET 2

LOT 2
DP 262213

LOT 1
DP 400697

LOT W
DP 419612

LOT 1
DP 650179

LEASE AREA
'A'
'B'
(DP1097123)

LOT 11
DP 558723

LOT 122
DP 1049623

SEE SHEET 4

'C'
'D'
'E'
'F'

EXISTING RIGHT OF CARRIAGEWAY

QUARRY

ROAD

'C'– RIGHT OF CARRIAGEWAY VARIABLE WIDTH
'D'– EASEMENT FOR SERVICES 4 WIDE & VARIABLE
'E'– EASEMENT FOR SERVICES 4 WIDE & VARIABLE
'F'– RIGHT OF CARRIAGEWAY VARIABLE WIDTH

NOTES:
1) This plan does not define the boundaries.
2) Boundary dimensions are obtained from the subject DP.
3) Origin of levels ASSUMED DATUM
Source SCIMS
4) Contour Interval is 0.2m.

L.G.A.
BLACKTOWN

CLIENT
HANSON

LOVEGROVE OXLEY CONSULTANTS
CONSULTING SURVEYORS ENGINEERS & TOWN PLANNERS
LEVEL 1 / 111 MAIN STREET, BLACKTOWN NSW 2148
Telephone (02) 9831 4167 Fax (02) 9622 9116

Datum: ---
Job No: ---
Date of Survey: --
CAD File: ---DWG
Reduction Ratio: 1 : 2000

JOB TITLE
PLAN OF
PROPOSED EASEMENTS BENEFITTING HANSON PROPERTY AT EASTERN CREEK

ISSUE FOR: --
DATE: --
Surveyor: GKO
Drawn By: LJMc

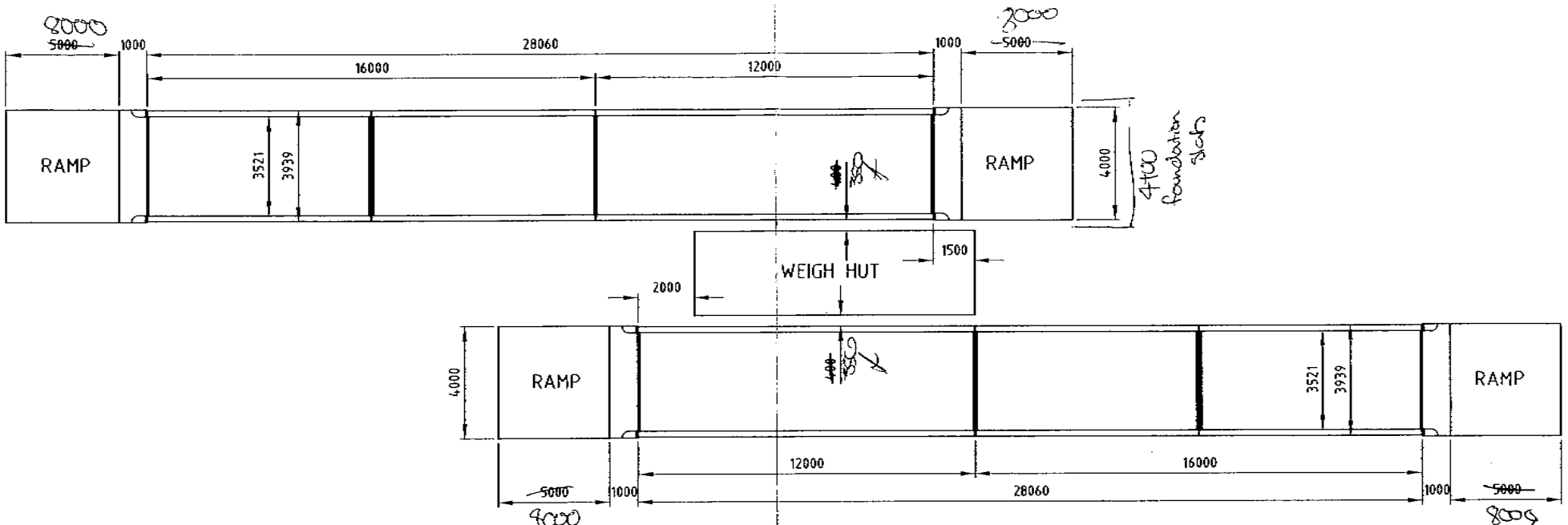
Plan No.: 68123 EAS

Sheet 3 of 4 Sheets

Annex H

Unauthorised Building Works

THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.



APPROVED DRAWING

ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	-
JOB No.	36A-063
SERIAL No.	26001 & 26002
DATE OF ISSUE	12-1-06 INITIALS

REV.	DESCRIPTION	DATE	APP.

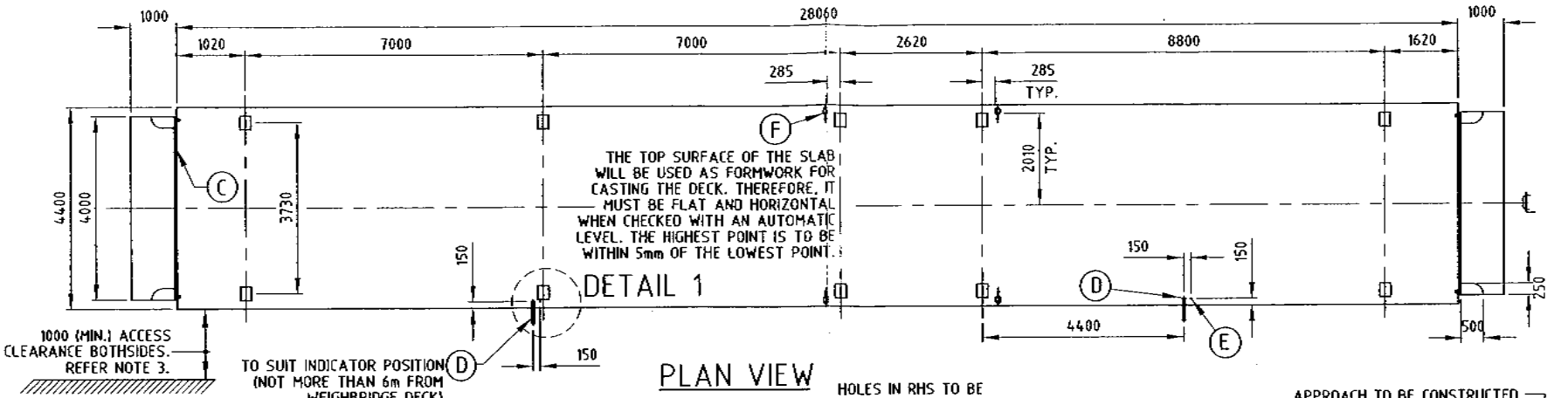
ULTRA SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 358

DR. BY: AR DATE: 12.01.2006
CH. BY: DATE:
APP. BY: DATE: 12-1-06
SCALE: 1:150

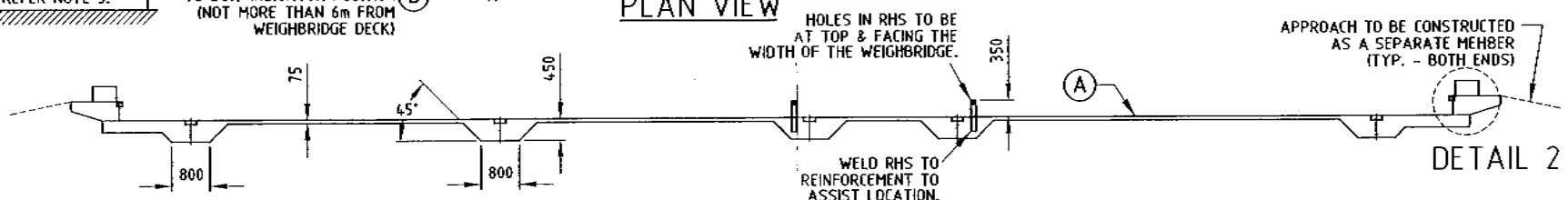
TITLE:
SITE LAYOUT
ABOVE GROUND - RAMPED
2 x 16+12=28mx3.5m WEIGHBRIDGES

DRAWING No. A3-36A-063-1
REV. No.
SHEET 1 OF 1

THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.



PLAN VIEW

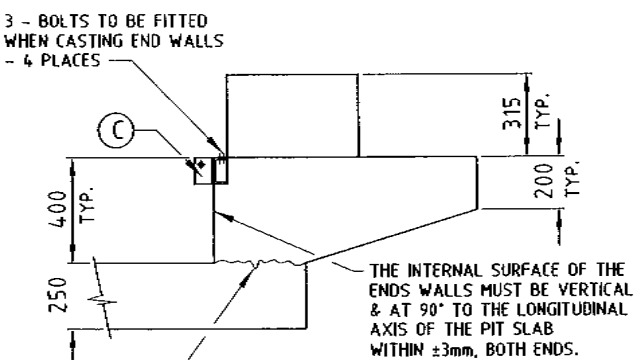


ELEVATION

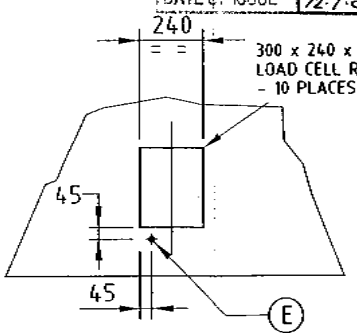
APPROVED DRAWING

ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	–
JOB No.	36A-063
SERIAL No.	26001 & 26002
DATE OF ISSUE	12-1-06 INITIALS



DETAIL 2



DETAIL 1

NOTE:

1. (A) SITE MUST BE APPROVED & SITE WORK SUPERVISED BY CLIENT'S CIVIL ENGINEER.
   (B) SOIL TO BE STABLE WITH MINIMUM BEARING CAPACITY TO BE 160 kPa.
2. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH AS 3600. MINIMUM STRENGTH SHALL BE 25 MPa AT 28 DAYS.
3. IF USED FOR TRADE WEIGHING - LOCATION, APPROACH LENGTH & ACCESS CLEARANCE MUST BE APPROVED BY CONSUMER AFFAIRS/ WEIGHTS & MEASURES AUTHORITIES.
4. GROUND RODS MUST BE LOCATED AS SHOWN ON PLAN. INSTALL RODS 1.75m INTO MOIST EARTH MAKING SURE THEY PROTRUDE 50 mm ABOVE FOUNDATION SLAB LEVEL.

ITEMS SUPPLIED BY PIT CONTRACTOR

ITEM	QTY.	DESCRIPTION / MATERIAL	PART NO.
F	4	RHS SIDE TRAVEL STOPS (SUPPLIED BY ULTRA)	4344
E	2	COPPER CLAD GROUND RODS x 1.8m LONG (MIN.)	
D	AS REQ'D	Ø50 CONDUIT, L.S. 90° BENDS, DRAW WIRE & CAPS	
C	2	END WALL SURROUND (SUPPLIED BY ULTRA)	3896/B-3.5m
B	AS REQ'D	REINFORCEMENT, REFER DWG. A3-36A-063-3	
A	25m³	APPROX. OF CONCRETE	

REV.	DESCRIPTION	DATE	APP.

ULTRA SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 358

DR. BY: AR	DATE: 12.01.2006	
CH. BY:	DATE:	
APP. BY:	DATE: 12-1-06	
SCALE: 1:100, 1:20		

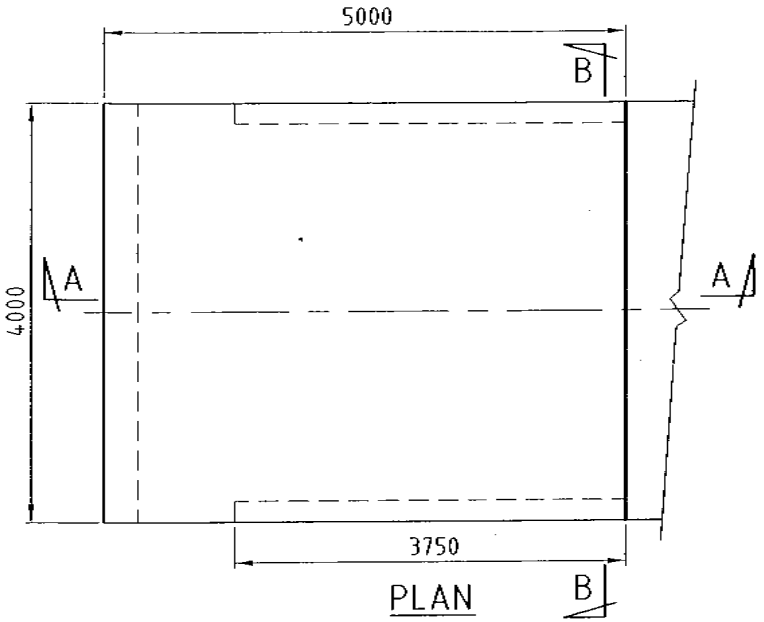
TITLE:
16m+12m=28mx3.5m
LOW PROFILE ELECTRONIC WEIGHBRIDGE
FOUNDATION DETAILS

DRAWING No.
A3-36A-063-2

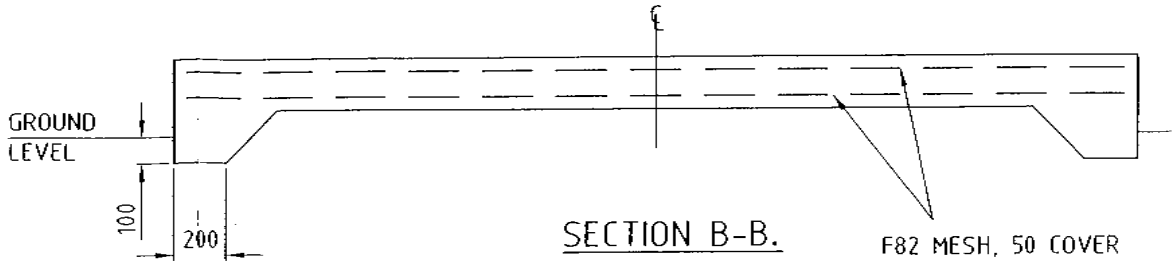
REV. No.

SHEET 1 OF 1

THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.

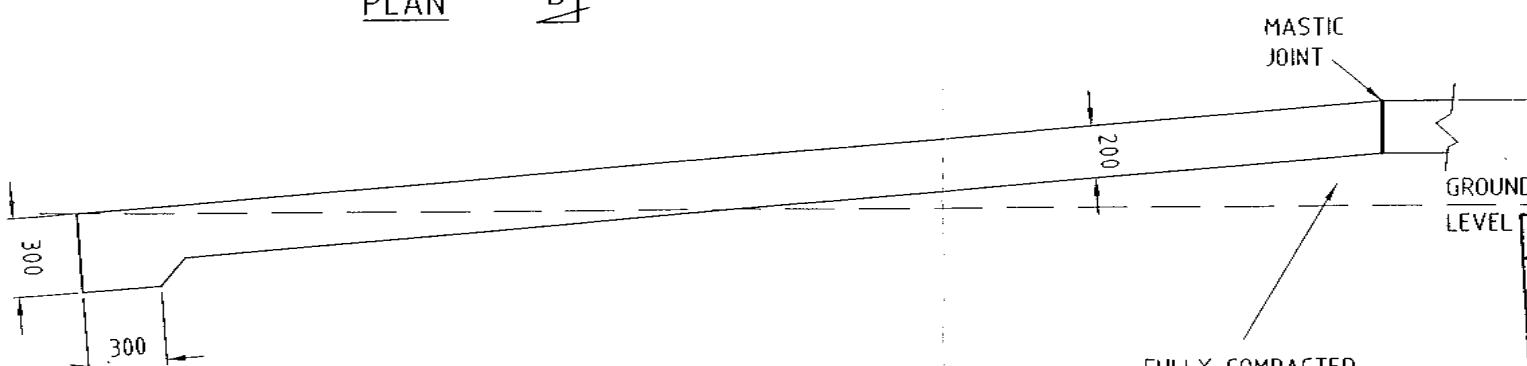


PLAN



SECTION B-B.

F82 MESH, 50 COVER TOP AND BOTTOM. THROUGHOUT.



SECTION A-A.

FULLY COMPACTED INFILL OR MASS CONCRETE.

APPROVED DRAWING
ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	–
JOB No.	361-063
SERIAL No.	26001 & 26002
DATE OF ISSUE	12.1.06 INITIALS

ITEM	REQ'D	MATERIAL/DESCRIPTION	PART NO.
2	AS REQ'D	REINFORCEMENT (F82 MESH)	
1	4.5m³	APPROX. OF CONCRETE. Fc = 25MPa.	

REV.	DESCRIPTION	DATE	APP.
D	WIDTH WAS 3700mm, LENGTH WAS 4000mm	16.6.05	
C	REDRAWN	23.8.01	

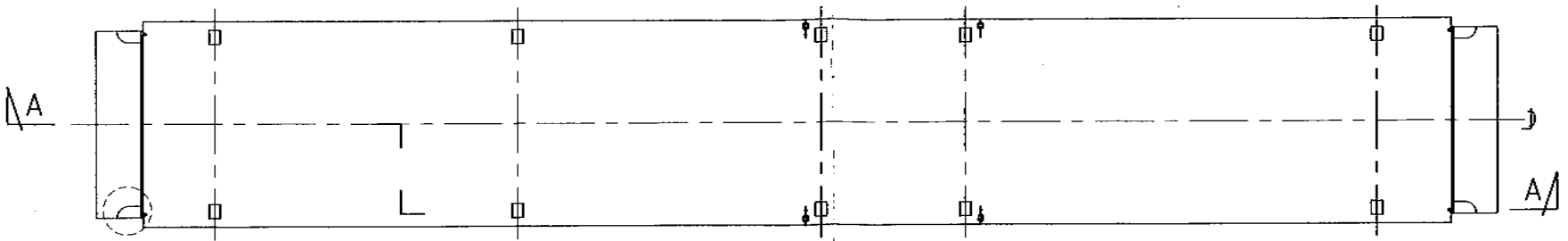
ULTRA SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 358

DR. BY: ANTE DATE: 28.08.2001
CH. BY: S/S DATE: 19-8-05
APP. BY: DATE: 19.8.05
SCALE: 1:50, 1:20

TITLE:
3.5m WIDE
ELECTRONIC WEIGHBRIDGE
RAMP DETAILS

DRAWING No. A3-4268/3.5m
REV. No. D
SHEET 1 OF 1

THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.



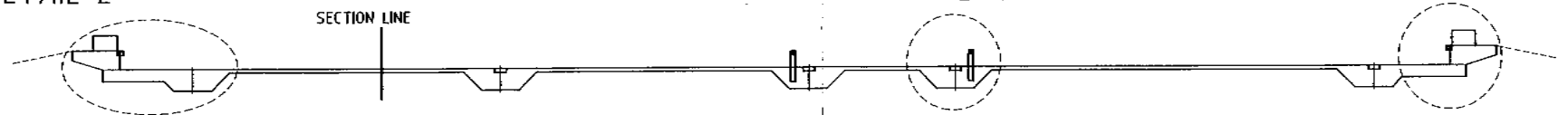
PLAN VIEW

DETAIL 1

DETAIL 2

DETAIL 3

DETAIL 4

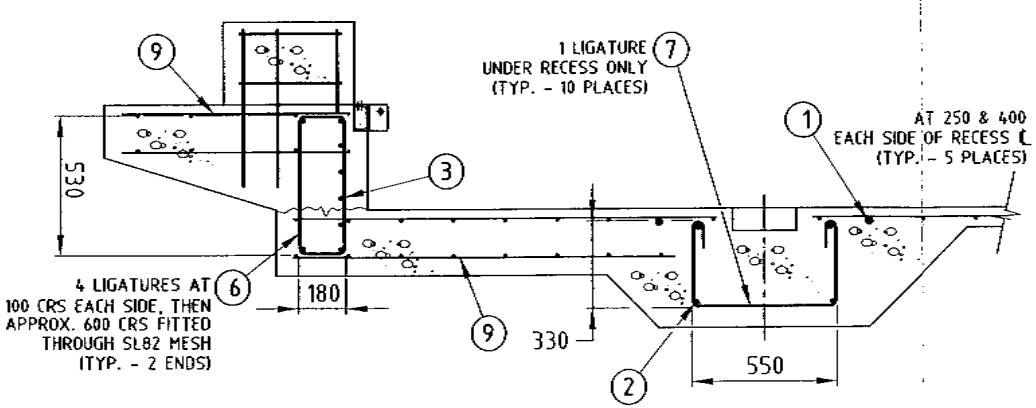


SECTION A - A

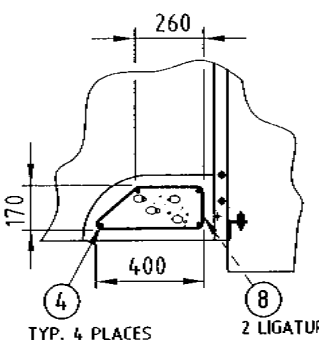
(DETAILS OF REINFORCEMENT OMITTED FOR CLARITY)

NOTE:

1. REINFORCEMENT TO AS 1302, 1303 AND 1304.
2. CONCRETE COVER
   - 30 - TOP COVER IN SLAB
   - 65 - TO BOTTOM REINFORCEMENT
   - 65 - EDGE COVER



DETAIL 2.



DETAIL 1

APPROVED DRAWING

ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	-
JOB No.	36A-063
SERIAL No.	26001 & 26003
DATE OF ISSUE	12·1·06 INITIALS

ITEM	QTY.	DESCRIPTION / MATERIAL	PART NO.
9	12	SL82, 6m x 2.4m SHEET	
8	8	N12 x 1.05 LN BENT AS SHOWN	
7	10	N12 x 1.43 LN BENT AS SHOWN	
6	26	N12 x 1.52 LN BENT AS SHOWN	
5	80	N12 x 1.88 LN BENT AS SHOWN	
4	16	N12 x 0.6 LN	
3	16	N12 x 3.87 LN	
2	10	N12 x 4.27 LN	
1	20	N24 x 4.27 LN	

REV.	DESCRIPTION	DATE	APP.

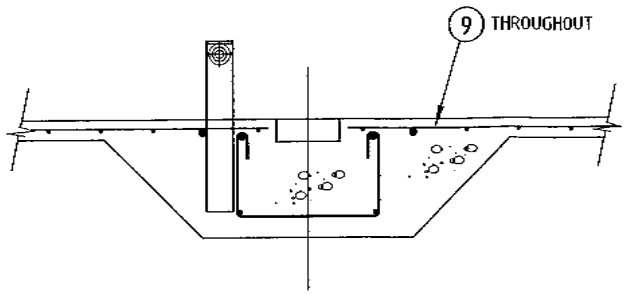
ULTRA
SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 358

DR. BY: AR DATE: 12.01.2006
CH. BY: DATE:
APP. BY: DATE: 12-1-06
SCALE: 1:100, 1:20

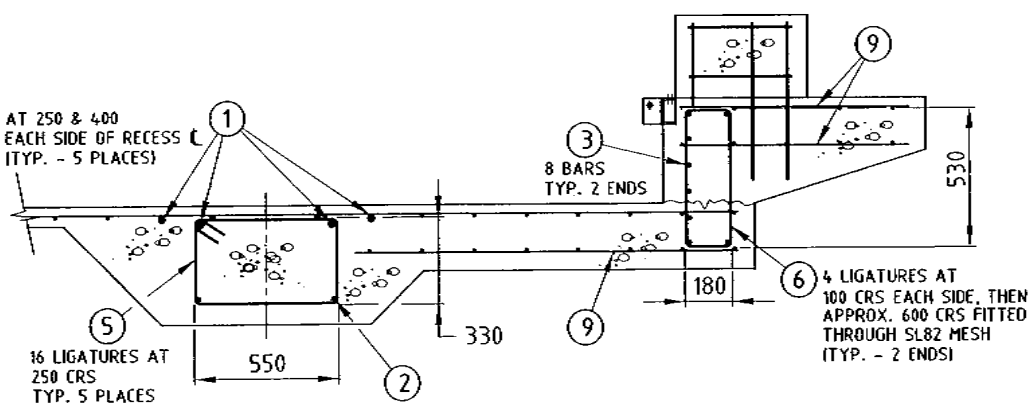
TITLE:
16m+12m=28mx3.5m
LOW PROFILE ELECTRONIC WEIGHBRIDGE
FOUNDATION REINFORCEMENT AND PLACEMENT

DRAWING No.
A3-36A-063-3
REV. No.
SHEET 1 OF 2

THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.



DETAIL 3



DETAIL 4

APPROVED DRAWING

ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	–
JOB No.	JGA-063
SERIAL No.	26001 & 26002
DATE OF ISSUE	12-1-06 INITIALS

REV.	DESCRIPTION	DATE	APP.

ULTRA SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 358

DR. BY: AR	DATE: 12.01.2006	
CH. BY:	DATE:	
APP. BY:	DATE: 12-1-06	
SCALE: 1:100, 1:20		

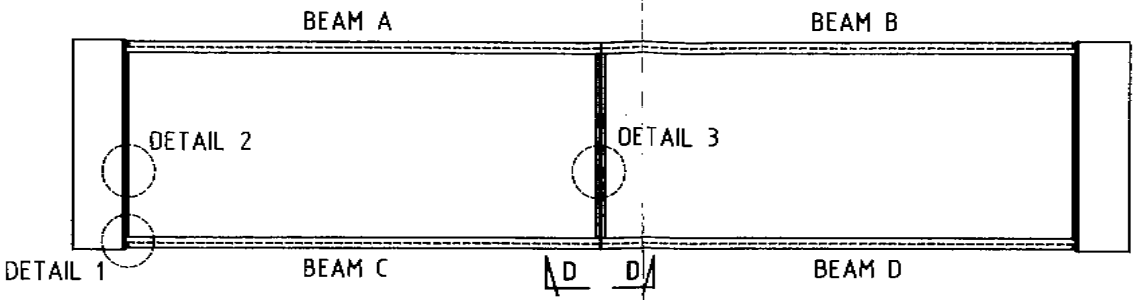
TITLE:
16m+12m=28mx3.5m
LOW PROFILE ELECTRONIC WEIGHBRIDGE
FOUNDATION REINFORCEMENT AND PLACEMENT

DRAWING No.
A3-36A-063-3

REV. No.

SHEET 2 OF 2

THIS DRAWING SHOULD NOT BE SCALED – IF IN DOUBT ASK.

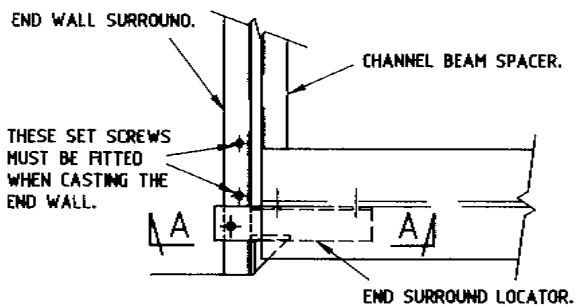


PLAN VIEW OF WEIGHBRIDGE STEELWORK

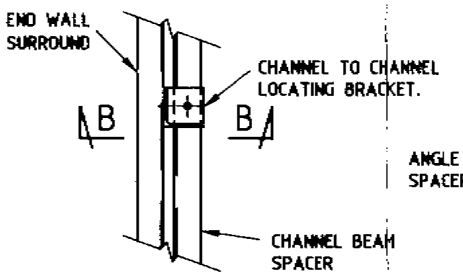
APPROVED DRAWING

ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

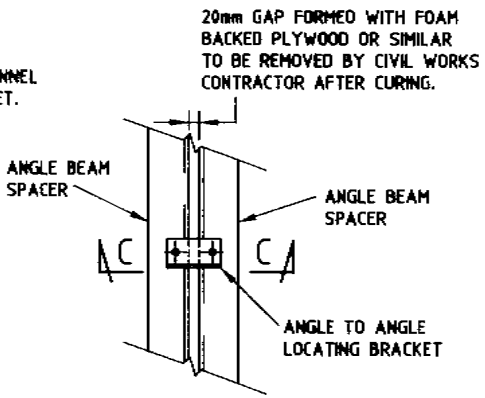
CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	–
JOB No.	36A-065
SERIAL No.	26001 & 26002
DATE OF ISSUE	12-1-06 INITIALS



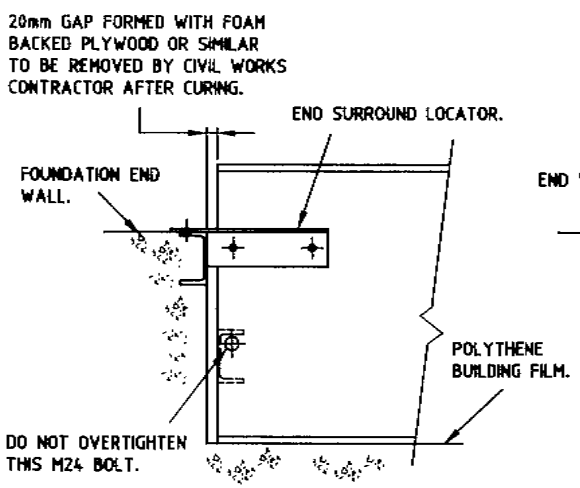
DETAIL 1



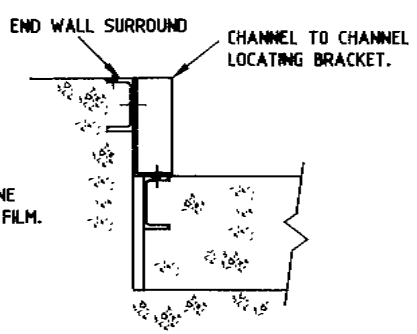
DETAIL 2



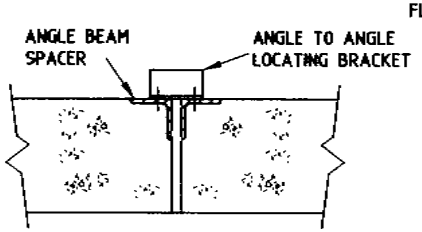
DETAIL 3



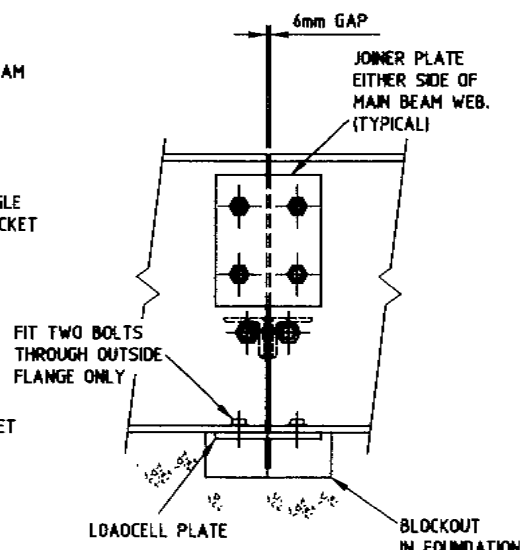
SECTION A-A.



SECTION B-B.



SECTION C-C.



SECTION D-D.

REV.	DESCRIPTION	DATE	APP.

ULTRA SCALES PTY LTD
ENGINEERED WEIGHING
95 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 398

DR. BY: ANTE	DATE: 21.11.2001
CH. BY: SK	DATE: 15-2-02
APP. BY:	DATE: 15-2-02
SCALE: NTS	

TITLE:

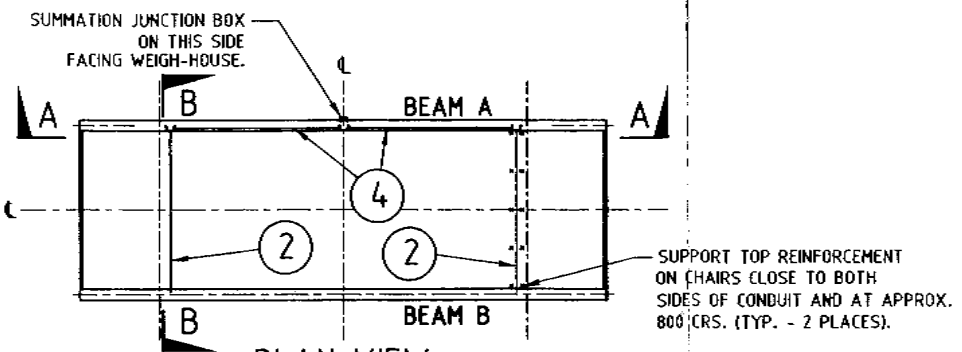
ABOVE GROUND WEIGHBRIDGE
6 LOADCELL TYPE
STEELWORK ASSEMBLY

DRAWING No. A3-4500-2

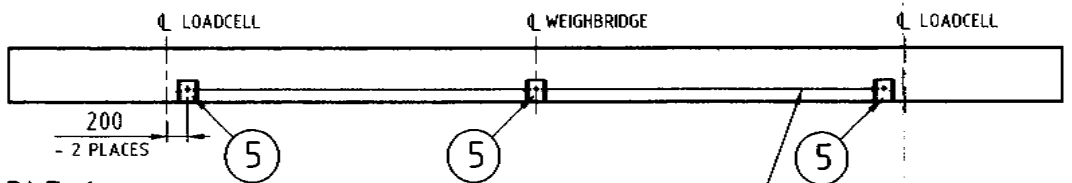
REV. No.

SHEET 1 OF 1

THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.



PLAN VIEW



SECTION A - A

TABLE 1.

WEIGHBRIDGE LENGTH	Ø 25mm CONDUIT LENGTHS
8m	2 x 2.7m
9m	2 x 3m
10m	2 x 3.2m
12m	2 x 4.1m

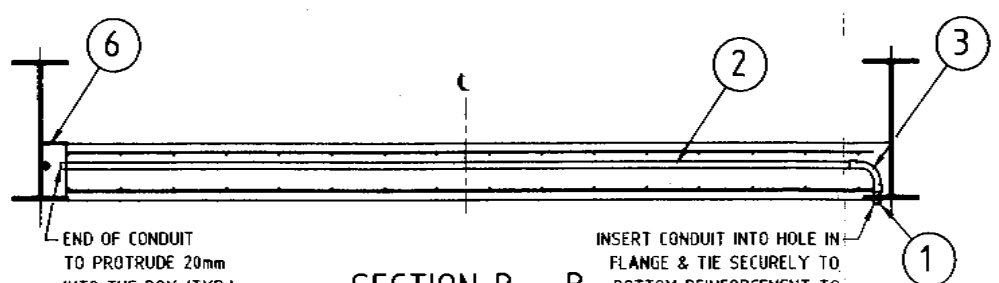
TABLE 2.

WEIGHBRIDGE WIDTH	Ø 25mm CONDUIT LENGTHS
3.0m	2 x 3.03m
3.5m	2 x 3.53m

APPROVED DRAWING

ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	-
JOB No.	361-063
SERIAL No.	26001 & 26002
DATE OF ISSUE	12-1-06 INITIALS



SECTION B - B

ITEMS SUPPLIED BY ULTRA SCALES PTY. LTD.

ITEM	QTY.	DESCRIPTION / MATERIAL	PART NO.
6	3	CONDUIT BOX COVER	A4-4486
5	3	CONDUIT BOX	A3-4483
4	AS REQ'D	Ø25mm PVC CONDUIT (REFER TABLE 1)	9025
3	2	Ø25mm PVC 90° BEND	247/25
2	AS REQ'D	Ø25mm PVC CONDUIT (REFER TABLE 2)	9025
1	2	Ø25mm PVC CONDUIT x 70mm LONG	9025

REV.	DESCRIPTION	DATE	APP.

ULTRA SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 350

DR. BY: ANTE DATE: 05.06.2000
CH. BY: S.K DATE: 5-6-00
APP. BY: DATE: 5-6-00
SCALE: 1:100, 1:50, 1:20

TITLE:
ABOVE GROUND WEIGHBRIDGE
4 LOADCELL
BEAM AND CONDUIT ARRANGEMENT

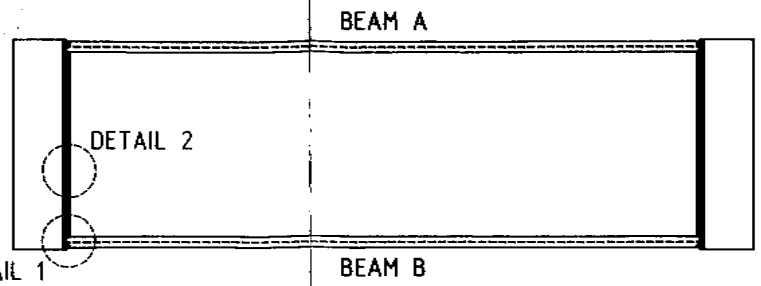
DRAWING No.
A3-4485-1

REV. No.

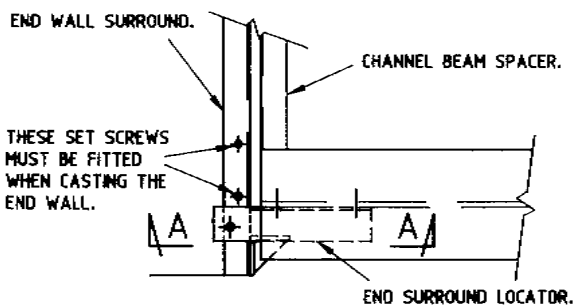
SHEET 1 OF 1

QAOK

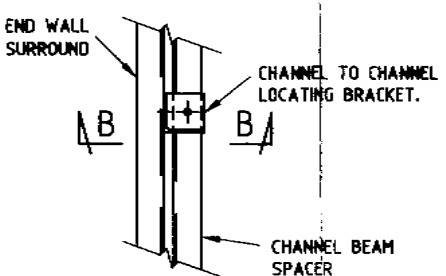
THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.



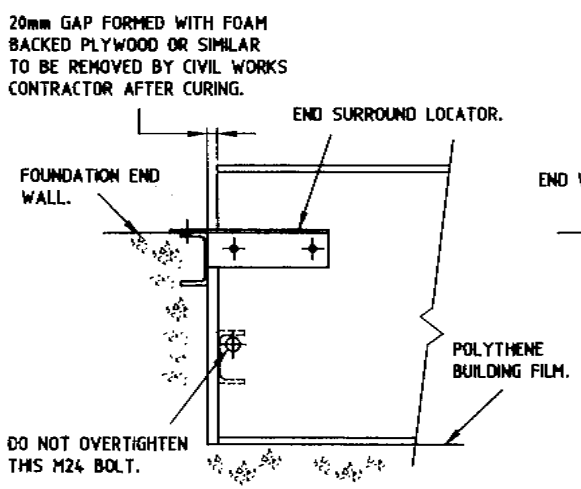
PLAN VIEW OF WEIGHBRIDGE STEELWORK



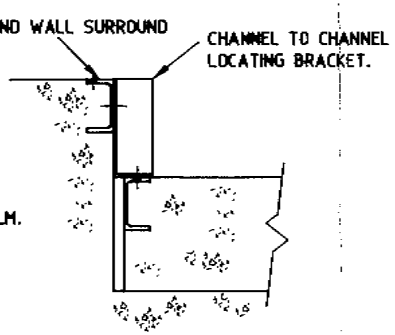
DETAIL 1



DETAIL 2



SECTION A-A.



SECTION B-B.

APPROVED DRAWING

ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	Alexandria Landfill
ORDER No.	-
JOB No.	36A-063
SERIAL No.	26001 & 26002
DATE OF ISSUE	12-1-06 INITIALS

REV.	DESCRIPTION	DATE	APP.
A	REDRAWN, WAS DRG. No. A3-4500-A	14.2.02	

ULTRA SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SHEPPARTON, VICTORIA, 3630 AUSTRALIA
TELEPHONE (03) 5831 5555 FACSIMILE (03) 5831 5453
A.C.N. 004 699 358

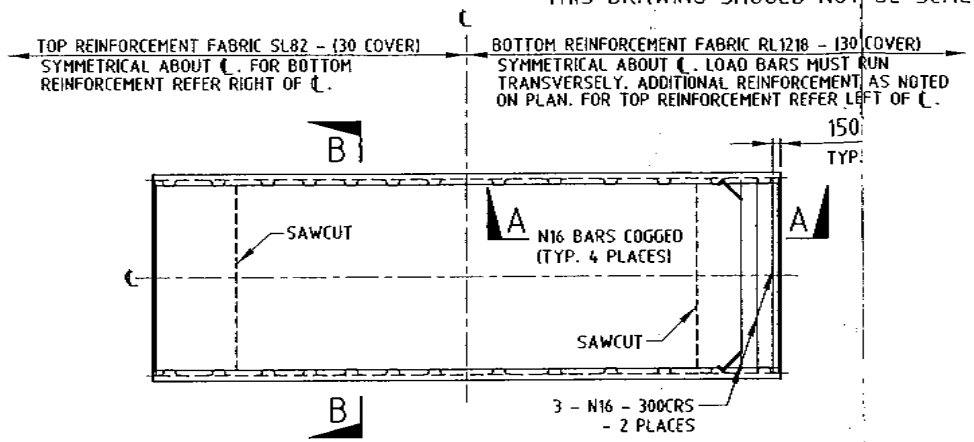
DR. BY: ANTE DATE: 14.02.2002
CH. BY: S.K. DATE: 15-2-02
APP. BY: K DATE: 15-2-02
SCALE: NTS

TITLE:
ABOVE GROUND WEIGHBRIDGE
4 LOADCELL TYPE
STEELWORK ASSEMBLY

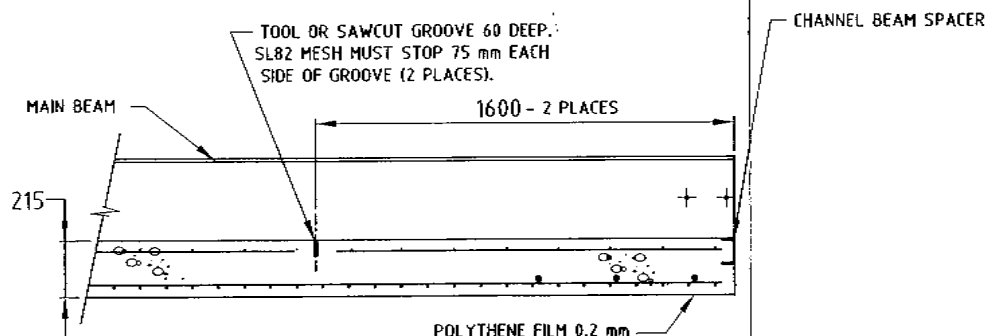
DRAWING No. A3-4500-1
REV. No. A
SHEET 1 OF 1

GMOK

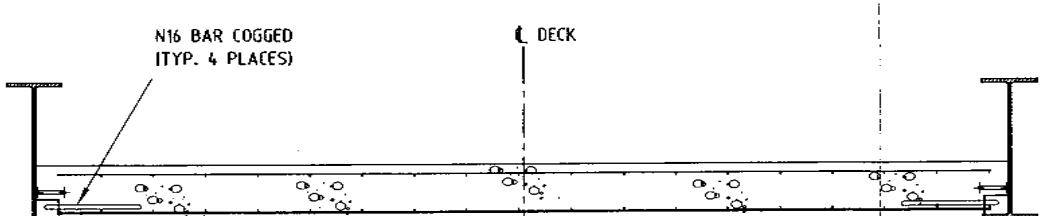
THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.



PLAN VIEW



SECTION A - A



SECTION B - B

APPROVED DRAWING

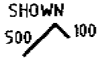
ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	-
JOB No.	36A-063
SERIAL No.	26001 & 26002
DATE OF ISSUE	12-1-06 INITIALS

REINFORCEMENT REQUIRED:

MESH: SL82 - 3 SHEETS
RL1218 - 3 SHEETS
(6 m x 2.4 m SHEETS)

BAR : N16 - 6 OFF AT 3.66 m LENGTHS
: N16 - 4 OFF AS SHOWN



NOTE:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH AS 3600. MINIMUM STRENGTH SHALL BE 32 MPa AT 28 DAYS.
2. REINFORCEMENT TO AS 1302, 1303 AND 1304.
3. A. FOR DRAINAGE PURPOSES SCREED CONCRETE TO 1:100 TRANSVERSELY AND LONGITUDINALLY AND BE FLUSH WITH CHANNEL BEAM SPACERS.
   B. CONCRETE TO BE LIGHTLY BROOM FINISHED (ie. NON SKID SURFACE) AND ALL EDGES OF CONCRETE AGAINST STEEL WORK TO BE TROWELED WITH RADIUS EDGING TOOL.

ITEM	QTY.	DESCRIPTION / MATERIAL	PART NO.
2	AS REQ'D	REINFORCEMENT, REFER TABLE	
1	10.5m³	APPROX. OF CONCRETE Fc' = 32 MPa	

REV.	DESCRIPTION	DATE	APP.

ULTRA SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 350

DR. BY: AR	DATE: 10.01.2006	
CH. BY:	DATE:	
APP. BY:	DATE: 12-1-06	
SCALE: 1:100, 1:20		

TITLE:

12m x 3.5m

ELECTRONIC WEIGHBRIDGE

CONCRETE DECK DETAILS

DRAWING No. A3-36A-063-4

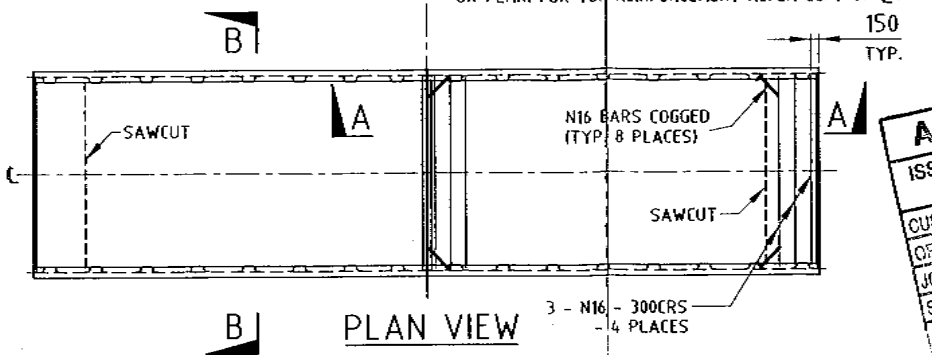
REV. No.

SHEET 1 OF 1

THIS DRAWING SHOULD NOT BE SCALED - IF IN DOUBT ASK.

TOP REINFORCEMENT FABRIC SL82 - (30 COVER) SYMMETRICAL ABOUT ℄. FOR BOTTOM REINFORCEMENT REFER RIGHT OF ℄.

BOTTOM REINFORCEMENT FABRIC RL1218 - (30 COVER) SYMMETRICAL ABOUT ℄. LOAD BARS MUST RUN TRANSVERSELY. ADDITIONAL REINFORCEMENT AS NOTED ON PLAN. FOR TOP REINFORCEMENT REFER LEFT OF ℄.



B PLAN VIEW

REINFORCEMENT REQUIRED:

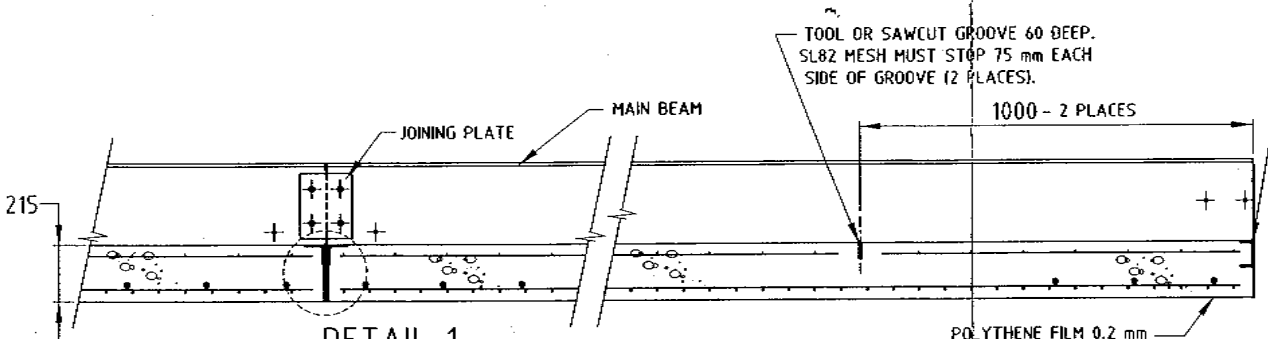
MESH: SL82 - 5 SHEETS
RL1218 - 5 SHEETS
(6 m x 2.4 m SHEETS)

BAR : N16 - 12 OFF AT 3.66m LENGTHS
: N16 - 8 OFF AS SHOWN

500 / 100

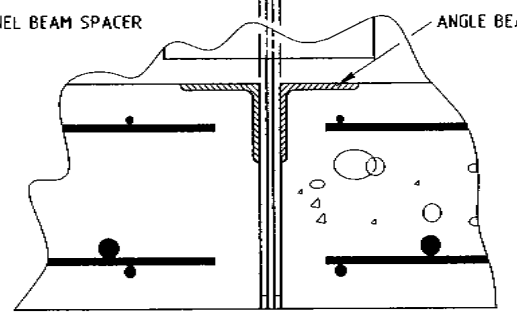
APPROVED DRAWING
ISSUED FOR DESIGN/CONSTRUCTION OR MANUFACTURE

CUSTOMER	ALEXANDRIA LANDFILL
ORDER No.	-
JOB No.	36A-063
SERIAL No.	26001 & 26002
DATE OF ISSUE	12-1-06 INITIALS

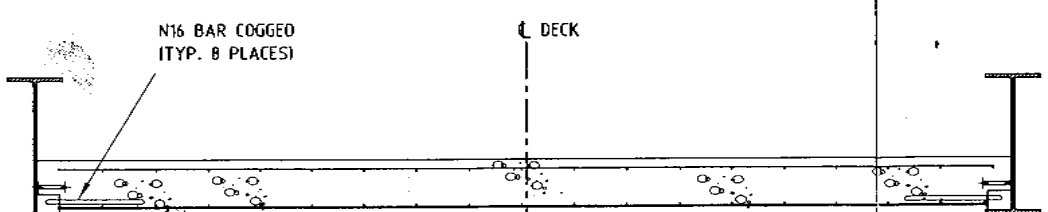


DETAIL 1

SECTION A - A



DETAIL 1



SECTION B - B

NOTE:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH AS 3600. MINIMUM STRENGTH SHALL BE 32 MPa AT 28 DAYS.
2. REINFORCEMENT TO AS 1302, 1303 AND 1304.
3. A. FOR DRAINAGE PURPOSES SCREED CONCRETE TO 1:100 TRANSVERSELY AND LONGITUDINALLY AND BE FLUSH WITH ANGLE AND CHANNEL BEAM SPACERS.
   B. CONCRETE TO BE LIGHTLY BROOM FINISHED (ie. NON SKID SURFACE) AND ALL EDGES OF CONCRETE AGAINST STEEL WORK TO BE TROWELED WITH RADIUS EDGING TOOL.

ITEM	QTY.	DESCRIPTION / MATERIAL	PART NO.
2	AS REQ'D	REINFORCEMENT, REFER TABLE	
1	13.5m³	APPROX. OF CONCRETE Fc' = 32 MPa	

REV.	DESCRIPTION	DATE	APP.

ULTRA
SCALES PTY LTD
ENGINEERED WEIGHING
35 JUDGE STREET, SUNSHINE, VICTORIA, 3020 AUSTRALIA
TELEPHONE (03) 9311 5555 FACSIMILE (03) 9311 5453
A.C.N. 004 659 358

DR. BY: AR DATE: 11.01.2006
CH. BY: DATE:
APP. BY: DATE: 12-1-06
SCALE: NTS

TITLE:
16m x 3.5m
ELECTRONIC WEIGHBRIDGE
CONCRETE DECK DETAILS

DRAWING No.
A3-36A-063-5
REV. No.
SHEET 1 OF 1