PROPOSED MACS REEF WASTE TRANSFER STATION, BYWONG, NSW SOIL AND WATER MONITORING PLAN

Prepared for:

Palerang Shire Council
C/- Environmental Property Services
Level 1, 19 Stockton St
Nelson Bay
NSW 2315

Report Date: 2 March 2012
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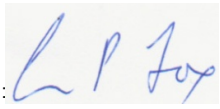

Laurie Fox
Principal

2 March 2012

Palerang Shire Council
C/- Environmental Property Services
Level 1, 19 Stockton St
Nelson Bay
NSW 2315

Attention: Steve McCall

Dear Steve,

RE: Soil and Water Management Plan for Proposed Macs Reef Waste Transfer Station, Bywong, NSW

Coffey Environments Australia Pty Ltd is pleased to provide this Soil and Water Management Plan for the Proposed Macs Reef Waste Transfer Station, Bywong, NSW.

We trust this meets your immediate requirements. Please do not hesitate to contact Nathalie O'Toole on 02 6162 2622 with any queries or comments you may have on the enclosed.

For and on behalf of Coffey Environments Australia Pty Ltd

Nathalie O'Toole
Senior Environmental Scientist/ Team Leader

RECORD OF DISTRIBUTION

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ABBREVIATIONS

AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Aboveground Storage Tank
C6-C36	Hydrocarbon chain length fraction
MBGL	meters below ground level
BH	Borehole
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
COC	Chain of Custody
DLWC	Department of Land and Water Conservation (NSW)
DO	Dissolved Oxygen
EC	Electrical Conductivity
Eh	Oxidation/Reduction Potential
ESA	Environmental Site Assessment
GAL	Gribbles Analytical Laboratories
ID	Identification
IP	Interface Probe
H2SO4	Sulfuric Acid
HBSIL	Health Based Soil Investigation Level
HCl	Hydrochloric Acid
HNO3	Nitric Acid
LOQ	Limit of Quantification
LOR	Limit of Reporting
MDL	Method Detection Limit

µg/L	micrograms per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MW	Monitoring Well
NATA	National Association of Testing Authorities
NEHF	National Environmental Health Forum
NEPM	National Environment Protection Measure
NSW EPA	Environment Protection Authority of New South Wales
OCP	Organochlorine Pesticide
OPP	Organophosphorous Pesticide
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PID	Photoionisation Detector
PO	Purchase Order
Ppm	parts per million
ppmv	parts per million by volume
PQL	Practical Quantification Limit
PSH	Phase Separated Hydrocarbon
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
RL	Reduced Level
RPD	Relative Percent Difference

SB	Soil Bore
SOP	Standard Operating Procedures
SPH	Separate Phase Hydrocarbon
SWL	Static Water Level
TBM	Temporary Benchmark
TCE	Trichloroethylene
TD	Total Depth
TDS	Total Dissolved Solid
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbon
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

1 INTRODUCTION

The Bywong Landfill on Macs Reef Road is nearing the end of its capacity for receipt of waste material from the Bywong community catchment. In order to continue servicing the local community's waste collection needs, Palerang Council (Council) plan on constructing a Waste Transfer Station (WTS) adjacent to the current active landfill.

The landfill is located on Macs Reef Road in the southern half of Lot 7008 DP 96164, Bywong, NSW (see Figure 1). The proposed WTS is to be constructed in the undeveloped northern half of the lot.

Council has determined through specialist studies and community surveys that the best development option for the site was to continue the landfill operations until capacity (with environmental improvements) followed by the landfill site's closure and rehabilitation. Concurrently, during the landfill closure and rehabilitation, a WTS would be constructed and established to manage local resident's waste disposal.

Council have reached the opinion that the proposed WTS is classified as a 'Designated Development' for the purposes of clause 32(1)(d)(iii), Part 1 , Schedule 3 of the *Environmental Planning and Assessment Regulation 2000*, which requires under Part 4 of the *Environmental Planning and Assessment Act 1979 (EP&A Act)* an Environmental Impact Statement (EIS)

The property is currently zoned Rural Residential (1d) under Yarrowlumla Local Environment Plan (LEP) 2002 and is Crown Reserve (Crown Reserve No 88693) managed by Council for the purpose of a waste depot.

1.1 Project description

Environmental Property Services (EPS) in association with Quadro Australia Pty Ltd (Quadro), acting on behalf of Council, approached Coffey Environments to prepare a Soil and Water Management Plan (SWMP) suitable for the proposed Designated Development and in accordance with the Director-General's Requirements (DGRs) to supplement the EIS required for the proposed development.

1.2 Objectives

The objective for the project is to prepare a document for the Macs Reef WTS which will provide site specific recommendations for the management of soil and water during the construction and ongoing operation of the WTS.

1.3 Scope of work

The scope of work was as follows:

- Site visit with Coffey Environments, Council, EPS and Quadro;
- Review of background documentation; and
- Preparation of SWMP that:
    - Addresses construction and operation phases of the development
    - Is in conjunction with the engineering and conceptual plans; and
    - Is consistent with relevant legislation and environmental planning instruments.

2 LEGISLATIVE FRAMEWORK

A detailed discussion of the legislative framework and its applicability to the project is provided in the Quadro Australia Environmental Management Plan. Below is a summary of the relevant legislation, guidelines and control plans applicable to the SWMP.

2.1 Relevant Legislation and Guidelines

- Protection of Environment Operations (POEO) 1997
- Environmental Planning and Assessment Act 1979
- Environmental Planning and Assessment Regulation 2000
- Protection of the Environment Operations (Waste) Regulation 2005
- NSW Water Management Act 2000

2.2 Relevant Environmental Planning Instruments

- State Environmental Planning Policy No 55 – Remediation of Land
- State Environmental Planning Policy (Infrastructure) 2007
- Yarrowlumla Local Environmental Plan 2002

2.3 Provisions of Relevant Draft Environmental Planning Instruments

The Draft Palerang Local Environmental Plan 2011 is not anticipated to be ready for release for public consultation during the DA and CC process of the Proposed WTS.

2.4 Provisions of Relevant Development Control Plans

Yarrowlumla Development Control Plan Rural Zones 2008 is the plan applicable to this proposal. The relevant sections of the Yarrowlumla DCP are listed below.

- Clause 11.11 – Erosion and Sediment Control
- Clause 16.2 – Effluent Disposal.
- Clause 22 – Erosion and Sediment Control on Building Sites.
- Clause 23.2 –Potable Water.
- Part 3 Clause 23.3 – Fire Fighting Resources.

3 EXISITING SITE CHARACTERISTICS

3.1 Existing Site Description

The WTS is proposed to be sited on Lot 7008, DP 96164. The site is located at the bottom of Macs Reef Hill and ranges in elevation from approximately 740m AHD in the south east corner to 700m AHD in the North West corner.

An ephemeral watercourse traverses the north-eastern corner of the site and drains via three reinforced concrete culverts under Macs Reef Road. A lesser ephemeral watercourse traverses the southern boundary of Lot 7008, drains across the unnamed road and onto Lot 4. This second watercourse does not impact the WTS, and is not impacted by the proposed development.

Table 3-1 Key Site Characteristics

Element	Description
Life of project	50 Years
Total land area of site	30,657m^2
Subsurface developments/infrastructure	None on site. Natural land-form is being utilised to construct appropriate drop heights to waste skips. 1 registered domestic groundwater extraction bore within 100m of the development.
Operating hours: • During construction • Maintenance and Management operating hours • WTS receiving hours	 • 7am-6pm Monday-Friday • 7am-8pm 7 days a week. • 2pm-5pm Fridays • 8am-4pm Saturdays and Sundays • 7am-11am Mondays
List of major infrastructure	• Skip Bin Facilities • Metals Storage – small cut up recyclable metal pieces • E-waste storage • Batteries Storage – used vehicle batteries • Used Motor Vehicle Oil Storage • Buy-back Centre

	• Site Office – with sink • Staff and Public Amenities • Litter Management • Traffic Management • Fire Management – dedicated water tank with capacity >20,000L for fire-fighting purposes.
Solid waste management	Current annual waste stream is estimated: • 944 tonnes mixed solid waste • 76 tonnes recyclable materials Council has estimated annual growth rate in population to be 1% WTS to accommodate four (4) $30m^3$ waste skips and one (1) $20m^3$ recyclables skip.
Water supply • Source • Requirement	• Office and Amenities - rain-water collected from roof of buy-back centre and stored in 4,500L tank • Washdown water – rainwater collected from roof over concrete storage bays and skip bin area and stored in a 10,000L tank
Fuel storage capacity and quantity used	Fuel is not stored on site.

3.2 Subsurface Conditions

Information has been sourced from the Soil Landscapes of the Canberra 1:100,000 Sheet (Soil Landscape Series Sheet 8727).

The site is situated on soils of Vestigial Landscapes: Bywong. The soil and landscape can be summarised as:

- Landscape – Rolling to undulating low hills, rises and minor flats on metasediments. Local relief 30-90m; elevation 600-920m; slopes 3-20%. Extensively Cleared open forest and woodland.
- Soils – shallow (<30cm), well to rapidly drained Rudosols (Lithosols) on crests and upper slopes, and near rock outcrop. Moderately deep (<75cm), moderately well-drained Red Chomosols (Red Podzolic Soils) and Brown Chromosols (Yellow Podzolic Soils and Non-calcic Brown Soils) on midslopes. Deep (>100cm), imperfectly drained Sodosols (Solodic Soils) on lower slopes.
- Limitations – soils are infertile, erodible and shallow. Subsoils are often dispersible and hardsetting. Run-on; water erosion and salinity hazards.

The Murrumbidgee 1:250,000 geological services sheet series indicate that the underlying geology of the site relates to the Orodovician period with shale being the dominant bedrock of the area

3.3 Surface Drainage

Stormwater is currently captured on site via a series of shallow earth swales which direct surface flows to a leachate pond located to the north west of the landfill operations area.

The area of the site for the proposed WTS is currently vegetated, with surface flows directed north towards Macs Reef Road and northeast towards an existing ephemeral drainage line.

3.4 Hydrogeology and Groundwater Use

Groundwater is expected to occur as a confined fractured rock aquifer at depths greater than 20m. There is a possibility that shallow (within 5m) perched groundwater occurs following heavy and/or prolonged rainfall. It is also possible that the nearby landfill has influenced shallow groundwater flow patterns.

There are two groundwater bores located within 500m of the development.

GW061122 is located within 100m to the east of the proposed WTS. This groundwater bore was drilled to a depth of 61m below ground level (mbgl) and is authorised and intended for domestic use. Drilling logs indicate water bearing zones at 21.0 – 22.0 mbgl; 26.0-38.0 mbgl and 45.0 – 47.0 mbgl in a fractured rock described as Dacite Water Supply. Static water level is at 21.0 mbgl.

GW411303 is located approximately 400m to the west of the proposed WTS. This groundwater bore was installed to a depth of 55 mbgl and is authorised and intended for domestic use. Static water level is at 52.0 mbgl. No other information regarding water bearing zone or geology was provided for this bore.

3.5 Site Constraints

The site constraints and characteristics are based on information in the Landcom Managing Urban Stormwater – Soils and Construction

Table 3-2 Site Constraints and Characteristics

Site constraint or characteristic	Value/comment
Rainfall	Mean annual rainfall of 614.7mm Mean daily evaporation of 4.7mm R = 1500
Rainfall Zone	Zone 10
Slope gradients	3-20%
Potential erosion hazard	Moderate to high

Soil Erodibilty	K-factor = 0.04
Calculated soil loss	677 tonnes/ha/yr
Soil Loss Class	Class 5 high
Soil Dispersivity	Moderate to High
Rural land capability (pre-disturbance)	Low
Agricultural land suitability (pre-disturbance)	Low

4 POTENTIAL ASPECTS AND IMPACTS FOR SOIL AND WATER

A table is presented (Table 4-1) with identified potential aspects and their associated impact, whether positive or negative, upon the soil, water and groundwater condition of the site.

Table 4-1: Aspects and Impacts

Potential Aspect		Construction/Operation	Impact
Litter	Unscreened storm water drains	Operation	Surface water
Spills	Uncontrolled activities	Construction & Operation	Contamination of surface water, soil, and groundwater
Earth works and tree felling.	Disturbed and/or unvegetated soils	Construction	Surface water quality salinity and soil erosion
Increased paving	Increased runoff	Construction & operation	Surface water quality and quantity; soil erosion
Sewage	Disturbance within aquifer	Operation	Groundwater quality

4.1 Soil

A review of the Canberra Soil Map Series indicates that the surface soil is susceptible to erosion, and the subsoils dispersible and hard-setting with salinity noted as a hazard associated with run-off water.

Potential aspects likely to create soil erosion impacts during construction include:

- Tree felling and earth works to establish hard-stand paving
- Movement of site vehicles prior to establishment of hard-stand paving
- Increased paving altering natural water absorption and surface flow

The following potential aspects of ongoing operations may create impacts on soils:

- Uncontrolled operations resulting in spills that may contaminate soil
- Increased paving altering natural water absorption and surface flow

4.2 Surface water

A review of the topographical plan (Figure 2) indicates the presence of a waterway to the north east of the site.

The following potential aspects of construction may create impacts to the waterway:

- Unscreened storm water drains permitting litter entering local waterway
- Uncontrolled activities with spills occurring to an extent that contaminants enter the local waterway
- Disturbed and/or unvegetated soils resulting from earth works and tree felling contributing sediment and silt to the waterway;
- Increased runoff resulting from the presence of increased paving contributing to sediment and silt to the waterway. Presence of hardstand paving provides greater control over direction of surface flow enabling runoff to be captured and diverted to the leachate pond.

The following potential aspects of ongoing operations may create impacts on surface water:

- Unscreened storm water drains permitting litter entering local waterway
- Uncontrolled activities with spills occurring to an extent that contaminants enter the local waterway

4.3 Groundwater

A groundwater well registered for domestic purposes is located within 100m north east of the development.

The following potential aspects of construction may create impacts to groundwater:

- Uncontrolled activities with spills occurring to an extent that contaminants enter the aquifer;
- Disturbance to the aquifer from uncontrolled sewage, resulting in degraded groundwater quality.

The following potential aspects of ongoing operations may create impacts on groundwater:

- Uncontrolled activities with spills occurring to an extent that contaminants enter the aquifer

4.3.1 Impact of the WTS on adjacent groundwater bores

There are two ground water bores located within a 500m radius of the proposed development. Both groundwater bores are registered for domestic purposes.

Static water levels (SWL) measured in the eastern groundwater bore (GW061122) and western groundwater bore (GW411303) indicate that the adjacent landfill may be acting as a localised groundwater recharge zone. This is typical in areas where the natural soils have been disturbed during development.

Water quality information was not available to Coffey to indicate the presence or otherwise of pollutants from the landfill site.

The proposed development is anticipated to increase the area of sealed surfaces, which will increase the volume of surface run-off, but will reduce rainfall infiltration to soils.

The proposed development will also capture leachate and surface runoff, and divert to the leachate catchment pond, thus avoiding impact to surrounding users of groundwater. Leachate water will remain in the catchment pond and either evaporate, or be extracted as part of regular operations and maintenance activity.

5 GENERAL MANAGEMENT PLAN AND PROCEDURES

5.1 Objectives

The objective for the project is to prepare a document for the Macs Reef WTS which will provide site specific recommendations for the management of soil and water during the construction and ongoing operation of the WTS.

5.2 Role, Responsibility, Authority and Accountability

Role	Contact	Responsibility
Facility Operator	Via WTS or Palerang Council as appropriate	Litter Management Spill Management Erosion and Sediment Control Surface Water Management Waste Water Management
Maintenance Supervisor	Via WTS or Palerang Council as appropriate	Day-to-day management of Facility Complaint Investigation
Assistant Engineer – Operations	Palerang Council	Auditing compliance of EMP
Director of Works	Palerang Council	Ensuring nominated officers are trained in requirements

5.3 Management Strategies

5.3.1 Litter

The management strategy for litter is addressed in the Quadro Environmental Management Plan. In summary:

- Litter will be collected on a regular basis;
- Litter fences and fence lines will be patrolled and cleared on a weekly basis;
- Approach roads to WTS will be inspected for dumped waste, and organising collection and disposal;
- Visually inspecting adjacent properties for litter and organising collection and disposal

5.3.2 Spills

The management strategy for Spills is addressed in the Quadro Environmental Management Plan. In summary:

- Inspection of incoming containers;
- Inspection and maintenance of liquid storage facilities and transport vehicles;
- Provision of spill kits; and
- Consultation with stakeholders (Fire and Rescue NSW, NSW EPA, Palerang Council; Ministry of Health; WorkCover Authority; and any other person directed by the EPA)

Spills could occur from the leachate management pond should the capacity of the pond be exceeded due to rainfall events greater than the design capacity (1:10 year even: 696m^3). For this reason, inspection of the leachate pond should be undertaken prior to, and following, forecast rainfall events to assess whether removal of leachate collected in the pond by vac-truck is required.

5.3.3 Surface Water

The management strategy for surface water is addressed in the Quadro Environmental Management Plan. In summary Surface water will be managed by:

- Maintaining the surface water structures (swales and existing leachate management/stormwater pond);
- Maintaining the revegetated zones;
- Controlling litter; and
- Controlling vehicle movement.

Runoff generated at the site will be diverted to different areas depending on where within the site it is generated:

- Runoff generated beyond the influence of landfill will be captured and diverted to ephemeral stormwater;
- Runoff generated within the landfill will be captured and transferred into the existing stormwater/leachate management pond via a proposed 3m leachate and stormwater diversion drain connected to the existing stormwater system; and
- Runoff generated within the waste transfer area is to be diverted to the proposed leachate management pond.

5.3.4 Wastewater

The management strategy for wastewater is addressed in the Quadro Environmental Management Plan. In summary:

- Wastewater generated in the WTS will be monitored and managed in accordance with the service manuals for the installed system.

6 EROSION AND SEDIMENT CONTROL PLAN

6.1.1 General

Management of water quality during any construction activity on the subject site is to be undertaken in accordance with the recommendations outlined in “Landcom (2004) Managing Urban Stormwater – Soils and Construction (The Blue Book)”. This may include but not be limited to; clean water diversion drains on the high side of disturbed areas, sediment fencing, sediment basins, staked bales, stockpile erosion protection and stabilised road crossings. Employees and subcontractors will be informed of their responsibilities in relation to installation and maintenance of erosion and sediment control measures on the subject site.

Erosion and sedimentation control across proposed disturbance areas will generally be provided in accordance with the details shown in Figures 4 and 5 found in Appendix A of this report, and requirements outlined in the following sections.

6.1.2 Clearing

Erosion and sediment control devices required for the proposed construction process will be installed prior to the commencement of vegetation clearing where possible or practical. Such erosion control measures will include, but not be limited to:

- Clean water diversion drains installed upslope of the proposed disturbance area;
- Dirty water diversion drains downslope of the proposed disturbance area;
- Sediment retention basins to collect and aide in settlement of dirty water runoff;
- Sediment fencing downslope of the proposed disturbance area where dirty water diversion drains are not appropriate, and downslope of proposed stockpile areas. These measures are indicated in figure 5 of Appendix A

Sedimentation fences are to be installed and cleared vegetation shall be mulched and spread or stockpiled onsite for use in revegetation activities.

6.1.3 Topsoil Stripping and Stockpiling

Topsoil stripping across the proposed disturbance area will stockpiled for re-use in rehabilitation activities. Stockpiles are to be managed to minimise soil erosion, and as such the following measures should be adopted:

- Wherever possible topsoil should be stripped in a slightly moist condition in order to minimise dust generation.
- Topsoil shall be immediately spread over revegetation zones where appropriate or stockpiled at the perimeter of the proposed disturbance area for future use.
- Stockpiles shall be limited to a height of 2m, with side slopes constructed at a slope no greater than 1:3.
- Where stockpiles are to be left for an extended period of time (longer than 3 months) they shall be sown with rapid growing pasture grasses and fertilised.

- Stockpiles shall be located to avoid natural or developed surface drainage paths.
- Weeds shall be removed from the stripped topsoil volume when identified to limit future weed regrowth.

6.1.4 Clean Water Diversion Drains

Clean water diversion drains shall be installed upslope of the proposed disturbance area where there is potential for stormwater run-on. The installation of clean water diversion drains will direct stormwater run-on away from the proposed disturbance area whilst promote the infiltration of diverted water to the subsurface. Excess clean water will be directed towards the stormwater culvert to the north east of the site.

6.1.5 Sediment Retention Basins

The leachate management pond has been designed with a capacity of 696m^3 based on anticipated run-off capacity and catchment configuration. There is a low risk of increased runoff during construction and soil erosion if it occurs should be limited to the excavation face and batter slopes. Additional sediment retention basins are not proposed at this stage in the proposed construction zone.

6.1.6 Site Access Road

Permanent roads shall be sealed in order to ensure long-term durability of the road surface. Grassed lined swales shall be provided adjacent to the road, with stormwater runoff being conveyed to the swales as un-concentrated sheet flow in order to minimise surface erosion of the proposed road verge. Sedimentation will be filtered vegetation within the proposed swales prior to captured water being infiltrated to the subsurface.

6.1.7 Waste Transfer Station

Long term erosion and sedimentation control shall be provided around the proposed Waste Transfer Station in accordance with the above methodology and as detailed on Figure 4 found in Appendix A of this report. Generally clean water will be diverted around the proposed Waste Transfer Station, with dirty stormwater runoff from proposed hardstand and disturbed areas diverted to a proposed sedimentation basin.

Local weather records indicate that evaporation rates are greater than rainfall, and as such volumes captured are anticipated to be managed by evaporation. In the event that rainfall volumes are greater than evaporation rate, settled water will be pumped from the leachate management pond, and discharged to the existing stormwater system.

7 WATER QUALITY PLAN

7.1 Frequency of Monitoring and Water Sampling

During construction, monitoring of sediment control structures is recommended on a daily basis. This is to provide assurance as to the effectiveness of the installed structures, as well as to identify areas which may require additional support with extra silt fencing, hay bales or other methods of sediment control.

Regular (daily) monitoring of the leachate management structures on the days the WTS is open to the public, is recommended to ensure capacity is available to accommodate rainwater run-off where it falls on the leachate catchment area. Whilst the average daily evaporation rate exceeds the annual average rainfall it may be necessary to empty the leachate pond during the rainy months of the year, September to February.

The leachate management pond should be cleaned and de-silted on an annual basis to ensure the agreed capacity (696m^3) is maintained.

Silt removed from the leachate management pond should be stockpiled prior to sampling and waste classification. Stockpiles should be located upgradient of the leachate management pond in order to capture runoff that may occur.

Samples of the liquid leachate and silt should be collected by suitably qualified and experienced personnel on an as-needs basis prior to off-site disposal by licenced contractors. Wastes removed from the leachate management pond during maintenance activity should be classified in accordance with the NSW DECCW (2009) Waste Classification Guidelines and disposed of at an appropriately licensed facility.

Table 7-1: Leachate Management Pond Sampling Requirements

Leachate Management Pond	Sampling Frequency	Sampling Requirements
Leachate waters	Prior to removing of leachate, as required. Minimum one event per year.	Collection of sample by suitably qualified and experienced personnel. Sample analysed for: field and chemical parameters outlined in table Table **7**-**2**.
Sediment	Annually, following dewatering.	Collection of sample by suitably qualified and experienced personnel. Sample analysed in accordance with NSW DECCW (2009) Waste Classification Guidelines.

7.2 Monitoring and Sampling Methodology

Prior to collection and disposal of leachate water, collect one sample for laboratory analysis.

7.2.1 Health and Safety

Minimise risk of primary contact with leachate water. Minimum PPE requirements include disposable gloves, eye protection and non-slip shoes.

7.2.2 Collection Location

Samples should be collected from the same location every time.

7.2.3 Sampling Methodology

The following sampling methodology should be used:

- Collect leachate water using an extendable sampler with a triple-rinsed (with leachate water) wide-mouthed bottle.
- Transfer sample carefully to laboratory prepared sample bottles appropriate for the following analytes: phenols; ammonia; zinc; chromium; lead; and total suspended solids (TSS).
- Do not field filter samples.
- Fill sample bottles to the top, but do not over-fill.
- Label bottles with date and unique sample identifying code. Transport to the laboratory for analysis within 48 hours in a sealed, chilled esky under chain of custody conditions.
- Collect field pH readings using a portable pH meter as soon as practicable, as changes in temperature can affect pH levels.

7.3 Water Quality Criteria

7.3.1 Leachate Water

Leachate water is required to be tested prior to collection by a licensed waste transport company. Water quality parameters listed in table Table **7**-**2** are required to be tested by a laboratory holding a NATA accreditation.

Table 7-2: Water Quality Criteria

Parameter
pH
Conductivity
Colour
Alkalinity as $CaCO_3$
Oil and Grease
Chromium
Copper

Lead
Zinc
Sulphate (as SO_4)

7.3.2 Offsite surface water

Water quality monitoring of the off-site ephemeral stream should be done on a weekly basis (where flow is present) during construction and on a monthly basis (where flow is present) during the first year of operation. Monitoring then may be scaled back to quarterly if appropriate.

Samples should be collected from two locations, one up-stream of the WTS and one down-stream of the WTS but prior to the road culverts.

Samples should be analysed for field parameters (pH, Dissolved Oxygen (DO), Electric Conductivity (EC), Redox Potential (Redox), Temperature and Turbidity). Samples should also be collected for BOD, Ammonia, Chromium, Lead, Zinc and Sulphate. The following schedule is recommended:

Table 7-3: Water Sampling Program

Location	Frequency	Parameter	Reporting
Upgradient of WTS	Weekly during Construction	Field parameters (pH, DO, EC, Redox, Temperature and Turbidity)	Monthly
Upgradient of WTS	Monthly during construction	Field parameters, suspended solids, Phenols, Nutrients, Chromium, Lead, Zinc, Sulphate	Monthly
Upgradient of WTS	Monthly during 1st year of operation	Field parameters suspended solids,	Quarterly
Upgradient of WTS	Quarterly during 1st year of operation	Field parameters, suspended solids, Phenols, Nutrients, Chromium, Lead, Zinc, Sulphate	Quarterly
Upgradient of WTS	Quarterly during subsequent years of operation	Field parameters, suspended solids, Phenols, Nutrients, Chromium, Lead, Zinc, Sulphate	Annually
Downgradient of WTS	Weekly during Construction	Field parameters	Monthly

Downgradient of WTS	Monthly during construction	Field parameters, suspended solids, Phenols, Nutrients, Chromium, Lead, Zinc, Sulphate	Monthly
Downgradient of WTS	Monthly during 1st year of operation	Field parameters	Quarterly
Downgradient of WTS	Quarterly during 1st year of operation	Field parameters, suspended solids, Phenols, Nutrients, Chromium, Lead, Zinc, Sulphate	Quarterly
Downgradient of WTS	Quarterly during subsequent years of operation	Field parameters, suspended solids, Phenols, Nutrients, Chromium, Lead, Zinc, Sulphate	Annually

7.4 Waste Classification of Silt

Silt is required to be stockpiled, sampled and classified prior to removal off-site. Samples should be analysed for heavy metals, BTEX and PAH.

7.5 Periodic Reporting During Construction and Operation

Reporting during construction should be conducted on a monthly basis during construction, and quarterly and annually during operation.

Outline of information to be covered in periodic reporting

- Introduction
- Construction Activities during Monitoring Period
    - Incidents & Spills
    - Complaints
    - Non-conformances
- Volume of waste and recycling handled by WTS during reporting period
- Field work (monitoring of the off-site ephemeral stream, leachate water sampling and silt waste classification)
- Rainfall Data in Graphical Form
- Laboratory Results and Comparison to NEPM J120 (leachate water) and NSW DECCW 2009 Waste Classification Criteria
- Conclusions and Recommendations

- Appendices

Reporting Post Construction

8 CONTINGENCIES

The following Contingencies would apply

Table 8-1: Contingencies

Event	Contingency
Water Quality parameters exceed criteria in first 12 months	Notification to Council and review of construction practices and water management
Sediment released from works area	Notification to Council and review of Soil and Erosion Management Plan and construction practices
Spills	Accidental spill kit to be on site during construction
Odour	Odours during operation to be reported to Council and the cause assessed. Excessive odours are not anticipated during construction

9 RELATED MANAGEMENT PLANS

This Soil and Water Management Plan should be read in conjunction with the Quadro Australia Environmental Management Plan for the same site.

10 REFERENCES

ANZECC (2000) Australian and New Zealand Water Quality Guidelines for Fresh and Marine Waters. Australian and New Zealand Environment & Conservation Council, 2000

Bureau of Mineral Resources, Geology and Geophysics (1980) 1:50,000 Geology of Canberra, Queanbeyan, and Environs.

Hydrogeology of the Australian Capital Territory and Environs (1984): 1:100,000 First Edition.

Landcom (2008) Managing Urban Stormwater: Soils and Construction. ISBN 978 1 74122 577 8

Netherlands (1994) Environmental Quality Objectives in the Netherlands. Ministry of Housing, Spatial Planning and the Environment, Netherlands Government. ISBN 90-6092-783-4.

NSW DECC (2006) Handbook for Design and Operation of Rural and Regional Transfer Stations. ISBN 1 74137 954 7

NSW EPA (1995) Sampling Design Guidelines. ISBN 0-7310-3756-1.

NSW EPA (1997) Guidelines for Consultants Reporting on Contaminated Sites. ISBN 0 7310 3892 4.

NSW EPA (1994) Guidelines for Assessing Service Station Sites. ISBN 0-7310-3712-X.

NSW EPA (1998) Guidelines for the NSW Site Auditor Scheme. ISBN 0-7313 0177 3

Quadro Australia (2011) Draft Environmental Management Plan: Macs Reef Waste Transfer Station.

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Important information about your **Coffey** Environmental Report

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

72510/07-06

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Important information about your **Coffey** Environmental Report

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Scope of Investigations

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within practical time and budgetary constraints, and in reliance on certain data and information made available to Coffey. The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete.

Subsurface conditions can change

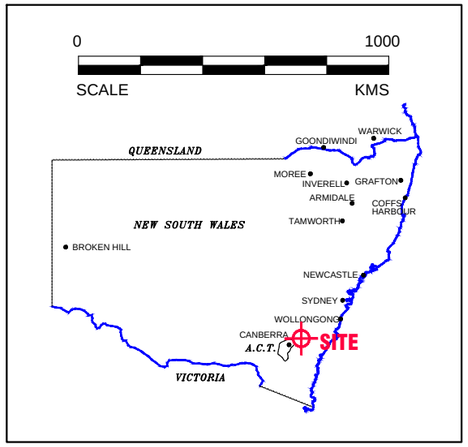
Subsurface conditions are created by natural processes and the activity of man and may change with time. For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project and/or on the property.

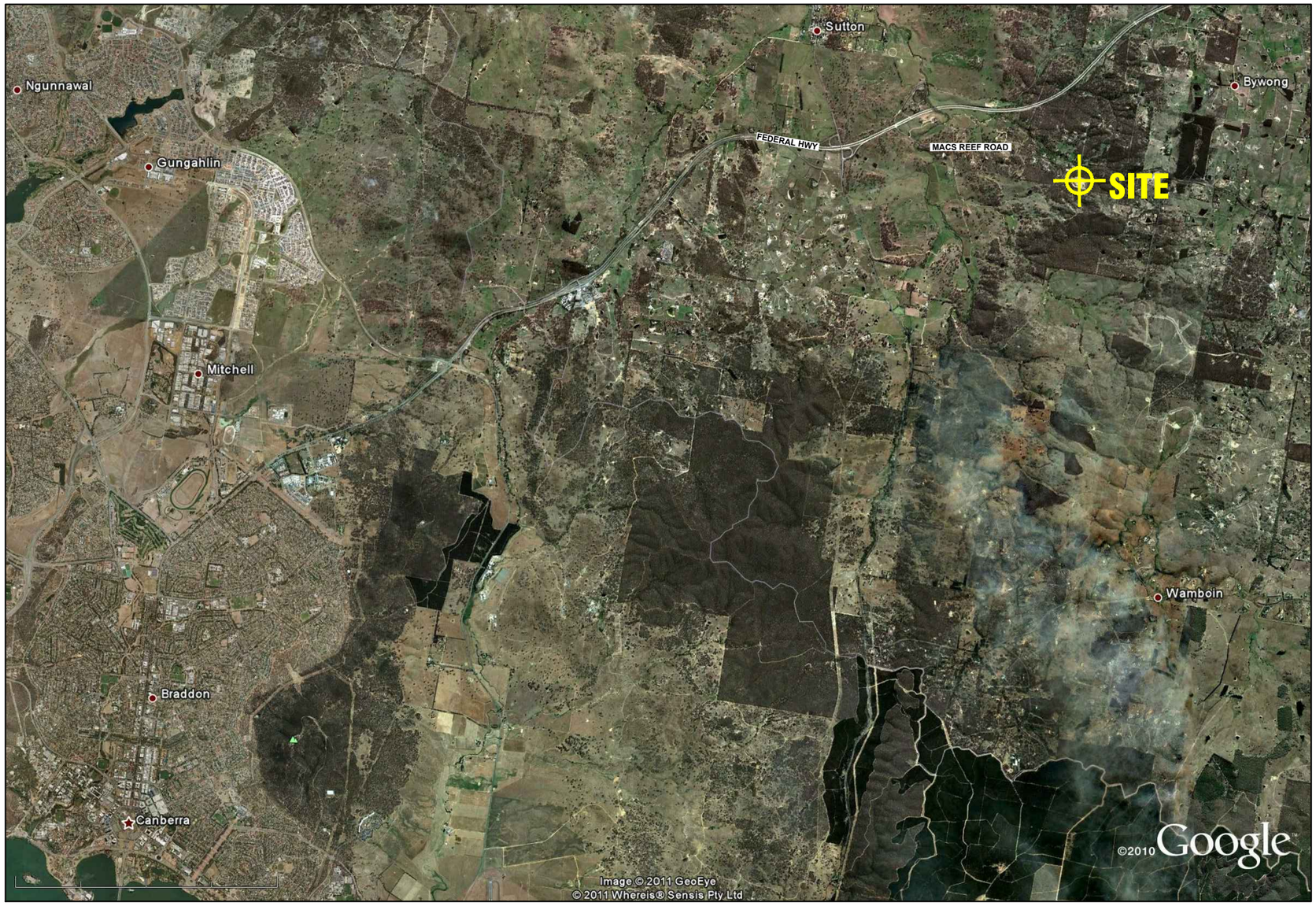
Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

Appendix A
Figures

Soil and Water Management Plan
Macs Reef Road, Bywong, NSW





Aerial image source: Google Earth Pro 2011
Aerial image ©: GeoEye 2011

revision	description	drawn	approved	date

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SCALE 1:80000 (A3) METRES

drawn	CGT
approved	
date	06.12.2011
scale	AS SHOWN
original size	

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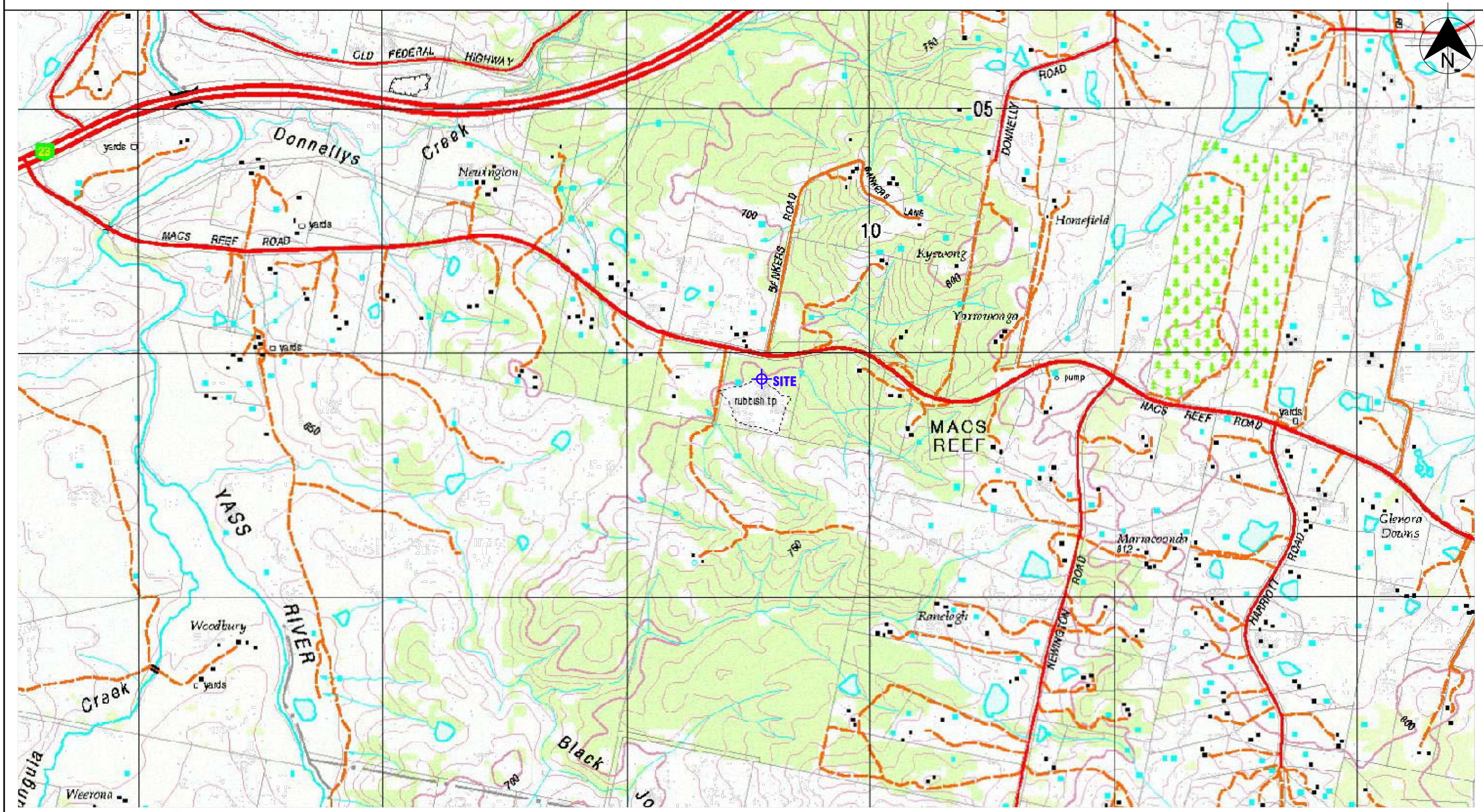
client: PALERANG COUNCIL - ENVIRONMENTAL PROPERTY SERVICES

project: SOIL AND WATER MANAGEMENT PLAN
MACS REEF WASTE TRANSFER STATION, MACS REEF ROAD, BYWONG,NSW

title: SITE LOCALITY PLAN

job no: ENAUBRAD01155AA-D01

figure no: FIGURE 1



Approx Scale 1:15717 1km

Source - NSW Department of Lands SIX Viewer © six.nsw.gov.au

- Current State-wide topographic
- NSW Regional imagery (Med-High resolution) - © Lands 2008

revision	description	drawn	approved	date

0 200 400 600 800 1,000
SCALE 1:20000 (A3) METRES

drawn	CGT
approved	
date	06.12.2011
scale	AS SHOWN
original size	

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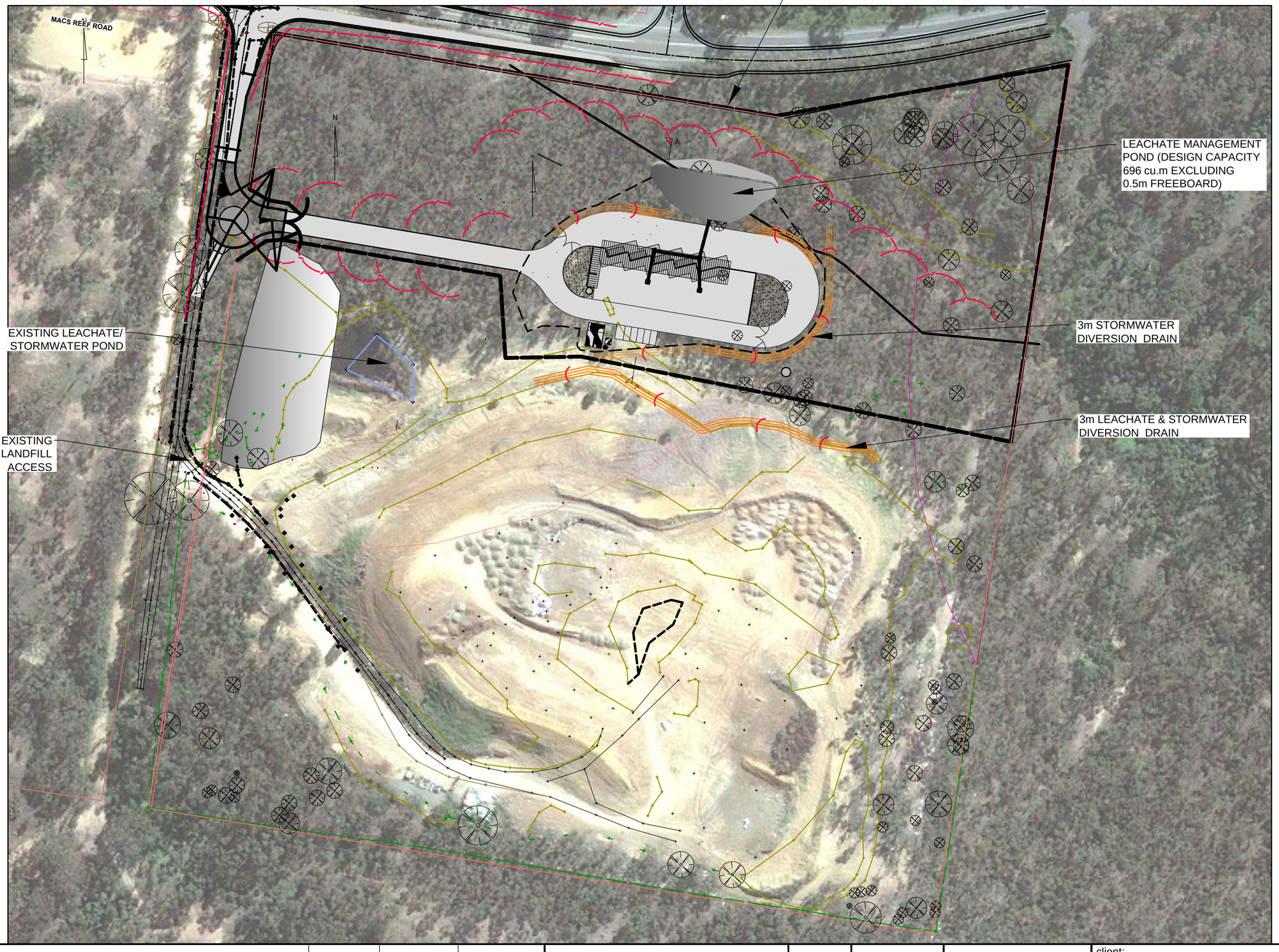
project: SOIL AND WATER MANAGEMENT PLAN
MACS REEF WASTE TRANSFER STATION, MACS REEF ROAD, BYWONG,NSW

title: SURROUNDING TOPOGRAPHICAL INFORMATION

job no: ENAUBRAD01155AA-D01

figure no: FIGURE 2



N

LEGEND

- FLEXIBLE PAVEMENT
- RIGID PAVEMENT
- GRASSED SURFACE

PROPOSED CONSTRUCTION PLAN SOURCE:

QUADRO AUSTRALIA Pty Ltd
Plan No: DA
Project Ref: 110013

revision	description	drawn	approved	date

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SCALE 1:1500 (A3) METRES

drawn	CGT
approved	
date	06.12.2011
scale	AS SHOWN
original size	

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client: PALERANG COUNCIL - ENVIRONMENTAL PROPERTY SERVICES

project: SOIL AND WATER MANAGEMENT PLAN
MACS REEF WASTE TRANSFER STATION, MACS REEF ROAD, BYWONG,NSW

title: PROPOSED WTS LAYOUT PLAN

job no: ENAUBRAD01155AA-D01

figure no: FIGURE 3

LEGEND

- FLEXIBLE PAVEMENT
- RIGID PAVEMENT
- GRASSED SURFACE

PROPOSED CONSTRUCTION PLAN SOURCE:

QUADRO AUSTRALIA Pty Ltd

Plan No: DA

Project Ref: 110013

revision	description	drawn	approved	date

0 15 30 45 60 75

SCALE 1:1500 (A3) METRES

drawn	CGT
approved	
date	06.12.2011
scale	AS SHOWN
original size	

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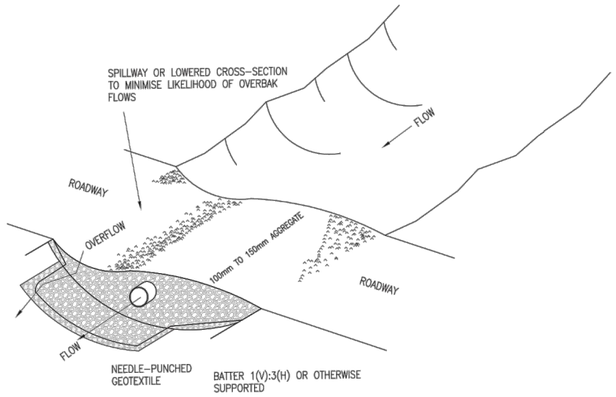
project: SOIL AND WATER MANAGEMENT PLAN
MACS REEF WASTE TRANSFER STATION, MACS REEF ROAD, BYWONG,NSW

title: DETAILED PROPOSED CONSTRUCTION PLAN

job no: ENAUBRAD01155AA-D01

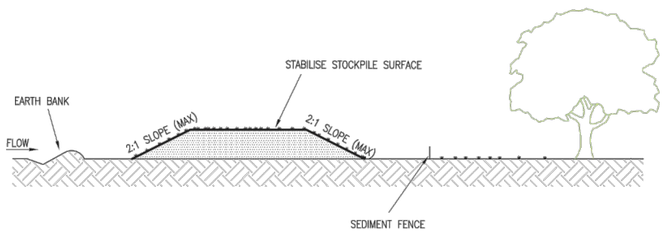
figure no: FIGURE 4



PERMANENT WATERWAY CROSSING SD 5-1

NOTES

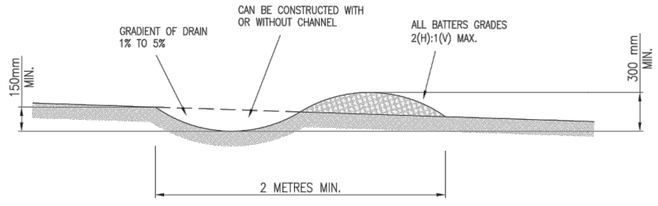
1. PROHIBIT ALL TRAFFIC UNTIL THE ACCESS WAY IS CONSTRUCTED.
2. STRIP ANY TOPSOIL AND PLACE A NEEDLE-PUNCHED TEXTILE OVER THE BASE OF THE CROSSING.
3. PLACE CLEAN, RIGID, NON POLLUTING AGGREGATE OR GRAVEL IN THE 100mm TO 150mm SIZE CLASS OVER THE FABRIC TO A MINIMUM DEPTH OF 200mm.
4. PROVIDE A 3-METRE WIDE CARRIAGEWAY WITH SUFFICIENT LENGTH OF CULVERT PIPE TO ALLOW LESS THAN A 3(H):1(V) SLOPE ON SIDE BATTERS.
5. INSTALL A LOWER SECTION TO ACT AS AN EMERGENCY SPILLWAY IN GREATER THAN DESIGN STORM EVENTS.
6. ENSURE THAT CULVERT OUTLETS EXTEND BEYOND THE TOE OF THE FILL EMBANKMENTS



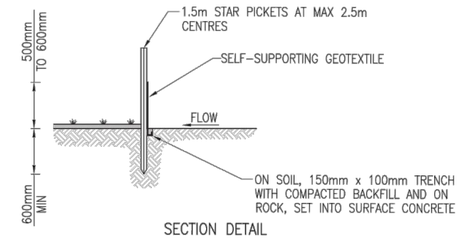
STOCKPILES (SD 4-1)

NOTES

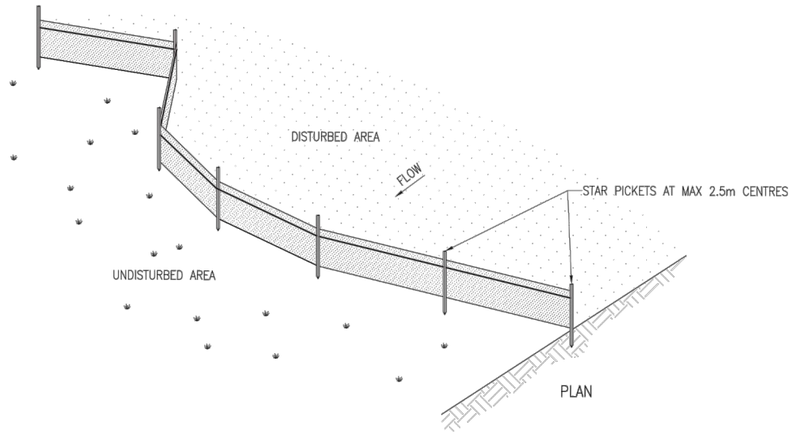
1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2 METRES DOWNSLOPE.



CLEAN WATER DIVERSION (LOW FLOW) SD 5-5



SECTION DETAIL



PLAN

20m MAX
(UNLESS STATED OTHERWISE BY SWMP/ESCP)

SEDIMENT FENCE SD 6-8

NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50L/SEC IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5m LONG STAR PICKETS INTO THE GROUND AT 2.5m INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH THE WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

PLAN SOURCE:
NORTHROP, DETAILS SHEET, DWG No.C03, 10.06.2011

revision	description	drawn	approved	date

drawn	CGT
approved	
date	14.02.2012
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project: MACS REEF WASTE TRANSFER STATION
MACS REEF ROAD, BYWONG,NSW

title: ENVIRONMENTAL DESIGN DETAIL

job no: ENAUBRAD01155AA-D02

figure no: FIGURE 1