ENVIRONMENTAL MANAGEMENT PLAN

EXTRACTIVE INDUSTRY AT LOT 2 DP 748820
311 OLD TELEGRAPH ROAD, MAROOTA

PREPARED FOR PF FORMATION

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DISTRIBUTION LIST AND REVISIONS

DISTRIBUTION OF EMP

LOCATION	RESPONSIBLE PERSONNEL	NUMBER OF COPIES
PF Formation, 1774 Wisemans Ferry Road, Maroota, NSW 2756	Joshua Graham, Joint Managing Director and Environmental Manager; Luke Graham, Joint Managing Director and Quarry Manager.	1 electronic pdf copy
PF Formation, 1774 Wisemans Ferry Road, Maroota, NSW 2756	Peter Watt, Quarry Manager	1 electronic pdf copy
Hornsby Shire Council	Rod Pickles or Cassandra Williams	1 electronic pdf copy
Maroota	Maroota Residents Community Committee if required	Electronic pdf copies if required
Environmental Planning Pty Ltd, PO Box 6443 Silverwater, NSW 1811	Bruce Adcock	Master electronic copy

REVISIONS OF EMP

REVISION No.	ISSUE DATE	DESCRIPTION	RESPONSIBLE PERSON	APPROVAL
0	February 2011	Revised EMP issued	Bruce Adcock	Peter Cummins, General Manager
1	September 2012	Attachment 7 replaced with Pollution Incident Response Management Plan. Monitoring reports included in AEMPs.	Joshua Graham Bruce Adcock	Peter Cummins, General Manager
2	August 2013	Single occurrence checklist deleted plus minor edits.	Bruce Adcock	Peter Cummins, General Manager
3	May 2017	Updated with modified Development Consent 342/98F conditions. Updated Pollution Incident Response Management Plan. Revised rehabilitation plans. Minor edits.	Bruce Adcock Joshua Graham	Joshua Graham, Joint Managing Director and Environmental Manager
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1. Aims of Environmental Management Plan

The aims of this Environmental Management Plan (EMP) are to ensure that*:*

- environmental effects of the site operations are identified.
- conditions of Development Consent No. 342/98F including any modifications and Environment Protection Licence No. 10357 licence requirements including any variations for the site are specified.
- environmental controls to be implemented are specified.
- a monitoring program is specified and implemented.
- responsible staff, target dates and reporting protocols are specified.
- requirements of all relevant environmental NSW legislation are complied with.
- PF Formation environmental policies, procedures and guidelines are implemented.

2. General Description of Site and Operations

2.1 Description of Site

Lot 2 DP 748820 at 311 Old Telegraph Road, Maroota is an irregular shaped lot of 30.7 hectares located on the north side of the road near the intersection with Old Northern Road. The land is located east of the Maroota Ridge which is composed of sandstone terrain with steep ridges and gullies. The site geology is weathered Hawkesbury sandstone underlain by shale. Within the land surface of the site elevations range from 144 metres to 200 metres AHD. The sandstone within both the eastern and western precincts of the land has been partially extracted and processed for sand. The eastern precinct also has native bushland covering varied topography.

Marramarra National Park is located east and north of the land and other land uses in the Maroota area include extractive industry, rural residential development and market gardens. The land is located within the upper catchment of Coopers Creek which drains to the Hawkesbury River approximately 4km to the east. Annual rainfall in the Maroota area averages 885mm.

The land is also known as Pit 4 by PF Formation. An office and amenities shed with adjacent staff and visitor parking are located near the site entrance off Old Telegraph Road. Toilet facilities are provided in the amenities shed for the workforce. A power room, electrical board, cyclone and power screens used for processing sand are located east of the amenities shed within the western extraction area or precinct. Temporary internal access tracks, haul roads, loading and service areas, stockpiles, many internally draining sediment ponds and a large pond for recycled water storage are located within the western extraction area. Hornsby Shire Council collects garbage from the site on a weekly basis. Other recyclable wastes (for example, metals and paper) are transferred by road to PF Formation's main head office and operational site at 1774 Wisemans Ferry Road, Maroota.

Figure 1 provides an aerial view of Lot 2 DP 748820 and the surrounding area with site boundaries shown in red. The western extraction area is shown as the mainly white area north-east of Old Telegraph Road. Extraction commenced in the eastern extraction area in 2011. Figure 2 provides a view of the processing plant within Lot 2 DP 748820 taken in April 2017 from near the site entrance. Figures 3 and 4 taken in April 2017 provide views of the eastern and western extraction precincts.

A landscaped mound within the site along the western extraction area and parallel to Old Telegraph Road limits views in the site. Another landscaped mound is located near the site entrance and along the northern boundary of the western extraction area. The closest occupied dwelling is located approximately 50 metres north of the site entrance. The site can also be viewed from some dwellings located along Old Telegraph Road and Hart Place located approximately 1.1 km to the south-east.

Figure 1 Aerial View of Lot 2 DP 748820 and Surrounds

Source: Landair Surveys December 2016

Figure 2 Existing Processing Plant Located on Lot 2 DP 748820

Figure 3 View of Eastern Extraction Precinct

Figure 4 View of Western Extraction Precinct

Two threatened flora species, the shrubs *Tetratheca glandulosa* and *Darwinia biflora* occur on the land and extraction areas were adjusted to conserve populations of these species. No archaeological sites occur on the land. A licensed groundwater production bore and three groundwater monitoring wells are located within the land.

2.2 Site Operations

The site operations area located mainly within the western precinct is used for sand and clay extraction and on-site processing in accordance with Hornsby Shire Council's modified development consent No. 342/98F conditions and Environment Protection Licence No. 10357 varied requirements. The modified development consent permits for the staged extraction of material and rehabilitation while there are approved extraction areas in Maroota and while quarry material in the Maroota area is available for processing. All fill material imported into the site must be Virgin Excavated Natural Material (VENM).

Approximately 11.6 hectares of the land has development consent for the extraction and processing of sand and clay which commenced in 2001 by Maroota Mining Pty Ltd. On 5 June 2009 Etra Pty Ltd trading as PF Formation took over ownership of the land and extractive industry operations for the site. Operational areas include the western extraction precinct (nearly all disturbed by operations) divided by two gullies and tributaries of Coopers Creek from the eastern extraction precinct in which operations commenced in 2011. The maximum extraction depth in both precincts is 160 metres AHD. The site extraction areas will be progressively rehabilitated for agricultural uses in the western precinct and with bushland in the eastern precinct. A previously cleared area of 1.4 hectares east of a tributary of Coopers Creek and near the western extraction precinct was the first priority for bushland rehabilitation.

The Environmental Impact Statement (June 1998) for the project estimated that between 2.9 and 3.1 million tonnes of material would be extracted from the site at the rate of 250,000 tonnes per annum over a period of 15 years terminating in 2014. An estimated 500,000 tonnes of material was extracted from the site up to mid-2010 and another 2,500,000 tonnes of material will be extracted from mid-2010 into the future plus material from other approved extraction areas in the Maroota area. Since 2001 extraction rates have been less than the approved production rate of 250,000 tonnes per year.

Extraction will be generally carried out in two stages from east to west and progressively backfilled with overburden including up to 30% of waste excavated material in the form of "boulies" (large boulders) and silt. The extraction areas will be reshaped and contoured with 1:3 batters and stockpiled topsoil will be placed on top and then progressively revegetated. Completion of extraction and progressive rehabilitation in the eastern precinct will be the first stage followed by progressive rehabilitation in the western precinct. The processing plant area will be maintained while there are approved extraction areas in Maroota and while quarry material is available for processing.

The extraction operation uses bulldozers, a mobile scalping machine, front end loaders and crusher to rip and excavate friable sandstone for transport to either an on-site fixed wash plant or mobile dry screening plant. Processing operations within the wet plant involve dry screening of the extracted material followed by washing to produce coarse and fine sand products. Clay and silt fines are pumped in suspension to a settling pond and the water is recycled within the wash plant.

Surface water is captured in a series of tailings ponds and sediment dams on site and directed to clean water dams for reuse in the processing of sand. The tailings ponds are progressively capped and rehabilitated as they fill with silt derived from the process water. Rainfall runoff is lost either by infiltration, evaporation or consumption in processing the sand. No water is drawn from Coopers Creek for the process.

Operating hours are between 7am and 5pm Monday to Friday, 7am to 1pm Saturday and at no time on Sundays and Public Holidays. No more than an average of 35 truck loads of material are removed from the site each work day averaged over one month.

The workforce on-site will generally include 2 or 3 persons operating a bulldozer, front end loader with weigh cell, screening plant, power screen (rinsing unit), radial conveyors, pumps and water cart. These vehicles, plant and equipment are fuelled on-site from a 26,500 litre storage vessel

complying with AS 1940-2004 *The storage and handling of flammable and combustible liquids*. No other bulk storage of fuel or hazardous materials takes place within the site. Administration of the site is carried out from PF Formation's main processing plant and offices located on Patricia Fay Drive at 1774 Wisemans Ferry Road, Maroota approximately 2 km south-west of the site. PF Formation's all diesel vehicle fleet is equipped with two-way and UHF radio for communications. The workforce also uses mobile phones although the reception in the area is poor.

2.3 Responsible Personnel

The responsible persons for operation of the site are the Joint Managing Directors assisted by the Quarry Manager as required. All these personnel are located at 1774 Wisemans Ferry Road, Maroota and as required part time on-site. Their names and contact details are listed below.

Joint Managing Director and *Environmental Manager* Mr Joshua Graham
Phone No. (02) 4566 8257
Mobile Phone No. 0418 439 923
Email josh@pfformation.com.au

Joint Managing Director and *Quarry Manager* Mr Luke Graham
Phone No. (02) 4566 8257
Mobile Phone No. 0407 415 413
Email luke@pfformation.com.au

Quarry Manager Mr Peter Watt (alternative Mr Luke Graham)
Phone No. (02) 4566 8314
Mobile Phone No. 0418 279 624
Email peterw@pfformation.com.au

The responsible personnel will be assisted as required by specialist contractors or consultants engaged by PF Formation to collect water samples quarterly, conduct noise monitoring quarterly, check extraction depths monthly and complete the monthly site inspections and checklists.

3. Environmental Management System

3.1 Environmental Policies

PF Formation's environmental goal is to carry out its extractive industry operations in a legally compliant and environmentally responsible manner. The goal is supported by the environmental operating philosophy of PF Formation being committed to continuous improvement in extractive industry technology and protection of the environment. The environmental goal is reinforced by PF Formation's work, health, safety and environmental policies which are as follows.

The management of PF Formation is committed to:

- Maintaining a safe and healthy place to work.
- Giving each employee and contractors as much responsibility as possible for the safe performance of their job.
- Providing safe plant, machinery and equipment.
- Reducing, eliminating and controlling risks to the health and safety of employees and contractors.
- Having employees and contractors work in a responsible manner and minimise environmental pollution particularly noise and dust.
- Encouraging employees and contractors to report environmental pollution, safety hazards and unsafe acts by others.

The work, health, safety and environmental policies will be met by operating and managing the plant and processing all clay and sand product with minimal environmental impact, while being a responsible corporate citizen and meeting all relevant legislative requirements. The aims of the work, health, safety and environmental policies are to ensure that:

- conditions of approval in the Shire of Hornsby modified development consent and EPA licence requirements for the site are implemented and complied with.

- the requirements of all relevant NSW environmental legislation are complied with.
- the site is operated and managed to minimise any adverse impacts and pollution on the surrounding environment and community.

PF Formation and all of its employees and suppliers have legal obligations to ensure the plant operates in an environmentally sustainable manner now and in the future. PF Formation has operated extractive industries in the Maroota area since 1983 with no significant environmental impact or harm and has successfully rehabilitated land previously used for extractive industry.

3.2 Ecologically Sustainable Development

The principles of ecologically sustainable development as detailed in the *Environmental Planning and Assessment Act, 1979* and a response in relation to the operations and environmental policies for the site follow and in partial fulfilment of condition 90 of the development consent No. 342/98F.

(a) The precautionary principle - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options.

There are no known threats of serious or irreversible environmental damage associated with the site; hence lack of full scientific certainty has not been used as a reason for postponing any of the safeguard measures outlined in the EIS, development consent conditions and EPA licence requirements to prevent environmental degradation. Site operations have followed the precautionary principle by ensuring that the environmental risks have been considered and relevant safeguards implemented to reduce any uncertainties and to avoid serious or irreversible damage to the environment (for example, use of monitoring, landscaped mounds, setbacks from site boundaries and Coopers Creek tributaries, maximum extraction depths, rehabilitation of extraction areas, and protection of *Tetratheca glandulosa* and *Darwinia biflora* habitat). The Maroota sand deposit including the land has been identified as a major source of sand within the Sydney region and this has been reinforced by the Department of Planning and Environment with the provisions of *Sydney Regional Environmental Plan No. 9 Extractive Industry (No. 2 - 1995)*.

(b) Inter-generational equity - namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

Site operations have been designed for future needs with the capacity to meet expected extraction rates in the Maroota area for at least the next 25 years. Progressive rehabilitation of the site will take place for the next generation and future uses including agricultural land uses in the western precinct and bushland in the eastern precinct. The health, diversity and productivity of the environment will be maintained for the benefit of future generations with implementation of the safeguards, development consent conditions and EPA licence requirements. The project will continue to contribute to the local and regional economy and have medium term benefits for future generations by providing a secure sand and clay resource close to the metropolitan Sydney market with acceptable environmental impact.

(c) Conservation of biological diversity and ecological integrity namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

The project will help conserve biological diversity and ecological integrity by retaining existing areas of *Tetratheca glandulosa* and *Darwinia biflora* habitat. Site rehabilitation will conserve biological diversity and ecological integrity with use of locally indigenous species in rehabilitation and revegetation of the site. Other mitigation measures including monitoring will be implemented to minimise any adverse impacts on soils, waterways, groundwater, water and air quality, noise and vibration, landscape and visual qualities, and the nearby Maroota rural community. The water cycle for the site is self-enclosed.

(d) Improved valuation, pricing and incentive mechanisms namely, that environmental factors should be included in the valuation of assets and services, such as:

(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The cumulative impacts of the site operations will be beneficial and manageable in the medium term. However, while prices for natural resources should be set to recover the full social and environmental costs for their use, many environmental values cannot be set in monetary terms. Nevertheless, the site's extractive resources will provide beneficial uses and economic benefits to the community with supply of product that is essential to the viability of the Sydney metropolitan building and construction industries. An on-site EMP will be continued to monitor any impacts and provide corrective actions. After completion of extraction the area will be rehabilitated for agricultural use and bushland to improve valuation of the site. Waste generation from the site will continue to be managed responsibly. In addition, based on extraction rates Section 94 contributions will be paid to Council for the maintenance and improvement of main roads in the Maroota area. The value placed on environmental resources in and around the site is evident in the extent of previous environmental investigations, planning and design of impact mitigation measures to prevent irreversible damage of those resources. PF Formation currently undertakes environmental monitoring of the existing development and this will continue for the project life.

3.3 Legislation Applicable to Site

The requirements of the following NSW legislation and their associated regulations directly apply to the site and will be complied with:

- *Biodiversity Conservation Act, 2016*
- *Environmental Planning and Assessment Act, 1979*
- *Heritage Act, 1977*
- *National Parks and Wildlife Act, 1974*
- *Noxious Weeds Act, 1993*
- *Protection of the Environment Operations Act, 1997*
- *Rural Fires Act, 1997*
- *Soil Conservation Act, 1938*
- *Threatened Species Conservation Act, 1995*
- *Waste Avoidance and Resource Recovery Act, 2001*
- *Water Management Act, 2000*
- *Work Health and Safety Act, 2011*
- *Work Health and Safety (Mines and Petroleum Sites) Act 2013.*

In addition, the site is subject to the following planning and legislative controls.

- *Environment Protection and Biodiversity Conservation Act, 1999* (Commonwealth)
- *Sydney Regional Environmental Plan No. 20 Hawkesbury-Nepean River (No. 2 - 1997)*
- *Sydney Regional Environmental Plan No.9 Extractive Industry (No. 2 - 1995)*
- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*
- *Hornsby Local Environmental Plan 2013*
- *Hornsby Development Control Plan 2013 – Part 2 Rural - Section 2.5 Extractive Industries*
- *Hornsby Shire Council Section 94A Development Contributions Plan 2014-2024*
- *Work Health and Safety Regulation 2011*
- *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.*

3.4 Environmental Impact Assessment and Implementation

The environmental impacts of the project were considered during preparation of the *Environmental Impact Statement, Sand Extraction, Lot 2 DP 748820, Old Telegraph Road, Maroota* (June 1998, Nexus Environmental Planning). Approval for operations of the site was granted on 1 July 1999 via conditional development consent No. 342/98 which has been subsequently modified including a Land and Environment Court Order.

An up to date copy of development consent No. 342/98F including all Section 96 modifications is provided in Attachment 1. Development Consent Plans CH2677G1 dated 1 May 1996, MP-01B dated April 1999, MP-02B dated January 1999, MP-03C dated July 2000, Drawing No. 8703 sheet 1A dated July 2000 and a Plan dated May 2004 Sheet 1 of 3 are provided in Attachment 2. The Environment Protection Licence No. 10357 for the site as at 11 May 2015 is provided in Attachment 3.

The EMP is a requirement of development consent number 90 to ensure all environmental controls developed during preparation of the EIS and listed in the development consent and EPA licence for the site are implemented during site operations and rehabilitation.

3.5 Amendments and Variations to the EMP

Two EMPs (*Maroota Sand and Clay Extraction, Environmental Management Plan*, June 2001, International Environmental Consultants Pty Ltd; and *Annual Environmental Management Report for Maroota Miming Pty Limited*, May 2005, South West Planning) for the site were previously submitted to Hornsby Shire Council. On behalf of PF Formation another EMP was submitted to Hornsby Shire Council in February 2011 and revised in September 2012 and August 2013. This revised EMP is based on the best available information for the site as at May 2017.

The requirements of this EMP may need to be amended during operations of the site. This could be, for example, because of issues raised by neighbouring residents, changes in legislation and associated regulations, the development consent or EPA licence. The need for variations may also occur as site operations progress and specific circumstances vary from those envisaged during the formulation of the safeguards in the EIS and the modified development consent for the site.

The procedure for amending the EMP, where requirements are considered not applicable, or additional requirements are needed, is a formal process in order to ensure that the environmental implications for any amendments are acceptable. The procedure outlined below will maintain the integrity of the EMP and ensure that any amendments are approved by the Environmental Manager.

For all amendments or variations to the EMP, the Environmental Manager will be notified, the reasons for the amendment explained and approval sought. Following approval by the Environmental Manager with notification to the neighbouring residents and Hornsby Shire Council, the amendment together with the responsibility and timing will be issued by the Environmental Manager and documented in Section 8.3. Any revisions will be referenced on page *iii* of the EMP and new pages issued to those on the distribution list. The revised contents of Section 8.3 will then be treated the same as the requirements of Section 8.2 in relation to checking procedures.

4. Safeguards

Safeguards and/or environmental mitigation measures were developed during the assessment of impacts on the environment during preparation of the EIS, issuing of the development consent and EPA licence. The safeguards generally follow the format of development consent No. 342/98F including Section 96 modifications plus other requirements. The safeguards are summarised in Section 8 - Schedule of Environmental Actions for the following key issues and activities.

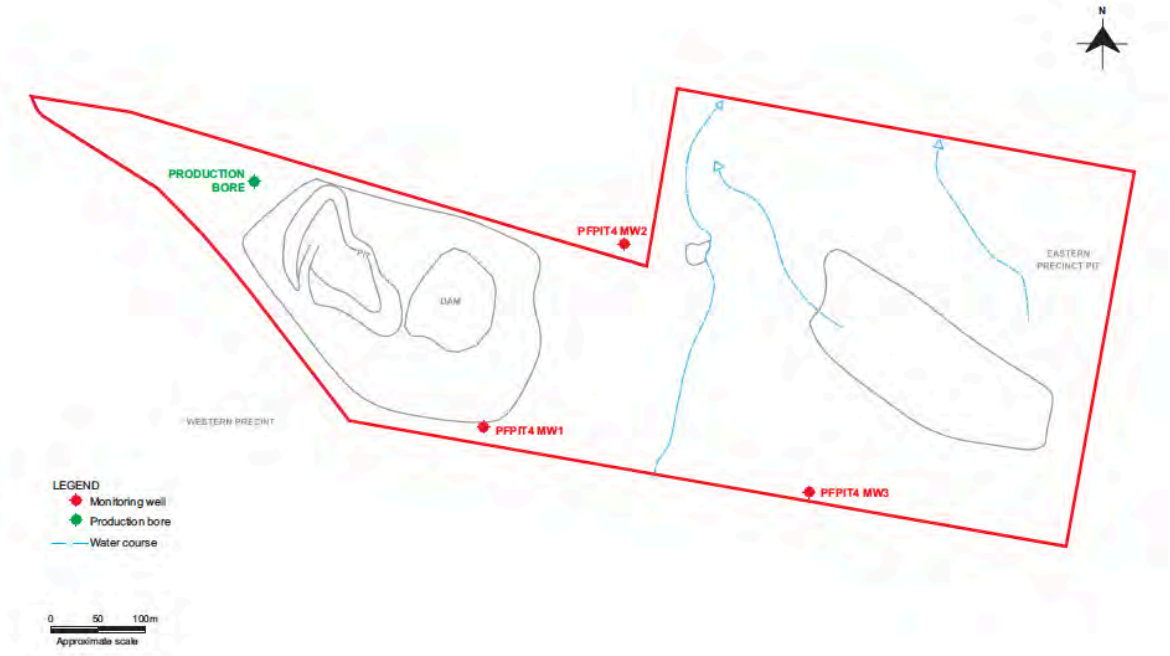
- Environment Protection Authority (EPA) requirements.
- National Parks and Wildlife Service requirements.
- Planning requirements.
- DL&WC (now Department of Primary Industries) requirements.
- Environment requirements.

- Sediment and erosion control requirements.
- Water quality requirements.
- Waste management requirements.
- Rehabilitation requirements.
- Air quality requirements.
- Monitoring and management requirements.
- Engineering requirements.
- Contributions requirements.
- Other operational requirements.

5. Environmental Monitoring

The objectives and/or requirements for the monitoring programme are detailed below for the key issues and activities for the site. The results of the monitoring programme and audits will be included in Annual Environmental Management Plans (AEMPs). The location of water quality and groundwater monitoring sites is shown in Figure 5. In addition, an automatic weather station located at the weighbridge on Patricia Fay Drive, Maroota has monitored temperature, wind speed and direction, rainfall and barometric pressure since December 1999. The weather station records are available for inspection at the weighbridge.

Figure 5 Location of Water Monitoring Sites



Operational

The EIS provided information on a maximum production rate of 250,000 tonnes/annum to a maximum extraction depth of 160 metres AHD in both precincts. Total extraction of weathered Hawkesbury sandstone in the western precinct has been an estimated 500,000 tonnes in the last 15 years or about 20% of the approved rate. The EPA licence provides for a production rate of between 100,000 and 500,000 tonnes/annum. Monitoring of Section 94 Contributions paid to Hornsby Shire Council by the Environmental Manager will establish that annual production rates are less than 250,000 tonnes/annum.

Operating hours are limited to between 0700 hours and 1700 hours Monday to Friday and 0700 hours to 1300 hours on Saturday and at no time on Sundays and Public Holidays.

The Environmental Manager and Quarry Manager will monitor and ensure operating hours are adhered to and that the maximum extraction depth of 160 metres AHD is not exceeded. Survey points have been established in the pits as benchmarks to determine maximum extraction depths.

Traffic

Daily records will be maintained by the weighbridge operator at Patricia Fay Drive, Maroota recording each truck movement from the site in terms of date, time, vehicle registration number, type of material, mass/tonnage and job number. Transport of material is limited to 35 truck loads a day averaged over one month. Monthly monitoring of production records held at 1774 Wisemans Ferry Road, Maroota by the Environmental Manager will establish the number of daily truck loads.

Soil and Water Management

All surface water run-off from site operations will be contained within the clean water pond, sediment ponds and tailings ponds. Rainfall will discharge over the disturbed and undisturbed portions of Coopers Creek catchment. No water will be drawn from Coopers Creek and where possible minimal use of groundwater from the production bore. Monitoring of site operations by the Environmental Manager and Quarry Manager will establish that no sediment laden run-off water (<50mg/litre non-filterable residues) reaches Coopers Creek. Each quarter the Environmental Manager will collect a water quality sample from an on-site tributary of Coopers Creek for laboratory analyses of pH, turbidity, oil and grease, total suspended solids and conductivity.

A soil and water management plan for the eastern precinct is provided in Attachment 10. In addition, the general principles of soil and water management in *Managing Urban Stormwater: Soils and Construction* (NSW Government, 2004) are implemented for both the eastern and western precincts.

Groundwater quality and depth of groundwater has been continuously monitored in the Hawkesbury Sandstone aquifer below the site by contractors since October 1997. Between January 1999 and June 2009 groundwater quality was monitored only for field parameters such as pH, Electrical Conductivity, Temperature and Redox potential. The revised analytical list which was discussed and agreed upon with the NSW Office of Water includes:

- pH, Electrical Conductivity and Total Dissolved Solids;
- Calcium, Magnesium, Sodium and Potassium;
- Chloride, Sulphate and Bicarbonate; and
- Oil and Grease.

The Environmental Manager will ensure that groundwater is automatically monitored and reported annually in monitoring wells PFPIT4 MW1, PFPIT4 MW2 and PFPITW MW3. Testing for the above analytes will be at a NATA registered laboratory. The results will be provided to the NSW Office of Water.

The water management and groundwater results will be included in the AEMPs with full documentation held at 1774 Wisemans Ferry Road, Maroota and available for inspection.

Waste Management

The Environmental Manager will be responsible for monitoring all on-site waste management, ensuring that all waste disposal, recycling and reuse procedures are followed as shown in the Waste Management Plan in Attachment 8. No waste will be buried or burnt on site.

Rehabilitation

The site will be progressively rehabilitated in accordance with the revised rehabilitation management plans shown in Attachment 9. The maximum extraction depth is 160 metres AHD. The western precinct will be progressively rehabilitated for agricultural uses and for bushland in the eastern precinct. The rehabilitation progress will be monitored by the Environmental Manager and the results will be summarised for inclusion in the AEMPs. Full documentation will be held at 1774 Wisemans Ferry Road, Maroota and available for inspection.

Air Quality

The EPA does not require dust monitoring for the site although upper limit dust deposition rates should not exceed 4.0 grams/m^2/month. Dust deposition will be monitored monthly by a private contractor with a NATA registered laboratory via four dust deposition gauges located near other PF Formation quarries and Maroota Public School in the surrounding area. If required, a summary of the monthly results in accordance with AS/NZS 3580.10.1:2016 *Methods for sampling and analysis of ambient air. Method 10.1 - Determination of particulate matter – Deposited matter - Gravimetric*

method will be provided in the AEMPs. If publically available, additional analysis of TEOM rolling 24-hour average PM_{10} impacts at Maroota Public School from surrounding quarries (including the site) will be reported annually and included in the AEMPs. The Environmental Manager will be responsible for ensuring the air quality monitoring is completed by others with full documentation held at 1774 Wisemans Ferry Road, Maroota and available for inspection.

In addition, regular on-site checks will be made by the Environmental Manager that there is no visible dust blowing across the site on windy days; there are no visible continuous exhaust emissions on public lands for greater than 10 seconds; and that dust suppression techniques have been applied during operations including on-site watering, keeping stockpiles damp and using the installed sprinkler system to ensure the haul roads are kept moist constantly during dry weather.

Noise

The EPA licence requires noise monitoring for the site at two locations, at Old Telegraph Road with a $L_{Aeq\ (15\ minute)}$ noise limit of 42 dB(A) during the day, and at Hart Place, Maroota with a $L_{Aeq\ (15\ minute)}$ noise limit of 40 dB(A) during the day. Noise will be monitored at the two locations by the Environmental Manager for at least 15 minutes on one operating day each quarter using a calibrated noise meter and as specified in the EPA licence. Noise will be measured using AS 1055.1 - 1997 *Acoustics - Description and measurement of environmental noise. Part 1: General procedures*. Instrumentation is held at 1774 Wisemans Ferry Road, Maroota and monitoring equipment includes a Class 1 Svan Sound Level Meter and a Class 1 Svantek Acoustic Calibrator. Instructions are available for the use of the equipment and the Environmental Manager has been trained in their use. Full documentation and results will be held at 1774 Wisemans Ferry Road, Maroota and available for inspection. A summary of the quarterly results will be provided in the AEMPs.

Community and Complaints

One community meeting for the site was held by Maroota Mining Pty Ltd in July 2004. The Maroota Residents Community Committee is composed of residents, Council Managers, PF Formation employees and consultants and other NSW government representatives as required. Since PF Formation acquired the site in June 2009 the February 2011 EMP was discussed at the first Maroota Residents Community Committee meeting held on-site on 26 July 2011. At that meeting neighbouring residents and a Hornsby Shire Council representative confirmed that they were happy to have communication by residents calling PF Formation direct if there were any issues rather than formal annual meetings. It was agreed at the meeting that this action would meet the requirements of condition number 11 in development consent No. 342/98F.

PF Formation will contact the neighbouring residents by letter at least annually requesting them if there are any issues to resolve and to inform them of the AEMPs which are available on PF Formation's website at www.pfformation.com.au.

Community complaints will be monitored and procedures implemented by the Environmental Manager, Quarry Manager and Environmental Manager to rectify any problems. The Environmental Manager will maintain a register of complaints as provided in Attachment 6. The objective is to have nil complaints.

Environmental audits of the site, the EMP and its effectiveness and implementation may be completed as required. These audit reports would be confidential to PF Formation.

6. Monthly Site Assessments

Monthly site assessments will be completed on the listed environmental commitments. Environmental commitments completed during construction are included in Section 8.1. All environmental commitments and/or actions, responsibilities and their timing for implementation are summarised in Section 8.2 and detailed in Section 8.3 Environmental Checklist for Operations. After completion of the designated environmental commitments and/or operational actions listed in Section 8.3, the Environmental Manager or delegate is to sign off and date photocopies of the Environmental Commitments Summary Checklist provided in Section 8.2. Comments and references can be completed as required. The completed checklists will be held by the Environmental Manager at 1774 Wisemans Ferry Road, Maroota.

A number of site assessments on a monthly basis are required to be completed to assess the implementation and effectiveness of all actions specified in the Section 8.3 Environmental Checklist for Operations, as follows.

To ensure that all environmental commitments and controls are in place and are being implemented during operations they have been nominated as routine monthly site activities to be checked by the Environmental Manager. The monthly checklists will be accompanied by any comments, corrective actions (see below) and additional environmental requirements to ensure that the safeguard measures are achieved. In addition, quarterly noise and water quality monitoring by the Environmental Manager will be included in the monthly checklists as they are obtained.

In the event that any environmental commitment or action is not implemented by the required date or any action does not conform or is ineffective, a Corrective Action Request will be completed by the Environmental Manager and issued to the responsible person for implementation. A register of Corrective Action Requests will be kept in Attachment 4. A Corrective Action Request form is included in Attachment 5. The responsible person will respond to the person issuing the Corrective Action Request within seven days indicating what action will be carried out and a due date. The Environmental Manager will check that the corrective action has been fulfilled by the required date and sign off the completed Corrective Action Request form.

Any complaints received on site operations and associated corrective actions will be documented on the checklist and in the Register of Complaints in Attachment 6.

7. Responsibilities and Reporting

Environmental Manager (assisted by specialist contractors and consultants)

- ensure implementation and maintenance of environmental actions and controls as provided in the Environmental Checklist for Operations in Section 8.3.
- ensure that where relevant all Environmental Checklists are also completed, signed and dated including the Quarry Manager and are included in the AEMPs.
- maintain a register of all completed monthly Environmental Checklists provided in Section 8.2 and include them in the AEMPs.
- issue and follow up on Corrective Action Requests, complaints, non-conformances and observations.
- report on effectiveness of safeguard measures.
- address any environmental or community complaints made about the site.
- activate the Pollution Incident Response Management Plan as required (Attachment 7).
- ensure daily records are maintained by the weighbridge operator recording each truck movement from the site in terms of date, time, vehicle registration number, type of material, mass/tonnage and job number.
- ensure that AEMPs are completed and a copy is provided to Hornsby Shire Council.
- ensure that all site personnel are aware of their environmental responsibilities in the management and implementation of safeguard controls and actions.
- ensure that site assessments by the Quarry Manager are being carried out and reported.
- ensure that corrective and preventative actions rising from internal assessments or environmental audits are implemented.
- address any environmental or community complaints made about the site.
- keep the neighbouring residents and Hornsby Shire Council informed of site operations via amendments to the EMP, AEMPs and at any meetings.

Quarry Manager

- ensure implementation and maintenance of environmental actions and controls as indicated in the Environmental Checklist for Operations in Section 8.3.
- ensure that all site personnel are aware of their environmental responsibilities in the management and implementation of safeguard controls and actions.

8. Schedule of Environmental Actions

8.1 Completed Prior to Commencement of Works Commitments

Some conditions in development consent No. 342/98F were prior to commencement of works and have either been completed or current status as shown in the table below.

No.	Development Consent No. 342/98F Conditions	Status
1.	The proponent is to obtain all necessary operating licences and permits from all relevant public authorities including the Environment Protection Authority and the Department of Land & Water Conservation and details of which are to be submitted to Council prior to the commencement of on-site works.	Completed
2.	Prior to commencement of the quarry operations the proponent is to undertake the following:- 2.1 Construct all internal all weather surfaced access tracks with crossfall and associated table drains and lead out, designed to carry the extraction vehicle loading; 2.2 Provision of headwalls, scour protection and sedimentation traps for all drainage systems and leadouts mentioned in 2.1 above; 2.3 The provision of erosion and sedimentation control. Details to be shown on engineering plans and the devices to be established prior to the commencement of engineering works; 2.4 Provision of safety protection fencing and guard rail where vertical faces are proposed in the quarry area and adjacent to the access track.	 Completed Completed Completed Completed
3.	Prior to the commencement of extraction, the proponent shall: 3.1 Prepare and submit to Council for its endorsement, an Environmental Management Plan which addresses performance and management of the operation, including matters of sediment and erosion control, waste, rehabilitation (incorporating staging throughout the life of the consent), air quality and monitoring; 3.2 Lodge with Council a contract for a Rehabilitation Bond based on an amount per tonne of extracted material. The total of this amount will be sufficient to cover the cost rehabilitating the approved extraction area and other likely disturbed areas.	Annual EMPs submitted in 2001 and 2005. Lodged and accepted by Council in May 2010.
4.	A site contamination investigation report is to be submitted prior to the commencement of any works on the site. Should evidence of contaminated land be apparent, the Environment Management Plan shall detail how such material is to be remediated and/or disposed of to the satisfaction of Council and the Environment Protection Authority.	No site contamination investigation report has been sighted or received by PF Formation. Extraction since June 2009 has shown no evidence of any land contamination.
5.	Fencing is to be provided to separate extraction areas and the internal haul road from habitat areas to reduce potential impacts to native vegetation and the habitat it provides.	Completed
31.	Prior to the commencement of any extractive operations on the site, the following works will be required to have been undertaken to Council's satisfaction.	Completed works as per consent condition 31

No.	Development Consent No. 342/98F Conditions	Status
	(a) (i) installation of the earth mounding and the planting of screen vegetation within the setback area to Old Telegraph Road in accordance with the detail contained in drawing No. 1530 – MP03 Issue C, dated July 2000 by Scott Murray & Associates. (ii) construction of the haul road in accordance with drawing No. 8703 Sheets 1A and 2A of Lyle Marshall and Associates Pty Ltd dated July 2000 subject to that section of the haul road located between section C-C and the southern most point of the frontage of the site to Old Telegraph Road being lowered by 1 m in relation to existing surface levels.	amended by Land and Environment Court Order of 4 October 2000.
91.	Council's public road between the entrance to the extraction site and the northern intersection of Old Northern Road and Old Telegraph Road shall be constructed to the satisfaction of Baulkham Hills and Hornsby Shire Councils.	Completed
92.	The northern intersection of Old Northern Road and Old Telegraph Road, Maroota, shall be constructed of Type B intersection to the requirements of the Roads and Traffic Authority (RTA), Baulkham Hills Shire Council and Hornsby Shire Council.	Completed
93.	In the proposed intersection and public road, design and construction of pavement shall cater for both the existing traffic volumes and equivalent standard axle (ESA) loadings, allowing for reasonable growth for a period of 20 years, as well as the maximum permissible number of fully loaded design semi trailer vehicles for the life of the extraction industry.	Completed
94.	Access from Old Telegraph Road to the site and an internal haul road shall be constructed to Council's standard and the requirements of the Department of Land and Water Conservation.	Completed
95.	The proposed intersection and Old Telegraph Road design and internal haul road shall incorporate the following design constraints:- 95.1 The intersection, public road, internal road and associated works shall cater for all anticipated classes of vehicle and any turning manoeuvre. 95.2 Roads shall be designed and constructed as generally two-way with lane widths to be at least 3.0 m. Shoulders to be designed and constructed at least 1.0 m wide. 95.3 Verges, batters and table drains to be designed and constructed in accordance with common Austroads and Council design standards. Verge width and lateral clearances for road shoulder, road furniture and trees are to be at least 1.0 m clear of the outer edge of road shoulder. Maximum side slopes of batters to be designed and constructed to prevent vehicles from overturning. 95.4 Sight lines are to be at least the minimum given topographic and geometric considerations, horizontal and vertical alignment and maximum grade considerations in accordance with common Austroads and Council design standards. 95.5 Drainage details to ensure that pre-construction stormwater runoff patterns shall be the same as after construction. Table drains and culverts are to have a capacity of not less than the 20 year average recurrence interval (ARI) storm capacity. Longitudinal slopes of drains shall be designed to prevent scour and siltation. 95.6. All engineering works required by these conditions must be designed and constructed in accordance with: (a) Australian Rainfall and Run-Off 1987 and (b) Hornsby Shire Council's Civil Works, Design and Construction Specifications 1999	Completed

No.	Development Consent No. 342/98F Conditions	Status
	95.7 Embankments where required shall have maximum slope determined by nature of their being cut or fill and the soil used. Creation of batters for support on roadsides as necessary and submission of a copy of the registered document of transfer to Council immediately after construction of such batters. 95.8 Accurate discovery and location of all services and marked on the plans and proposals to adjustments to same as required with the written authority of the utility or service provider. 95.9 Access into the lot affected by boundary subdivision is to be shown on the Engineering plans and is to be constructed to Council's satisfaction. 95.10 In order to incorporate biodiversity issues of roadsides, design and construction of all works are to be in accordance with Council's "Management Plan for Rural Roads". 95.11 In order to provide safety, appropriate signage, warning, traffic control and safety measures are to be installed in Old Northern Road and Old Telegraph Road on all approaches prior to work commencement. Such measures shall be signposted and illuminated with flashing beacons between sunset and sunrise for the duration of the road works. Signage advising of altered traffic conditions shall be installed for a reasonable time after the completion of works. Such measures are to be proposed on Engineering plans for construction in accordance with AS 1742.3 - 1996 and the relevant SAA HB81 Handbooks.	Completed
96.	In order to ensure adequate safety, a proposal shall be prepared by a suitably qualified Traffic Engineer for agreement by the RTA in respect of maximum speed, safety and advisory signposting and line marking given the proposed alignment and geometry of the works. Such report is to be lodged with the Construction Certificate. Subsequently, construction of approved signage and line marking to RTA and Council standards.	Completed
98.	A Construction Certificate with Engineering plans is to be lodged for examination. The plans are to be submitted using Council's Civil Works Specifications. This information shall include the following:- 98.1 Design constraints from abovementioned conditions. 98.2 Any Construction Certificate that may be issued in association with this development consent must also ensure that any proposed plans and designs are generally consistent (in terms of site layout, site levels, building location, size, external configuration and appearance) with Development Application plans as already determined. 98.3 Previous written consent from RTA and Baulkham Hills Shire Council, referring to relevant plan numbers, stating there is no objection to commencement of construction and extraction activities. 98.4 Plans of longitudinal sections, cross sections, drainage sections, drainage catchment plans and soil and water management plans. 98.5 Position of all lot boundaries, and all existing and proposed features and structures. 98.6 Chainages, existing and proposed topography, limits of work, bench marks and Datum. 98.7 A check including a report by a suitably qualified Civil Engineer of advisory speed capacities given the final alignment. 98.8 Four sets of Al or A2 size sheets suitable for black and white copying. Plans to be clearly set out so the works may be understood. Logical collection of information on sheets in order to avoid onerous effort in cross referencing.	Completed

No.	Development Consent No. 342/98F Conditions	Status
103.	A works-as-executed plan prepared by a suitably qualified and certified Chartered Civil Engineer shall be submitted on the completion of the works showing:- 103.1 The levels and datum for all survey marks found or placed 103.2 Where the works-as-executed plans differ from the approved plans, the information shown on the plan is to be neatly crossed out and the new information substituted in such a manner that it can be clearly distinguished on a print taken from microfilm.	Completed
104.	Construction of proposed intersection. Old Telegraph Road construction and internal haul road to be completed in accordance with the approved Engineering plans and any consent, and to the satisfaction of Council and the Roads and Traffic Authority prior to commencement of any extraction on the site.	Completed
105.	Lodgement and approval of a Subdivision Certificate is required to authorise the plan of boundary adjustment. It should be noted that a Subdivision Certificate can only be issued by Council unless an Environmental Planning Instrument identifies that an Accredited Certifier can undertake the work.	Completed
106.	*Amended consent condition 106.* There shall be no commencement of extraction works until all conditions Nos. 91 to 106 inclusive, have been completed to the satisfaction of Council and the Roads and Traffic Authority.	Completed
107.	Dedication of proposed Lot 11 to Council and the Roads and Traffic Authority. Such land to be free from any taxes, rates and charges owing.	Completed
109.	109. To obtain a Subdivision Certificate (in relation to condition No. 107), you must submit a Subdivision Certificate application form, pay the appropriate fee and provide the following: 109.1 A Final Survey Plan together with eight (8) exact copies prepared by a Registered Surveyor. 109.2 An original Section 88B document (if required) together with one additional copy, in accordance with the Conveyancing Act, 1919.	Completed

8.2 Environmental Commitments Summary Checklist

A summary checklist for monthly recurring commitments follows. The checklist will be completed by the Environmental Manager or a delegated specialist contractor or consultant with assistance from the Quarry Manager as required. The completed monthly summary checklists will be included in the AEMPs by the Environmental Manager.

PF FORMATION EXTRACTIVE INDUSTRY AT PIT 4 OLD TELEGRAPH ROAD, MAROOTA
ENVIRONMENTAL COMMITMENTS SUMMARY CHECKLIST
COMMITMENT/ACTION - MONTH ENDING …… 201 .
Completed by Environmental Manager or delegate - Signature …… Date ……

COMMITMENT GROUP	EMP Checklist Commitment Numbers	COMPLETED √ Satisfactory or X Needs Corrective Action	COMMENTS Include details of any Corrective Actions required, complaints received and implementation of any *As Required* commitments
EPA	1 to 36		
NPWS	37 and 38		
Planning	39 to 45		
DL&WC	46 to 51		
Environment	52 to 61		
Sediment & Erosion Control	62 to 72		
Water Quality	73 to 80		
Waste Management	81 to 86		
Rehabilitation	87 to 119		
Air Quality	120 to 134		
Monitoring and Management	135 to 149		
Engineering	150 to 154		
Contributions	155		
Other Operational	156 to 162		
Any *As Required* commitments implemented?		Yes or No	

8.3 Environmental Checklist for Operations

ENVIRONMENT PROTECTION AUTHORITY REQUIREMENTS

EPA Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
1. Dust deposition monitoring be carried out at the locations specified in Air Quality Impact Assessment by Holmes Air Sciences and the Environmental Management and Rehabilitation Plan. *Note: the EPA Licence does not require on-site dust deposition monitoring but it is carried out monthly at four nearby locations in the Maroota area.*	Consent condition 6	√		Enviro. Manager
2. Noise monitoring is to be undertaken during the initial stages of overburden removal and construction activities to ensure compliance with the noise level predictions.	Consent condition 7		√	Enviro. Manager
3. The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.	EPA Licence condition L2.1	√		Enviro. Manager and Quarry Manager
4. Noise from the premises must not exceed: • an $L_{Aeq\ (15\ minute)}$ noise emission criterion of 42 dB(A) during the day (0700 to 1800) at 1 metre from the boundary of Lot 1 Old Telegraph Road Maroota; and • an $L_{Aeq\ (15\ minute)}$ noise emission criterion of 40 dB(A) during the day (0700 to 1800) at 1 metre from the boundary of Lot 1 Hart Place Maroota.	EPA Licence condition L3.1		√ Quarterly check	Enviro. Manager
5. Noise from the premises is to be measured at the locations specified to determine compliance with L3.1.	EPA Licence condition L3.2		√ Quarterly check	Enviro. Manager
6. The noise emission limits identified in this licence apply under all meteorological conditions except: (a) during rain and wind speeds (at 10m height) greater than 3m/s; and (b) under "non-significant weather conditions".	EPA Licence condition 3.3		√ Quarterly check	Enviro. Manager

EPA Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
7. Licensed activities must be carried out in a competent manner. This includes: (a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and (b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.	EPA Licence condition O1.1	√		Enviro. Manager and Quarry Manager
8. All plant and equipment installed at the premises or used in connection with the licensed activity: (a) must be maintained in a proper and efficient condition; and (b) must be operated in a proper and efficient manner.	EPA Licence condition O2.1	√		Enviro. Manager
9. The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.	EPA Licence condition O3.1	√		Enviro. Manager
10. Unless otherwise agreed to in writing by the EPA, works covered by this Licence must only be carried out between the hours of 0700 and 1700 Monday to Friday, and 0700 and 1300 Saturday, and at no time on Sundays and Public Holidays. For the purpose of this licence, the term "works" refers to all operations carried out on the premises.	EPA Licence condition O4.1	√		Enviro. Manager and Quarry Manager
11. The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.	EPA Licence condition M1.1		√ Quarterly check	Enviro. Manager
12. All records required to be kept by this licence must be: (a) in a legible form, or in a form that can readily be reduced to a legible form; (b) kept for at least 4 years after the monitoring or event to which they relate took place; and (c) produced in a legible form to any authorised officer of the EPA who asks to see them.	EPA Licence condition M1.2		√	Enviro. Manager
13. The following records must be kept in respect of any samples required to be collected for the purposes of this licence: (a) the date(s) on which the sample was taken; (b) the time(s) at which the sample was collected; (c) the point at which the sample was taken; and (d) the name of the person who collected the sample.	EPA Licence condition M1.3		√ Quarterly check	Enviro. Manager

EPA Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
14. The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.	EPA Licence condition M2.1	√		Enviro. Manager
15. The record must include details of the following: (a) the date and time of the complaint; (b) the method by which the complaint was made; (c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; (d) the nature of the complaint; (e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and (f) if no action was taken by the licensee, the reasons why no action was taken.	EPA Licence condition M2.2	√		Enviro. Manager
16. The record of a complaint must be kept for at least 4 years after the complaint was made.	EPA Licence condition M2.3		√	Enviro. Manager
17. The record must be produced to any authorised officer of the EPA who asks to see them.	EPA Licence condition M2.4		√	Enviro. Manager
18. The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.	EPA Licence condition M3.1	√		Enviro. Manager
19. The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.	EPA Licence condition M3.2	√		Enviro. Manager
20. The preceding two conditions do not apply until 3 months after the date of the issue of this licence.	EPA Licence condition M3.3	√		Enviro. Manager
21. The licensee must complete and supply to the EPA an Annual Return in the approved form comprising: (a) a Statement of Compliance; and (b) a Monitoring and Complaints Summary. At the end of each reporting period, the EPA will provide to the licensee a copy of the form	EPA Licence condition R1.1		√ Annually	Enviro. Manager

EPA Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
that must be completed and returned to the EPA.				
22. An Annual Return must be prepared in respect of each reporting period, except as provided below.	EPA Licence condition R1.2		√ Annually	Enviro. Manager
23. Where this licence is transferred from the licensee to a new licensee: (a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and (b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.	EPA Licence condition R1.3		√	Enviro. Manager
24. Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on: (a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or (b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.	EPA Licence condition R1.4		√	Enviro. Manager
25. The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').	EPA Licence condition R1.5		√ Annually	Enviro. Manager
26. The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.	EPA Licence condition R1.6		√	Enviro. Manager
27. Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by: (a) the licence holder; or (b) by a person approved in writing by the EPA to sign on behalf of the licence holder.	EPA Licence condition R1.7		√ Annually	Joint Managing Director
28. Notifications of environmental harm must be made by telephoning the Environment Line service on 131 555.	EPA Licence condition R2.1		√	Enviro. Manager

EPA Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
29. The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.	EPA Licence condition R2.2		√	Enviro. Manager
30. Where an authorised officer of the EPA suspects on reasonable grounds that: (a) where this licence applies to premises, an event has occurred at the premises; or (b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.	EPA Licence condition R3.1		√	Enviro. Manager
31. The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.	EPA Licence condition R3.2		√	Enviro. Manager
32. The request may require a report which includes any or all of the following information: (a) the cause, time and duration of the event; (b) the type, volume and concentration of every pollutant discharged as a result of the event; (c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event; (d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort; (e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants; (f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and (g) any other relevant matters.	EPA Licence condition R3.3		√	Enviro. Manager
33. The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.	EPA Licence condition R3.4		√	Enviro. Manager
34. A copy of this licence must be kept at the premises to which the licence applies.	EPA Licence condition G1.1	√		Enviro. Manager

EPA Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
35. The licence must be produced to any authorised officer of the EPA who asks to see it.	EPA Licence condition G1.2		√	Enviro. Manager
36. The licence must be available for inspection by any employee or agent of the licensee working at the premises.	EPA Licence condition G1.3		√	Enviro. Manager

NATIONAL PARKS AND WILDLIFE SERVICE REQUIREMENTS

NPWS Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
37. Bunding is to be provided on the lower sections of non-perennial drainage lines and to establish emergent aquatic vegetation in and around the dam area to maintain a suitable habitat for the Red-crowned Toadlet and Giant Burrowing Frog.	Consent condition 8	√		Enviro. Manager and Quarry Manager
38. Local, endemic native species are to be used in any rehabilitation works for the development.	Consent condition 9	√		Enviro. Manager and Quarry Manager

PLANNING REQUIREMENTS

Planning Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
39. No encroachment of extraction is to occur into the Environmental Protection B Zone.	Consent condition 10	√		Enviro. Manager and Quarry Manager
40. Establishment of a community committee to Council's satisfaction to monitor the environmental impact through a Memorandum of Understanding to be agreed to prior to commencement of any works.	Consent condition 11		√	Enviro. Manager
41. A standard method of determining weighted material be negotiated, being a method that is auditable by Council at six monthly intervals.	Consent condition 12		√	Enviro. Manager
42. Processing of materials shall take place wholly on the site.	Consent condition 13	√		Enviro. Manager and Quarry Manager
43. No more than 35 truck loads shall be removed from the site per day averaged over 1 month.	Modified consent condition 14	√		Enviro. Manager and Quarry Manager
44. All unsealed haul roads within the site shall be kept damp at all times during transportation to minimise wind-blown or traffic-generated dust.	Consent condition 15	√		Enviro. Manager and Quarry Manager
45. All bunds constructed on site will be rehabilitated with native vegetation to the satisfaction of the Council's Environment Division.	Consent condition 16	√		Enviro. Manager and Quarry Manager

DEPARTMENT OF LAND & WATER CONSERVATION REQUIREMENTS

DL&WC Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
46. A minimum of a 20m vegetated buffer shall be kept or established on either side of any drainage line in accordance with the Department's requirements.	Consent condition 17	√		Enviro. Manager and Quarry Manager
47. Stockpiles of topsoil material removed from the grassland areas on site (which are dominated by introduced species such as kikuyu) shall not be used to rehabilitate native vegetation in the eastern precinct.	Consent condition 18	√		Enviro. Manager and Quarry Manager
48. Prior to any site disturbance proceeds in the western precinct, provision shall be made for a non-eroding spillway to safely convey water into the nearest existing natural stable waterway.	Consent condition 19	√		Quarry Manager
49. Continuous monitoring be undertaken of the three ground water bores on the site.	Consent condition 20	√		Enviro. Manager
50. Groundwater salinity and water levels should be measured and data from the nearest weather station collected every month. The information collected from groundwater monitoring should be used to update the groundwater model every five years to determine if there is significant deviations to the model predictions. The raw data should be kept in hard and digital form and should be readily available when requested by Council or the Department of Land and Water Conservation.	Consent condition 21	√		Enviro. Manager
51. The proponent shall at least annually report all groundwater-related data to a dedicated website in accordance with the Integrated Mining Policy Web-based Reporting Guideline, and separately provide: a) All monitoring and modelling results in accordance with the requirements of the NSW Aquifer Interference Policy to Council and the Department of Primary Industries Water for review on an annual basis. b) An interpreted hydrogeological report describing the ongoing impacts of the operation in accordance with the requirements of the NSW Aquifer Interference Policy to Council and the Department of Primary Industries Water for review on an annual basis.	Modified consent condition 22		√ Annually	Enviro. Manager

ENVIRONMENT REQUIREMENTS				
Environment Commitment and/or Action	**Reference**	**Monthly Check**	**As Required**	**Responsibility**
52. Prior to the commencement of extraction, the proponent shall lodge with Council a Restoration / Rehabilitation Plan based on ecological principles. This shall include but not be limited to the following: a) succession / progressive planting b) time frame for planting c) details / reasons for much use d) different soil / nutrient requirements for the different land use end uses. e) species selection variation bases on end use, aspect etc f) planting schedule g) demonstrate structural integrity of walls including hydrostatic pressure and root development h) grading details including the trapping of onsite water and the allowance for swaling.	Consent condition 23		√	Enviro. Manager and Quarry Manager
53. No operation of machinery on site nor movement of trucks shall be permitted except between the hours of 7.00am and 5.00pm Monday to Friday exclusive, and 8.00am to 12.00 noon Saturday, public holidays excepted, with signs and lockable gates being maintained at the point of access to ensure compliance. The gates are to be kept locked except during authorised hours of operation.	Consent condition 24	√		Enviro. Manager and Quarry Manager
54. Fuel storage areas shall be located to ensure protection from bushfire.	Consent condition 25	√		Enviro. Manager and Quarry Manager
55. Extraction depths may extend to no more than two (2) metres above the wet weather height groundwater level in accordance with bore hole monitoring required by condition No. 20, and shall comply with the requirements of Council's Extractive Industry Development Control Plan (Water Resources). Under no circumstances shall extraction exceed a depth of RL 160 AHD.	Consent condition 26	√		Enviro. Manager and Quarry Manager
56. The proponent is to ensure at all times that ground water is not breached nor contaminated. In the event of ground waters being breached or contaminated, operations are to cease and Council together with the Department of Land & Water Conservation are to be immediately consulted to determine the basis upon which extraction may recommence.	Consent condition 27	√		Enviro. Manager and Quarry Manager

Environment Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
57. Annual volume of material (250,000t/pa) to be extracted shall be in accordance with the details provided in the Environmental Impact Statement and accompanying documents.	Consent condition 28		√	Quarry Manager
58. Care is to be taken at all times to ensure that all natural bushland directly adjoining the extraction site is not damaged or disturbed.	Consent condition 29	√		Enviro. Manager and Quarry Manager
59. Consent for the staged extraction of material and rehabilitation is permitted while there are approved extraction areas in Maroota, based upon a high level of performance and while quarry material in the Maroota area is available for processing.	Modified consent condition 30		√	Enviro. Manager
60. The area of the land disturbed for the purpose of extraction shall not exceed the overall extraction site as identified in the Environmental Impact Statement and supplementary information accompanying the application. In this regard extraction activities are not to encroach within the following setbacks: - a setback to Old Telegraph Road as depicted in drawing No. 8703, sheet 1A of Lyle Marshall & Associates Pty Ltd dated July 2000 - 50m from National Parks - 10m from all property boundaries not associated with the extraction operation. Condition 31 (b) The owner/operator of the site to maintain the landscaping works within the setback area at all times during the life of the operations to the best of their endeavour.	Part of consent condition 31 as amended by Land and Environment Court Order of 4 October 2000.	√		Enviro. Manager and Quarry Manager
61. Strip and stockpiling of topsoil shall be placed at a designated area diverted away by a minimum 10 metre buffer zone from natural streams and overland drainage flow paths. Stabilisation protection such as siltation fencing and impervious covering to be applied. Mulching and seeding may be applied to stockpiles as a protective measure after 14 days exposure.	Consent condition 32	√		Enviro. Manager and Quarry Manager

SEDIMENT AND EROSION CONTROL REQUIREMENTS				
Sediment and Erosion Control Commitment and/or Action	**Reference**	**Monthly Check**	**As Required**	**Responsibility**
62. The proponent is to submit every 12 months after the endorsed date of this consent a Water Management Plan (which may be referred to in the Environment Management Plan) in which Council is to be satisfied that adequate means of transferring and / or discharging the build up of ground water and surface waters is continually maintained and monitored particularly in relation to the following: 1 certified and suitable arrangement for dewatering water pits including contingency arrangements 2 means of treating polluted (including sediment laded) waters 3 means of maintaining & monitoring current surface and sub surface water quality 4 identification and adequacy of existing destination points for waters collected within the extraction area. 5 maximum and average water levels experienced and the capacity of the existing water sump to sustain major storm events 6 on-site reuse of collected water and other potential uses 7 state of the significant site features, ground water recharge areas and natural springs 8 achievement of qualitative and quantitative criteria of the approved water management strategy including any improvements and / or adjustments now needed. 9 maintenance of log book and recording rainfall 10 the protection of water dependent features and ecosystems of the site and adjacent catchments; 11 the actual source, quantity and quality of water used by all aspects of the operation; 12 the effectiveness of the *Water Management Plan* in providing a framework for a complete balance for both artificial and natural surface and sub-surface waters; 13 risks, safeguards and contingency plans for extreme climatic conditions and operational hazards including groundwater breach or contamination; 14 the results of monitoring water quality at down stream boundaries relative to the stage of extraction;	Consent condition 33		√ Annually	Enviro. Manager

Sediment and Erosion Control Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
15 that the advice and licensing requirements of state agencies have been considered including DLWC Dam Safety Committee and the EPA; 16 the following condition (34-43, *now 64 to 73*) shall be reported on within the Water Management Plan.				
63. In order to protect the adjoining land and downstream water quality the following measures are required: - 1 Sediment and erosion control measures are to be constructed in accordance with plans prepared by Morse & McVey and shown on Plan No.975038- S1, dated April 1998 and shown on Plan No.985059-01 & 985059-02, dated January 1999. 2 No development works are to commence until the approved sediment and erosion control measures are implemented. 3 All sediment and erosion control measures once installed are to be maintained in good working order and repair until development and rehabilitation / landscaping works have been completed. 4 An amended plan for erosion and sediment control may be submitted for approval if new best practice measures proposed to be incorporated into the proposed development.	Consent condition 34	√		Enviro. Manager and Quarry Manager
64. In order to protect downstream water quality and maintain public roads in a clean condition, sediment control measures (shake-down or other approved methods) are to be implemented and maintained at entry / exit points to ensure the removal of soils and other associated soil pollutants i.e. concrete slurry, from vehicles before leaving the site.	Consent condition 35	√		Enviro. Manager and Quarry Manager
65. In order to protect downstream water quality the proposed sediment retention basin is to be maintained in good working order, ensuring that: - 1 water in the basin must be discharged when it reaches 1/3 of the total capacity, this water must be treated with a flocculating agent prior to discharge: 2 water in the basin can only be discharged if an acceptable water quality of 50mg/L non-filterable residues (NFR) has been achieved. 3 disposed of pollutants removed from the basin to an authorised disposal site is to occur in areas where further pollution to downslope lands and waterways are not approved; 4 details of water being discharged from the basin are to be recorded by the site supervisor (quantity, quality and time), and	Consent condition 36	√		Enviro. Manager and Quarry Manager

Sediment and Erosion Control Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
5 the basin's condition is to be regularly inspected by the site supervisor and recorded.				
66. Check dams shall be incorporated with siltation fencing to be provided and constructed across catch drainage flows approximately at 10 metres intervals to facilitate velocity reduction and to further mitigate against sediment and erosion. Maximum height shall not exceed 600mm. A spillway provision shall be incorporated with the check dam, allowing 150mm spillway clearance.	Consent condition 37	√		Enviro. Manager and Quarry Manager
67. The sediment retention basin shall be provided and designed to accommodate a 5 year ARI time of concentration storm event, with a volume capacity of water that will enter in 6 minutes, one hour storm event with an additional 20% capacity provided for storage of sediment.	Consent condition 38	√		Enviro. Manager and Quarry Manager
68. The riser shall be designed to discharge at peak flow a minimum of a 20 year frequency storm, trash collection devices and a geotextile filter shall also be incorporated.	Consent condition 39		√	Enviro. Manager and Quarry Manager
69. All sediment controls shall be maintained and be fully operational until the final stage of the development is completed and all rehabilitation and landscaping has been established to the satisfaction of the consenting authority. All disused and discarded sediment controls shall be removed and disposed of to approved waste disposal depots or to approved landfill use.	Consent condition 40	√		Enviro. Manager and Quarry Manager
70. Excavation or alteration of the natural gradient or flowpath of the watercourse is prohibited.	Consent condition 41	√		Quarry Manager
71. Instream sediment retention devices or excavations within the watercourse are prohibited without Council approval. Sediment retention structures shall be constructed off line and shall not impact or impede the frequency, depth, extent, or volume of the flow within the watercourse.	Consent condition 42	√		Enviro. Manager and Quarry Manager
72. The NSW Department of Housing *Managing Urban Stormwater - Soils & Construction* 1998 manual should be the basic reference used for the correct installation and maintenance of all proposed sediment and erosion control measures.	Consent condition 43		√	Enviro. Manager and Quarry Manager

WATER QUALITY REQUIREMENTS				
Water Quality Commitment and/or Action	**Reference**	**Monthly Check**	**As Required**	**Responsibility**
73. Surface water monitoring will be conducted within the tributaries of Coopers Creek on a quarterly basis as to ensure that there are no adverse impacts on water quality.	Best practice		√ Quarterly	Enviro. Manager
74. Vegetation shall only be cleared from the banks of Coopers Creek tributaries only where it is absolutely necessary for construction and maintenance purposes.	Best practice	√		Enviro. Manager and Quarry Manager
75. Safeguards to avoid spills of oil, fuel and other chemicals and the containment of such spillages at the site will be implemented including conducting all such operations within areas that are appropriately bunded and floored.	Best practice	√		Enviro. Manager and Quarry Manager
76. Any waste rock/material or other waste will be carefully disposed of in such a way that it will not pollute the surface or groundwater resources.	Best practice	√		Enviro. Manager and Quarry Manager
77. Groundwater will be automatically monitored and reported annually in monitoring wells PFPIT4 MW1, PFPIT4 MW2 and PFPITW MW3 for the following: • pH, Electrical Conductivity and Total Dissolved Solids; • Calcium, Magnesium, Sodium and Potassium; • Chloride, Sulphate and Bicarbonate; and • Oil and Grease. The results will be provided to the NSW Office of Water.	Agreed with NSW Office of Water		√ Annually	Enviro. Manager
78. All sedimentation control measures will be inspected regularly.	Best practice	√		Enviro. Manager and Quarry Manager
79. Any damaged sedimentation control structural measures will be repaired as soon as possible.	Best practice	√		Enviro. Manager and Quarry Manager
80. Stormwater collected by any sediment control structure within the site will not be pumped to any dam which lies outside the area of the premises, or to any watercourse if the concentration of non-filtrable residues in the water exceeds 50 milligrams per litre.	Best practice	√		Enviro. Manager and Quarry Manager

WASTE MANAGEMENT REQUIREMENTS				
Waste Management Commitment and/or Action	**Reference**	**Monthly Check**	**As Required**	**Responsibility**
81. An annual Waste Management Plan, may be referred to as a chapter within the Environmental Management Plan, shall be submitted to demonstrate the: - 1 type, composition and quantity of material proposed to be re-used, recycled and removed: 2 source and quantity of material imported; 3 destination of all material removed from the site; 4 the following conditions are adhered to.	Consent condition 44	√		Enviro. Manager
82. In order to prevent site contamination, no fill is to be imported onto the site without development approval unless it is for processing on-site and the following requirement: a) All fill material imported to the site is to wholly consist of Virgin Excavated Natural Material (VENM) as defined in Schedule 1 of the *Protection of the Environment Operations Act 1997*.	Modified consent condition 45		√	Enviro. Manager
83. All chemicals, fuels and compounds used in the proposed development are to be stored so as not to leak, leach or percolate into stormwater systems.	Consent condition 46	√		Enviro. Manager and Quarry Manager
84. In order to provide for the storage and disposal of garbage / recycling at the proposed development the following must occur:- 1 All putrescible waste generated is to be deposited in properly constructed water, fly, and vermin proof approved garbage containers. 2 Garbage containers are to be cleaned off-site regularly by an authorised contractor.	Consent condition 47	√		Enviro. Manager
85. In order to ensure adequate treatment and disposal of wastewater, an application to install or construct a sewage management facility is to be submitted for the proposed development prior to works commencing on site.	Consent condition 48		√	Enviro. Manager
86. No burning or burying of wastes will be permitted on-site.	Best practice	√		Enviro. Manager

REHABILITATION REQUIREMENTS

Rehabilitation Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
87. To ensure rehabilitation progresses in an orderly and efficient manner the proponent is to submit every 12 months after the endorsed date of this consent a Rehabilitation Management Plan, which may be referred to as a chapter within the Environmental Management Plan, in which Council is to be satisfied of the following:- 1 the rate of rehabilitation is similar to the rate of extraction and cleared/disturbed areas are minimised, including a requirement that rehabilitation of the western precinct is to be completed within six (6) months of the commencement of extraction of the Eastern precinct; 2 vegetative buffer zones and rehabilitated areas are maintained 3 vegetation outside the extraction areas are successfully retained and protected 4 progressive rehabilitation integrates with the surrounding terrain and approved final landform 5 vegetative covers are established at the earliest possible opportunities 6 assessment / comment on the progress of rehabilitation carried out under the direction of the nominated supervisor, and 7 method and progress of the rehabilitation of extracted areas are in accordance with current environmental laws standards and practice including guidelines published by the Australian Federal Environment Department and Department of Land and Water Conservation. 8 rehabilitation management including results of flora and fauna monitoring programmes. The program outline shall describe the following monitoring details: 8.1 the key information that will be monitored, its criteria and the reasons for monitoring (which may be compliance with regulatory requirements) 8.2 the monitoring locations, intervals and duration (particularly of threatened species) 8.3 procedures to be undertaken if the monitoring indicates a non-compliance or abnormality 8.4 internal reporting and link to management practices and action plans 8.5 reporting procedures to relevant authorities and, if appropriate, to the consent authority and the community.	Consent condition 49		√ Annually	Enviro. Manager

Rehabilitation Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
9 the following conditions (50-80, *now 89 to 119 in this EMP*) may be reported on within the Rehabilitation Plan. *Note: Rehabilitation Management Plans revised see Attachment 9.*				
88. Soil stripping, storing, and replacement methods shall include the following criteria: 1 removal of topsoil removed in two (2) parts by saving the organic layer first, being 100-300mm; 2 removal of the next layer (300-500mm) shall be stripped and stockpiled separate 3 flat and low stockpiles no more than 3m high to ensure survival of organic material and aerobic organisms; 4 stockpiles kept free of traffic and away from drainage lines; 5 stockpiles stored for as brief a period as possible and no more than twelve (12) months at a time; and that 6 stockpiles created for each soil type and which should not be mixed 7 stockpiled remaining longer than 14 days shall be seeded with a temporary sterile vegetation cover;	Consent condition 50	√		Enviro. Manager and Quarry Manager
89. Mulch from one vegetation community type shall be kept separate from mulch of another vegetation community.	Consent condition 51	√		Enviro. Manager and Quarry Manager
90. Stockpile sites for mulch will be provided in the Rehabilitation Plan.	Consent condition 52		√ Annually	Enviro. Manager
91. Topsoil from one area of a vegetation community type shall be kept separate from another vegetation type.	Consent condition 53	√		Enviro. Manager and Quarry Manager
92. Appropriate measures for the collection, processing and storage of native seeds shall include: 1 collection from site by a suitable horticulturist 2 portion of the seeds collected shall be used as part of a hydro mulch mix. A sterile cereal seed mix shall be used for the other part: 3 remainder of the seeds collected shall be propagated under appropriate nursery conditions and maintained: 4 identification of collection areas;	Consent condition 54		√	Enviro. Manager

Rehabilitation Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
5 collect seed only when mature; 6 avoid seeds attached by insects or showing signs of fungal infestation; 7 consider establishing a seed orchard; 8 seeds are cleaned before storage; 9 use established processing techniques such as drying, threshing, burning; 10 treat seeds with insecticide/fungicide, including 1 day exposure to carbon dioxide prior to storage; 11 clean seeds stored in dry, insect and vermin free containers at low humidity and low temperatures; 12 collection from a range of species and types; 13 the type, composition of seed mixes, application rates, adaptation and expected growth of proposed species used in the rehabilitation shall be included in the rehabilitation plan.				
93. Weed infestation on rehabilitated areas shall be controlled and prevented through: 1 the careful use of fertilisers and organic matters such as manure so as not to stimulate weeds; 2 promotion of a vigorous cover of appropriate plant species in the agricultural area; 3 hand weeding; 4 selective application of herbicides; and mulching with weed free materials.	Consent condition 55	√		Enviro. Manager
94. Rehabilitated areas shall be sustained by re-establishing nutrient cycles within the soil to: 5 store and supply water; 6 support root growth; and 7 improve water infiltration to reduce compaction.	Consent condition 56		√	Enviro. Manager
95. Rehabilitated and/or disturbed areas shall be regularly maintained including: 1 replanting of exposed areas and replacing dead plants within six (6) months; 2 repairing erosion problems 3 pest and weed control 4 fertiliser applications where appropriate on land for agricultural use; 5 regular watering; 6 application of lime or gypsum to control pH and improve soil structure where appropriate on land restored for agricultural use.	Consent condition 57	√		Enviro. Manager

Rehabilitation Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
96. Topsoil and overburden used as bund walls during extraction shall be stabilised using appropriate native species and rehabilitation techniques under the direction of a qualified Plant Ecologist or Landscape Architect and used as backfill only when not contaminated with exotic grasses or weeds	Consent condition 58	√		Enviro. Manager and Quarry Manager
97. Direct scaling shall be carried out in soft soil free of leaf litter/weeds and under favourable conditions of water, oxygen, temperature and light.	Consent condition 59	√		Enviro. Manager and Quarry Manager
98. Permanent ground cover shall be established on areas disturbed for more than 14 days and be maintained by regular watering and additional applications of seed and fertiliser.	Consent condition 60	√		Enviro. Manager and Quarry Manager
99. The extraction area is to be backfilled only with earth and rock materials sourced as a result of extraction. No solid waste or putrescible materials should be disposed of within the site.	Consent condition 61	√		Enviro. Manager and Quarry Manager
100. The site is to be progressively rehabilitated in accordance with the rehabilitation provisions of the Environmental Impact Statement and other documents submitted. It is to be regularly reported in the Rehabilitation Management Plan the subject of condition 49 of this consent.	Consent condition 62		√	Enviro. Manager and Quarry Manager
101. Trees to be retained shall be protected during site works and construction by the erection of solid barricades to the name/design specification of the Manager, Parks & Landscape Team, and generally at 4 metres or other specified distance, from the trunk/s of such trees.	Consent condition 63		√	Enviro. Manager and Quarry Manager
102. All tree protection measures so approved and installed, shall be maintained in good working order and repair throughout the course of building or development works.	Consent condition 64	√		Enviro. Manager
103. All environmental weeds, noxious and invasive plants are to be removed and continually suppressed using an appropriate method prior to release of the final plan.	Consent condition 65	√		Enviro. Manager
104. No works, stockpiles, dams or clearing of bushland to occur in the designated area, as shown in red on attached property map. *Note: Property map is provided in Attachment 2.*	Consent condition 66	√		Enviro. Manager and Quarry Manager

Rehabilitation Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
105. All natural landscape features including natural rock outcrops, natural vegetation, soil and water courses are to remain undisturbed except where affected by necessary works detailed on approved plans, or with Council's written consent.	Consent condition 67	√		Enviro. Manager and Quarry Manager
106. No clearing of bushland to occur in the designated area, as shown in red on the attached property map. *Note: Property map is provided in Attachment 2.*	Consent condition 68	√		Enviro. Manager and Quarry Manager
107. Prior to any construction work a protective barrier mesh fence must be installed along the edge of the internal haul road to protect the restricted bushland areas.	Consent condition 69	√		Enviro. Manager and Quarry Manager
108. The areas within the 'restricted zone' containing threatened species should be fenced prior to any construction or excavation that occurs on the site.	Consent condition 70	√		Enviro. Manager and Quarry Manager
109. All care shall be taken to ensure no areas are disturbed unnecessarily. In this regard, existing vegetation shall be undisturbed by a "no go" boundary constructed by silt fencing to facilitate the filtration and collection of runoff pollution emanating from the works.	Consent condition 71	√		Enviro. Manager and Quarry Manager
110. The riparian buffer along the watercourse, as marked on the attached site plan, must be re-vegetated according to the *Sustainable Water Best Practice Q1.01 (riparian vegetation), Q1.04 (stream rehabilitation)* and in accordance with the rehabilitation plan and EIS submitted.	Consent condition 72		√	Enviro. Manager and Quarry Manager
111. The dam embankment adjacent to bushland is to be re-vegetated using native grass species, as per species list attached. In conjunction with native species the use of a sterile cover crop, as per attached species list, would provide quick growth for initial stabilisation of the embankment without spreading into the adjacent bushland.	Consent condition 73		√	Enviro. Manager and Quarry Manager
112. Acoustic earth bunds and visual screen bunds shall be established and planted with appropriate native vegetation to facilitate screening and noise reduction of extraction works.	Consent condition 74	√		Enviro. Manager and Quarry Manager
113. The north and west facing slopes shall be rehabilitated at a 1:4 grade and the south & east facing slopes shall be rehabilitated to 1:3 grade within the west precinct.	Consent condition 75		√	Enviro. Manager and Quarry Manager

Rehabilitation Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
114. All slopes will be rehabilitated to 1:3 grade within the east precinct.	Consent condition 76		√	Enviro. Manager and Quarry Manager
115. The Rehabilitation Management Plan shall include detailed species for each vegetation community type, densities for planting for individual seedlings and cutting stock.	Consent condition 77		√	Enviro. Manager
116. The proponent is to ensure the conservation and on-going management of threatened species, populations and ecological communities, in particular those of *Acacia bynoeana* at all times and details of which are to be incorporated within the Rehabilitation Plan subject to condition No 79 of this consent.	Consent condition 78		√	Enviro. Manager
117. The rehabilitation of the eastern sector must be undertaken in accordance with the submitted Rehabilitation Plan and undertaken by a suitably qualified person with experience in rehabilitation.	Consent condition 79		√	Enviro. Manager
118. Any plans to propagate threatened species will require a licence from National Parks and Wildlife Service.	Consent condition 80		√	Enviro. Manager
119. The Bushland Restoration & Rehabilitation Plan dated 19 September 2007 for 1.4 hectares of the site near Coopers Creek will be implemented over two years commencing in January 2011. Progress will be monitored every 6 months.	Council Order		√ Completed	Enviro. Manager

AIR QUALITY REQUIREMENTS				
Air Quality Commitment and/or Action	**Reference**	**Monthly Check**	**As Required**	**Responsibility**
120. The proponent is to submit to Council every 12 months after the endorsed date of this consent an Air Quality Report (which may be referred to in the Environmental Management Plan) in which Council is to be satisfied that dust and noise levels generated by the extraction operations comply with the established practices and standards, including the EPA manual. The report shall include: 1 a public complaint register 2 recording of data from dust deposition gauge 3 report on the following (82-88, *122 to 128 in this EMP*) conditions	Consent condition 81		√ Annually	Enviro. Manager
121. The proponent is to monitor dust generation from the extractive operations and associated activities and the results of which are to be detailed in the Air Quality report referred to in condition No.81 (*121 in this EMP*). In the event of dust nuisance being identified, the proponent shall immediately inform Council and implement any mitigation practice as required.	Consent condition 82	√		Enviro. Manager
122. Proponents shall employ wind activated water sprinkler systems or any alternative method, to the satisfaction of Council, to ensure extraction sites minimise dust generation particularly during periods of high wind and when sites are unattended.	Consent condition 83	√		Enviro. Manager and Quarry Manager
123. Proponents shall provide details (this can be included in the annual air quality report) of effective measures proposed to be implemented to suppress dust generated from:- 1 Blasting; 2 Removal of overburden 3 Site clearing; 4 Extraction and haulage; 5 Moving material on to and from stockpiles; 6 Mobile earthmoving equipment; 7 Blow-off and spillage from truck loads; and 8 Crushing and screening procedures.	Consent condition 84		√	Enviro. Manager

Air Quality Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
124. Proponents shall ensure that prior to leaving extraction sites all laden trucks have their pay loads fully covered by suitable material to prevent spillage from the trucks on roads and adjoining properties.	Consent condition 85	√		Enviro. Manager and Quarry Manager
125. Proponents shall ensure that any blasting is not undertaken in strong wind and/or prolonged dry weather periods.	Consent condition 86		√	Quarry Manager
126. Stockpiles of material and other sediment laden areas are to be maintained so as to prevent any dust nuisance.	Consent condition 87	√		Enviro. Manager and Quarry Manager
127. Dust suppression equipment is to be fitted to all processing equipment and is to be maintained on a minimum of a six monthly basis and details of which are to be submitted to Council in accordance with condition No. 81 (*121 in this EMP*) of this consent and to any other relevant authority referred to under section 23 of the Clean Air Act 1961.	Consent condition 88	√		Enviro. Manager and Quarry Manager
128. Upon activities commencing an acoustic report prepared by an acoustic consultant is to be submitted within the first 6 months, detailing the noise levels being emitted to adjacent premises from the new development. If noise levels exceed the background levels by more than 5dB(A) noise attenuation methods are to be installed. Details of all noise attenuation methods are to be submitted for approval prior to installation.	Consent condition 89		√	Enviro. Manager
129. The proponent shall ensure employees are not subjected to noise or dust levels greater than those specified and prescribed by WorkCover NSW and the *Mine Health and Safety Regulation 2007.*	Legislation		√	Enviro. Manager and Quarry Manager
130. An on-site water truck will be used whenever there is potential for dust generation.	Best practice		√	Enviro. Manager and Quarry Manager
131. Signs requiring compliance with covered loads will be prominent on the site.	Best practice	√		Enviro. Manager
132. Checks will be made that there is no visible dust blowing across the site on dry windy days.	Best practice		√	Enviro. Manager and Quarry Manager
133. All internal combustion motors will not be permitted to emit continuous visible smoke for greater than 10 seconds on public lands.	Best practice		√	Enviro. Manager

Air Quality Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
134. Exhaust systems and engines of site plant and vehicles will be properly maintained to minimise exhaust emissions and adverse impacts on air quality.	Best practice		√	Quarry Manager

MONITORING AND MANAGEMENT REQUIREMENTS

Monitoring and Management Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
135. The proponent shall submit to Council every 12 months after the endorsed date of this consent an Environmental Management Plan in which Council is to be satisfied of the overall performance and management of the operation. The Environmental Management Plan should refer to the objectives and principles of Ecologically Sustainable Development and may use and / or reference as chapters the respective management plans required by condition Nos. 1 to 3, 6, 7 and 23 to 87 of this consent in order to address the following matters:- 1 Acquisition of all necessary licences and permits and an indication of how compliance with licensing and approval requirements will be achieved and due diligence attained 2 On site materials Management including management of operational impacts: if appropriate, include such as: : management of explosive, chemicals and fuel and their use : maintenance an site security plans 3 Water Management 4 Acoustic Management 5 Air quality Management 6 Transport routes, access & movements 7 Soil Conservation including geo-technical appraisal of tailing systems and erosion and sediment controls. 8 Social impact management including consultation with community groups, nearby residents and monitoring of complaints received 9 Identification, assessment and evaluation of risks, safeguards and the confidence level of contingency / emergency plans;	Consent condition 90		√ Annually	Enviro. Manager

Monitoring and Management Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
10 Statement of Compliance with the approved EIS documentation, conditions of this consent and the objectives of Councils DCP - Extractive industries. 11 Advice and recommendations of all relevant state government agencies; 12 Reference to International Standards (ISO) 14001-14004 relating to Environmental Management Systems, which should address issues such as:- : the capacity and support mechanisms necessary to implement and achieve the proponent company's environmental policy, objectives and targets and : the means by which the proponent company measure, monitor and evaluate its environmental performance and 13 Recommendations to adjust operation procedures to improve the overall performance of the operations. 14 Strategies to feed information from the monitoring program back into the management practices and action plans to improve the environmental performance and sustainability of all components of the proposal 15 Training programs for operational staff and incentives for environmentally sound performance 16 Performance indicators in relation to critical operational issues including: Compliance with the conditions of consent; Compliance with the objectives of this DCP;				
136. A Pollution Incident Response Management Plan will be implemented in accordance with Attachment 7.	Best practice and EPA requirement		√	Enviro. Manager
137. Emergency procedures will be displayed in a prominent position within the site office.	Best practice	√		Enviro. Manager
138. Two persons will be nominated to be available to the EPA on a 24 hour basis and have authority to take any action to mitigate pollution on-site as directed by an authorised EPA Manager.	Best practice		√	Enviro. Manager
139. If the Environmental Manager identifies or receives a complaint regarding any pollution caused by the work, a written report will be prepared within one working day of receipt of the complaint or identification of pollution. This report will include details of the pollution, action taken to correct the problem and measures to prevent the occurrence of a similar incident. A Corrective Action Request will be completed.	Best practice		√	Enviro. Manager
140. Care will be taken to minimise fire risk from use of plant and equipment during total fire ban periods.	Best practice		√	Quarry Manager

Monitoring and Management Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
141. One general purpose fire extinguisher suitable for control of oil/petrol fires will be available at the site at all times.	Best practice	√		Enviro. Manager
142. A minimum of two persons will be familiar or trained in the use of all fire-fighting equipment on-site.	Best practice	√		Enviro. Manager and Quarry Manager
143. The requirements of all relevant legislation relating to air quality, water quality and noise will be met.	Best practice		√	Enviro. Manager
144. Site safety and work conditions will be subject to WorkCover NSW requirements.	Best practice		√	Quarry Manager
145. Community complaints will be monitored and procedures implemented by the Environmental Manager to rectify any problems and a register of corrective actions maintained. The neighbouring residents will be contacted by letter at least annually requesting them if there are any issues to resolve and to inform them of the AEMPs.	Best practice		√ Annually	Enviro. Manager
146. Environmental audits of the site, the EMP and its effectiveness and implementation may be completed as required.	Best practice		√	Enviro. Manager
147. Daily records will be maintained recording each truck movement to the site in terms of date, time, vehicle registration number, type of material, mass/tonnage and job number.	Best practice	√		Enviro. Manager
148. 24 hour access to the site will be maintained at all times for emergency purposes.	Best practice		√	Quarry Manager
149. In order to assist in the collection of construction material production data, the proponent shall provide annual production data for the subject site to the Department of Resources and Energy (DRE) in accordance with their requirements.	Modified consent condition 110		√ Annually	Enviro. Manager

ENGINEERING REQUIREMENTS				
Engineering Commitment and/or Action	**Reference**	**Monthly Check**	**As Required**	**Responsibility**
150. All truck traffic generated by this Consent shall access Old Northern Road and the extraction site via the northern intersection of Old Northern Road and Old Telegraph Road. No truck vehicles shall access Old Northern Road or the extraction site via Roberts Road.	Consent condition 97	√		Enviro. Manager and Quarry Manager
151. At least two day's written notice must be given of the commencement of water and soil management, safety signage or engineering works.	Consent condition 99		√	Enviro. Manager
152. In order to maintain the amenity of adjoining properties, site works shall be restricted to between 7.00am and 6.00pm, Monday to Friday and 8.00am to 1.00pm Saturday. If inaudible, site works shall be restricted to between 7.00am and 4.00pm on Saturday. No work shall be undertaken on Sundays or public holidays.	Consent condition 100	√		Enviro. Manager and Quarry Manager
153. In order to avoid air contamination and nuisance, frequent watering of internal haul road is to be undertaken by the Applicant when conditions prescribe or anytime at the written direction from Council.	Consent condition 101	√		Enviro. Manager and Quarry Manager
154. Revegetation must be applied to disturbed areas and established. Such revegetation to be applied as soon as practicable after completion of earthworks or anytime at the written direction of Council.	Consent condition 102		√	Enviro. Manager and Quarry Manager

CONTRIBUTIONS REQUIREMENTS				
Contributions Commitment and/or Action	**Reference**	**Monthly Check**	**As Required**	**Responsibility**
155. Subject to the following paragraphs of this condition, the party carrying on the extraction work shall pay to the Council a contribution under Section 94 of the Environmental Planning and Assessment Act, 1979 at a rate of $0.63 per tonne for all extracted material transported from the site. The following provisions shall apply to the contribution: 1 The contribution will be calculated and paid monthly in respect of all material transported from the site as from the date of this consent. 2 The rate of the contribution will be varied annually with the first variation due as at 1 July, 2000. On each variation date, the rate per tonne shall be varied to an amount which bears to $0.63 the same proportion as the Consumer Price Index (All Groups) for Sydney last published prior to the relevant date of variation bears to the same index last published prior to 1 September, 1998. 3 On or before the fourteenth day of each month so long as extracted materials are transported from the site, there shall be delivered to the Council a true certified copy of returns or records acceptable to the Council showing the true quantities of extracted material transported from the site during the immediately preceding month and the Council will then as soon as it can conveniently do so issue to the Applicant or subsequent operator an invoice for the contribution payable for such material transported from the site. Payment of the amount of the invoice shall be made by the Applicant to the Council within 14 days of the invoice date. If the party carrying out the extraction work fails to deliver such returns to the Council in accordance with this clause by the fourteenth day of a particular month, the Council shall at its absolute discretion be entitled but not obliged to estimate the quantity of material transported from the site during the immediately preceding month and shall be entitled to issue such an invoice on the basis of such estimate PROVIDED HOWEVER that an appropriate adjustment shall be made between the parties when certified copies of the required returns in respect of such immediately preceding month have been provided to the Council as required by this clause.	Consent condition 108	√		Enviro. Manager

	Contributions Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
4	The Council shall be entitled to have any person or persons nominated by its internal accountant to inspect and audit the original records relating to any of the extracted material, including locality of destinations, numbers and types of laden trucks and trailers and load quantities, transported from the site. Nomination of a person or persons to carry out such inspections and/or audit shall be in writing.				
5	Council will pay all of the contributions received by it into a specially identified trust account for payment towards the rehabilitation, restoration, repair and/or maintenance of Old Northern Road and Old Telegraph Road and of the road giving access to the site.				
6	If the Applicant ceases to carry out the approved extraction work or if a party other than the Applicant commences to carry out such work without the Applicant having started to do so, then the Applicant shall forthwith furnish to the Council notice of that fact together with the name and address of the party (if any) who has commenced or will thereafter commence to carry on the said work. Such notice shall be accompanied by an acknowledgment in writing by that party that it is aware of the obligations imposed on it pursuant to this condition. Until such time as the notice and acknowledgment are furnished to the Council by the Applicant, the Applicant will remain jointly and severally liable with the party for the time being carrying out the extraction work for payment of the aforesaid contribution and for compliance with the terms of this condition. The terms of this paragraph shall apply mutatis mutandis to any future operator of the extraction work in the event of his ceasing to carry out the work.				

OTHER OPERATIONAL REQUIREMENTS

Other Operational Commitment and/or Action	Reference	Monthly Check	As Required	Responsibility
156. In the event that any archaeological material is found during extraction, operations are to cease in the immediate area and the National Parks and Wildlife Service and Council are to be consulted, with all reasonable directions to be complied with.	Best practice		√	Enviro. Manager
157. No blasting will take place on site.	Best practice		√	Quarry Manager
158. No chemicals (other than fuels and lubricants) or hazardous materials will be used in extraction or processing.	Best practice		√	Quarry Manager
159. Fuel storage will be in above ground tanks within a roofed, impervious bunded area. *Note: Vehicles, mobile plant and equipment are now fuelled on-site from a 26,500 litre storage vessel complying with AS 1940-2004 The storage and handling of flammable and combustible liquids.*	Best practice	√		Quarry Manager
160. All plant and equipment operators and employees will be instructed to confine operations to within the clearly marked area of site operations.	Best practice	√		Enviro. Manager and Quarry Manager
161. All plant/equipment will be inspected regularly to avoid leakage of fuel, oil or hydraulic fluid to the work site. Machinery found to be leaking will be repaired or replaced.	Best practice	√		Enviro. Manager and Quarry Manager
162. Ensure all PF Formation staff working on the site are inducted, trained and aware of their environmental responsibilities, emergency response procedures and the requirements of this EMP.	Best practice	√		Enviro. Manager

Attachment 1

Development Consent 342/98F

HORNSBY
SHIRE COUNCIL

Etra Pty Ltd
Trading as P F Formation
1 Patricia Fay Drive
MAROOTA NSW 2756

NOTICE OF DETERMINATION

Approval

Development Application No: DA/342/1998/F

Pursuant to Section 96 (2) of the *Environmental Planning and Assessment Act 1979* consent is granted to the development, it being noted that Council is satisfied that the development remains substantially the same development as that originally approved.

The development consent is subject to the conditions specified within this notice and will lapse unless the development is physically commenced within five years of the effective date of the original determination.

Section 97 of the Act allows an applicant who is dissatisfied with the determination of a consent authority, a right of appeal to the Land and Environment Court within 6 months from the date of this notice.

Property:	Lot 2 DP 748820, No. 311 Old Telegraph Road, MAROOTA NSW 2756
Original development:	Sand and clay extractive industry to be developed in two stages with dams and rehabilitation to bushland.
Effective date of original determination:	1 July 1999

Date of 1st modification:	4 August 1999
Details of 1st modification:	Correct minor errors in the consent
Conditions Added:	109, 109.1 and 109.2
Conditions Deleted:	Nil
Conditions Modified:	106

Date of 2nd modification:	17 November 2004
Details of 2nd modification:	Amend the operational areas, internal roads, plant and equipment within the western precinct
Plans Added:	Plans dated May 2004 Sheet No. 1 of 3
Conditions Added:	Nil
Conditions Deleted:	Nil
Conditions Modified:	Nil

Date of 3rd modification:	5 September 2007
Details of this modification:	Extend the period of extraction
Amended Plans Added:	Plans dated May 2004, Sheet No. 1 of 3
Conditions Added:	Nil
Conditions Deleted:	Nil
Conditions Modified:	30

Date of this modification:	26 May 2016
Details of this modification:	Annual groundwater monitoring and modelling; extend the period of extraction/ processing;
Conditions Added:	110
Conditions Deleted:	Nil
Conditions Modified:	14, 22, 30, 45

Per:
Manager, Assessments
Planning Division

Contact: Cassandra Williams (9847 6724 – 8.30 am to 5.00 pm)

CONDITIONS OF APPROVAL

Modify the following conditions to read:

14. No more than 35 truck loads shall be removed from the site per day averaged over 1 month.

22. The proponent shall at least annually report all groundwater-related data to a dedicated website in accordance with the Integrated Mining Policy Web-based Reporting Guideline, and separately provide:

    a) All monitoring and modelling results in accordance with the requirements of the NSW Aquifer Interference Policy to Council and the Department of Primary Industries Water for review on an annual basis.

    b) An interpreted hydrogeological report describing the ongoing impacts of the operation in accordance with the requirements of the NSW Aquifer Interference Policy to Council and the Department of Primary Industries Water for review on an annual basis.

30. Consent for the staged extraction of material and rehabilitation is permitted while there are approved extraction areas in Maroota, based upon a high level of performance and while quarry material in the Maroota area is available for processing.

45. In order to prevent site contamination, no fill is to be imported onto the site without development approval unless it is for processing on-site and the following requirement:

    a) All fill material imported to the site is to wholly consist of Virgin Excavated Natural Material (VENM) as defined in Schedule 1 of the *Protection of the Environment Operations Act 1997.*

Add the following new condition:

110. In order to assist in the collection of construction material production data, the proponent shall provide annual production data for the subject site to the Department of Resources and Energy (DRE) in accordance with their requirements.

    Note: For further information with regards to the requirements, please contact the GSNSW Land Use Team at landuse.minerals@industry.nsw.gov.au.

AMENDMENT:
"E"- 5 September 2007

AMENDMENT:
"A" - 4/8/99

AMENDMENT:
"C" - 17/11/04

THE COUNCIL OF THE
SHIRE OF HORNSBY

NOTICE TO APPLICANT

DEVELOPMENT CONSENT

(Environmental Planning & Assessment Act, 1979)

To: F & K Vella

of: PO Box 73
DOONSIDE NSW 2767

being the applicant in respect of Development Application No. 342/98.

Pursuant to Section 92 of the Act notice is hereby given of approval by the consent authority of the Development Application No. 342/98 relating to the land described as follows:

Lot 2, DP 748820 Old Telegraph Road, Maroota

The development application has been determined by granting of development consent subject to the conditions specified in this notice for a sand and clay extractive industry to be developed in two stages with dams and rehabilitation to bushland generally in accordance with plans reference CH2677, Nos. MP-01B and MP-02B dated April, 1999 as amended in red together with supporting documentation contained in the Environmental Impact Statement, Volume 1 dated June, 1998.

The conditions of the consent and the reasons therefore are set out as follows:

PRIOR TO COMMENCEMENT OF WORKS

1. The proponent is to obtain all necessary operating licences and permits from all relevant public authorities including the Environment Protection Authority and the Department of Land & Water Conservation and details of which are to be submitted to Council prior to the commencement of on-site works

2. Prior to commencement of the quarry operations the proponent is to undertake the following:-

2.1. Construct all internal all weather surfaced access tracks with crossfall and associated table drains and lead out, designed to carry the extraction vehicle loading;

2.2. Provision of headwalls, scour protection and sedimentation traps for all drainage systems and leadouts mentioned in 2.1 above;

2.3. The provision of erosion and sedimentation control. Details to be shown on engineering plans and the devices to be established prior to the commencement of engineering works;

2.4. Provision of safety protection fencing and guard rail where vertical faces are proposed in the quarry area and adjacent to the access track.

3. Prior to the commencement of extraction, the proponent shall:

3.1 Prepare and submit to Council for its endorsement, an Environmental Management Plan which addresses performance and management of the operation, including matters of sediment and erosion control, waste, rehabilitation (incorporating staging throughout the life of the consent), air quality and monitoring;

3.2 Lodge with Council a contract for a Rehabilitation Bond based on an amount per tonne of extracted material. The total of this amount will be sufficient to cover the cost rehabilitating the approved extraction area and other likely disturbed areas.

4. A site contamination investigation report is to be submitted prior to the commencement of any works on the site.

Should evidence of contaminated land be apparent, the Environment Management Plan shall detail how such material is to be remediated and/or disposed of to the satisfaction of Council and the Environment Protection Authority.

5. Fencing is to be provided to separate extraction areas and the internal haul road from habitat areas to reduce potential impacts to native vegetation and the habitat it provides.

OPERATIONAL

ENVIRONMENTAL PROTECTION AUTHORITY

6. Dust deposition monitoring be carried out at the locations specified in Air Quality Impact Assessment by Holmes Air Sciences and the Environmental Management and Rehabilitation Plan.

7. Noise monitoring is to be undertaken during the initial stages of overburden removal and construction activities to ensure compliance with the noise level predictions.

NATIONAL PARKS & WILDLIFE SERVICE

8. Bunding is to be provided on the lower sections of non-perennial drainage lines and to establish emergent aquatic vegetation in and around the dam area to maintain a suitable habitat for the Red-crowned Toadlet and Giant Burrowing Frog.

9. Local, endemic native species are to be used in any rehabilitation works for the development.

PLANNING

10. No encroachment of extraction is to occur into the Environmental Protection B Zone.

11. Establishment of a community committee to Council's satisfaction to monitor the environmental impact through a Memorandum of Understanding to be agreed to prior to commencement of any works.

12. A standard method of determining weighted material be negotiated, being a method that is auditable by Council at six monthly intervals.

~~13. Processing of materials shall take place wholly on the site.~~

14. No more than 35 truck loads shall be removed from the site per day.

15. All unsealed haul roads within the site shall be kept damp at all times during transportation to minimise wind-blown or traffic-generated dust.

16. All bunds constructed on site will be rehabilitated with native vegetation to the satisfaction of the Council's Environment Division.

DEPARTMENT OF LAND & WATER CONSERVATION

17. A minimum of a 20m vegetated buffer shall be kept or established on either side of any drainage line in accordance with the Department's requirements.

18. Stockpiles of topsoil material removed from the grassland areas on site (which are dominated by introduced species such as kikuyu) shall not be used to rehabilitate native vegetation in the eastern precinct.

19. Prior to any site disturbance proceeds in the western precinct, provision shall be made for a non-eroding spillway to safely convey water into the nearest existing natural stable waterway.

20. Continuous monitoring be undertaken of the three ground water bores on the site.

21. Groundwater salinity and water levels should be measured and data from the nearest weather station collected every month. The information collected from groundwater monitoring should be used to update the groundwater model every five years to determine if there is significant deviations to the model predictions. The raw data should be kept in hard and digital form and should be readily available when requested by Council or the Department of Land and Water Conservation.

22. ~~The results of the groundwater monitoring and groundwater modelling be submitted to Council for review on a six monthly basis by Council and the Department of Land and Water Conservation.~~

ENVIRONMENT

23. Prior to the commencement of extraction, the proponent shall lodge with Council a Restoration / Rehabilitation Plan based on ecological principles. This shall include but not be limited to the following:

a) succession / progressive planting
b) time frame for planting
c) details/ reasons for much use
d) different soil / nutrient requirements for the different land use end uses.
e) species selection variation bases on end use, aspect etc
f) planting schedule
g) demonstrate structural integrity of walls including hydrostatic pressure and root development
h) grading details including the trapping of onsite water and the allowance for swaling.

24. No operation of machinery on site nor movement of trucks shall be permitted except between the hours of 7.00am and 5.00pm Monday to Friday exclusive, and 8.00am to 12.00 noon Saturday, public holidays excepted, with signs and lockable gates being maintained at the point of access to ensure compliance. The gates are to be kept locked except during authorised hours of operation.

25. Fuel storage areas shall be located to ensure protection from bushfire.

26. Extraction depths may extend to no more than two (2) metres above the wet weather height groundwater level in accordance with bore hole monitoring required by condition No. 20, and shall comply with the requirements of Council's Extractive Industry Development Control Plan (Water Resources). Under no circumstances shall extraction exceed a depth of RL 160 AHD.

27. The proponent is to ensure at all times that ground water is not breached nor contaminated.

In the event of ground waters being breached or contaminated, operations are to cease and Council together with the Department of Land & Water Conservation are to be immediately consulted to determine the basis upon which extraction may recommence.

28. Annual volume of material (250,000t/pa) to be extracted shall be in accordance with the details provided in the Environmental Impact Statement and accompanying documents.

29. Care is to be taken at all times to ensure that all natural bushland directly adjoining the extraction site is not damaged or disturbed.

30. ~~Consent for the staged extraction of material and rehabilitation is limited to a period of 15 years effective from the endorsed date of this consent, based upon a high level of performance and terminating in the year 2014.~~

31. The area of the land disturbed for the purpose of extraction shall not exceed the overall extraction site as identified in the Environmental Impact Statement and supplementary information accompanying the application.

In this regard extraction activities are not to encroach within the following setbacks:

- 30m from Old Telegraph Road, inclusive of the haul road
- 50m from National Parks
- 10m from all property boundaries not associated with the extraction operation.

32. Strip and stockpiling of topsoil shall be placed at a designated area diverted away by a minium 10 metre buffer zone from natural streams and overland drainage flow paths. Stabilisation protection such as siltation fencing and impervious covering to be applied. Mulching and seeding may be applied to stockpiles as a protective measure after 14 days exposure.

SEDIMENT & EROSION CONTROL

33. The proponent is to submit every 12 months after the endorsed date of this consent a Water Management Plan (which may be referred to in the Environment Management Plan) in which Council is to be satisfied that adequate means of transferring and / or discharging the build up of ground water and surface waters is continually maintained and monitored particularly in relation to the following:

33.1. certified and suitable arrangement for dewatering water pits including contingency arrangements
33.2. means of treating polluted (including sediment laded) waters
33.3. means of maintaining & monitoring current surface and sub surface water quality
33.4. identification and adequacy of existing destination points for waters collected within the extraction area.
33.5. maximum and average water levels experienced and the capacity of the existing water sump to sustain major storm events
33.6. on-site reuse of collected water and other potential uses
33.7. state of the significant site features, ground water recharge areas and natural springs
33.8. achievement of qualitative and quantitative criteria of the approved water management strategy including any improvements and / or adjustments now needed.

33.9. maintenance of log book and recording rainfall
33.10. the protection of water dependent features and ecosystems of the site and adjacent catchments;
33.11. the actual source, quantity and quality of water used by all aspects of the operation;
33.12. the effectiveness of the *Water Management Plan* in providing a framework for a complete balance for both artificial and natural surface and sub-surface waters;
33.13. risks, safeguards and contingency plans for extreme climatic conditions and operational hazards including groundwater breach or contamination;
33.14. the results of monitoring water quality at down stream boundaries relative to the stage of extraction;
33.15. that the advice and licensing requirements of state agencies have been considered including DLWC Dam Safety Committee and the EPA;
33.16. the following condition (34-43) shall be reported on within the Water Management Plan.

34. In order to protect the adjoining land and downstream water quality, the following measures are required: -

34.1. Sediment and erosion control measures are to be constructed in accordance with plans prepared by Morse & McVey and shown on Plan No.975038-S1, dated April 1998. and shown on Plan No.985059-01 & 985059-02, dated January 1999.

34.2. No development works are to commence until the approved sediment and erosion control measures are implemented.

34.3. All sediment and erosion control measures once installed are to be maintained in good working order and repair until development and rehabilitation / landscaping works have been completed.

34.4. An amended plan for erosion and sediment control may be submitted for approval if new best practice measures proposed to be incorporated into the proposed development.

35. In order to protect downstream water quality and maintain public roads in a clean condition, sediment control measures (shake-down or other approved methods) are to be implemented and maintained at entry / exit points to ensure the removal of soils and other associated soil pollutants ie. concrete slurry, from vehicles before leaving the site.

36. In order to protect downstream water quality the proposed sediment retention basin is to be maintained in good working order, ensuring that: -

36.1. water in the basin must be discharged when it reaches 1/3 of the total capacity, this water must be treated with a flocculating agent prior to discharge;
36.2. water in the basin can only be discharged if an acceptable water quality of 50mg/L non-filterable residues (NFR) has been achieved;

36.3. disposed of pollutants removed from the basin to an authorised disposal site is to occur in areas where further pollution to downslope lands and waterways are not approved;

36.4. details of water being discharged from the basin are to be recorded by the site supervisor (quantity, quality and time), and

36.5. the basin's condition is to be regularly inspected by the site supervisor and recorded.

37. Check dams shall be incorporated with siltation fencing to be provided and constructed across catch drainage flows approximately at 10 metres intervals to facilitate velocity reduction and to further mitigate against sediment and erosion. Maximum height shall not exceed 600mm. A spillway provision shall be incorporated with the check dam , allowing 150mm spillway clearance.

38. The sediment retention basin shall be provided and designed to accommodate a 5 year ARI time of concentration storm event, with a volume capacity of water that will enter in 6 minutes, one hour storm event with an additional 20% capacity provided for storage of sediment.

39. The riser shall be designed to discharge at peak flow a minimum of a 20 year frequency storm, trash collection devices and a geotextile filter shall also be incorporated.

40. All sediment controls shall be maintained and be fully operational until the final stage of the development is completed and all rehabilitation and landscaping has been established to the satisfaction of the consenting authority. All disused and discarded sediment controls shall be removed and disposed of to approved waste disposal depots or to approved landfill use.

41. Excavation or alteration of the natural gradient or flowpath of the watercourse is prohibited.

42. Instream sediment retention devices or excavations within the watercourse are prohibited without Council approval. Sediment retention structures shall be constructed off line and shall not impact or impede the frequency, depth, extent , or volume of the flow within the watercourse.

43. The NSW Department of Housing *Managing Urban Stormwater - Soils & Construction* 1998 manual should be the basic reference used for the correct installation and maintenance of all proposed sediment and erosion control measures.

WASTE

44. An annual Waste Management Plan , may be referred to as a chapter within the Environmental Management Plan, shall be submitted to demonstrate the :-

44.1. type, composition and quantity of material proposed to be re-used, recycled and removed;

44.2. source and quantity of material imported;
44.3. destination of all material removed from the site;
44.4. the following conditions are adhered to

~~45. In order to prevent site contamination, no fill is to be imported onto the site without development approval.~~

46. All chemicals, fuels and compounds used in the proposed development are to be stored so as not to leak, leach or percolate into stormwater systems.

47. In order to provide for the storage and disposal of garbage / recycling at the proposed development the following must occur:-

47.1. All putrescible waste generated is to be deposited in properly constructed water, fly, and vermin proof approved garbage containers.

47.2. Garbage containers are to be cleaned off-site regularly by an authorised contractor.

48. In order to ensure adequate treatment and disposal of wastewater, an application to install or construct a sewage management facility is to be submitted for the proposed development prior to works commencing on site.

REHABILITATION

49. To ensure rehabilitation progresses in an orderly and efficient manner the proponent is to submit every 12 months after the endorsed date of this consent a Rehabilitation Management Plan, which may be referred to as a chapter within the Environmental Management Plan, in which Council is to be satisfied of the following:-

49.1. the rate of rehabilitation is similar to the rate of extraction and cleared/disturbed areas are minimised, including a requirement that rehabilitation of the western precinct is to be completed within six (6) months of the commencement of extraction of the Eastern precinct;
49.2. vegetative buffer zones and rehabilitated areas are maintained
49.3. vegetation outside the extraction areas are successfully retained and protected
49.4. progressive rehabilitation integrates with the surrounding terrain and approved final landform
49.5. vegetative covers are established at the earliest possible opportunities
49.6. assessment / comment on the progress of rehabilitation carried out under the direction of the nominated supervisor, and
49.7. method and progress of the rehabilitation of extracted areas are in accordance with current environmental laws standards and practice including guidelines published by the Australian Federal Environment Department and Department of Land and Water Conservation
49.8. rehabilitation management including results of flora and fauna monitoring programmes -

The program outline shall describe the following monitoring details :

49.8.1 the key information that will be monitored, its criteria and the reasons for monitoring (which may be compliance with regulatory requirements)
49.8.2 the monitoring locations, intervals and duration (particularly of threatened species)
49.8.3 procedures to be undertaken if the monitoring indicates a non-compliance or abnormality
49.8.4 internal reporting and link to management practices and action plans
49.8.5 reporting procedures to relevant authorities and, if appropriate, to the consent authority and the community.

49.9 the following conditions (50-80) may be reported on within the Rehabilitation Plan

50. Soil stripping, storing, and replacement methods shall include the following criteria:

50.1. removal of topsoil removed in two (2) parts by saving the organic layer first, being 100 - 300mm;
50.2. removal of the next layer (300-500mm) shall be stripped and stockpiled separate
50.3. flat and low stockpiles no more than 3m high to ensure survival of organic material and aerobic organisms;
50.4. stockpiles kept free of traffic and away from drainage lines;
50.5. stockpiles stored for as brief a period as possible and no more than twelve (12) months at a time; and that
50.6. stockpiles created for each soil type and which should not be mixed
50.7. stockpiled remaining longer than 14 days shall be seeded with a temporary sterile vegetation cover;

51. Mulch from one vegetation community type shall be kept separate from mulch of another vegetation community.

52. Stockpile sites for mulch will be provided in the Rehabilitation Plan

53. Topsoil from one area of a vegetation community type shall be kept separate from another vegetation type.

54. Appropriate measures for the collection, processing and storage of native seeds shall include :

54.1. collection from site by a suitable horticulturist
54.2. portion of the seeds collected shall be used as part of a hydro mulch mix. A sterile cereal seed mix shall be used for the other part:
54.3. remainder of the seeds collected shall be propagated under appropriate nursery conditions and maintained:

54.4. identification of collection areas;
54.5. collect seed only when mature;
54.6. avoid seeds attached by insects or showing signs of fungal infestation;
54.7. consider establishing a seed orchard;
54.8. seeds are cleaned before storage
54.9. use established processing techniques such as drying, threshing, burning;
54.10. treat seeds with insecticide/fungicide, including 1 day exposure to carbon dioxide prior to storage;
54.11. clean seeds stored in dry, insect and vermin free containers at low humidity and low temperatures;
54.12. collection from a range of species and types.
54.13. the type, composition of seed mixes, application rates, adaptation and expected growth of proposed species used in the rehabilitation shall be included in the rehabilitation plan.

55. Weed infestation on rehabilitated areas shall be controlled and prevented through:

55.1. the careful use of fertilisers and organic matters such as manure so as not to stimulate weeds;
55.2. promotion of a vigorous cover of appropriate plant species in the agricultural area;
55.3. hand weeding
55.4. selective application of herbicides; and mulching with weed free materials

56. Rehabilitated areas shall be sustained by re-establishing nutrient cycles within the soil to:
56.5. store and supply water
56.6. support root growth; and
56.7. improve water infiltration to reduce compaction

57. Rehabilitated and/or disturbed areas shall be regularly maintained including:

57.1. replanting of exposed areas and replacing dead plants within six (6) months;
57.2. repairing erosion problems
57.3. pest and weed control
57.4. fertiliser applications where appropriate on land for agricultural use;
57.5. regular watering;
57.6. application of lime or gypsum to control pH and improve soil structure where appropriate on land restored for agricultural use.

58. Topsoil and overburden used as bund walls during extraction shall be stabilised using appropriate native species and rehabilitation techniques under the direction of a qualified Plant Ecologist or Landscape Architect and used as backfill only when not contaminated with exotic grasses or weeds.

59. Direct seeding shall be carried out in soft soil free of leaf litter/weeds and under favourable conditions of water, oxygen, temperature and light.

60. Permanent ground cover shall be established on areas disturbed for more than 14 days and be maintained by regular watering and additional applications of seed and fertiliser.

61. The extraction area is to be backfilled only with earth and rock materials sourced as a result of extraction. No solid waste or putrescible materials should be disposed of within the site.

62. The site is to be progressively rehabilitated in accordance with the rehabilitation provisions of the Environmental Impact Statement and other documents submitted. It is to be regularly reported in the Rehabilitation Management Plan the subject of condition 49 of this consent.

63. Trees to be retained shall be protected during site works and construction by the erection of solid barricades to the name/design specification of the Manager, Parks & Landscape Team, and generally at 4 metres or other specified distance, from the trunk/s of such trees.

64. All tree protection measures so approved and installed, shall be maintained in good working order and repair throughout the course of building or development works.

65. All environmental weeds, noxious and invasive plants are to be removed and continually suppressed using an appropriate method prior to release of the final plan.

66. No works, stockpiles, dams or clearing of bushland to occur in the designated area, as shown in red on attached property map.

67. All natural landscape features including natural rock outcrops, natural vegetation, soil and water courses are to remain undisturbed except where affected by necessary works detailed on approved plans, or with Council's written consent.

68. No clearing of bushland to occur in the designated area, as shown in red on the attached property map,

69. Prior to any construction work a protective barrier mesh fence must be installed along the edge of the internal haul road to protect the restricted bushland areas.

70. The areas within the 'restricted zone' containing threatened species should be fenced prior to any construction or excavation that occurs on the site.

71. All care shall be taken to ensure no areas are disturbed unnecessarily. In this regard, existing vegetation shall be undisturbed by a "no go" boundary constructed by silt fencing to facilitate the filtration and collection of runoff pollution emanating from the works.

72. The riparian buffer along the watercourse, as marked on the attached site plan, must be re-vegetated according to the *Sustainable Water Best Practice Q1.01 (riparian vegetation), Q1.04 (stream rehabilitation)* and in accordance with the rehabilitation plan and EIS submitted.

73. The dam embankment adjacent to bushland is to be re-vegetated using native grass species, as per species list attached. In conjunction with native species the use of a sterile cover crop, as per attached species list, would provide quick growth for initial stabilisation of the embankment without spreading into the adjacent bushland.

74. Acoustic earth bunds and visual screen bunds shall be established and planted with appropriate native vegetation to facilitate screening and noise reduction of extraction works.

75. The north and west facing slopes shall be rehabilitated at a 1:4 grade and the south & east facing slopes shall be rehabilitated to 1:3 grade within the west precinct.

76. All slopes will be rehabilitated to 1:3 grade within the east precinct.

77. The Rehabilitation Management Plan shall include detailed species for each vegetation community type, densities for planting for individual seedlings and cutting stock.

78. The proponent is to ensure the conservation and on-going management of threatened species, populations and ecological communities, in particular those of *Acacia bynoeana* at all times and details of which are to be incorporated within the Rehabilitation Plan subject to condition No 79 of this consent.

79. The rehabilitation of the eastern sector must be undertaken in accordance with the submitted Rehabilitation Plan and undertaken by a suitably qualified person with experience in rehabilitation.

80. Any plans to propagate threatened species will require a licence from National Parks and Wildlife Service.

AIR QUALITY

81. The proponent is to submit to Council every 12 months after the endorsed date of this consent an Air Quality Report (which may be referred to in the Environmental Management Plan) in which Council is to be satisfied that dust and noise levels generated by the extraction operations comply with the established practices and standards, including the EPA manual . The report shall include:

81.1 a public complaint register
81.2 recording of data from dust deposition gauge
81.3 report on the following (82-88) conditions

82. The proponent is to monitor dust generation from the extractive operations and associated activities and the results of which are to be detailed in the Air Quality report referred to in condition No.81.

In the event of dust nuisance being identified, the proponent shall immediately inform Council and implement any mitigation practice as required.

83. Proponents shall employ wind activated water sprinkler systems or any alternative method, to the satisfaction of Council, to ensure extraction sites minimise dust generation particularly during periods of high wind and when sites are unattended.

84. Proponents shall provide details (this can be included in the annual air quality report) of effective measures proposed to be implemented to suppress dust generated from :-

84.1 Blasting;
84.2 Removal of overburden
84.3 Site clearing;
84.4 Extraction and haulage;
84.5 Moving material on to and from stockpiles;
84.6 Mobile earthmoving equipment;
84.7 Blow-off and spillage from truck loads; and
84.8 Crushing and screening procedures.

85. Proponents shall ensure that prior to leaving extraction sites all laden trucks have their payloads fully covered by suitable material to prevent spillage from the trucks on roads and adjoining properties.

86. Proponents shall ensure that any blasting is not undertaken in strong wind and/or prolonged dry weather periods.

87. Stockpiles of material and other sediment laden areas are to be maintained so as to prevent any dust nuisance.

88. Dust suppression equipment is to be fitted to all processing equipment and is to be maintained on a minimum of a six monthly basis and details of which are to be submitted to Council in accordance with condition No. 81 of this consent and to any other relevant authority referred to under section 23 of the Clean Air Act 1961.

89. Upon activities commencing an acoustic report prepared by an acoustic consultant is to be submitted within the first 6 months, detailing the noise levels being emitted to adjacent premises from the new development. If noise levels exceed the background levels by more than 5dB(A), noise attenuation methods are to be installed. Details of all noise attenuation methods are to be submitted for approval prior to installation.

MONITORING & MANAGEMENT

90. The proponent shall submit to Council every 12 months after the endorsed date of this consent an Environmental Management Plan in which Council is to be satisfied of the overall performance and management of the operation.

The Environmental Management Plan should refer to the objectives and principles of Ecologically Sustainable Development and may use and / or reference as chapters the respective management plans required by condition Nos. 1 to 3, 6, 7 and 23 to 87 of this consent in order to address the following matters:-

90.1 Acquisition of all necessary licences and permits and an indication of how compliance with licensing and approval requirements will be achieved and due diligence attained

90.2 On site materials Management including management of operational impacts: if appropriate, include such as:
- management of explosive, chemicals and fuel and their use
- maintenance an site security plans

90.3 Water Management

90.4 Acoustic Management

90.5 Air quality Management

90.6 Transport routes, access & movements

90.7 Soil Conservation including geo-technical appraisal of tailing systems and erosion and sediment controls.

90.8 Social impact management including consultation with community groups, nearby residents and monitoring of complaints received

90.9 Identification, assessment and evaluation of risks, safeguards and the confidence level of contingency / emergency plans;

90.10 Statement of Compliance with the approved EIS documentation, conditions of this consent and the objectives of Councils DCP - Extractive industries.

90.11 Advice and recommendations of all relevant state government agencies;

90.12 Reference to International Standards (ISO) 14001-14004 relating to Environmental Management Systems, which should address issues such as:-
- the capacity and support mechanisms necessary to implement and achieve the proponent company's environmental policy, objectives and targets and
- the means by which the proponent company measure, monitor and evaluate its environmental performance and

90.13 Recommendations to adjust operation procedures to improve the overall performance of the operations.

90.14 Strategies to feed information from the monitoring program back into the management practices and action plans to improve the environmental performance and sustainability of all components of the proposal

90.15 Training programs for operational staff and incentives for environmentally sound performance

90.16 Performance indicators in relation to critical operational issues including :
Compliance with the conditions of consent;
Compliance with the objectives of this DCP;

ENGINEERING

91. Council's public road between the entrance to the extraction site and the northern intersection of Old Northern Road and Old Telegraph Road shall be constructed to the satisfaction of Baulkham Hills and Hornsby Shire Councils.

92. The northern intersection of Old Northern Road and Old Telegraph Road, Maroota, shall be constructed of Type B intersection to the requirements of the Roads and Traffic Authority (RTA), Baulkham Hills Shire Council and Hornsby Shire Council.

93. In the proposed intersection and public road, design and construction of pavement shall cater for both the existing traffic volumes and equivalent standard axle (ESA) loadings, allowing for reasonable growth for a period of 20 years, as well as the maximum permissible number of fully loaded design semi trailer vehicles for the life of the extraction industry.

94. Access from Old Telegraph Road to the site and an internal haul road shall be constructed to Council's standard and the requirements of the Department of Land and Water Conservation.

95. The proposed intersection and Old Telegraph Road design and internal haul road shall incorporate the following design constraints:-

95.1. The intersection, public road, internal road and associated works shall cater for all anticipated classes of vehicle and any turning manoeuvre.

95.2. Roads shall be designed and constructed as generally two-way with lane widths to be at least 3.0 m. Shoulders to be designed and constructed at least 1.0 m wide.

95.3. Verges, batters and table drains to be designed and constructed in accordance with common Austroads and Council design standards. Verge width and lateral clearances for road shoulder, road furniture and trees are to be at least 1.0 m clear of the outer edge of road shoulder. Maximum side slopes of batters to be designed and constructed to prevent vehicles from overturning.

95.4. Sight lines are to be at least the minimum given topographic and geometric considerations, horizontal and vertical alignment and maximum grade considerations in accordance with common Austroads and Council design standards.

95.5. Drainage details to ensure that pre-construction stormwater runoff patterns shall be the same as after construction. Table drains and culverts are to have a capacity of not less than the 20 year average recurrence interval (ARI) storm capacity. Longitudinal slopes of drains shall be designed to prevent scour and siltation.

95.6. All engineering works required by these conditions must be designed and constructed in accordance with:

(a) Australian Rainfall and Run-Off 1987 and
(b) Hornsby Shire Council's Civil Works, Design and Construction Specifications 1999

95.7. Embankments where required shall have maximum slope determined by nature of their being cut or fill and the soil used. Creation of batters for support on roadsides as necessary and submission of a copy of the registered document of transfer to Council immediately after construction of such batters.

95.8. Accurate discovery and location of all services and marked on the plans and proposals to adjustments to same as required with the written authority of the utility or service provider.

95.9. Access into the lot affected by boundary subdivision is to be shown on the Engineering plans and is to be constructed to Council's satisfaction.

95.10. In order to incorporate biodiversity issues of roadsides, design and construction of all works are to be in accordance with Council's "Management Plan for Rural Roads".

95.11. In order to provide safety, appropriate signage, warning, traffic control and safety measures are to be installed in Old Northern Road and Old Telegraph Road on all approaches prior to work commencement. Such measures shall be signposted and illuminated with flashing beacons between sunset and sunrise for the duration of the roadworks. Signage advising of altered traffic conditions shall be installed for a reasonable time after the completion of works.

Such measures are to be proposed on Engineering plans for construction in accordance with AS 1742.3 - 1996 and the relevant SAA HB81 Handbooks.

96. In order to ensure adequate safety, a proposal shall be prepared by a suitably qualified Traffic Engineer for agreement by the RTA in respect of maximum speed, safety and advisory signposting and linemarking given the proposed alignment and geometry of the works. Such report is to be lodged with the Construction Certificate. Subsequently, construction of approved signage and linemarking to RTA and Council standards.

97. All truck traffic generated by this Consent shall access Old Northern Road and the extraction site via the northern intersection of Old Northern Road and Old Telegraph Road. No truck vehicles shall access Old Northern Road or the extraction site via Roberts Road.

98. A Construction Certificate with Engineering plans is to be lodged for examination. The plans are to be submitted using Council's Civil Works Specifications. This information shall include the following:-

98.1. Design constraints from abovementioned conditions.

98.2. Any Construction Certificate that may be issued in association with this development consent must also ensure that any proposed plans and designs are generally consistent (in terms of site layout, site levels, building location, size, external configuration and appearance) with Development Application plans as already determined.

98.3. Previous written consent from RTA and Baulkham Hills Shire Council, referring to relevant plan numbers, stating there is no objection to commencement of construction and extraction activities.

98.4. Plans of longitudinal sections, cross sections, drainage sections, drainage catchment plans and soil and water management plans.

98.5. Position of all lot boundaries, and all existing and proposed features and structures.

98.6. Chainages, existing and proposed topography, limits of work, bench marks and Datum.

98.7. A check including a report by a suitably qualified Civil Engineer of advisory speed capacities given the final alignment.

98.8. Four sets of A1 or A2 size sheets suitable for black and white copying. Plans to be clearly set out so the works may be understood. Logical collection of information on sheets in order to avoid onerous effort in cross referencing.

99. At least two day's written notice must be given of the commencement of water and soil management , safety signage or engineering works.

100. In order to maintain the amenity of adjoining properties, site works shall be restricted to between 7.00am and 6.00pm, Monday to Friday and 8.00am to 1.00pm Saturday. If inaudible, site works shall be restricted to between 7.00am and 4.00pm on Saturday. No work shall be undertaken on Sundays or public holidays.

101. In order to avoid air contamination and nuisance, frequent watering of internal haul road is to be undertaken by the Applicant when conditions prescribe or anytime at the written direction from Council.

102. Revegetation must be applied to disturbed areas and established. Such revegetation to be applied as soon as practicable after completion of earthworks or anytime at the written direction of Council.

103. A works-as-executed plan prepared by a suitably qualified and certified Chartered Civil Engineer shall be submitted on the completion of the works showing:-

103.1. The levels and datum for all survey marks found or placed

103.2. Where the works-as-executed plans differ from the approved plans, the information shown on the plan is to be neatly crossed out and the new information substituted in such a manner that it can be clearly distinguished on a print taken from microfilm.

104. Construction of proposed intersection, Old Telegraph Rd construction and internal haul road to be completed in accordance with the approved Engineering plans and any consent, and to the satisfaction of Council and the Roads and Traffic Authority prior to commencement of any extraction on the site.

105. Lodgement and approval of a Subdivision Certificate is required to authorise the plan of boundary adjustment. It should be noted that a Subdivision Certificate can only be issued by Council unless an Environmental Planning Instrument identifies that an Accredited Certifier can undertake the work.

106. To obtain a Subdivision Certificate, you must submit a Subdivision Certificate application form, pay the appropriate fee and provide for the following:

106.1 A Final Survey Plan together with eight (8) exact copies prepared by a Registered Surveyor.

106.2. An original Section 88B document (if required) together with one additional copy, in accordance with Conveyancing Act, 1919.

106.3. Completion of all works and eligibility for all certificates as required in Development Application No. 342/98. This shall include the completion of works for:-

106.3.1 Construction of proposed northern intersection of Old Northern Rd and Old Telegraph Road, Maroota, to the satisfaction of the appropriate Road Authorities.

106.3.2 Construction of Council road on Old Telegraph Road between the proposed intersection and the entrance to the extracting site at Lot 2 DP 748820, to the satisfaction of Baulkham Hills Shire Council and Hornsby Shire Council.

106.4 "Work-as-Executed" plans prepared by a Chartered Engineer/Registered Surveyor in accordance with the requirements of Development Consent No. 342/98.

Note: The issue of a Subdivision Certificate is not to occur until conditions Nos. 91 to 106 have been satisfactory addressed.

107. Dedication of proposed Lot 11 to Council and the Roads and Traffic Authority. Such land to be free from any taxes, rates and charges owing."

CONTRIBUTIONS

108. Subject to the following paragraphs of this condition, the party carrying on the extraction work shall pay to the Council a contribution under Section 94 of the Environmental Planning and Assessment Act, 1979 at a rate of $0.63 per tonne for all extracted material transported from the site. The following provisions shall apply to the contribution:

108.1 The contribution will be calculated and paid monthly in respect of all material transported from the site as from the date of this consent.

108.2 The rate of the contribution will be varied annually with the first variation due as at 1 July, 2000. On each variation date, the rate per tonne shall be varied to an amount which bears to $0.63 the same proportion as the Consumer Price Index (All Groups) for Sydney last published prior to the relevant date of variation bears to the same index last published prior to 1 September, 1998.

108.3 On or before the fourteenth day of each month so long as extracted materials are transported from the site, there shall be delivered to the Council a true certified copy of returns or records acceptable to the Council showing the true quantities of extracted material transported from the site during the immediately preceding month and the Council will then as soon as it can conveniently do so issue to the Applicant or subsequent operator an invoice for the contribution payable for such material transported from the site. Payment of the amount of the invoice shall be made by the Applicant to the Council within 14 days of the invoice date. If the party carrying out the extraction work fails to deliver such returns to the Council in accordance with this clause by the fourteenth day of a particular month, the Council shall at its absolute discretion be entitled but not obliged to estimate the quantity of material transported from the site during the immediately preceding month and shall be entitled to issue such an invoice on the basis of such estimate PROVIDED HOWEVER that an appropriate adjustment shall be made between the parties when certified copies of the required returns in respect of such immediately preceding month have been provided to the Council as required by this clause.

108.4 The Council shall be entitled to have any person or persons nominated by its internal accountant to inspect and audit the original records relating to any of the extracted material, including locality of destinations, numbers and types of laden trucks and trailers and load quantities, transported from the site. Nomination of a person or persons to carry out such inspections and/or audit shall be in writing.

108.5 Council will pay all of the contributions received by it into a specially identified trust account for payment towards the rehabilitation, restoration, repair and/or maintenance of Old Northern Road and Old Telegraph Road and of the road giving access to the site.

108.6 If the Applicant ceases to carry out the approved extraction work or if a party other than the Applicant commences to carry out such work without the Applicant having started to do so, then the Applicant shall forthwith furnish to the Council notice of that fact together with the name and address of the party (if any) who has commenced or will thereafter commence to carry on the said work. Such notice shall be accompanied by an acknowledgment in writing by that party that it is aware of the obligations imposed on it pursuant to this condition. Until such time as the notice and acknowledgment are furnished to the Council by the Applicant, the Applicant will remain jointly and severally liable with the party for the time being carrying out the extraction work for payment of the aforesaid contribution and for compliance with the terms of this condition. The terms of this paragraph shall apply mutatis mutandis to any future operator of the extraction work in the event of his ceasing to carry out the work.

All conditions of consent must be complied with before land use (including occupancy) takes place. Any consent given shall be void if the development to which it refers is not commenced within five (5) years after the date of approval, provided that the Council may, if good cause be shown, grant an extension of renewal of such consent beyond such period.

Endorsement of date of development consent 1 July, 1999.

NOTES

1. To ascertain the date upon which the consent becomes effective refer to Section 93 of the Act.

2. To ascertain the extent to which the consent is liable to lapse refer to Section 99 of the Act.

3. Section 97 of the Act confers on an applicant who is dissatisfied with the determination of a consent authority a right of appeal to the Land and Environment Court exercisable within 12 months after receipt of this notice.

4. Failure to comply with any of the above conditions, may result in a maximum penalty of $100,000 and a further daily penalty not exceeding $10,000 being imposed pursuant to the provisions of Environmental Planning and Assessment Act, 1979.

5. **For failure to install and maintain sediment and erosion devices as shown on the approved plans Council, under the Clean Waters Act, will issue $600.00 on the spot fines for each and every offence and no further warnings will be issued.**

6. House numbering can only be authorised by Council. Before proceeding to number each lot/occupancy in your development, advice must be sought from Council's Planning Division.

7. The following comments from the Manager Building are to be noted:

7.1 No building works are to be commenced until a building application complying in full with Council's terms and conditions of development consent together with four (4) sets of plans and specifications are submitted to and approved by Council.

R J BALL
General Manager

per:
R PICKLES
Team Co-Ordinator
Planning Division

1 July, 1999

Council ref: DA 342/98
Enquiries: Mr R Pickles (9847 6732) (8.30am to 5.00pm)

RP:HW

Attachment: Stamped Approved Plan(s)

SECTION 96(1) AMENDMENT (DA No. 342/98A)

Pursuant to Section 96(1) of the Environmental Planning and Assessment Act, 1979, Development Consent No. 342/98 for a sand and clay extractive industry to be developed in two stages with dams and rehabilitation to bushland is amended as follows:

1. Condition No. 106 is amended to read:

   "106. There shall be no commencement of extraction works until all conditions Nos. 91 to 106 inclusive, have been completed to the satisfaction of Council and the Roads and Traffic Authority.

2. The following additional condition applies:

   "109. To obtain a Subdivision Certificate (in relation to condition No. 107), you must submit a Subdivision Certificate application form, pay the appropriate fee and provide the following:

   109.1 A Final Survey Plan together with eight (8) exact copies prepared by a Registered Surveyor.

   109.2 An original Section 88B document (if required) together with one additional copy, in accordance with the Conveyancing Act, 1919."

RIGHT OF APPEAL

1. Should any of the determination not be acceptable, you are entitled to request reconsideration under Section 82A of the Environmental Planning & Assessment Act, 1979. Such request to Council must be made in writing together with a $500.00 fee, within 28 days from the date of determination;

2. To ascertain the date upon which the determination becomes effective refer to Section 83 of the Act.

3. Section 96(6) of the Act confers on an applicant who is dissatisfied with the determination of the Council to modify the consent a right of appeal to the Land and Environment Court providing that appeal is lodged **WITHIN 60 DAYS** of the date of this determination.

R J BALL
General Manager

per:
R PICKLES
Team Co-ordinator
Planning Division
4 August, 1999

SECTION 96(2) AMENDMENT (DA No. 342/98C)

THAT pursuant to Section 96(2) of the Environmental Planning and Assessment Act, 1979, Development Consent No. 342/98 for a sand and clay extractive industry be amended in accordance with plans dated May, 2004 Sheet No. 1 of 3.

RIGHT OF REVIEW

1. For a determination other than designated development, integrated development or complying development certificate, you are entitled to request reconsideration under Section 82A of the Environmental Planning & Assessment Act, 1979. Such request to Council must be made in writing, together with the prescribed fee of 50 per cent of the fee for the original development application (including advertising fee if applicable), within 28 days from the date of receipt of this notice of determination. A decision on a review may not be further reviewed under this section.

RIGHT OF APPEAL

1. Sections 96(6) or 97 of the Act, where applicable, confers on an applicant who is dissatisfied with the determination of a consent authority a right of appeal to the Land and Environment Court exercisable within 60 days or 12 months respectively, from the date of determination.

2. To ascertain the date upon which the determination becomes effective refer to Section 83 of the Act.

R J BALL
General Manager

per:
R PICKLES
Team Co-ordinator
Planning Division

22 November 2004

Attachment: Stamped Approved Plan(s)

SECTION 96(2) AMENDMENT (DA/342/1998/E)

Pursuant to Section 96(2) of the Environmental Planning and Assessment Act, 1979, Development Consent No. DA/342/1998/E for a sand and clay extraction operation is amended as follows:

1. Modification of condition No. 30:

   "30. ~~Consent for the staged extraction of material and rehabilitation is limited to a period of 30 years effective from the endorsed date of this consent, based upon a high level of performance and terminating in the year 2029.~~"

RIGHT OF REVIEW

1. For a determination other than designated development, integrated development or complying development certificate, you are entitled to request reconsideration under Section 82A of the Environmental Planning & Assessment Act, 1979. Such request to Council must be made in writing, together with the prescribed fee of 50 per cent of the fee for the original development application (including advertising fee if applicable), within 28 days from the date of receipt of this notice of determination. A decision on a review may not be further reviewed under this section.

RIGHT OF APPEAL

1. Sections 96(6) or 97 of the Act, where applicable, confers on an applicant who is dissatisfied with the determination of a consent authority a right of appeal to the Land and Environment Court exercisable within 60 days or 12 months respectively, from the date of determination.

2. To ascertain the date upon which the determination becomes effective refer to Section 83 of the Act.

R J BALL
General Manager

per:
Rod Pickles
Assessments
Planning Division

DA/342/1998/E

Attachment 2

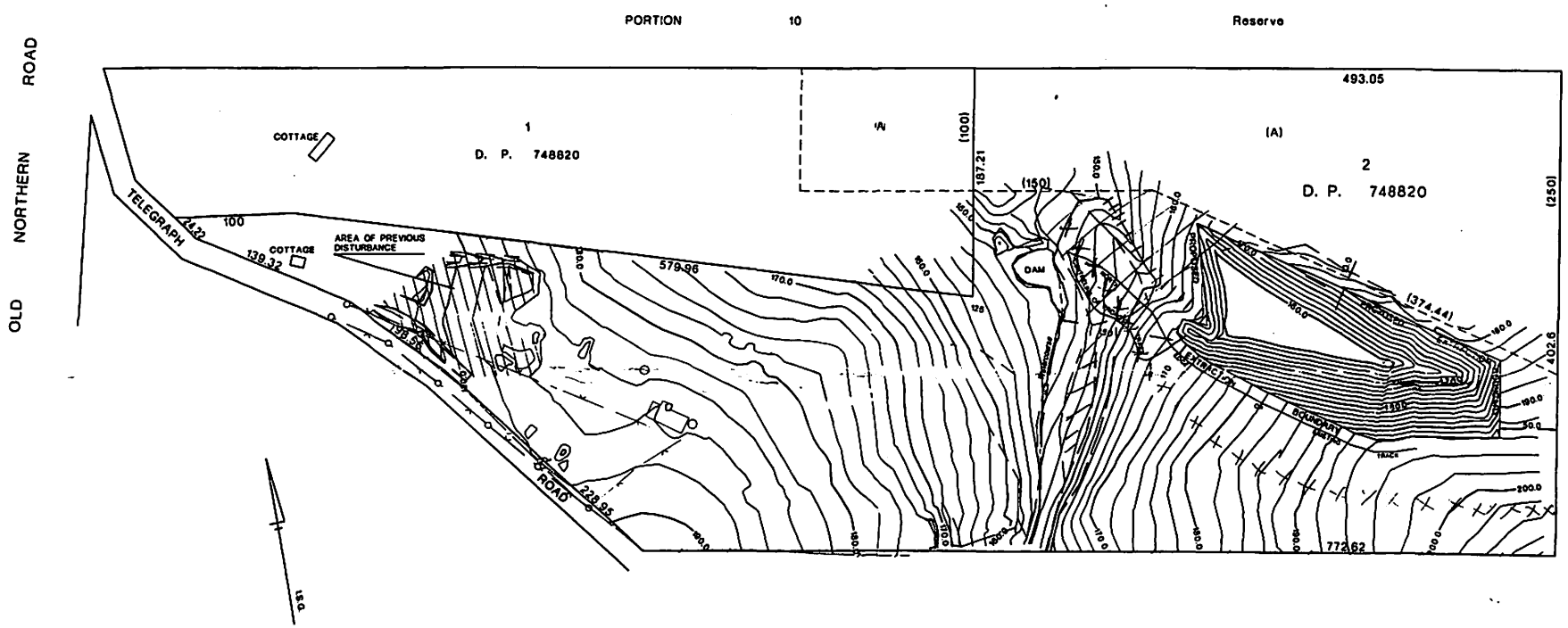
Development Consent Plans and Drawings

CH2677G1 dated 1 May 1996,

Drawing No. MP-01B dated April 1999,
MP-02B dated January 1999 and
MP-03C dated July 2000

Drawing No. 8703 Sheet 1A dated July 2000

Plan Dated May 2004 Sheet 1 of 3



LEGEND

- FENCELINE
- POLE
- POLE WITH OVERHEAD WIRES
- WATERCOURSE
- (A) RESTRICTION AS TO USER

NOTE: PROPOSED EXTRACTION BATTERS 1:2

NOTE:
THE PURPOSE OF THIS SURVEY WAS TO OBTAIN TOPOGRAPHICAL DETAIL AS REPRESENTED ON THIS PLAN.

CONTOURS ARE BASED ON AUSTRALIAN HEIGHT DATUM (AHD)

ORIGIN OF LEVELS IS P.M.32896 R.L.231.366 VERTICAL ACCURACY 1 AS SUPPLIED BY SURVEY CONTROL BRANCH, DEPARTMENT OF LAND AND WATER CONSERVATION DATED 22.03.96

BOUNDARIES HAVE NOT BEEN DEFINED OR MARKED

DIMENSIONS SHOWN HEREON HAVE BEEN COMPILED FROM PUBLIC RECORDS AND ARE SUBJECT TO A BOUNDARY SURVEY

PLAN OF PROPOSED EXTRACTION IN THE LAND CONTAINED IN CERTIFICATE OF TITLE 2/748820 AT MAROOTA

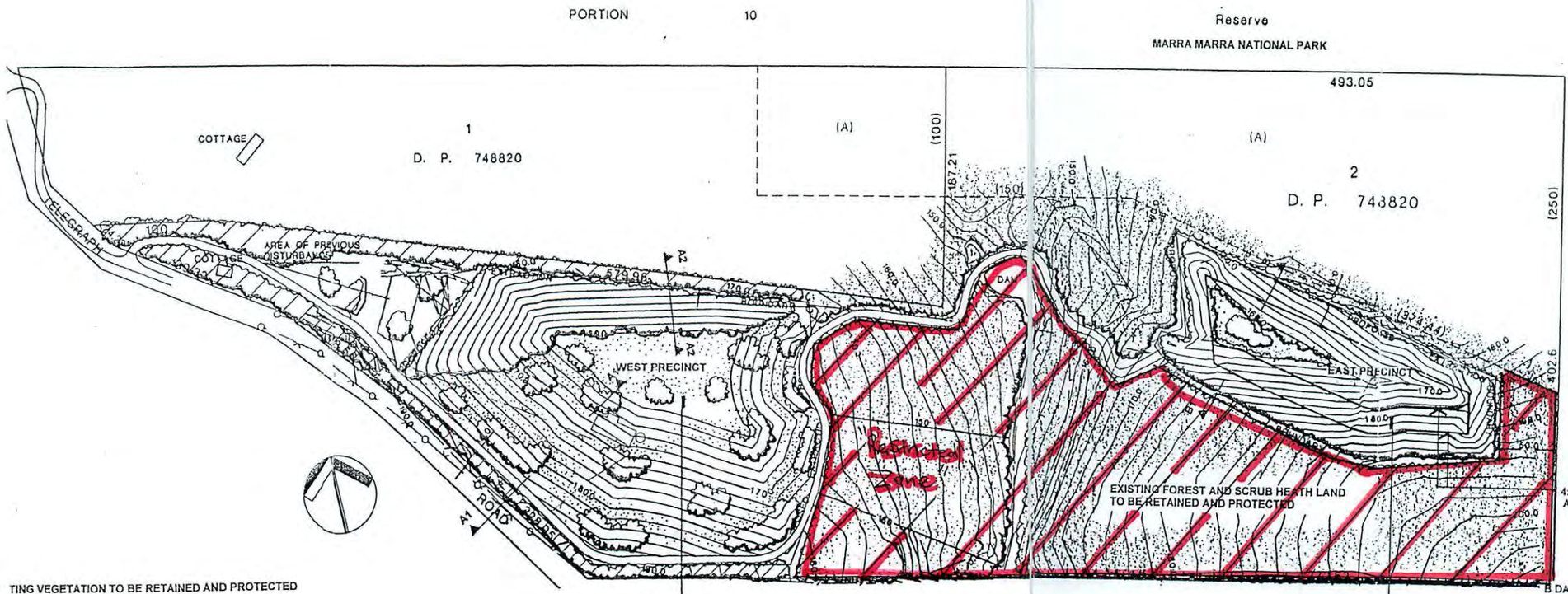
LOCAL GOVERNMENT AREA OF HORNSBY

RE-VELLA

RATIO 1:2000	SURVEYED SS & PC
LEVEL DATUM AHD	DRAWN BW
DATE 01.05.1996	CAD FILE CH2677G1.DWG
SHEET 1 OF 2	REFERENCE CH2677

WILLIAM L. BACKHOUSE Pty. Limited
REGISTERED SURVEYORS, PLANNERS AND DEVELOPMENT CONSULTANTS
ACN 000 000 000
Suite 8, 88 Brookhollow Ave.
Norwest Business Park,
Baulkham Hills
PO Box 601
Castle Hill 2154
DX 8483 Castle Hill
Telephone: (02) 9634 2606
Facsimile: (02) 9680 4286
email: wlbhouse@ozemail.com.au

21499.



TING VEGETATION TO BE RETAINED AND PROTECTED

POSED SCREEN VEGETATION

ABILITATION OR BASIN AREAS

ULE OF PROPOSED PLANT SPECIES
CTED FROM

LANTING
ELEGRAPH ROAD

UARINA LITTORALIS	BLACK SHE-OAK
IA GLOMULIFERA	TURPENTINE
TUS PUNCTATA	GREY GUM

BOUNDARY PLANTING

TUS PIPERITA	SYDNEY PEPPERMINT
ORA COSTATA	*SMOOTH-BARKED APPLE*
A GUMMIFERA	RED BLOODWOOD
ETALUM GUMMIFERA	CHRISTMAS BUSH
UARINA LITTORALIS	BLACK SHE-OAK

WEST PRINCINCT

- NORTH AND WEST FACING SLOPES REHABILITATED AT 1:4 GRADE
- SOUTH AND EAST SLOPES REHABILITATED AT 1:3 GRADE
- 1:3 SLOPES PLANTED WITH NATIVE VEGETATION
- REMAINDER OF PRECINCT REHABILITATION SUITABLE FOR AGRICULTURAL LAND USE, INCLUDING GRAZING.

i.e. LOCAL WOODLAND SPECIES TO NORTHERN SLOPES
LOCAL OPEN SCRUB/HEATH SPECIES TO REMAINDER OF BASIN

WEST PRECINCT

(A) 1:3 BATTERS (OPEN SCRUB / HEATH SPECIES)

• ANGOPHORA HISPIDA	DWARF APPLE
• BANKSIA ERICIFOLIA	HEATH-LEAVED BANKSIA
• LEPTOSPERMUM TRINERVIUM	PAPERBARK TEA TREE
• EUCALYPTUS HAEMASTOMA	SCRIBBLY GUM
• EUCALYPTUS SQUAMOSA	SCALY BARK

(B) REMAINDER

- AS ABOVE, BUT WITH A PREDOMINANCE OF COVER CROP AND LONGER TERM GROUND COVERS, IN PREPARATION FOR FUTURE AGRICULTURAL USE.

EAST PRECINCT

- ALL SLOPES REHABILITATED AT 1:3 GRADE
- EAST PRECINCT TO BE REHABILITATED WITH NATIVE VEGETATION REFLECTING SPECIES PRESENT PRIOR TO EXCAVATION: i.e. LOCAL WOODLAND SPECIES ON 1:3 BATTERS

EAST PRECINCT

(A) 1:3 BATTERS

TO REFLECT EXISTING VEGETATION COVER TYPE

• EUCALYPTUS HAEMASTOMA	SCRIBBLY GUM
• ANGOPHORA BAKERI	NARROW LEAVED APPLE
• CORYMBIA GUMMIFERA	RED BLOODWOOD
• EUCALYPTUS SQUAMOSA	SCALY BARK
• ANGOPHORA HISPIDA	DWARF APPLE
• LEPTOSPERMUM TRINERVIUM	PAPERBARK TEA TREE

B DA ISSUE – NEW DRAWING APRIL 1999
A DA ISSUE JANUARY 1999
Revision: date:

S. M. A.
Scott Murray & Associates
• Landscape Architecture • Golf Course Architecture
• Urban Design • Environmental Planning
79 Zig Zag Lane, Crows Nest, NSW 2065
Telephone: (02) 9439 9340 Fax: (02) 9439 9287

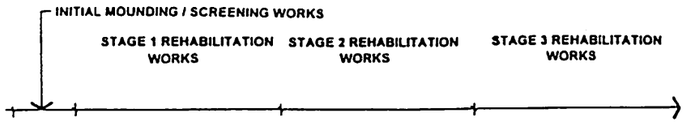
client:
F. & K. VELLA

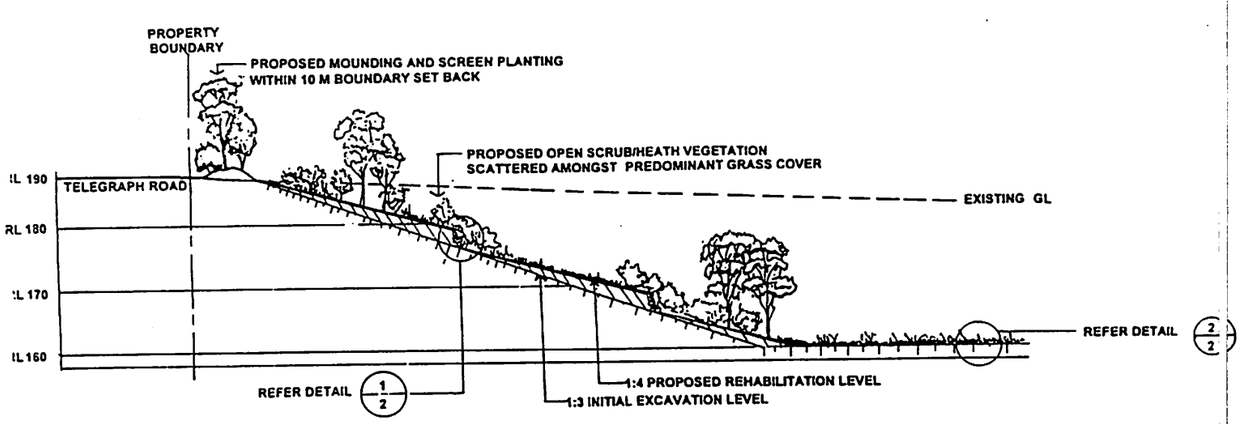
project:
PROPOSED SAND MINING OPERATION
LOT W D.P. 748820 MAROOTA

drawing title:
CONCEPT REHABILITATION PLAN

scale: 1:2000
date: APRIL 1999
drawing number: MP-01B

TYPICAL REHAB STAGING CONCEPT – WEST PRECINCT





WEST PRECINCT SECTION A1-A1
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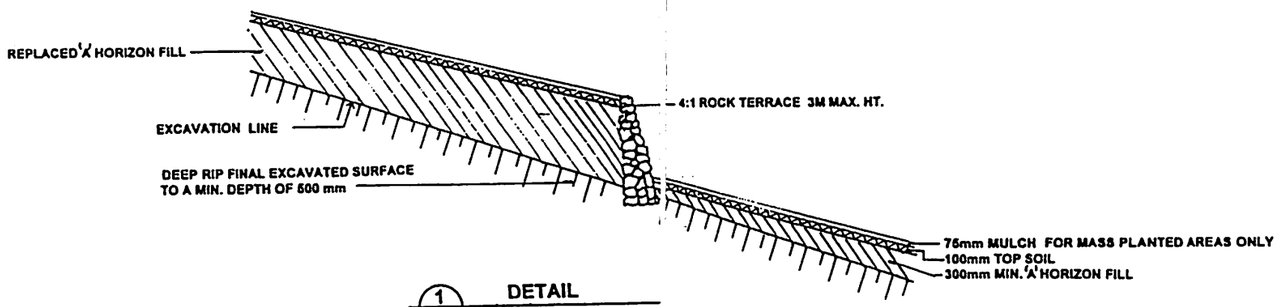
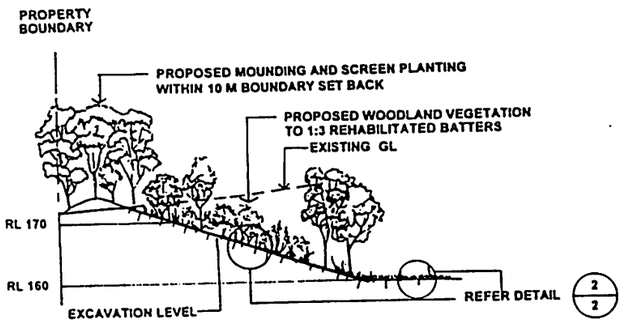


1/2 DETAIL
NTS



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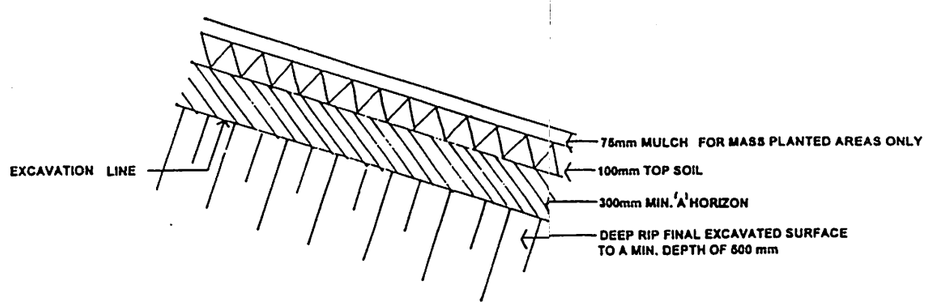
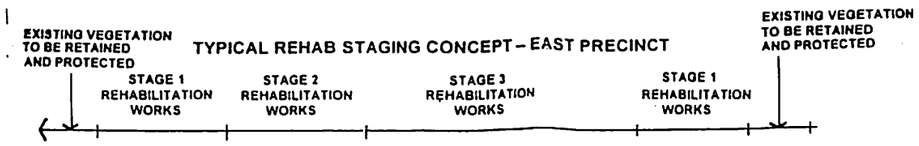
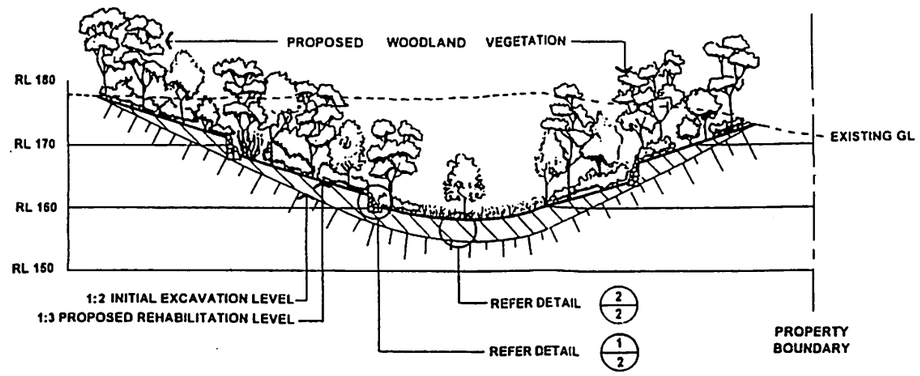


2/2 DETAIL
NTS

TYPICAL REHAB STAGING CONCEPT – EAST PRECINCT





EAST PRECINCT SECTION B1-B1
SCALE 1:500

B DA ISSUE – NEW DRAWING APRIL 1999
A DA ISSUE JANUARY '99

Revision

S. M. A.
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client
F. & K. VELLA

project
PROPOSED SAND MINING OPERATION
LOT2 D.P. 748820 MAROOTA

drawing title
SECTIONS

scale 1:500

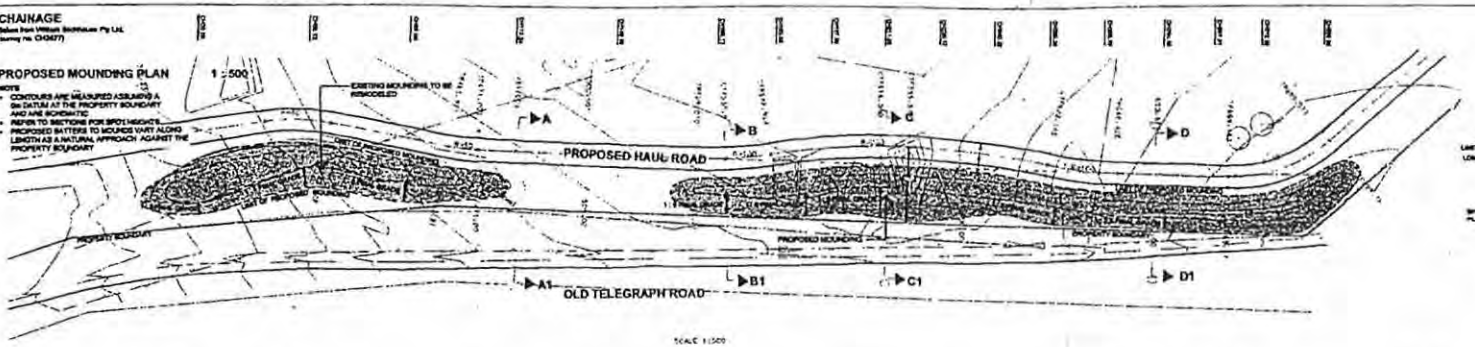
date JANUARY '99

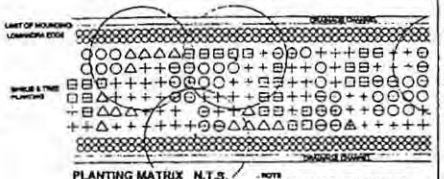
drawing number MP-02 B

CHAINAGE
(taken from William Backhouse Pty Ltd. survey no. CH327)

PROPOSED MOUNDING PLAN 1 : 500

NOTE
- CONTOURS ARE MEASURED ASSUMING A 0m DATUM AT THE PROPERTY BOUNDARY AND ARE INDICATIVE
- REFER TO SECTIONS FOR SPOT HEIGHTS
- PROPOSED BATTERS TO MOUNDS VARY ALONG LENGTH AS A NATURAL APPROACH AGAINST THE PROPERTY BOUNDARY



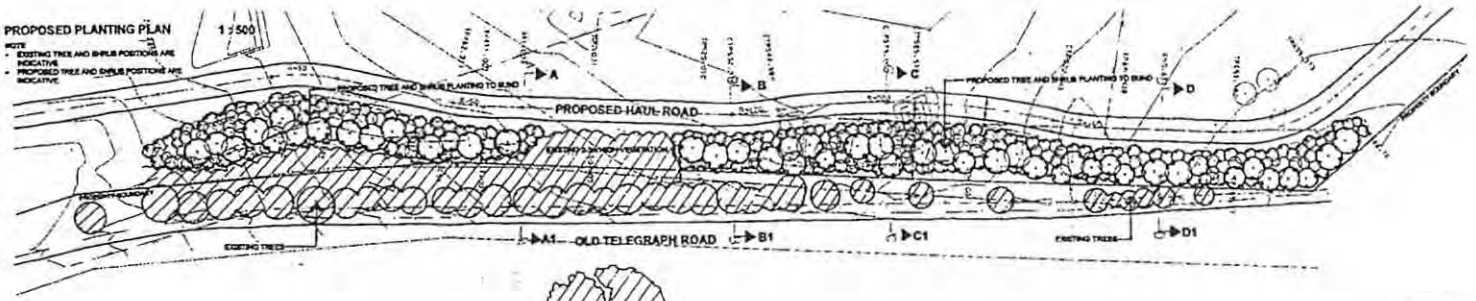


PLANTING MATRIX N.T.S.

NOTE
- SHRUBS TO BE PLANTED IN GROUPS OF NO LESS THAN 5, WITH NO TWO OF THE SAME SPECIES TOGETHER
- THIS MATRIX IS TYPICAL AND FINAL LAYOUT SHOULD BE SUPERVISED ON SITE BY LANDSCAPE ARCHITECT

PROPOSED PLANTING PLAN 1 : 500

NOTE
- EXISTING TREE AND SHRUB POSITIONS ARE INDICATIVE
- PROPOSED TREE AND SHRUB POSITIONS ARE INDICATIVE

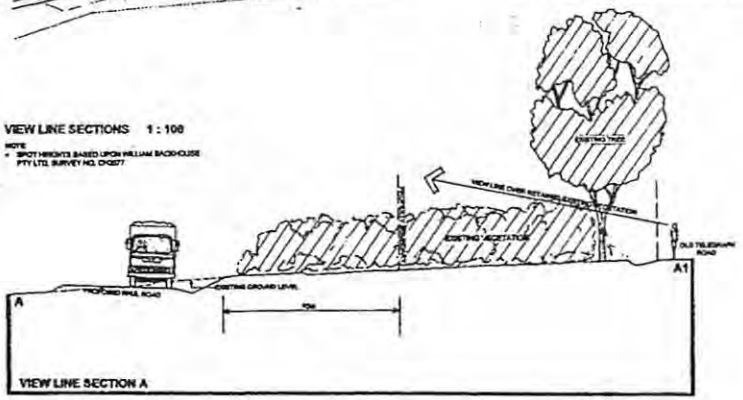


PLANT SCHEDULE - to be selected from

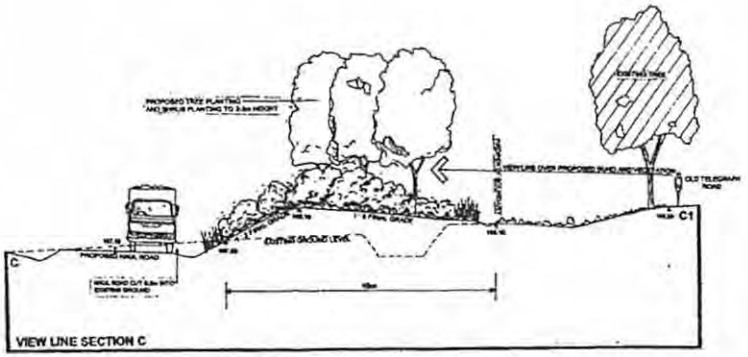
Botanical Name	Common Name	Ultimate Height	Ultimate Spread
TREES			
Acacia longifolia	Sydney Golden Wattle	8	4
Acacia parramattensis	Parramatta Green Wattle	8	4
Allocasuarina littoralis	Black She-Oak	13	10
Eucalyptus punctata	Grey Gum	30	8
Syncarpia glomulifera	Turpentine	35	8
SHRUBS			
Banksia ericifolia	Heath Leaved Banksia	5	4
Banksia spinulosa	Hairpin Banksia	1.5	1.5
Hakea sericea	Bushy Needle Bush	4	3
Grevillea sericea	Pink Spider Flower	1.5	1
Leptospermum Wesonium	Fraser Bank Tea Tree	3	2
Leptospermum polygalifolium	Yellow Tea Tree	3	3
Lomandra longifolia		1.5	1

VIEW LINE SECTIONS 1 : 100

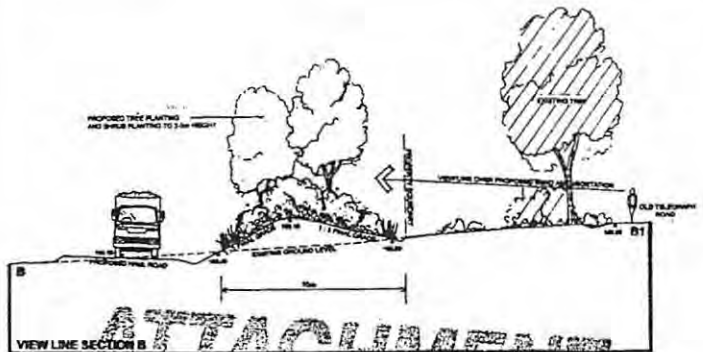
NOTE
- SPOT HEIGHTS BASED UPON WILLIAM BACKHOUSE PTY LTD. SURVEY NO. CH327



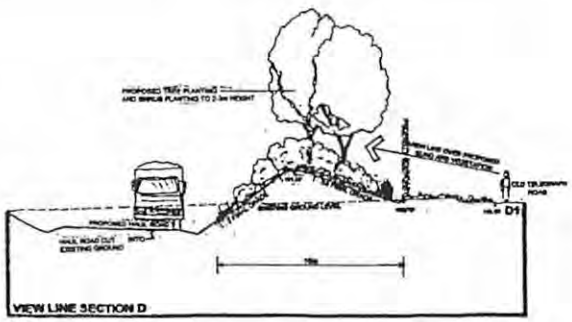
VIEW LINE SECTION A



VIEW LINE SECTION C



VIEW LINE SECTION B



VIEW LINE SECTION D

DO NOT SCALE THIS DRAWING. ALL DIMENSIONS ARE TO BE VERIFIED ON SITE AND ANY DISCREPANCIES REPORTED PRIOR TO COMMENCEMENT OF ANY WORK OR SHOP DRAWING BEING UNDERTAKEN.

C HAUL ROAD CUT 1m INTO EXISTING GROUND – SECTION D
B NEW DRAWING
A

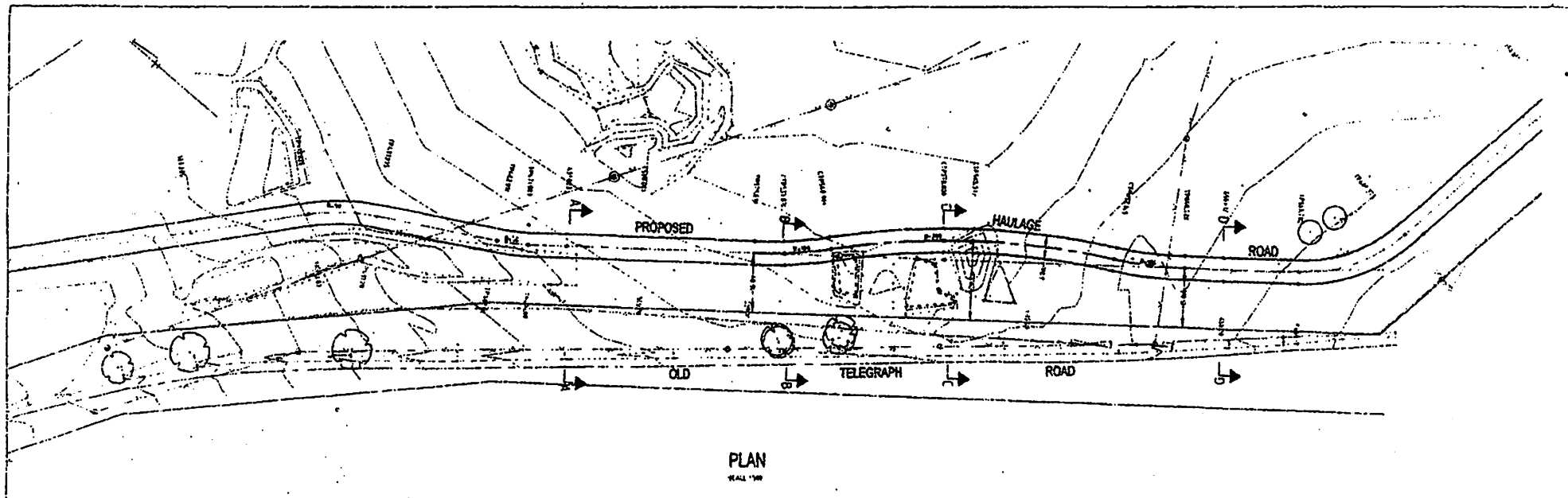
s.m.a.
Scott Murray & Associates

F. & K. VELLA

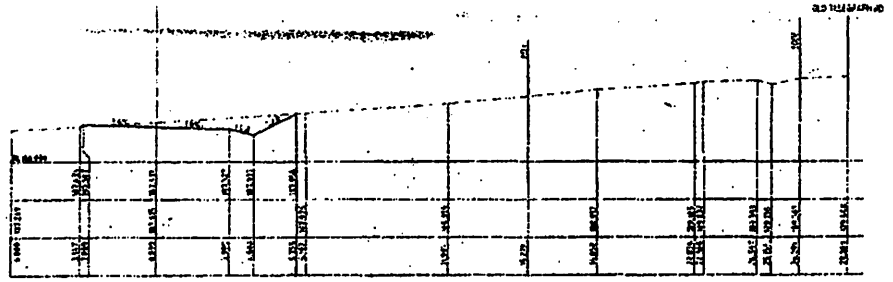
VELLA SAND QUARRY

OLD TELEGRAPH ROAD
BIODIVERSITY TREATMENT

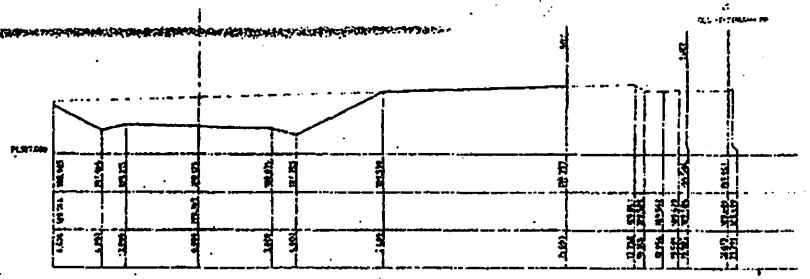
1530-MP03 C



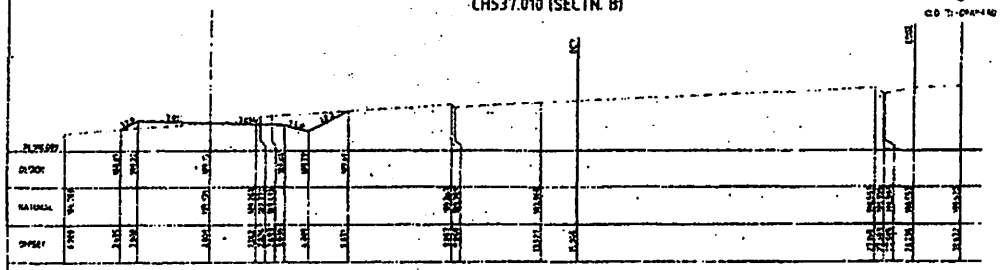
PLAN



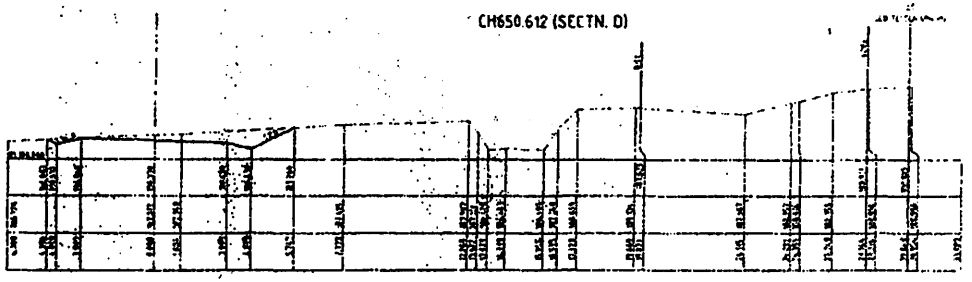
CH537.010 (SECTN. B)



CH650.612 (SECTN. D)



CH481.003 (SECTN.A)



CH578.000 (SECTN. C)

WILLIAM L. BACKHOUSE PTY LTD

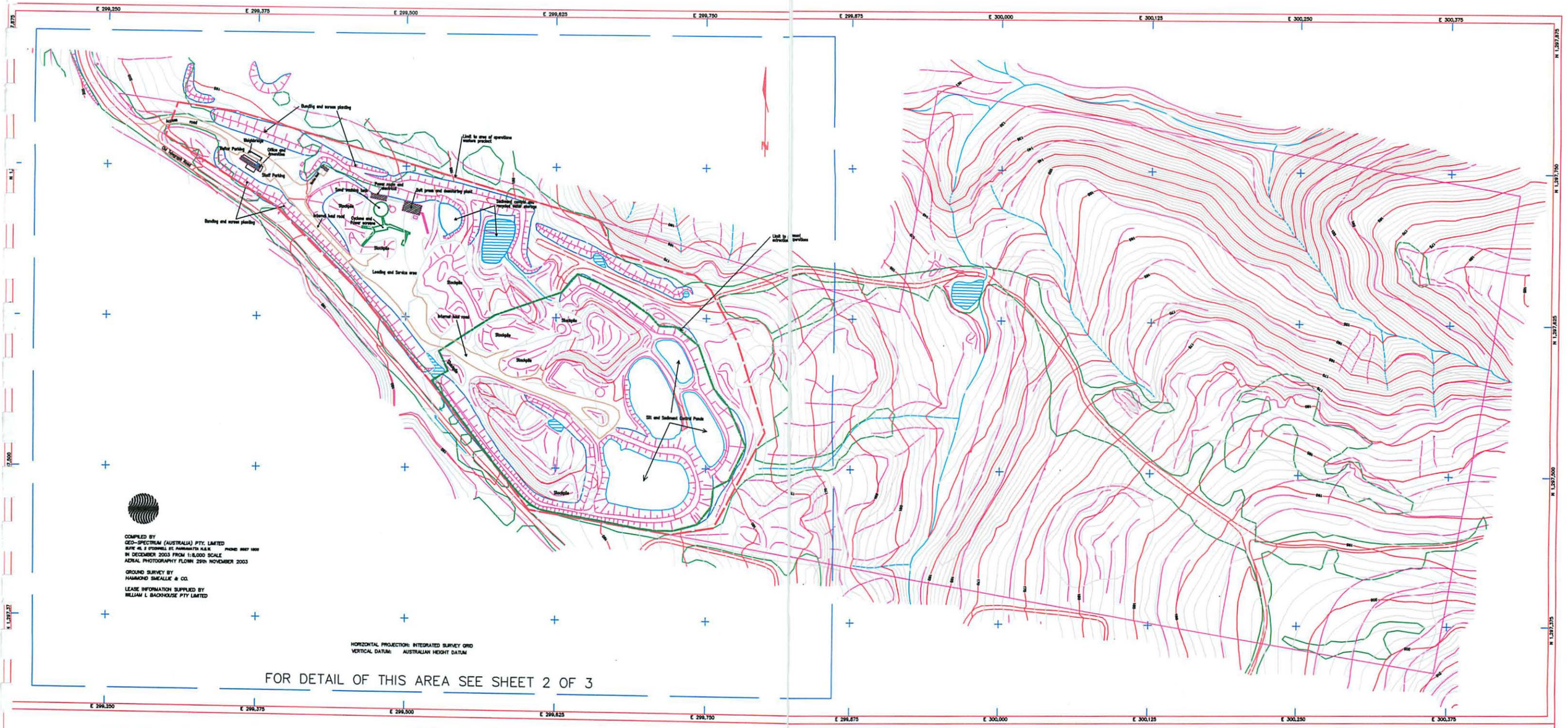
LYLE MARSHALL AND ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS, TRANSPORTATION AND ENVIRONMENTAL PLANNERS

ROADWORKS IN OLD NORTHERN RD & OLD TELEGRAPH RD, MAROOTA

BOUNDARY TREATMENT LAYOUT PLAN & SECTIONS

8703

ATTACHMENT



MAROOTA MINING PTY LTD

MAROOTA QUARRY

CURRENT EXTRACTION OPERATIONS - MAROOTA SAND MINE

FOR: MAROOTA MINING PTY LTD

AT: Lot 2 DP 748820
Old Telegraph Road
MAROOTA, NSW.

SOUTH WEST PLANNING
40 KINGSTON ROAD, MOUNT ANNAN, 2567
ABN 73 880 766 818
PHONE: 4647 4839 FAX: 4647 4850 MOBILE 0407 721943
E-MAIL: SWPLANNING@BIGPOND.COM

SCALE: AS SHOWN
DATE: May 2004
SHEET NO: 1 of 3
JOB NO: 2084
DRAFTSPERSON: MA

Attachment 3

Environment Protection Licence Number 10357

Environment Protection Licence

Licence - 10357

Licence Details	
Number:	10357
Anniversary Date:	12-October

Licensee

ETRA PTY LTD

1774 WISEMANS FERRY ROAD

MAROOTA NSW 2756

Premises

OLD TELEGRAPH ROAD QUARRY

LOT 2 OLD TELEGRAPH ROAD

MAROOTA NSW 2756

Scheduled Activity

Crushing, Grinding or Separating

Extractive Activities

Fee Based Activity	Scale
Crushing, grinding or separating	> 100000-500000 T processed
Land-based extractive activity	> 100000-500000 T extracted, processed or stored

Region

Metropolitan - Sydney Industry

Level 13, 10 Valentine Ave

PARRAMATTA NSW 2150

Phone: (02) 9995 5000

Fax: (02) 9995 6900

PO Box 668 PARRAMATTA

NSW 2124

Environment Protection Licence

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Environment Protection Licence

Licence - 10357

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

Licence - 10357

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

ETRA PTY LTD
1774 WISEMANS FERRY ROAD
MAROOTA NSW 2756

subject to the conditions which follow.

Environment Protection Licence

Licence - 10357

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Crushing, Grinding or Separating	Crushing, grinding or separating	> 100000 - 500000 T processed
Extractive Activities	Land-based extractive activity	> 100000 - 500000 T extracted, processed or stored

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
OLD TELEGRAPH ROAD QUARRY
LOT 2 OLD TELEGRAPH ROAD
MAROOTA
NSW 2756
LOT 2 DP 748820

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Limit Conditions

Environment Protection Licence

Licence - 10357

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Waste

L2.1 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.

L3 Noise limits

L3.1 Noise from the premises must not exceed:

- an $L_{Aeq(15\ minute)}$ noise emission criterion of 42 dB(A) during the day (0700 to 1800) at 1 metre from the boundary of Lot 1 Old Telegraph Road Maroota; and

- an $L_{Aeq(15\ minute)}$ noise emission criterion of 40 dB(A) during the day (0700 to 1800) at 1 metre from the boundary of Lot 1 Hart Place Maroota.

L3.2 Noise from the premises is to be measured at the locations specified to determine compliance with L3.1.

Definition
$L_{Aeq\ (15\ minute)}$ is the equivalent continuous noise level, the level of noise equivalent to the energy-average of noise levels occurring over a measurement period (15 minute).

Note: Noise measurement
For the purpose of noise measures required for this condition, the LAeq noise level must be measured or computed at any point within 1 metre of the nearest effected residential premises over a period of 15 minutes using "FAST" time weighting response and 'A' frequency weighting on the sound level meter.

For the purpose of noise criteria for this condition, 5dBA must ne added to the measured level if the noise has substantially tonal, low frequency or impulsive characteristics. The location or point of impact can be different for each development, for example, at the closest residential reciever or at the closest boundary of the development. Measurement locations can be:
1. 1 metre from the facade of the residence for night time assessment;
2. at the residential boundary;
3. 30 metres from the residence (rural situations) where boundary is more than 30 metres from residence.

L3.3 The noise emission limits identified in this licence apply under all meteorological conditions except:
a) during rain and wind speeds (at 10m height) greater than 3m/s; and
b) under "non-significant weather conditions".

Note: Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

Environment Protection Licence

Licence - 10357

3 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O4 Other operating conditions

O4.1 Unless other agreed to in writing by the EPA, works covered by this Licence must only be carried out between the hours of 0700 and 1700 Monday to Friday, and 0700 and 1300 Saturday, and at no time on Sundays and Public Holidays. For the purpose of this licence, the term "works" refers to all operations carried out on the premises.

4 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of

this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Recording of pollution complaints

M2.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M2.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M2.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M2.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M3 Telephone complaints line

M3.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M3.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M3.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

5 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
a) a Statement of Compliance; and
b) a Monitoring and Complaints Summary.
At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

Environment Protection Licence

Licence - 10357

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

6 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Environment Protection Licence

Licence - 10357

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

Environment Protection Licence

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

Licence - 10357

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Mr Tim Gilbert

Environment Protection Authority

(By Delegation)

Date of this edition: 12-October-2000

End Notes

1	Licence transferred through application 141146, approved on 18-Apr-2002, which came into effect on 18-Apr-2002.
2	Licence varied by notice 1081973, issued on 29-Feb-2008, which came into effect on 29-Feb-2008.
3	Licence varied by Change to schedule 1, issued on 07-May-2008, which came into effect on 07-May-2008.
4	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
5	Licence transferred through application 145868, approved on 08-Jul-2009, which came into effect on 06-Jun-2009.
6	Licence varied by notice 1111655, issued on 31-Mar-2010, which came into effect on 31-Mar-2010.
7	Licence varied by notice 1530557 issued on 11-May-2015

Attachment 4

REGISTER OF CORRECTIVE ACTION REQUESTS (CAR)

CAR No.	Date CAR Received	CAR Responsibility	Date CAR Completed	Date CAR Verified	Signature and Details of Any Non-Conforming Work
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

Attachment 5

CORRECTIVE ACTION REQUEST (CAR)
NUMBER .....

PART A NOTIFICATION

To be completed by Environmental Manager or delegate issuing CAR

Date 201___

Issued by ..... Signature .....

Environmental Commitment or Action No.

Responsibility

Reason for Non-Conformance

Recommended Corrective Action

Comments

PART B CORRECTIVE ACTION

To be completed by Environmental Manager or delegate

Date Received

Recommended Corrective Action

Responsibility

Comments

Date Completed 201___ Signature .....

PART C VERIFICATION

To be completed by Environmental Manager

Verification Procedure

Date Corrective Action Verified 201___ Signature .....

Attachment 6

REGISTER OF COMPLAINTS

DATE OF COMPLAINT	BY WHOM	NATURE OF COMPLAINT (what, when, where, how, why?)	CORRECTIVE ACTION AND DATE COMPLETED

Attachment 7

Pollution Incident Response Management Plan

18.0 POLLUTION/INCIDENT RESPONSE MANAGEMENT PLAN

Contents

Attachment – Form 9A Site Plan
Attachment – Form 9B Emergency Procedure & Emergency Location Map
Attachment – Form 15A Dangerous Hazardous Register
Attachment – Form 15B Non Dangerous Hazardous Register
Attachment – Form 18A Pollution Incident Response Management Plan Testing Checklist

1. Introduction

PF Formation has prepared this Pollution/Incident Response Management Plan in order to comply with the new requirements introduced by the *Protection of the Environment Legislation Amendment Act 2011* (POELA Act)

The objectives of this plan are to:

- Ensure comprehensive and timely communication about a pollution incident to staff at the premises, the Environment Protection Authority (EPA) and other relevant authorities specified in the Act.
- Ensure comprehensive and timely communication about a pollution incident to people outside the Quarry who may be affected by the impacts of pollution.
- Minimise and control the risk of a pollution incident at the site through the identification of risks and the development of planned actions to minimise and mange those risks.
- Ensure that the plan is properly implemented by trained staff, identifying staff responsible for implementing it, and ensuring that the plan is regularly tested for accuracy, currency and suitability.

2. Legislative Requirements.

The specific requirements for pollution incident response management plans are set out in Part 5.7A of the POEO Act and the Protection of the Environment Operations (General) Regulation 2009 (POEO (G) Regulation) in summary, this provision requires the following:

- All holders of environmental protection licences must prepare a pollution incident response management plan (section 153A, POEO Act)
- The plan must include the information detailed in the POEO Act (section 153C) and be in the form required by the POEO (G) Regulation (clause 98B)
- Licensees must keep the plan at the premises to which the environment protection licence relates to.
- Licensees must test the plan in accordance with the POEO (G) Regulation (clause 98E)

2.1. Definition of pollution incident.

The definition of a pollution incident is:

Pollution incident means an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a results of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise.

2.2. Notification of a Pollution Incident.

A pollution incident is required to be notified if there is a risk of 'material harm to the environment', which is defined in section 147 of the POEO Act as:

(a) Harm to the environment is material if:

1. It involves actual or potential harm to the health and safety of human beings or to ecosystems that is not trivial, or
2. It results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations), and

(b) Loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment.

3. Description and Likelihood of Hazards. *(Clause 98C (1) (a) and (b))*

This section provides a description of the main hazards and potential hazards to human health and the environment associated with the operation and the likelihood of any such hazards occurring.

3.1. Description of hazards

The following hazards have been identified:

1 Fire or bushfire occurring on site.
2 Fuel Spillage.
3 Degradation of air quality.
4 Oil Spillage.
5 Chemical Spillage.
6 Contaminated water run-off.
7 Soil erosion and sediment run-off.
8 Silt Ponds.
9 Uncontrolled release of gas.
10 Groundwater Contamination

3.2. Likelihood of identified hazards occurring on site.

Hazard	Likeliness	Reason
1. Fire or Bushfire	Likely	The site is situated in a bushfire prone area and has been subject to bushfires in the past. Electrical services located on the site also increase the risk of fire.
2. Fuel Spillage	Likely	There are several fuel containment vessels situated on the site. Each day large amounts of fuel are transferred into plant and equipment and also carted around the site in mobile fuel tanks.
3. Degradation of air quality	Likely	The use of unsealed haul roads by quarry vehicles increases the risk of dust being produced and causing the degradation of air quality.
4. Oil spillage	Likely	The most likely cause of an oil spillage occurring on site would be from a hose or a fitting failing on a machine. It is unlikely that an oil spill would occur as a result of a storage vessel leaking.
5. Chemical spillage	Unlikely	Only small amounts of hazardous chemicals are stored on site.
6. Contaminated water run-off.	Unlikely	The site has approved effluent treatment devises only.
7. Soil erosion and sediment run-off	Unlikely	Best practice guidelines used for erosion and sediment control. Methods approved by consent authorities.
8. Silt Ponds Rupturing	Unlikely	Silt ponds are well constructed and allowed to settle out before capping is undertaken.
9. Uncontrolled release of gas.	Unlikely	Only small amounts of gas are kept on site.
10. Groundwater contamination.	Unlikely	Appropriate management systems in place.

4. Pre-emptive actions to be taken *[clause 98C(1) ©]*

The PF Formation Safety Booklet is explained to all staff upon employment. It contains the company's health and safety policies, procedures and first aid directions. Safety booklets are issued to all staff upon employment.

1) Fire or Bushfire

- Fire extinguishers are fitted to all plant and equipment and strategically placed at certain locations around the site.
- Personnel are trained on the use of fire extinguishers.
- Fire extinguishers are regularly inspected by a professional contactor.
- Site water carts are fitted with fire fighting pumps.
- Personnel are trained on the use of fire fighting pumps.
- Procedure to be undertaken in the event of a fire or bushfire is documented in the PF Formation Safety Booklet.
- Plant and equipment are inspected regularly for potential fire hazards.
- Vegetation around electrical services is removed periodically to reduce fire hazards cause by electricity.

2) Fuel Spillage

- Fuel containment vessels are inspected regularly for any leaks and corrosion.
- Mobile fuel tanks are placed in impervious bunds.
- All fuel containment vessels are to comply with AS 1692 and AS 1940.
- Spill containment kits are located at various locations around the site and personnel trained on correct procedure in the event of a spill.

3) Degradation of air quality.

- All haul roads and trafficked areas will be kept damp at all times to prevent the generation of dust.
- All staff are required to contact management immediately if smoke or dust is noticed.
- Air quality is monitored at four locations in Maroota and reported on in each respective Environmental Management Plan and EPA License.
- Dust mitigation measures are addressed in the Hitchcock Road Annual Environmental Management Report (AEMR), Hitchcock Road Environmental Strategy Document, Pit 5 Environmental Management Plan (Dust Monitoring Plan) and the Pit 4 Environmental Management Plan.

4) Oil Spillage

- Oil storage vessels are inspected regularly for leaks and corrosion.
- Spill containment kits are located at various locations around the site and personnel trained on the correct procedure in the event of a spill.
- Any oil leaks detected on machinery is to be reported to management immediately.
- Machines are inspected daily by staff for oil leaks.
- The cleaning of greasy or oily machinery or parts of machinery may only be undertaken in the approved wash down area.

5) Chemical spill

- Material Safety Data Sheets are kept on site for all chemicals used.
- Spill containment kits are located at various locations around the site and personnel trained on the correct procedure in the event of a spill.
- Hazardous chemicals stored on site are clearly labelled and access is restricted to trained personnel only.
- Details for procedure to be carried out in the event of a spill is in the PF Formation Safety Booklet.

6) Contaminated water run-off

- Regular maintenance and inspections of effluent treatment devises.
- All liquid wastes are removed from the site and disposed of appropriately and responsibly.
- Containment measures in place in the event of any oil, fuel or chemical spillage that may occur on site.
- Impervious bunding around fuel storage areas.

7) Soil erosion and sediment run-off.

- Soil erosion and sediment control plans containing procedures and mitigation measures used on the site are in implemented and reviewed by the Department of Planning, Hills Shire Council and Hornsby Shire Council.
- Refer to Hitchcock Road Environmental Strategies, Hitchcock Road Annual Environmental Management Report, Telegraph Road (Pit 4) Environmental Management Plan and Old Northern Road (Pit 5) Environmental Management Plan.

8) Silt Ponds.

- Haul roads are clearly delineated on the ground.
- Silt ponds located in high traffic areas are clearly delineated on the ground.
- Silt ponds are constructed using clay to form an impervious membrane which contains the silt within the dam and prevents any possible groundwater contamination.
- Procedures to follow in the event of an accident involving a silt pond are in the PF Formation Safety Booklet.

9) Uncontrolled release of gas.

- Refer to PF Formation Safety Booklet for safety procedures involving the use of Oxygen and Acetylene.
- Only certified storage vessels are permitted on site.
- Access to oxygen and acetylene is restricted to trained personnel only.
- Safe handling and storage methods have been adopted and implanted.

10) Groundwater contamination.

- Groundwater Management Plans are prepared annually and included in the Hitchcock Road Annual Environmental Management Report, Old Telegraph Road (Pit 4) Environmental Management Plan and the Old Northern Road (Pit 5) Environmental Management Plan.
- Groundwater management plans include water quality analysis.

5. Inventory of pollutants [clause 98C (1)(d)and (e)]

- See Section 15 Hazardous Substances & Dangerous goods in PF Formation Mine Safety Management Plan. (Hazardous Substance Register) Includes Material Safety Data Sheets for all substances listed.
- See Attachments - Form 15A Hazardous Substances Register and
  - Form 15B NON Dangerous Hazardous Substance Register.

6. Safety equipment [clause 98C(1)(d) and (e)]

The following safety equipment is kept on site and made available to personnel.

Personal Protective Equipment (PPE)

1. Heavy duty chemical resistant gloves.
Used when handling particularly hazardous substances such as Barrel Kleen Safe (used to clean concrete agitators) and heavy duty degreasers (used for removing grease and oil off engines and parts.)

2. High quality leather rigging gloves.
Used when tying down loads or rigging loads using chains, cables or slings. Can be used when greasing machines to avoid contact with grease. Also used by operators when re fuelling machines.

3. Safety glasses
To be worn at all times when cutting or grinding. Must be worn when slumping concrete.

4. High Visibility Vest
To be worn if high visibility clothing has not been issued or not available.

5. Hard Hat
Must be worn when working around conveyor belts and running plant.

6. Ear plugs and Ear muffs.
To be worn when undertaking noisy activities or working in proximity to loud noise.

7. Gum boots
In the event of a fuel, oil or chemical spill gum boots are to be worn to avoid contact with skin. Also used by maintenance staff during wet weather.

8. Water proof clothing.
Used by maintenance personnel when undertaking work in wet weather.

9. Welding PPE.

Used by authorised personnel or contractors when undertaking welding on the site. Includes, flash barriers, welding helmets and heat resistant gloves.

Other Safety Equipment.

- Spill Containment Kits - *Contains highly absorbent material for cleaning up liquid chemical spills.*
- Safety Harnesses - *Used by authorised personnel when undertaking work at a height.*
- Fire Extinguishers - *Located at strategic locations around the site and fitted to all plant and equipment*
- Fire Fighting Pumps - *Fitted to site water cart for use in the event of a bushfire.*

7. Contact details [clause98C (1)(g) and (h)]

The following persons are responsible for implementing this plan in the event of an incident and notifying the relevant authorities.

Joshua Graham (Managing Director)
Business Phone – 02 45668314
Mobile – 0418439923
E Mail – josh@pfformation.com.au

Luke Graham (Managing Director)
Business Phone – 02 45668314
Mobile – 0407415413
E Mail – luke@pfformation.com.au

Peter Watt (Quarry Manager)
Business Phone – 02 45668314
Mobile – 0418279624
E Mail – peterw@pfformation.com.au

Protocol for industry notification of pollution incidents.

Part 5.7 of the Protection of the Environment Operations Act requires the occupier of premises, employer or any person carrying on the activity on which a pollution incident occurs to *immediately* notify each of the relevant authorities (identified below) when material harm to the environment is caused or threatened.

1) Call 000 if the incident presents an immediate threat to human health or property. Fire and Rescue NSW, the NSW Police and the NSW Ambulance Service are the first responders, responsible for controlling and containing incidents.

2) If the incident does not require an initial combat agency, or once the 000 call has been made, notify the relevant authorities in the following order:

- Environmental Protection Authority (EPA)
- Department of Resources & Energy
- NSW Planning & Environment or Local Council (depending on which pit incident occurred.)
- Maroota Rural Fire Service.

For each relevant authority, the appropriate point of 24 hour contact is:

- EPA NSW – EPA's Pollution Line Service 131555
- Resources & Energy – John Tsallos 02 4222 8333
- NSW Planning & Environment (if incident occurred on Lot 198 or Hitchcock Rd Site) 9228 6111
- Hills Shire Council (if incident occurred on Lot 198 or Hitchcock Road site.) 9843 0555
- Hornsby Council (if incident occurred at Pit 4 or 5) 9847 6666
- Maroota Rural Fire Service – 4566 4302

8. Communicating with neighbours and the local community [clause98C(1)(i)]

As part of the Hitchcock Road Sand Extraction and Rehabilitation Project a Community Consultative Liaison and Review Committee is established for the site and holds meeting bi annually. Local members of the community attend the meetings along with representatives from council and OEH.

9. Actions taken to minimise harm to persons on the premises.

The course of action to be taken in the event of an incident will be determined by the Quarry Manager. In the case of a bushfire the course of action to be taken will have to be determined at the time, in consultation with the local RFS as wind direction and the location of the fire could be anywhere.

The PF Formation Mine Safety Management Plan provides a detailed description of the different activities that are carried out on the site and looks at the hazards and methods of controlling the hazards for each task. Safe Work Method Statements are discussed at Toolbox Safety Meetings quarterly.

PF Formation has an Emergency Procedure Policy in place which is found in the PF Formation Safety Booklet and copies issued to all personnel.

- See Attachment – Form 9B Emergency Procedure.

10. Site Plans/Map [clause98C(1)(k)]

- See Attachment – Form 9A Map of Pit & Emergency Location Map

11. Actions to be taken during or immediately after a pollution incident. [clause 98C(1)(l)]

- The Quarry Manager is to ensure the best course of action is taken to minimise harm to persons on site and the environment during and after an incident occurring.
- Emergency Procedures are to be followed.
- Protocol for industry notification of pollution incidents is to be followed. Peter Cummins (General Manager) will be responsible for implementing the notification protocol and ensuring funds are available to cover any associated costs involved with the remediation works.

12. Staff Training [clause 98C(1)(m)]

Toolbox Safety Meetings are conducted quarterly and emergency procedures are discussed and reviewed. All full time employed plant operators are trained through Workskill at a Certificate III level. All employees and contractors are inducted into the site so the incident response procedures are clear.

Luke Graham and Peter Watt are the Production Managers for the site and are responsible for the day to day running of the operation. Both hold Production Managers Permits issued by the Department of Primary Industries.

Joshua Graham is the site Environmental Officer responsible for all environmental management of the site. Joshua holds a Diploma in Extractive Industries Management issued through TAFE NSW.

- Register of staff training is kept in the Mine Safety Management Plan.

13. Procedures for testing the plan [clauses 98C (1)(n), (o) and (p), 98C (2)(f) and (g), 98E (1) and 98E (2)]

The plan is reviewed annually along with the Mine Safety Management Plan. All aspects of the plan are reviewed including:

- Check to see if any new hazards have been identified since the last review.
- Effectiveness of pre-emptive actions and any additional pre-emptive actions identified.
- Hazardous Substance Register reflects all pollutants on the site and Material Safety Data Sheets are up to date.
- Safety equipment register is up to date.
- All contact details for personnel responsible for implementing the plan are up to date.
- All contact details for notification of an incident are up to date.
- Review minutes for Community Liaison and Review Committee Meetings.
- Maps are up to date with assembly point locations and all haul roads and Pit numbers are accurate.
- Check that any incidents that may have occurred have been reported on and complaints register has been filled if any complaints were made.
- See Attachment - Form 18A Pollution Incident Response Management Plan testing Checklist

Form 18A *(actual form is in "Shared/Standard forms/Health & Safety/Form 18A")*

POLLUTION / INCIDENT RESPONSE MANAGEMENT PLAN
TESTING CHECKLIST

Test #	Test Date	All aspects reviewed Yes/No	Changes made	Name	Signed
1	23/5/12	Yes	Hazardous Substance Register updated	Josh	
2	5/11/13	Yes	–	P. Cummins	
3	13/10/14	Yes	–	Josh	
4	9/10/15	Yes	Hazardous Substance Register updated.	Josh	
5	19/10/15	Yes	Hazardous Substance Register updated	Josh	

Refer to EPA Plan.

PF Formation

1 Patricia Fay Drive, Maroota NSW
02 4566 8314

Emergency Procedure

1. Follow First Aid Priorities
2. Get on the Two Way and call EMERGENCY, EMERGENCY, EMERGENCY Everyone is to remain quiet for the injured to state the nature of emergency and identify location
3. Weighbridge Officer to ring 000 for ambulance, ensure Quarry Manager is informed and arrange first aid kid to be delivered to accident site
4. Staff working near accident site should assist the injured person until help arrives.
5. Quarry Manager or Weighbridge Officer will advise by two-way if everyone should meet at the Emergency Meeting Point (Weighbridge)

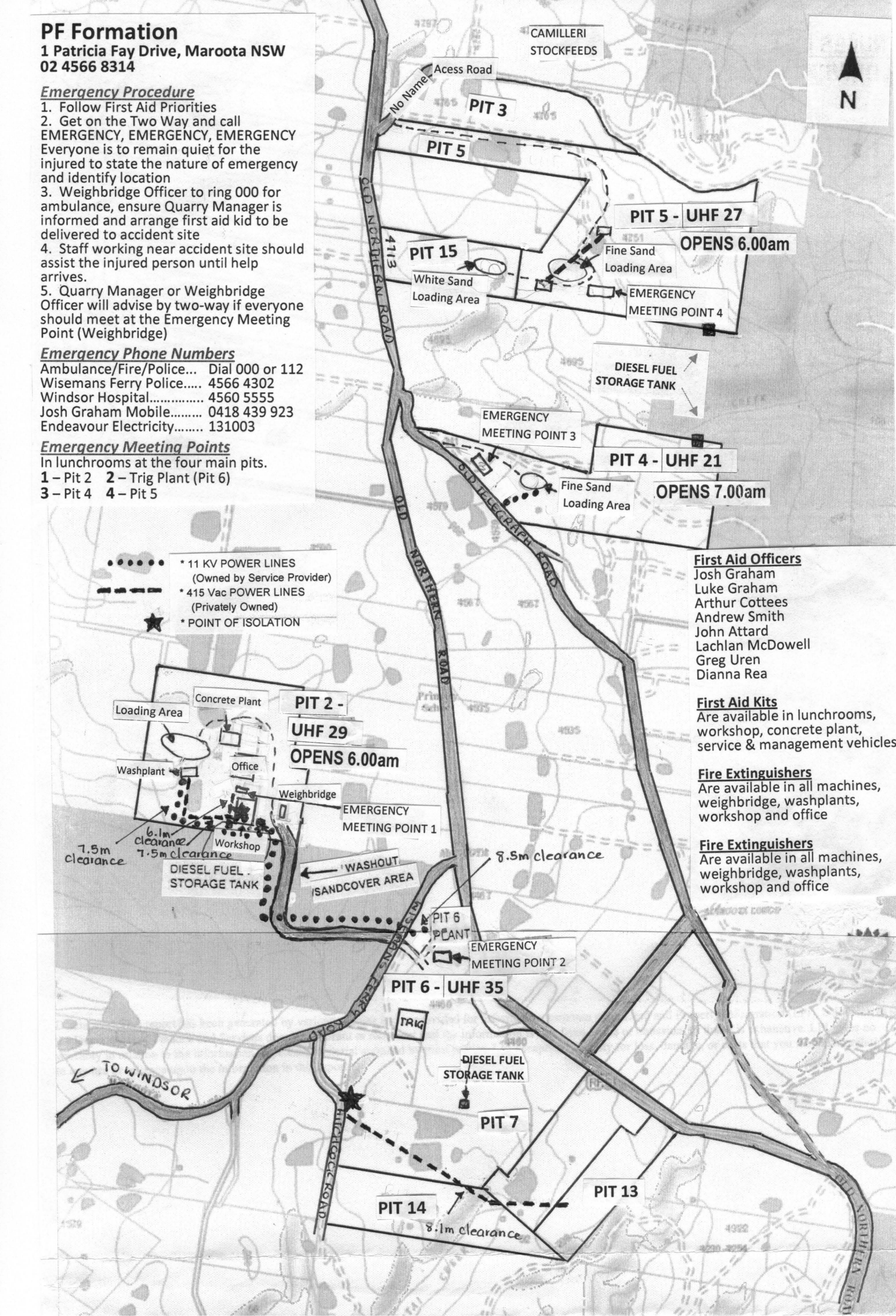
Emergency Phone Numbers

Ambulance/Fire/Police...	Dial 000 or 112
Wisemans Ferry Police.....	4566 4302
Windsor Hospital.....	4560 5555
Josh Graham Mobile.....	0418 439 923
Endeavour Electricity.....	131003

Emergency Meeting Points

In lunchrooms at the four main pits.

1 – Pit 2 **2** – Trig Plant (Pit 6)
3 – Pit 4 **4** – Pit 5



First Aid Officers
Josh Graham
Luke Graham
Arthur Cottees
Andrew Smith
John Attard
Lachlan McDowell
Greg Uren
Dianna Rea

First Aid Kits
Are available in lunchrooms, workshop, concrete plant, service & management vehicles.

Fire Extinguishers
Are available in all machines, weighbridge, washplants, workshop and office

Fire Extinguishers
Are available in all machines, weighbridge, washplants, workshop and office

EMERGENCY RESPONSE PROCEDURE

In the event of an emergency

KEEP CALM

DIAL 000 OR 112 (mobile)

1. Call for help, use the two-way radio to call weighbridge and start by saying **"EMERGENCY, EMERGENCY, EMERGENCY"** then state nature of the emergency and identify your location.
2. In the case of an Electrical Fire cut off the power supply at the nearest switch. DO NOT USE WATER TO EXTINGUISH THE FIRE. Do not attempt to restore the power supply or attempt to use the equipment until is examined by a competent person.
3. Weighbridge officer to ring the Emergency Services and tell the operator which service you require and provide them with the site's address.
4. Quarry Manager (Peter Watt or Luke Graham) is required to co-ordinate to send a person to the front gate to direct Ambulance or Emergency Services if possible

Address:	1 Patricia Fay Drive MAROOTA
Nearest Cross Road:	Wisemans Ferry Road
Contact Name:	Joshua Graham
Contact Number:	45668314
GPS Coordinates:	*Lat:* 33° 27' 47.74" S *Long:* 150° 59' 31.00" E
Fire Phone:	4566 4302
Windsor Hospital:	4560 5555
Josh Mobile:	0418 439 923
Endeavour Electricity:	131 003

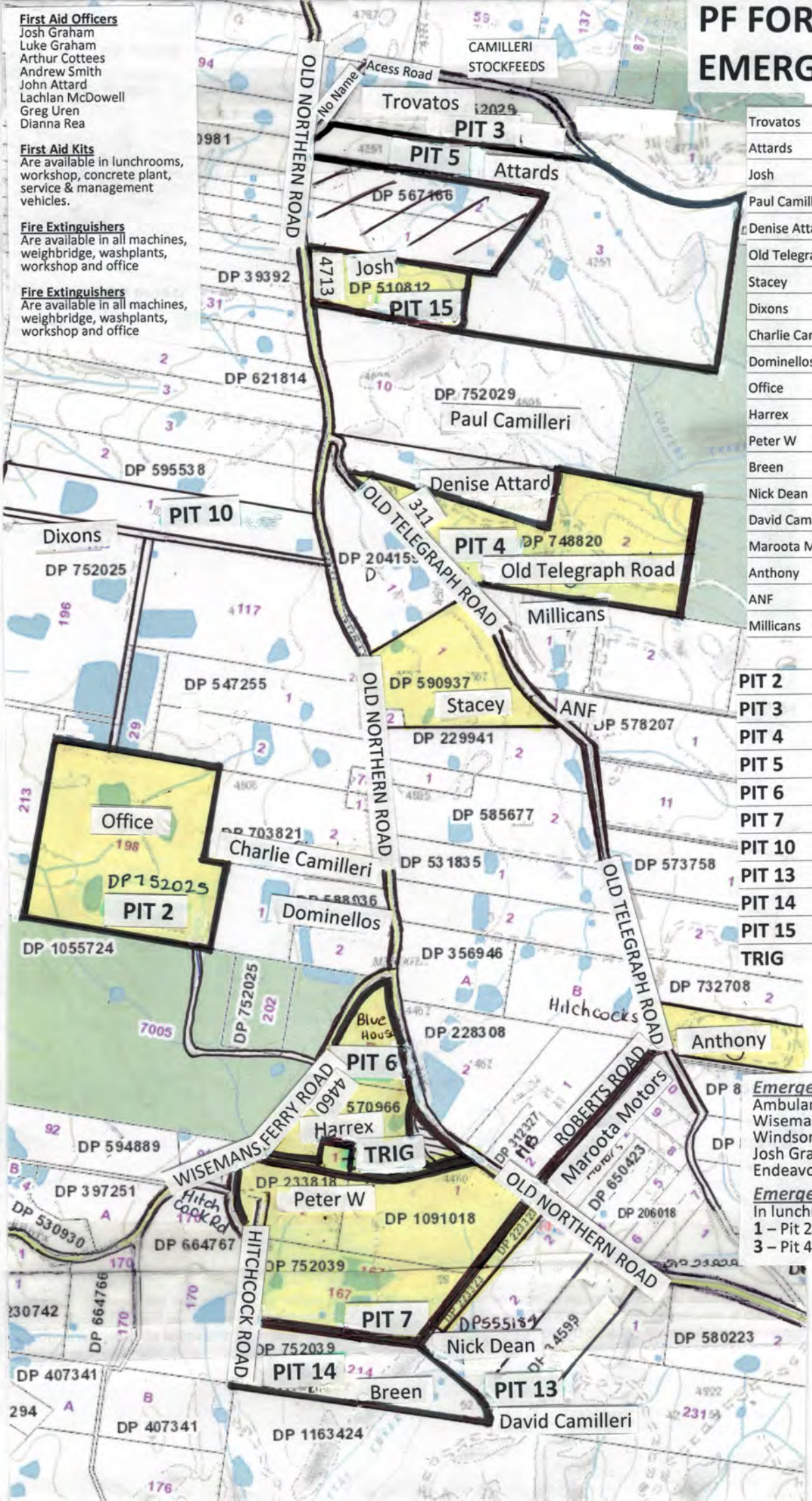
5. Staff working near accident site should assist the injured person until help arrives.
6. A Quarry Manager or Weighbridge Officer will advise by two way if everyone should meet at the assembly point (weighbridge)
7. In case of fire Different extinguishers are for different types of fires-

   RED - water (is only suitable for ordinary combustibles NOT for electrical or flammable liquid fires)

   RED WITH WHITE BAND - dry chemical powder suitable for all fires including electrical

   BLUE & BLUE STRIPE - foam (suitable for ordinary combustibles and flammable and combustible liquid NOT electrical fires

PF FORMATION EMERGENCY MAP



First Aid Officers
Josh Graham
Luke Graham
Arthur Cottees
Andrew Smith
John Attard
Lachlan McDowell
Greg Uren
Dianna Rea

First Aid Kits
Are available in lunchrooms, workshop, concrete plant, service & management vehicles.

Fire Extinguishers
Are available in all machines, weighbridge, washplants, workshop and office

Fire Extinguishers
Are available in all machines, weighbridge, washplants, workshop and office

Trovatos	4765 Old Northern Road
Attards	4751 Old Northern Road
Josh	4713 Old Northern Road
Paul Camilleri	4695 Old Northern Road
Denise Attard	325 Old Telegraph Road
Old Telegraph Road	311 Old Telegraph Road
Stacey	4567 Old Northern Road
Dixons	4612 Old Northern Road
Charlie Camilleri	4506 Old Northern Road
Dominellos	4490 Old Northern Road
Office	1 Patricia Fay Drive
Harrex	4460 Wisemans Ferry Road
Peter W	4 Hitchcock Road
Breen	52 Hitchcock Road
Nick Dean	4630 Old Northern Road
David Camilleri	4342 Old Northern Road
Maroota Motors	11 Roberts Road
Anthony	97 Old Telegraph Road
ANF	205 Old Telegraph Road
Millicans	1 Old Telegraph Road

PIT 2	1 Patricia Fay Drive
PIT 3	4765 Old Northern Road
PIT 4	311 Old Telegraph Road
PIT 5	4751 Old Northern Road
PIT 6	4460 Wisemans Ferry Rd
PIT 7	28 Wisemans Ferry Rd
PIT 10	4624 Old Northern Road
PIT 13	4342 Old Northern Rd
PIT 14	52 Wisemans Ferry Rd
PIT 15	4713 Old Northern Road
TRIG	4460 Wisemans Ferry Rd

Emergency Phone Numbers
Ambulance/Fire/Police... Dial 000 or 112
Wisemans Ferry Police..... 4566 4302
Windsor Hospital..... 4560 5555
Josh Graham Mobile..... 0418 439 923
Endeavour Electricity..... 131003

Emergency Meeting Points
In lunchrooms at the four main pits.
1 – Pit 2 **2** – Trig Plant (Pit 6)
3 – Pit 4 **4** – Pit 5

PIT 2 -	UHF 29
PIT 4 -	UHF 21
PIT 5 -	UHF 27
PIT 6 -	UHF 35

This hazardous substance Register will record all **DANGEROUS** hazardous substances and chemicals that are located on site.
A folder will be located in the weighbridge with copies of all Material Safety Data Sheets (MSDS)
and maintained by the Weighbridge Officer

Ref No	Product Name/Chemical name	Supplier	Location Stored	Approx Quantity	MSDS date
D001	Diesel	Advantage F	All Vehicles	40000L	Apr-15
D002	WRM 80S Part B	Chemtura	Workshop	N/A	Oct-13
D003	All sand gravel	PF Formatio	All over quarry	10000T	Oct-14
D004	WRM P4 Primer PartA	Chemtura	Workshop	20L	May-15
D005	WRM P4 Primer Part B	Chemtura	Workshop	20L	May-15
D006	625 Polythane Mixed Colour	Protec	Workshop	20L	Apr-15
D007	Oxygen based compressed gas	Air Liquide	Workshop	N/A	Nov-12
D008	Acetylene	Air Liquide	Workshop	N/A	Sep-12
D009	PRO EPT Spray Lubricant	Anglomoil	Workshop	2L	Feb-14
D010	WRM P4 KIT	Chemtura	Workshop	N/A	May-15
D011	Nitrogen (N2)	Air Liquide	Workshop	N/A	Jun-14
D012	Cement	Cement Aus	Concrete Plant	40T	Jun-14
D013	Polythane AU-625-Pack A	Protec	Concrete Plant	20L	Apr-15
D014	GSB Methyl Ethyl Ketone	GSB Chemic	Workshop	N/A	Sep-14
D015	Pre -mix concrete	PF Formatio	Concrete Plant	N/A	Oct-14
D016	Barrell kleen safe	Chemetall	Concrete Plant	100L	Dec-11
D017	KCB Methyl Ethy Ketone	Chemwatch	Workshop	N/A	Jul-14
D018	Araidite 5 Minute Expoxy Adesive	Selleys Aust	Workshop	50GR	Jun-14
D019	WRDA PN 20	Grace	Concrete Plant	1000L	Oct-13
D020	Anti Seize	Bakers	Workshop	500G	Feb-15
D021	Sikaflex 221	Bakers	Workshop	1L	Jun-14
D022	CRC 2087 bright zinc aerosol	Bakers	Workshop	2L	Feb-15
D023	Lanotec heavy duty liquid lanolin	Bakers	Workshop	2L	Aug-15
D024	Tubular ARC Welding Electrodes	Hobart Met	Workshop	N/A	May-14
D025	Micro Air 940	Basf Austral	Concrete Plant	500L	May-15
D026	Nonox SCR Solution	Anglomoil	Workshop	N/A	Jan-13
D027	WRM 80S PartA	Chemtura	Workshop	N/A	Oct-12
D028	WRM 80S Kit	Chemtura	Workshop	N/A	Oct-12
D029	Cat To-4 SAE 30 SAE 50	Anglomoil	Workshop	600L	Jul-13
D030	Coregas 5/2	Coregas	Workshop	Cylinder	Jun-16
D031	Acetylene (dissolved)	Coregas	Workshop	6 x 9.3 (M3) Bottles	Aug-16
D032	Oxygen based compressed gas	Coregas	Workshop	Cylinder	Feb-16
D033	Aluminium Brightener	Premier One	Workshop	5L	Jan-15
D034	Scale Away	Premier One	Concrete Plant	200L	Jul-15
D035					
D036					
D037					
D038					
D039					
D040					
D041					
D042					
D043					
D044					
D045					
D046					
D047					
D048					
D049					
D050					

FORM 15B - NON DANGEROUS HAZARDOUS SUBSTANCE REGISTER

This hazardous substance Register will record all **NON-DANGEROUS** hazardous substances and chemicals that are located on site.
A folder will be located in the weighbridge with copies of all Material Safety Data Sheets (MSDS)
and maintained by the Weighbridge Officer

Ref No	Product Name/Chemical name	Supplier	Location Stored	Approx Quantity	MSDS date
N001	Dash Vinyl protector	Premier one	Workshop	20L	May-15
N002	BL 10-B Turbo Truck Wash	Premier one	Workshop	100L	Jul-15
N003	Pozzolith 400Ri	Basf	Concrete Plant	200L	Oct-11
N004	Argon Compressed(Ar)	Air Liquide	Workshop	N/A	Nov-12
N005	Pozzolith 555	Basf	Concrete Plant	100L	Nov-11
N006	Master Pozzolith 370	Basf	Concrete Plant	100L	Nov-15
N007	Oatcool 50 Red	Anglomoil	Workshop	200L	Apr-15
N008	ATF DX3	Valvoline	Workshop	20L	Sep-12
N009	HP Gear oil 85W/140	Valvoline	Workshop	140L	Dec-12
N010	AdBlue	Shell	New vehicles	200L	Apr-15
N011	Roadmaster 300 15W40	Anglomoil	Workshop	800L	Jul-13
N012	Trans EP 85W140	Anglomoil	Workshop	N/A	Jan-14
N013	Hi-Tec 82220	Nalco	Workshop	1000L	Oct-13
N014	Hyd AW 68	Anglomoil	All vehicles	800L	Jan-13
N015	Citra-Clean with Grit	Premier One	Workshop	20L	May-15
N016	WRM 80S PART C	Chemtura	Workshop	N/A	Oct-13
N017	Daramene R	Grace	Concrete Plant	1000L	May-14
N018	AW Hydraulic Oil	Anglomoil	Workshop	N/A	Feb-14
N019	Nalcoag r 3268	Nalco	Workshop	1000L	Oct-13
N020	Oxalic acid dihydrate	Redox	Concrete Plant	20kg	May-14
N021	Roadmaster 600 15W40	Anglomoil	Workshop	200L	Jul-13
N022	Dara Set	Grace	Concrete Plant	500L	Dec-14
N023	HI_TEX 82220	Nalco	Workshop	N/A	Dec-14
N024	Oxygen Compressed	Coregas	Workshop	6 x 8.9 (M3)	Feb-15
N025	Coregas 5/2	Coregas	Workshop	6 x 10.6 (M3)	Feb-15
N026	CCS Onyx 44 Pigment	River Sands	Concrete Plant	200 kg	Jul-14
N027	Protecta Wash N Wax	Premier One	All vehicles	20L	Jul-15
N028	Pearly White Liquid Soap	Premier One	All Staff	5L	Jul-15
N029	AdBlue	Platinum Lubricants	Concrete Plant	1000lt	Apr-15
N030					
N031					
N032					
N033					
N034					
N035					
N036					

Attachment 8

Waste Management Plan

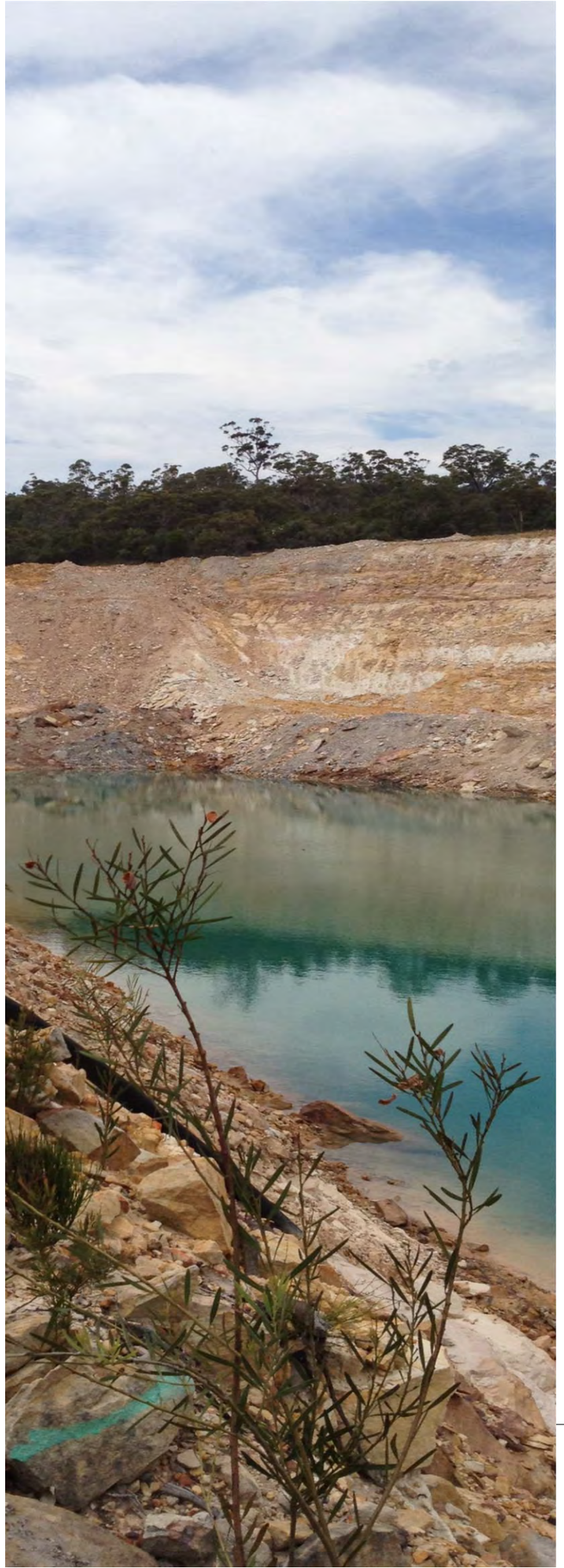
Material	Destination for Reuse and Recycling		Destination for Disposal	
	Estimated Volume	**On-site**	**Estimated Volume**	**Off-site**
Surplus extraction material	Varies ~30% of total volume of extracted material	Completely reused as backfill in site rehabilitation	Not applicable	Not applicable
Topsoil	Varies	Stockpiled and completely reused in site rehabilitation	Not applicable	Not applicable
Vegetation	Varies depending on area of extraction	Completely reused on-site for sediment control and as mulch in landscaping	Not applicable	Not applicable
Wash water	~130,000 m^3 per month but varies	Completely recycled and reused on-site	Not applicable	Not applicable
Sullage	Varies	Held in 4,000 litre underground holding tank for disposal into an on-site absorption trench	Not applicable	Not applicable
Amenities shed garbage (food scraps, wrappers etc)	~1 m^3 per month	Held on-site in Council wheelie bins	~1 m^3 per month	Council provides weekly service for disposal at landfill
Glass, Plastics, Metals, Paper and Cardboard	~1 m^3 per month	Stockpiled on-site for transfer to waste bins at 1774 Wisemans Ferry Road, Maroota	~1 m^3 per month	Recycled by approved waste contractors with two weekly collection
Oils, lubricants, used filters	~100 litres per month	Held on-site for transfer to waste oil tank at 1774 Wisemans Ferry Road, Maroota	~100 litres per month	Recycled by an approved waste oil contractor

Attachment 9

Revised Rehabilitation Management Plans

Quarry Rehabilitation Plan, April 2017, Footprint Green Pty Ltd

**Bushland Restoration & Rehabilitation Plan for Lot 2 DP 748820,
311 Telegraph Road Maroota, September 2007,
UBM Ecological Consultants Pty Ltd**



quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph road, maroota

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11th April 2017

prepared by:
Mark Couston Ass. Dip. Env. Ctrl. (CSU), Grad. Dip. Env. Mgmt. (CSU), Cert. Soil & Water Mgmt. (UWS), MECA.
OEH - Scientific Licence No. S L100777, DPI - Animal Research Authority 04-4786

Background
This quarry rehabilitation plan has been prepared to update and replace the previous Landscape Rehabilitation Report (Murray & Associates 1999) prepared as part of development application DA/342/1998 and to specifically address condition 49 of the development consent.

This plan has been commissioned by PF Formation and site inspections and field work were conducted on 5th December 2016.

The plan covers the allotment of Lot 2 in DP 748820 known as 311 Old Telegraph Road, Maroota with the exception of a small area to the east of the western precinct adjacent the existing haul road. This small area, approximately 1.4ha, has been excluded from this plan and is covered in the report Bushland Restoration & Rehabilitation Plan (UBM Ecological Consultants, 2007).

The site has an area of approximately 30 ha with quarrying operation currently in progress. Just under half of the site is subject to quarry operations and the remainder consists of native bushland vegetation and natural habitats.

This plan has been prepared to identify the end landuses once extraction works and processing operations cease and the rehabilitation has been considered in 3 separate precincts. The eastern precinct is to be rehabilitated as native bushland vegetation, the western precinct is to be rehabilitated as Class 3 agricultural land and when the processing plant is decommissioned at some time in the future the processing plant precinct is to be as Class 3 agricultural land.

Class 3 agricultural land is considered to be grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture.

A number of rehabilitation planning principals have been considered in this report including:

- Sydney Regional Environmental Plan No. 9 Extractive Industry (No.2) 1995,
- Hornsby Development Control Plan 2013, s. 2.5 Extractive Industries,
- Best Practice Environmental Management Rehabilitation & Revegetation (Cwlth Environmental Protection Agency, 1995)
- Guidelines to the Mining, Rehabilitation & Environmental Management Process, version 3. (NSW Dept. Primary Industries, 2006)
- Agricultural Land Classification Atlas, Sydney Basin, including the Lower Nepean - Hawkesbury Catchment (NSW Agriculture, 1995)

Contents

scale at A3	date	dwg no.	rev.	sheet	of	drawing title
nts		**mrpac.01**	**0.1**	**1**	**10**	**cover sheet**

legend

- site boundary
- rehabilitation precinct boundaries covered in this plan
- rehabilitation precinct not covered by this plan (refer Bushland Restoration & Rehabilitation Plan 19/09/07, UBM Ecological Consultants)
- existing waterbody / dam
- 5m contour intervals

This plan is based upon digital data extracted from:

plan - PF Formation 4567 Old Northern Road, Maroota Lot 1 in DP 590937 compiled 14/04/15. (AAM Pty Ltd, North Ryde, NSW)

aerial photography - Six Maps accessed 20/03/17, Spatial Services (NSW Department of Finance and Services, Bathurst NSW)

note: some discrepancies may occur between the date of digital data collection and current land uses

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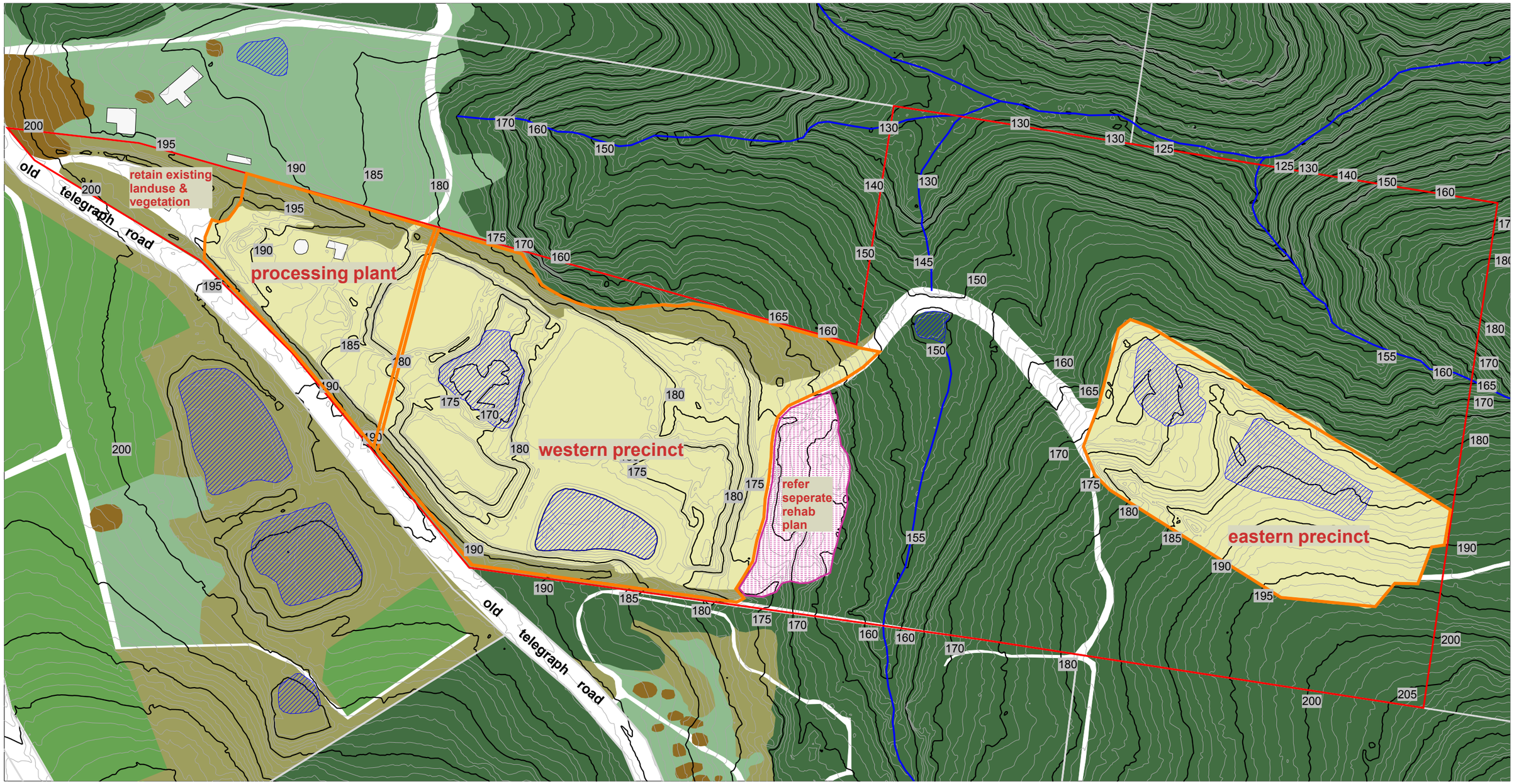
mark couston	**1: 3000**	**11/04/17**	**mrpe1.01**	**0.1**	**2**	**10**

project: **quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**

drawing title: **overview of the existing site & rehabilitation precincts**



legend

- site boundary
- rehabiltiation precinct boundaries covered in this plan
- rehabiltiation precinct not covered by this plan (refer Bushland Restoration & Rehabilitation Plan 19/09/07, UBM Ecological Consultants)
- 5m contour intervals
- waterbody / dam
- tracks / roads

landuses

- bushland
- modified / disturbed vegetation
- pasture
- intensive horiculture
- paddock trees
- quarry activities

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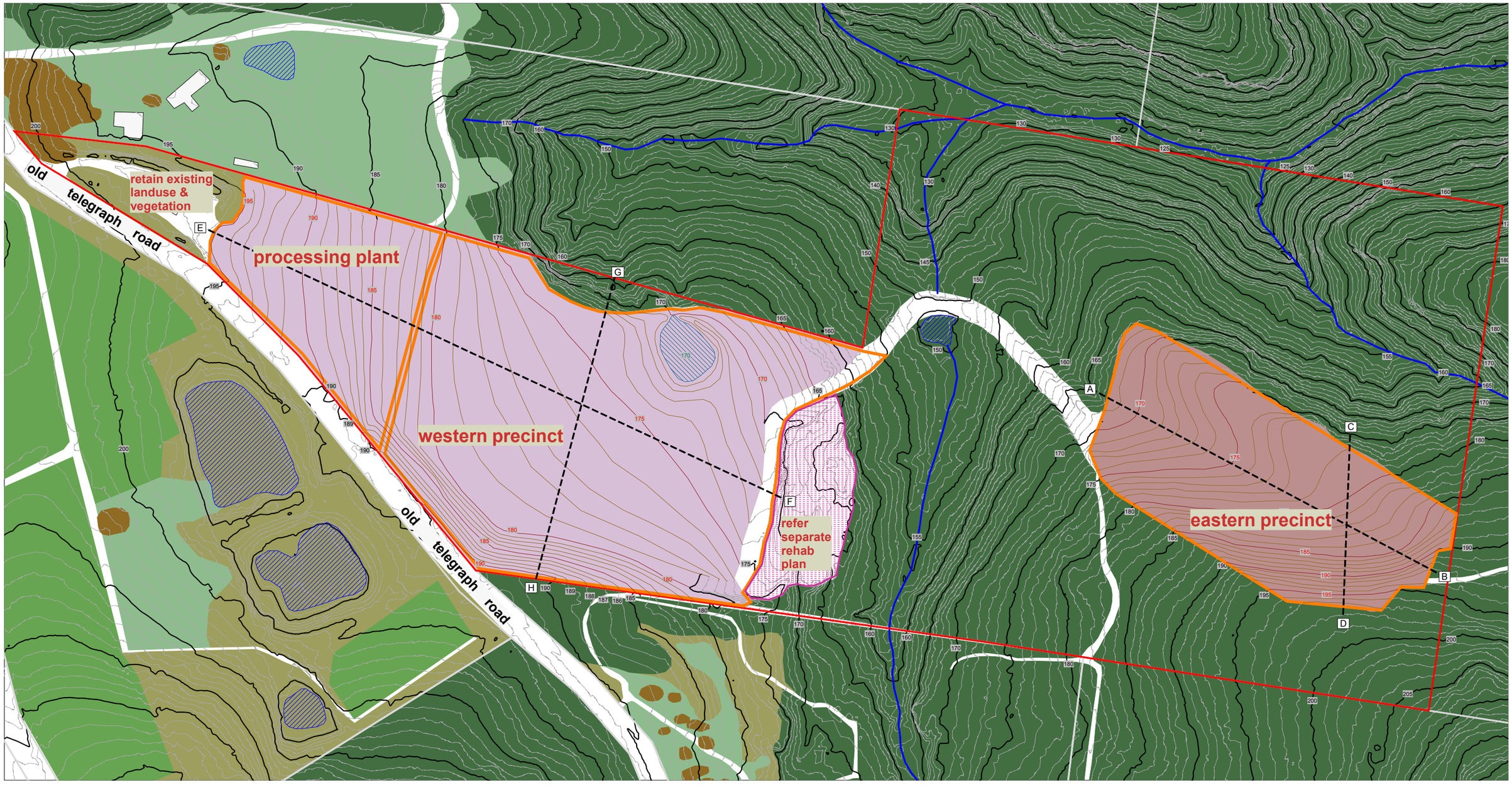
mark couston	**1: 3000**	**11/04/17**	**mrpl1.01**	**0.1**	**3**	**10**

project: **quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**

drawing title: **overview of the existing site & current landuses**



legend

- site boundary
- rehabilitation precinct boundaries covered in this plan
- rehabilitation precinct not covered by this plan (refer Bushland Restoration & Rehabilitation Plan 19/09/07, UBM Ecological Consultants)
- X – – – Y sections (refer sheet 8)
- 999 5m contour intervals existing
- 1m contour intervals existing
- existing waterbody / dam
- tracks / roads

landuses

- bushland
- modified / disturbed vegetation
- pasture
- intensive horiculture
- paddock trees
- quarry activities

rehabilitation landuses

- bushland
- agricultural land
- 999 5m contour intervals proposed
- 1m contour intervals proposed
- 178 proposed dams

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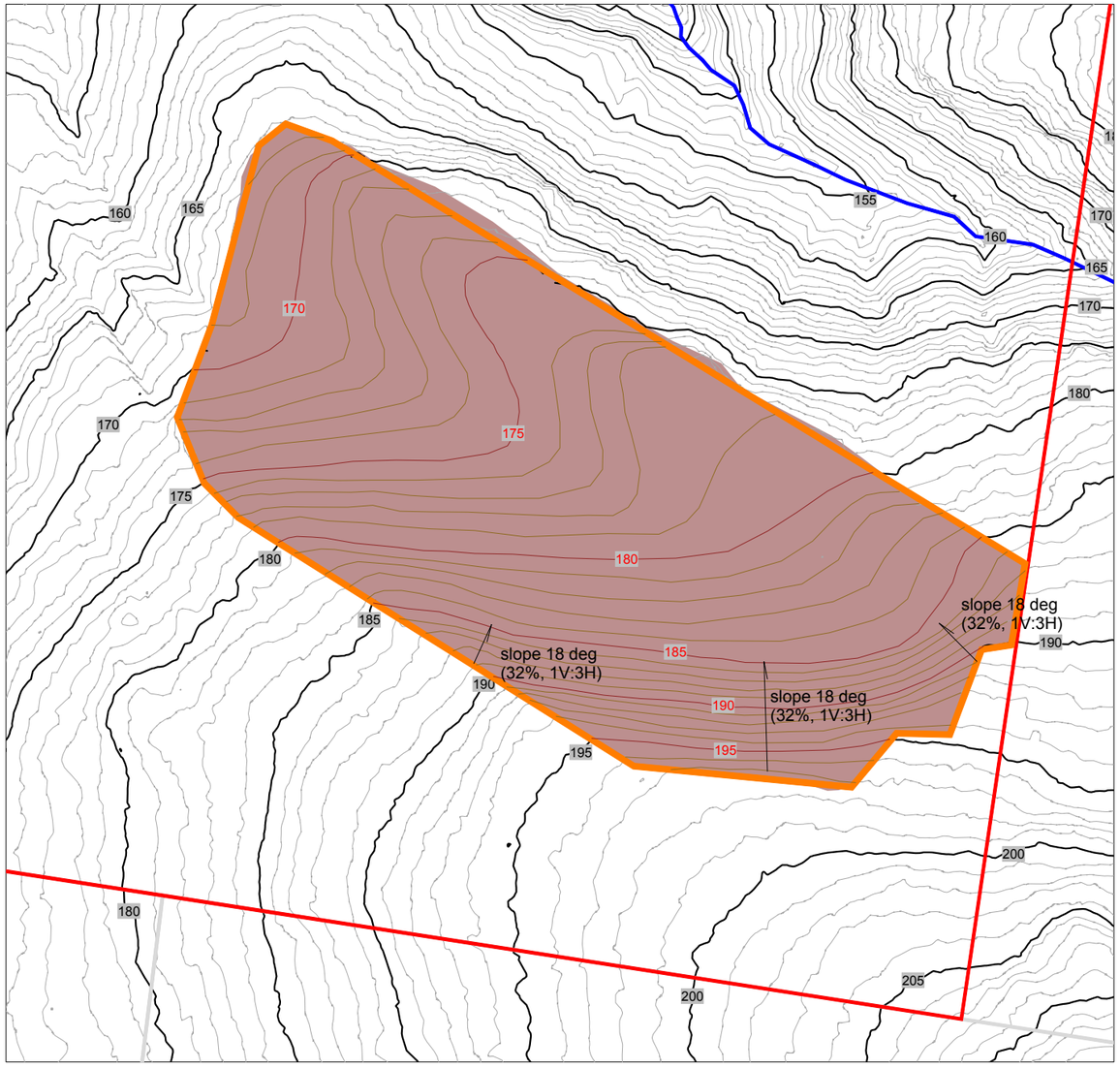
project: **quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**

drawing title: **proposed landform & rehabilitation landuses**

eastern precinct



rehabilitation procedure - bushland

to commence within 6 months from the completion of sand extraction in this precinct

Task No.	Task
1.1	Overburden material or topsoil stockpiles shall be inspected and all non-indigenous and weed species are to be treated at monthly intervals for a minimum of 3 months using standard bush regeneration weed control techniques (refer specification s10).
1.2	The quarry site to be rehabilitated is to be inspected and all non-indigenous and weed species are to be treated at monthly intervals for a minimum of 3 months using standard bush regeneration weed control techniques (refer specification s10).
1.3	Weed control is continue to be undertaken at 1 month intervals until the application of hydromulching in Task 1.16.
1.4	At the completion of Tasks 1.1 & 1.2 (above) any shale or clay overburden material is to be initially used in the regrading of the final landform. .
1.5	Sandstone overburden material is to be used to form the final landform contours
1.6	The final landform is to be left in a roughened stage prior to the spreading of topsoil
1.7	Stockpiles of B horizon soils (stripped from 300-500mm) shall be reinstated over the rehabilitation area.
1.8	Stockpiles of A horizon soils (stripped from 0-300mm) including organic material such as logs or plants debris is to be reinstated over the rehabilitation area.
1.9	On slopes between 18 deg (32%, 1:3) and 14 deg (25%, 1:4) topsoil should be left in a roughened state with small terraces parallel to the contours and should not be compacted. Where finished surfaces are compacted or smooth, the topsoils shall be ripped to a depth of 100mm.
1.10	On slopes less than 14 deg (25%, 1:4), the topsoil surface should be machine tracked to form small furrows parallel to the contours. Where finished surfaces are compacted or smooth, the topsoil should be ripped to a depth of 200mm.
1.11	Material such as logs or plants debris is to be reinstated over the rehabilitation area to form microhabitats.
1.12	The sandstone soils are likely to be acidic in nature. The background pH of natural sandstone top soils are acidic with pH 4.0 commonly occurring. Whilst it is unlikely that soil conditioners such as Lime will be required pH testing of the sub topsoil material should be undertaken.
1.13	In areas prone to erosion such as drainage depressions, organic fibre matting (refer specification s6) can be used or alternatively sandstone riprap material (refer specification s7) can be used in more incised drainage lines.
1.14	Available material such as logs or plants debris is to be reinstated over the rehabilitation area.
1.15	After the spreading of topsoil over the final contouring, temporary erosion and sediment controls (refer specification s7) such as sediment fence, check weirs etc. shall be installed in concentrated flow paths where appropriate
1.16	On slopes of 18 deg (32%, 1:3), the slopes are to be hydromulched with organic material (refer specification s3) in conjunction with hydroseeding. (refer specification s4).
1.17	On slopes of less than 18 deg (32%, 1:3), the slopes are to be hydroseeded. (refer specification s4) without mulch.
1.18	To minimise the establishment of weed species, fertiliser is not to be used as a soil amendment and is not to be used in the hydromulching or hydroseeding process.
1.19	Where viable seed is available on local native vegetation on the site, the seed is to harvested as brushmatting to supplement the soil or hydroseeding seed bed.
1.20	Regular watering is to be undertaken to assist with plant establishment and dust suppression within 2 days of hydroseeding and at intervals of 1 week (for 0 - 1 months), 2 weeks (for 1-4 months), and monthly (for 4-6 months) unless rain occurs.
1.21	Maintenance weed control (refer specification s10) must occur after rehabilitation at; 1 monthly intervals (for 1-3 months), 3 monthly intervals (for 4-12 months) and 6 monthly intervals (for 12-36 months) after rehabilitation.
1.22	No access to the rehabilitation cell is to occur except for prescribed watering, visual assessments and weed or sediment control
1.23	The performance measures for this area (refer sheet 10) and all the tasks in this procedure are to be carried out satisfactorily
1.24	Currently there is no evidence of herbivorous foraging on adjacent agricultural crops. In the event that there is evidence of foraging activity on regenerating seedlings by rabbits, goats or wallabies etc., exclusion fencing shall be installed around rehabilitation cells. Exclusion fencing shall be star-pickets with sediment control fencing for rabbits and parra- webbing to deter goats and wallabies.
1.25	After 3 years from the commencement of rehabilitation where the regeneration has not achieved the vegetation densities required by the Performance Measures (refer sheet 10,) supplementary planting shall be carried out.

legend

site boundary

rehabilitation precinct boundaries covered in this plan

999 5m contour intervals existing

1m contour intervals existing

999 5m contour intervals proposed

1m contour intervals proposed

rehabilitation landuse

area: 34,460 m2 — bushland / native vegetation

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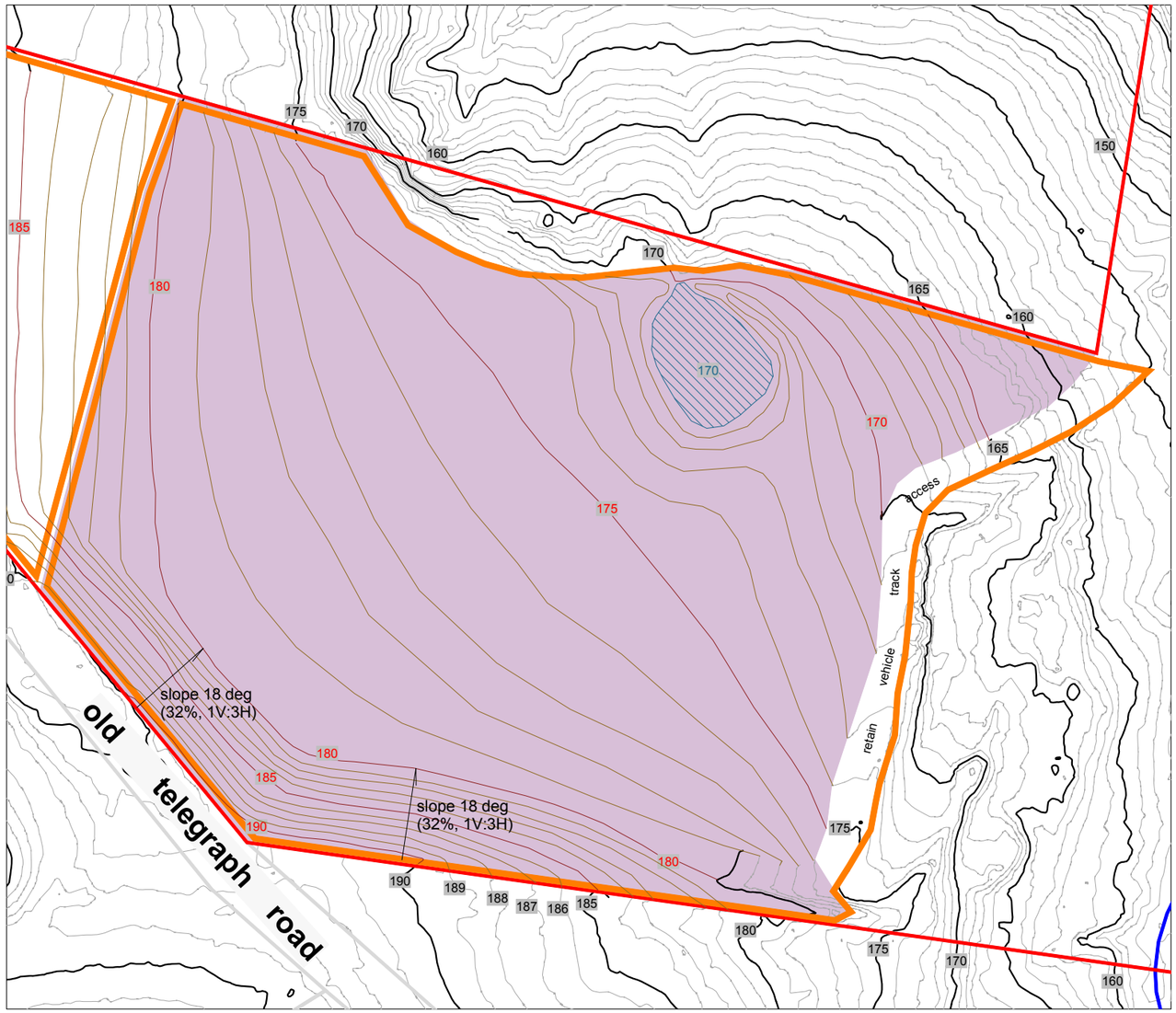
mark couston	**1: 2000**	**11/04/17**	**mrpe1.01**	**0.1**	**5**	**10**

project: **quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**

drawing title: **rehabilitation of the eastern precinct - bushland / native vegetation**

western precinct



legend

- site boundary
- rehabilitation precinct boundaries covered in this plan
- 5m contour intervals existing (999)
- 1m contour intervals existing
- 5m contour intervals proposed (999)
- 1m contour intervals proposed

rehabilitation landuse

- area: 65,070 m2 — agricultural land - class 3
- 170 — proposed agricultural dam

rehabilitation procedure - agricultural land - class 3

to commence within 6 months from the completion of processing operations

Task No.	Task
2.1	Overburden material or topsoil stockpiles shall be inspected and all environmental and noxious weed species are to be treated at monthly intervals for a minimum of 3 months using standard bush regeneration weed control techniques (refer specification s10).
2.2	The quarry site to be rehabilitated is to be inspected and all environmental and noxious weed species are to be treated at monthly intervals for a minimum of 3 months using standard bush regeneration weed control techniques (refer specification s10).
2.3	Weed control is continue to be undertaken at 1 month intervals until the application of hydromulching in Task 2.16.
2.4	At the completion of Tasks 1.1 & 1.2 (above) any shale or clay overburden material is to be initially used in the regrading of the final landform. .
2.5	Sandstone overburden material is to be used to form the final landform contours
2.6	The final landform is to be left in a roughened stage prior to the spreading of topsoil
2.7	Stockpiles of B horizon soils (stripped from 300-500mm) shall be reinstated over the rehabilitation area.
2.8	Stockpiles of A horizon soils (stripped from 0-300mm) including organic material is to be reinstated over the rehabilitation area.
2.9	On slopes between 18 deg (32%, 1:3) and 14 deg (25%, 1:4) topsoil should be left in a roughened state with small terraces parallel to the contours and should not be compacted. Where finished ground levels are smooth or the soils are compacted, the topsoils shall be ripped to a depth of 200mm.
2.10	On slopes less than 14 deg (25%, 1:4) the topsoil surface should be tracked surface to form small furrows parallel to the contours. Where finished levels are smooth or soils are compacted, the topsoil should be ripped to a depth of 300mm.
2.11	Samples of topsoil are to be tested and analysed to determine suitability for plant establishment and if necessary remedial actions shall be undertaken (refer specification s8) .
2.12	The topsoil, overburden and exposed sandstone is likely to be acidic in nature. The topsoil is to be treated with agricultural or coarsely crushed limestone or Dolomite with additional fertiliser as necessary
2.13	In areas prone to erosion such as drainage depressions, organic fibre matting (refer specification s6) can be used or alternatively sandstone riprap material (refer specification s7) in more incised drainage lines.
2.14	After the spreading of topsoil over the final contouring, temporary erosion and sediment controls (refer specification s1) such as sediment fence, check weirs etc. shall be installed in concentrated flow paths where appropriate
2.15	Slopes between 18 deg (32%, 1:3) and 14 deg (25%, 1:4) shall be hydromulched with organic material (refer specification s3) incorporating hydroseeding using temporary cover crop (refer specification s5) to minimize the potential for sheet or rill erosion.
2.16	Slopes less than 14 deg (25%, 1:4) shall be hydroseeded with a temporary cover crop (refer specification s5)
2.17	Regular watering is to be undertaken to assist with plant establishment and dust suppression within 2 days of hydroseeding and at intervals of 1 week (for 0 - 1 months), 2 weeks (for 1-4 months), and monthly (for 4-6 months) unless rain occurs.
2.18	Maintenance weed control (refer specification s10) must occur after rehabilitation at; 1 monthly intervals (for 1-3 months), 3 monthly intervals (for 4-12 months) and 6 monthly intervals (for 12-36 months) after rehabilitation.
2.19	No access to the rehabilitation cell is to occur except for prescribed watering, visual assessments and weed or sediment control
2.20	Currently there is no evidence of herbivorous foraging on adjacent agricultural crops. In the event that there is evidence of foraging activity on regenerating seedlings by rabbits, goats or wallabies etc., exclusion fencing shall be installed around rehabilitation cells. Exclusion fencing shall be star-pickets with sediment control fencing for rabbits and parra- webbing to deter goats and wallabies.
2.21	The performance measures for this area and all the tasks in this procedure are to be carried out satisfactorily (refer sheet 10)
2.22	To maximize agricultural productivity, legumes such as Lucerne and Clover species should be considered as part of the initial pasture crop to improve soil fertility and soil nitrogen levels.

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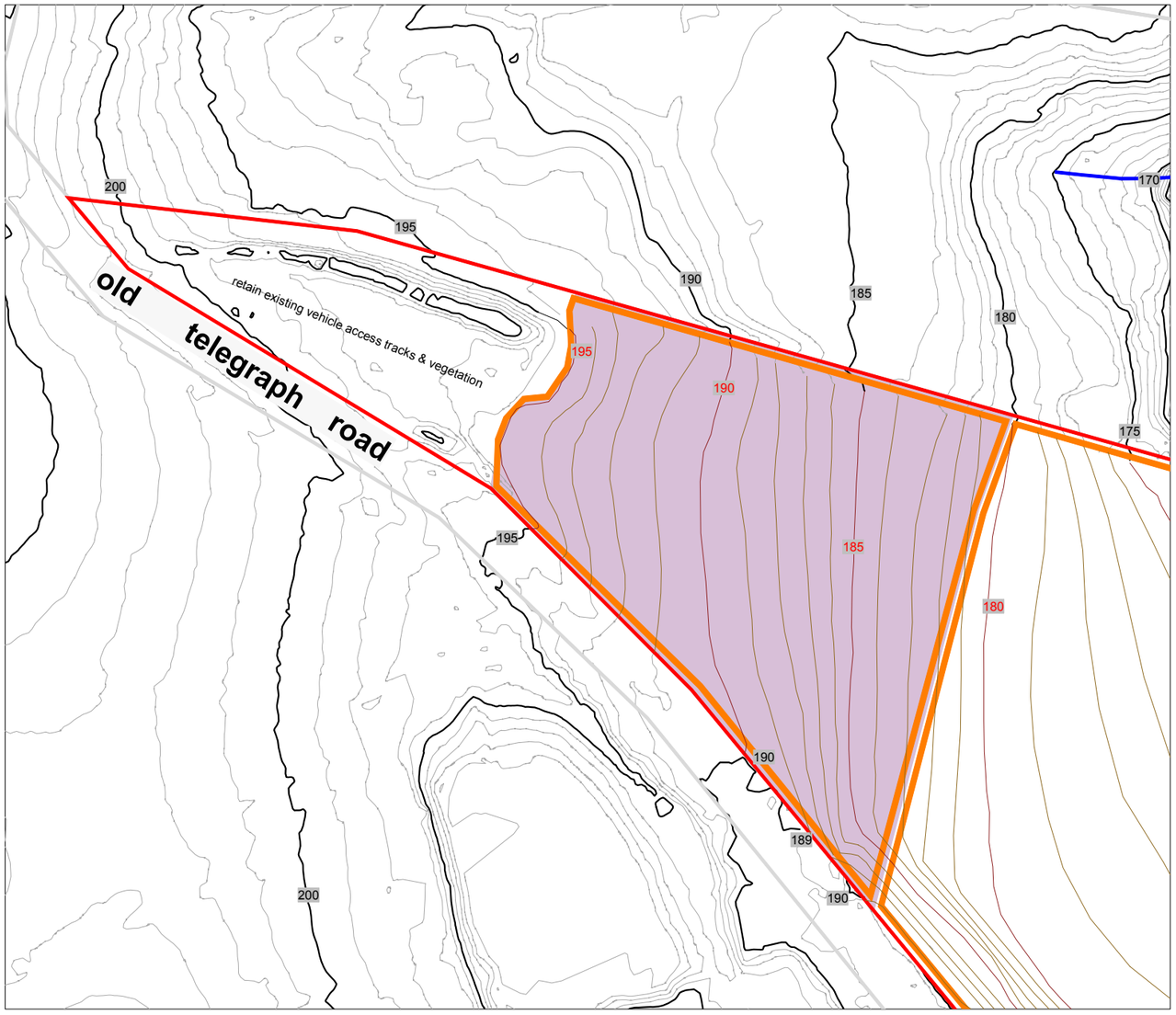
mark couston	**1: 2000**	**11/04/17**	**mrpw1.01**	**0.1**	**6**	**10**

project: **quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**

drawing title: **rehabilitation of the western precinct - agricultural land**

processing plant area



rehabilitation procedure - agricultural land - class 3

to commence within 6 months from the completion of processing operations

Task No.	Task
3.1	All machinery, plant and debris is to be removed from the rehabilitation area.
3.2	Overburden material or topsoil stockpiles shall be inspected and all environmental and noxious weed species are to be treated at monthly intervals for a minimum of 3 months using standard bush regeneration weed control techniques (refer specification s10).
3.3	The quarry site to be rehabilitated is to be inspected and all environmental and noxious weed species are to be treated at monthly intervals for a minimum of 3 months using standard bush regeneration weed control techniques (refer specification s10).
3.4	Weed control is continue to be undertaken at 1 month intervals until the application of hydromulching in Task 2.16.
3.5	At the completion of Tasks 1.1 & 1.2 (above) any shale or clay overburden material is to be initially used in the regrading of the final landform. .
3.6	Sandstone overburden material is to be used to form the final landform contours
3.7	The final landform is to be left in a roughened stage prior to the spreading of topsoil
3.8	Stockpiles of B horizon soils (stripped from 300-500mm) shall be reinstated over the rehabilitation area.
3.9	Stockpiles of A horizon soils (stripped from 0-300mm) including organic material is to be reinstated over the rehabilitation area.
3.10	On slopes between 18 deg (32%, 1:3) and 14 deg (25%, 1:4) topsoil should be left in a roughened state with small terraces parallel to the contours and should not be compacted. Where finished ground levels are smooth or the soils are compacted, the topsoils shall be ripped to a depth of 200mm.
3.11	On slopes less than 14 deg (25%, 1:4) the topsoil surface should be tracked surface to form small furrows parallel to the contours. Where finished levels are smooth or soils are compacted, the topsoil should be ripped to a depth of 300mm.
3.12	Samples of topsoil are to be tested and analysed to determine suitability for plant establishment and if necessary remedial actions shall be undertaken (refer specification s8) .
3.13	The topsoil, overburden and exposed sandstone is likely to be acidic in nature. The topsoil is to be treated with agricultural or coarsely crushed limestone or Dolomite with additional fertiliser as necessary
3.14	In areas prone to erosion such as drainage depressions, organic fibre matting (refer specification s6) can be used or alternatively sandstone riprap material (refer specification s7) in more incised drainage lines.
3.15	After the spreading of topsoil over the final contouring, temporary erosion and sediment controls (refer specification s1) such as sediment fence, check weirs etc. shall be installed in concentrated flow paths where appropriate
3.16	Slopes between 18 deg (32%, 1:3) and 14 deg (25%, 1:4) shall be hydromulched with organic material (refer specification s3) incorporating hydroseeding using temporary cover crop (refer specification s5) to minimize the potential for sheet or rill erosion.
3.17	Slopes less than 14 deg (25%, 1:4) shall be hydroseeded with a temporary cover crop (refer specification s5)
3.18	Regular watering is to be undertaken to assist with plant establishment and dust suppression within 2 days of hydroseeding and at intervals of 1 week (for 0 - 1 months), 2 weeks (for 1-4 months), and monthly (for 4-6 months) unless rain occurs.
3.19	Maintenance weed control (refer specification s10) must occur after rehabilitation at; 1 monthly intervals (for 1-3 months), 3 monthly intervals (for 4-12 months) and 6 monthly intervals (for 12-36 months) after rehabilitation.
3.20	No access to the rehabilitation cell is to occur except for prescribed watering, visual assessments and weed or sediment control
3.21	Currently there is no evidence of herbivorous foraging on adjacent agricultural crops. In the event that there is evidence of foraging activity on regenerating seedlings by rabbits, goats or wallabies etc., exclusion fencing shall be installed around rehabilitation cells. Exclusion fencing shall be star-pickets with sediment control fencing for rabbits and parra- webbing to deter goats and wallabies.
3.22	The performance measures for this area and all the tasks in this procedure are to be carried out satisfactorily (refer sheet 10)
3.23	To maximize agricultural productivity, legumes such as Lucerne and Clover species should be considered as part of the initial pasture crop to improve soil fertility and soil nitrogen levels.

legend

site boundary

rehabilitation precinct boundaries covered in this plan

5m contour intervals existing

1m contour intervals existing

5m contour intervals proposed

1m contour intervals proposed

rehabilitation landuse

area: 21,100 m2 — agricultural land - class 3

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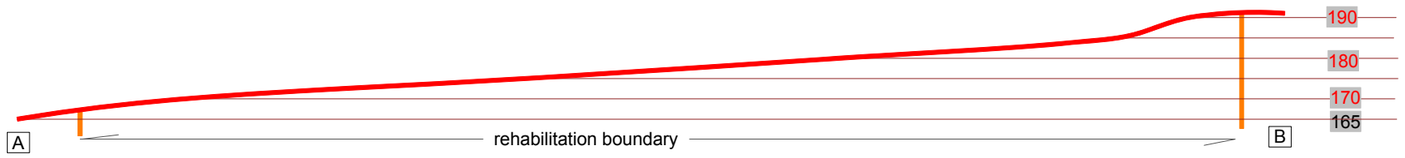
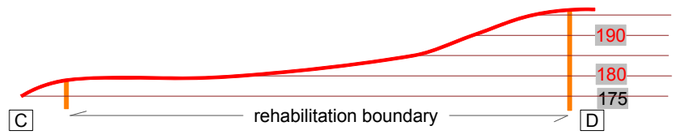
mark couston	**1: 2000**	**11/04/17**	**mrpp1.01**	**0.1**	**7**	**10**

project: **quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**

drawing title: **rehabilitation of the processing plant area - agricultural land**

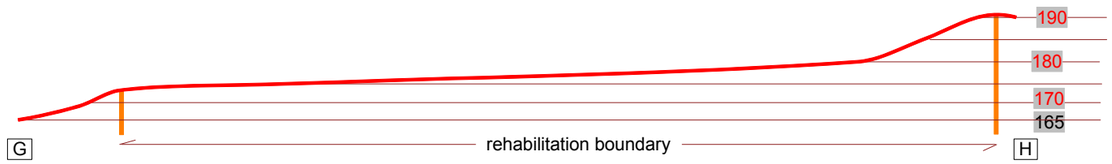


Section A-B
Eastern Precinct



Section C-D
Eastern Precinct

Section E-F
Western Precinct & Processing Plant



Section G-H
Western Precinct

note:
refer sheet 4 plan for section locations

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mark couston	**1: 1500**	**11/04/17**	**mrpf1.01**	**0.1**	**8**	**10**	**quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**	**proposed landform sections**

specifications

s1. erosion & sediment controls

All erosion and sediment controls such as berms, sediment fences, rumble zones, rehabilitation sediment basins and site drainage flow paths must be designed and constructed in accordance with Managing Urban Stormwater: Soils and Construction. 4th Edition (Landcom, 2004), New South Wales Government.

s2. herbicide usage

Glyphosate based herbicides can be used in conjunction with weed control techniques and is to be used in accordance with the product label and registration. Herbicide usage must be undertaken in a manner or method that does not cause harm to new plantings and there is no contamination of surface or ground waters.

s3 hydromulching

Hydromulching is to be carried out by a mechanical spray machine using a bonded-fibre matrix. A light application of fibre mulch is to be used at a rate of 1 tonnes/ ha. In conjunction with the fibre mulch, a binder is to be used such as Envirotack at a rate of 50kg/ha, or a polymer binder maximum 250 litres per hectare. It is important to note that in the hydromulching mix:

- No processed paper based fibre is be used.
- No fertiliser is to be used in the hydromulching process.

s4 hydroseeding – native species

The species to be used are consistent with those found in the Grey Gum – Scribbly Gum Woodland (Smith & Smith, 2008). Hydroseeding of native species in this situation is to comprise of the following species:

Species	Common Name	Grams of seed required
Acacia linifolia	Flax-Leaved Wattle	500
Acacia suaveolens	Sweet Wattle	500
Allocasuarina littoralis	Black She-oak	500
Angophora bakeri	Narrow-Leaved Apple	500
Angophora costata	Sydney Red Gum	1000
Angophora hispida	Drarf/Scrub Apple	1000
Banksia serrata	Old Man Banksia	1500
Banksia spinulosa	Hairpin Banksia	500
Bossiaea heterophylla	Variable Bossiaea	50
Corymbia gummifera	Red Bloodwood	250
Dillwynia retorta	Eggs and Bacon	250
Eragrostis brownii	Brown's Lovegrass	250
Eucalyptus haemastoma	Scribbly Gum	600
Eucalyptus punctata	Grey Gum	500
Kunzea ambigua	Tick Bush	1000
Lambertia formosa	Mountain Devil	500
Leptospermum trinervium	Paperbark Tea-tree	250
Themeda australis	Kangaroo Grass	1000
Xanthorrhoea media	Grass Tree	50

Note 20% of the seed mix is to be used on slopes of 18 degrees (32%, 1V:3H) in conjunction with hydromulching. The remaining 80% of seed is to be hydroseeded without mulch.

s5. hydroseeding – agriculture

Initial hydroseeding for agricultural land is to be undertaken using a temporary cover crop (refer s9)

s6 organic fibre matting

Organic fibre matting is to be fully biodegradable organic fibre material such as jute fibre (Jutemaster ® TM) and is to act as a weed suppressant whilst enabling gaseous exchange with the soil. Organic fibre matting must be installed and pinned down in accordance with the manufacturer's instructions.

s7 sandstone rip-rap material

Non-engineered sandstone rip-rap material is to be a mixture of hard sandstone rocks laid over geotextile membrane and should be made up of:

- 70% large rocks of regular dimension suitable for neat interlocking stacks typically 100 kg to 200 kg)
- 15% medium rocks (50kg typically 300mm diameter)
- 15% small rocks (typically 100mm diameter)
- hand-compacted growing medium in voids less than 200 mm diameter.

s8 soil amelioration – agricultural land

The following are some soil amelioration treatments suitable for treating common soil deficiencies in agricultural land.

Soil Deficiency	Soil Ameliorant
Low pH.	Agricultural Lime or Dolomite
High pH; legume stimulant in some conditions.	Sulphur
Dispersion; sodicity; soil structure; calcium to magnesium ratio.	Gypsum
Low organic carbon, structure, water holding capacity, calcium to magnesium ratio.	Compost
Hydrophobicity.	Wetting agents
Lack of natural soil biota such as Rhizobium, Mycorrhiza fungi and humates. High quality topsoil is not always available in the quantities needed to meet the objectives of a revegetation project. In such cases, infertile subsoils can be augmented by the incorporation of organic matter and biological inoculants.	Biological inoculants

s9 temporary cover crop

Depending upon the season, temporary cover crops are to be sown with either:

- Autumn/Winter seed mix – Oats @ 30kg/ha and Japanese millet @ 10kg/ha; or
- Spring/Summer seed mix – Japanese millet @ 30kg/ha plus oats @ 10kg/ha.

s10 weed control

Weed control is to be undertaken using standard bush regeneration techniques such as hand weeding or with the use of Glyphosate based herbicides when necessary (eg. cut & paint, stem scrape, spot spraying).

s11 weed material disposal and temporary storage on site.

Weed material containing seed or weed material capable of spreading vegetatively shall be removed from site and disposed of at an appropriate location where it will not cause further environmental damage.

Temporary storage of weed material prior to disposal can occur on site where it is stored, outside drainage lines, on an impervious surface and it is covered with a material that adequately contains the weed debris.

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mark couston	**nts**	**11/04/17**	**mrpsa1.01**	**0.1**	**9**	**10**	**quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**	**rehabilitation specifications**

monitoring & reporting

This monitoring and reporting program primarily focuses on the implementation of this rehabilitation plan. The program below should be read in conjunction with other monitoring requirements (ground water, air quality etc.) and should form part of the quarry operations Environmental Management Plan.

The monitoring program is based upon the aims of rehabilitation procedures, identifies assessment of key objectives and performance measures.

Whilst reporting is required annually, it is acknowledged that not all stages of the rehabilitation program will be in progress at any one time. In the event that bush fires occur locally and spread into the areas under rehabilitation or other major catastrophic events occur, a review of this monitoring program and the performance measures will need to be made.

Rehabilitation Monitoring & Reporting

Aims	Objectives	Assessment Method	Survey Parameters	Frequency and Timing of Assessment	Performance measure	Remedial Actions
Rehabilitation of Bushland – native vegetation	Extent of Bushland Rehabilitation	Bushland rehabilitation works in progress	Extent of areas completed or under bushland rehabilitation (hectares)	Annually	Areas post extraction under bushland rehabilitation.	Undertake bushland rehabilitation procedures.
	Soil Stability	Evidence of active soil erosion, sediment deposition or landform slumping.	All areas completed or under rehabilitation	6 month intervals	No evidence of soil erosion, sediment deposition or landform slumping.	Implement soil & erosion controls (refer specification s1)
	Re-establishment of native flora	Native vegetation cover and abundance.	Two randomly selected 10m x 10m quadrats, recording stem abundance and vegetative cover.	2 year intervals after rehabilitation commences.	Average of 8 plants / $2m^2$ in good health & displaying vigour	Reseeding with native species or supplementary tubestock planting
			A minimum of 100 points at 2m intervals along a 200m randomly selected transect, recording, the: - % cover of the highest canopy stratum, - number of understorey species > 1m above ground, - the number of grasses and ground cover species < 1m above ground level, - the depth of leaf litter or organic mulch	2 year intervals after rehabilitation commences.	General comparative assessment analysis of the site against recognised benchmarks for the vegetation type taking into account the establishment period.	Reseeding with the appropriate native understorey or ground cover species or supplementary tubestock planting of canopy species.
		Estimated percentage of weed biomass in the areas under rehabilitation	Randomly selected 10m x 10m quadrats within each area under rehabilitation	Annually	< 5% weed biomass in the ground cover layer No exotic or non-indigenous understorey species and canopy trees	Undertake weed control (refer specification s10)
Rehabilitation of Agricultural Land - Class 3	Extent of Agricultural Land under Rehabilitation	Agricultural Land rehabilitation works in progress	Extent of areas completed or under agricultural rehabilitation (hectares)	Annually	All areas post extraction under agricultural land rehabilitation.	Undertake agricultural land rehabilitation procedures.
	Soil Stability	Evidence of active soil erosion or sediment deposition or landform slumping.	All areas completed or under rehabilitation.	6 month intervals	No evidence of soil erosion, sediment deposition or landform slumping.	Implement soil & erosion controls (refer specification s1) or sow temporary cover crop (refer specifications s9)
	Vegetation Cover	Vegetation cover in each rehabilitation area.	Randomly selected 10m x 10m quadrats within each area under rehabilitation	Annually after rehabilitation commences.	No areas of exposed soil without vegetation cover.	Undertake further soil testing, if necessary undertake soil remediation and application of temporary cover crop or hydromulching with seed (refer specifications sheet 7)

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mark couston	**nts**	**11/04/17**	**mrpar.01**	**0.1**	**10**	**10**

project: **quarry rehabilitation plan - lot 2 dp 748820, 311 old telegraph rd, maroota**

drawing title: **rehabilitation plan - monitoring & reporting**

Bushland Restoration & Rehabilitation Plan

for Lot 2 DP 748820 311 Old Telegraph Road Maroota

19th September 2007

Prepared for

R.W. Corkery & Co. Pty Ltd
on behalf of
Maroota Mining Pty Ltd (Vella Group)

Prepared by

UBM Ecological Consultants Pty Ltd
111 Showground Road, Castle Hill NSW 2154
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Email: ubmc@urbanbushland.com.au

CERTIFICATION

I, Judith Rawling Managing Director of UBM Ecological Consultants Pty Ltd hereby state that the **Bushland Restoration & Rehabilitation Plan for Lot 2 DP 748820 at 311 Old Telegraph Road, Maroota** has been prepared in accordance with the NSW Department of Sustainable Natural Resources[1] *Urban Bushland Management Guidelines* and their publication entitled '*How to Prepare a Vegetation Management Plan*'.

Reference has also been made to Hornsby Shire Council's *Biodiversity Conservation Strategy* (2004), *Bushland Restoration Strategy* (2004), and other relevant plans and policies.

Judith Rawling
19th September 2007

[1] Formerly Department of Natural Resources ('DNR') and prior, Department of Infrastructure, Planning & Natural Resources ('DIPNR').

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1 INTRODUCTION

1.1 BACKGROUND TO STUDY

UBM Ecological Consultants[2] ('**UBM**') has been commissioned by R.W. Corkery Co. Pty. Limited to prepare a Bushland Restoration & Rehabilitation Plan for an area of native vegetation on property operating as a sand mining facility owned by the Maroota Mining Pty Ltd (Vella Group) (**hereafter 'Vella'**).

Maroota Quarry (**'the subject property'**) is 77 acres (32 ha) in size and located on freehold land known as Lot 2, DP 748820, 311 Old Telegraph Road, Maroota, in Hornsby Local Government Area.

Under *Hornsby Local Environment Plan* (1994), the property is zoned Rural AE (Large Holdings – Extraction) and Environmental Protection B (River Catchment). Sand mining operations commenced in October 1999. Development Consent No 342/1998 granted by Hornsby Shire Council allows for a 30-year operating life.

A small (2-ha) area of bushland in the eastern-central sector of the subject property has been inadvertently cleared without Council Consent. The cleared area is located ~40 metres east of a permanent watercourse, within a restricted area which excludes mining operations.

This Action is contrary to Condition 69 of Development Consent No 342/1998, which provides for the extraction of sand and clay only within an approved extraction area. Consequently the clearing has been subject to investigation and action by Council.

Subsequently, Council has required Vella to undertake site rehabilitation to restore the damaged area of bushland. Council has also required the preparation of a Bushland Restoration & Rehabilitation & Management Plan, which will determine the extent of damage, and identify strategies and actions to guide the rehabilitation process (see HSC Correspondence, Appendix 1).

This report comprises a Bushland Restoration & Management Plan (**hereafter 'the BR&RP'**) for the area of native vegetation subject to unauthorised clearing and located in the eastern-central portion of the subject property (**hereafter 'the Bushland Restoration Zone'**).

The Plan does <u>not</u> apply to other bushland on the subject property, or bushland on adjoining land owned by others, although the weed control and other strategies described in this document may equally be applied to the management of native bushland in the locality.

The regional position of the subject property is shown on Figure 1.1.

[2] Formerly trading as Urban Bushland Management Consultants ('UBMC')

Figure 1.1 Regional Positioning of Subject Property

1.2 LAND TO WHICH THE BR&RP APPLIES – BUSHLAND RESTORATION ZONE

Lot 2, DP 748820 is a large (32 ha) lot, irregularly shaped and located on the eastern side of Old Telegraph Road, close to the northern intersection with Old Northern Road. The site office and other amenities associated with the subject property landuse are located at the western part of the site.

The subject property is located in a rural/extractive zone, with properties retaining large tracts of undisturbed bushland. Within the subject property, bushland has been more so to the eastern part of the site. The cleared/disturbed area immediately to the west of this bushland forms the subject of this BR&MP.

The recommendations of this BR&RP relate only to the bushland cleared and soil disturbed by Vella outside the currently approved extraction area to the east of the existing haul road/fire trail – an area of approximately 1.4 ha in size – described as '**the Bushland Restoration Zone'**. The remaining 0.6 ha of cleared area is located west of the haul road / fire trail (see Figure 1.2) and includes part of an earthen sound barrier.

The Bushland Restoration Zone is bounded to the south by the subject property's southern boundary fence and to the west by the existing haul road and earthen sound barrier. The original topography has been altered during to recent mining activity, but generally has a north east aspect. Much of the disturbed area is flat or only gently sloping (result of earthworks), however some steeper areas are present, namely on the larger dam wall and areas of stockpiled soil.

The BR&R Plan does <u>not</u> apply to other disturbed areas subject to extraction or to the remaining areas of intact bushland on the property, although the weed control and other strategies described in this document may equally be applied to the management of other bushland within the property.

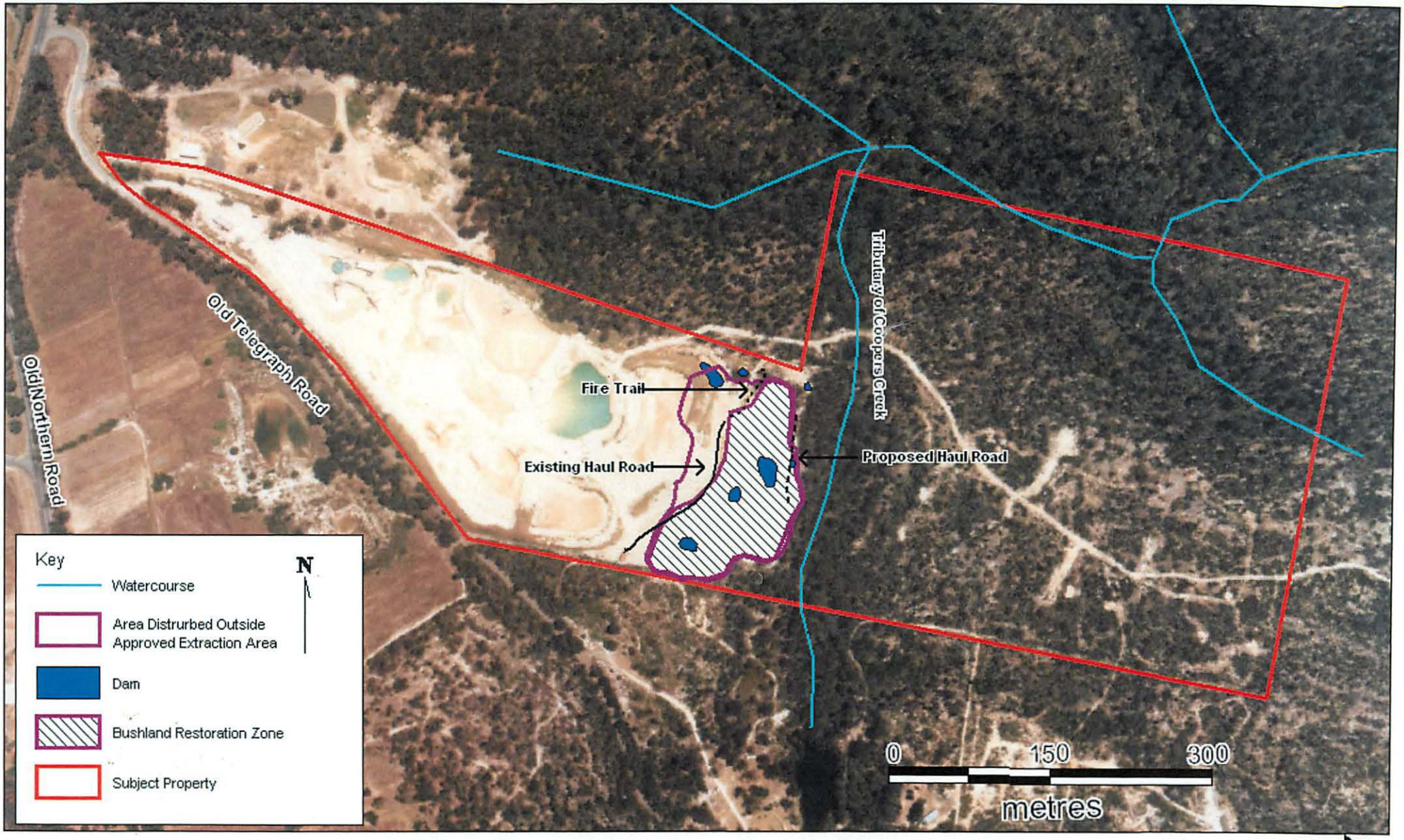

Figure 1.2 Site Details

UBM ECOLOGICAL CONSULTANTS PTY LTD

\\UBMC\Consultancy\Maroota Quarry\Mapping\Site Details Final.WOR

1.3 REPORT PURPOSE & OBJECTIVES

This BR&RP for the 1.4 ha of bushland cleared at 311 Old Telegraph Road, Maroota has been prepared by UBM at the request of R.W. Corkery & Co. P/L on behalf of their clients Maroota Mining P/L.

The Plan will recommend:

- Strategies and implementation guidelines to assist Vella to restore, rehabilitate and manage damaged native bushland occurring within the mid section of the subject property – the Bushland Restoration Zone;
- A weed control strategy;
- A bushland restoration (revegetation) program; and
- Propose a monitoring strategy to assess the progress of bushland regeneration.

1.4 PLAN PREPARATION & METHODOLOGY

1.4.1 Literature Review

During preparation of the BR&RP, other investigations and surveys undertaken for the locality and Region were reviewed. Standard papers and texts were consulted. These included:

- **Smith, P. & J. Smith (2006)**. The Native Vegetation Communities of Hornsby Shire.
- **Urban Bushland Management Consultants (2007).** Bushland Condition and Priority Ranking for Bushland Restoration in Hornsby Shire.
- **Nexus Environmental Planning Pty Ltd (1998).** Environmental Impact Statement, Sand Extraction, Lot 2 DP 748820, Old Telegraph Road, Maroota.

In addition, the *EPBC Act* Online Database (Department of Environment & Heritage 2006), search areas five (5)-kilometre radius centred on the subject property, and *NPWS Atlas of NSW Wildlife Database* (Department of Environment & Heritage 2006, search area 10 x 10 km centred on the subject property were accessed to identify previous recordings of plant species of conservation significance within the Region.

1.4.2 Site Assessment & Vegetation Mapping

Preliminary investigations were undertaken in August 2007, with detailed site survey and assessment undertaken by restoration ecologist Judith Rawling (BA,DipEd,DipEnvStud,MEnvStud), consultant botanist David Thomas (CertMarineEng,BSc [in progress]) and field biologist Joseph Horvath ((B.App.Sc[Env. Man]) on 12 & 13 September 2007.

The Bushland Restoration Zone and immediate environs to a distance of 10 metres was surveyed on foot, ensuring that the full range of native plants and weed infestations were surveyed and recorded. Approximately seven (7) person-hours were spent actively surveying the subject site[3].

A Thales MobileMapper GPS unit was used to log data in the field, with locations being recorded in three (3) second increments. The MobileMapper is a hand-held unit, accurate of up to three (3) metres, and allowing for rapid translation of data into a Geographical Information System ('**GIS**').

Vegetation boundaries were mapped (i.e. intact bushland communities and cleared areas) and a list of native and weed (introduced) species was prepared; with species abundance/density also recorded. A list of native species regenerating naturally was also compiled.

[3] Note that a comprehensive flora survey of the whole of the subject property was NOT undertaken.

Management issues such as presence of significant weed sources on adjoining land, potential for surface wash and erosion, the position of drainage lines and a visual determination of the site's fire history were also recorded.

A targeted search was made for weeds and introduced species. Keystone weeds were identified as (in order of priority) as: Weeds of National Significance (**'WONS'**); noxious weeds listed in Hornsby Local Control Area (*Noxious Weeds Act 1993, as Amended 2005*), and regionally significant (environmental) weeds.

Details of the parameters recorded and the method of defining each weed occurrence are provided in the following sections. Because of the homogenous topography, a single Broad Weed Polygon was recorded for the subject site.

The data recorded was downloaded from the MobileMapper into a GIS (MapInfo version 9.0) and additional field notes were added. This data was then used for analysis and assessment.

For Impacts and Management Issues, a single point was recorded, and details of any impacts on the vegetation, or other management issues were entered.

1.5 LEGAL & PLANNING FRAMEWORK

A number of local planning policies, State and Commonwealth acts and policies apply to the management of remnant native vegetation (bushland) within Hornsby Shire. The most relevant of these are listed in Table 1.1, below.

Table 1.1: Summary of Environmental Policies, Planning & Legislative Requirements

Government Level	Relevant Policy /Legislation	Relevance to Subject Property
Local	Hornsby Shire Local Environment Plan (1994)	Zoned Rural AE (Large Holdings –Extractive)
	Hornsby Bushland Restoration Strategy (2004)	The Bushland Restoration Strategy is embedded in Council's *Community Land & Crown Reserves Generic Plans of Management* (2004), which requires plans of management to be prepared for community land and crown land under Council's care, control and management. Does not apply to the subject property as it is privately owned land; however the BR&RP has been prepared in accordance with the spirit of the Strategy.
	Biodiversity Conservation Strategy for Hornsby Shire (2004)	Serves as an 'umbrella document', bring together information on biodiversity in the Shire, explains why its conservation is important, and provides priorities for action. The Strategy aims to conserve both terrestrial and aquatic biodiversity, their habitats and the ecological processes that support them. The Strategy provides for no net loss of native vegetation, therefore the Strategy seeks protection (or reinstatement) of an equivalent amount of any area of native vegetation lost due to development or unauthorised disturbance.
	Extractive Industries Maroota DCP Hornsby Shire (2003)	The subject property is located within Hornsby Shire's Extractive Industries Maroota DCP.

Government Level	Relevant Policy /Legislation	Relevance to Subject Property
State	*Threatened Species Conservation Act 1995*	No endangered ecological communities or populations were recorded for subject property. However, a single individual of a flora species listed as 'endangered' under the Act - *Acacia bynoeana* - was located within the 'regeneration area'.
	Noxious Weeds Act 1993	There are no noxious weeds in the Bushland Restoration Zone or on immediately adjoining land.
	Rural Fires Act 1997 / Amendment 2002	Vegetation within the subject property and environs has been classified as Bush Fire Prone Land - Category 1 (this being the highest category) (Hornsby Shire Council 2003). A minimum 30 metre Asset Protection Zone ('APZ') is required to be maintained around built structures. Bushland in the locality was badly impacted by bushfires in 1994. Fire scars are evident on many of the canopy trees in the subject property.
	State Environmental Planning Policy 19 – Bushland in Urban Areas	Does not apply to privately-owned land. However, this BR&RP has been prepared in keeping with the general intent and spirit of the Policy
	State Environmental Planning Policy 44 – Koala Habitat Protection	Hornsby LGA is listed under Schedule 1 of the Act as supporting potential koala habitat. Development Applications must consider the potential for Koala Habitat where the area is greater than one (1) hectare in size or the land is together with any adjoining land in the same ownership, an area of more than one (1) hectare. The Bushland Restoration Zone at Maroota is 1.4 ha in size and all vegetation has been removed. Although Koala feed trees (e.g. *E. punctata*) occur in adjoining bushland, under separate ownership, these trees comprise less than 15% of the total tree compliment (as required under the SEPP). It is assumed that a similar compliment such trees would have occurred in the BCA prior to clearing, so that it is considered that this site does NOT constitute potential koala habitat.
	Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005	Mining operations require appropriate erosion and sediment control measures to minimise impacts on downstream waterways and the Sydney Harbour Catchment. The EIA prepared for the mining operation complies with these requirements.
Commonwealth	*Environment Protection and Biodiversity Conservation Act 1999*	No endangered ecological communities or populations were recorded for subject property. However, a single individual of a flora species listed as 'vulnerable' under the Act - *Acacia bynoeana* - was located within the 'regeneration area'.

2 SITE DESCRIPTION

This chapter provides a description of the physical and biological environment within the subject property and immediately surrounding land.

2.1 LOCATION & SETTING

Lot 2, DP 748820 is a large (32 ha) battle-axe shaped Lot, occupying a series of ridges, slopes and gullies on the eastern side of Old Telegraph Road - which joins Old Northern Road about a kilometre north of the Wisemans Ferry Road junction.

The subject property is located in a rural area, with most properties retaining large tracts of undisturbed bushland. Local land uses include rural residential, horse grazing, plant nurseries and orcharding, with several other extractive operations in the locality.

In common with neighbouring properties, the subject property retains extensive stands of bushland. The vegetation community within the subject property has been identified as 'Grey Gum/Scribbly Gum Woodland'; with areas of Sydney Peppermint-Angophora Forest also present (NPWS 2002). Neither community is listed as 'endangered' or 'threatened' under State or Commonwealth environmental legislation, and occurs widely in the locality and Region. However, a number of threatened flora and fauna species are known for the locality, including the endangered shrub *Acacia bynoeana* – which has been identified on the subject property.

Within the subject property ('The Maroota Quarry'), bushland has been retained on the western ridgeline off Old Telegraph Road, along the creek corridor in the lower sector of the property, and on the western hill slopes across the creek. At this time, mining operations have been carried out only in the western portions of the subject property.

The recommendations of this BR&RP relate only to those areas of bushland inadvertently cleared by Vella in the eastern-central sector of the current extractive operations – the Bushland Restoration Zone - an area of approximately 1.4 ha in size (see Figure 1.2 for site details).

2.2 SITE DEFINITION

Table 2.1: Summary of Legal Description

Title Information	Lot 2, DP 748820
Zoning	Zoned Rural AE (Large Holdings –Extractive) under Hornsby LEP 1994
Ownership	Maroota Mining Pty Ltd (Vella Group)
Location	311 Old Telegraph Road, Maroota, in Hornsby Shire. Located on the eastern side of Old Northern Road, near its intersection with Wisemans Ferry Road.
Grid Co-ordinates	314000E, 6297000N
Total Area	Lot 2 77 acres (32 ha) /bush restoration 1.4 ha
Current Land Use	Extractive – sand and clay

2.3 PHYSICAL ENVIRONMENT

Table 2.2: Geophysical Setting of the Subject Property

Feature	Subject Site Description
Topography	Locally - generally undulating to rolling low hills and moderately inclined slopes on quartz sandstones along the edge of the Somersby Plateau. Local relief to 80m, with slopes gradients 5-25%. In the *subject property* Situated on north-eastern face of a ridge defined by Old Northern Road/telegraph road. Land slopes gently to the north east, becoming steeper toward the eastern part of the site then rising on the eastern side of the watercourse. *Within the Bushland Restoration Zone* The areas original topography has been altered during to recent activity, but generally has a north east aspect. Much of the area is flat however some steeper areas are present namely on the larger dam wall and areas of stockpiled soil.
Geology & Soils	*Hawkesbury Sandstone* – medium to coarse-grained quartz sandstone with minor shale and laminate lenses; and Narrabeen Group (Gosford Sub-group, Terrigal Formation), comprising lithic/quartz sandstone, siltstone and claystone. *Soils* are shallow to deep (<50->150cmn) Yellow Earths, Earthy Sands and some siliceous Sands on crests and slopes; shallow to moderately deep (<50->150cm), Leached Sands and Grey Earths in poorly drained areas and drainage lines. Moderately deep (100-150cm) Yellow Podzolic and Gleyed Podzolic Soils associated with shale lenses also occur (Murphy, 1993) *Limitations:* very high erosion hazard, permanent waterlogging (localised), highly permeable, strongly acid soils with very low soil fertility.
Soil Landscapes	There are four (4) SLU within the subject property: Gymea (gy), Hawkesbury (ha), Maroota (ma) and Sydney Town (st). The Bushland Restoration Zone (i.e. the area of disturbance) is located partly on the **Sydney Town SLU**, which is an erosional landscape –meaning that the landscape has been sculpted by running water, and partly on the **Maroota SLU**, a residual landscape – meaning that the deep soils have evolved via deep *in situ* weathering of the underlying parent rock. Sydney Town slopes are described as usually steep to undulating (local relief to 80m and slope gradients 5-15%): soil depth is shallow to absent, with streams in the landscape well defined. Maroota slopes are gently undulating, with local relief<20 m and slope gradients <10%. (Murphy 1993) *Within the Bushland Restoration Zone* The upper slope had much variation, with skeletal soils, exposed rock outcrops and locally deep sandy soil, some with gravel. The soils of the lower slopes were somewhat deeper generally, however due to soil extraction areas of skeletal soil and rock outcropping were also present in this area.
Local Hydrology	The subject property forms part of the Hawkesbury Nepean Catchment and the Coopers Creek sub-catchment. An unnamed tributary of Coopers Creek is located at the toe of the eastern slopes – downslope and within 40 metres of the area of disturbance (i.e. the Bushland Restoration Zone). The proximity of this watercourse has determined the area of disturbance as a restricted area – hence this land is unavailable for extractive purposes.
Climate	The mean daily maximum temperature is 22.3°C, with highest temperatures recorded in January, February and March. The mean daily minimum temperature is 11°C, with lowest temperatures recorded in June, July and August. Mean annual rainfall is 1066.1 mm; with February, March and April recording the highest mean levels (Bureau of Meteorology 2005, Pennant Hills (Yarrara Road #066047).

Figure 2.1 Maroota Quarry Soil Landscapes

2.4 BIOLOGICAL ENVIRONMENT

2.4.1 Vegetation Mapping

Smith & Smith (2006) have mapped the bushland in the subject property at Maroota as **Grey Gum – Scribbly Gum Woodland** on the upper and middle slopes, and **Sydney Peppermint-Angophora Forest** on the lower slopes and along the creek corridor [4] (see Figure 2.2).

Recent site investigation (September 2007) generally confirms these descriptions, although limitations to the survey included the highly disturbed nature of the bushland in the active mining areas and in the Bushland Restoration Zone itself, which made it necessary to extrapolate from observation of bushland on adjoining properties.

In the description of the plant communities presented in Section 2.4.2 below, their structure and floristics, have been taken from a brief assessment of bushland on the property adjoining the subject site to the east.

The Bushland Restoration Zone incorporates species from both plant communities, but it is stressed that the boundaries between these two (2) communities described above does not exist as a straight line. Variations and gradations are present and subject to slope, aspect and other micro-site conditions. However, given the range of native species regenerating in the Bushland Restoration Zone, it is considered that mapping by Smith & Smith is relatively accurate.

[4] *Eucalyptus punctata – E. haemastoma* Woodland and *E. piperita- Angophora costata* Woodland respectively

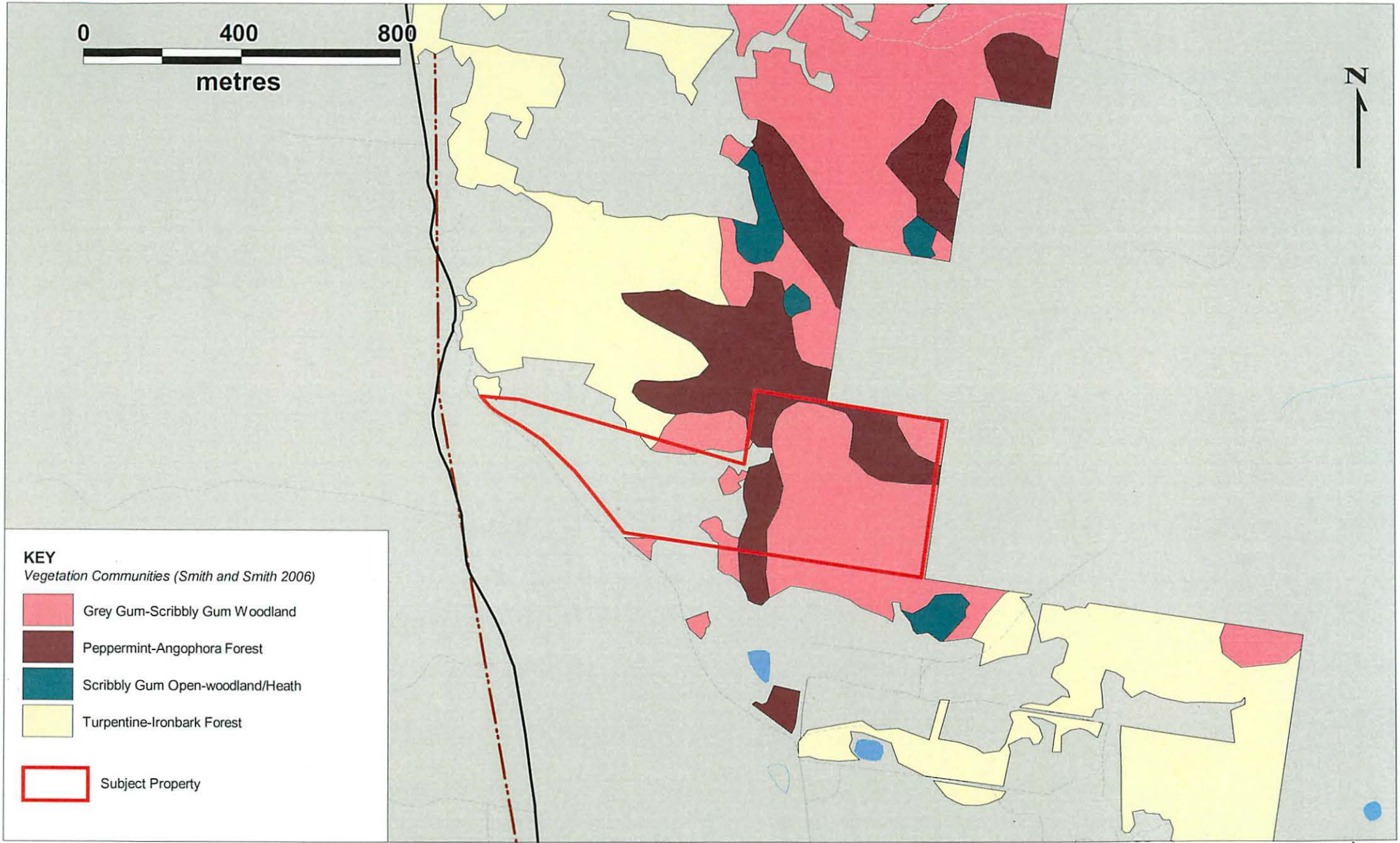

Figure 2.2 Mapped Native Vegetation Communities (Smith &Smith 2006)

2.4.2 Communities

The following assessment of vegetation in the adjoining property to the east was undertaken to provide information on the pre-disturbance vegetation communities, and to serve as a guide for monitoring the restoration of damaged bushland in the Bushland Restoration Zone.

Scribbly Gum / Grey Gum Woodland

Based on the adjoining property's intact upper slope vegetation, the general vegetation of the **upper slope** was likely to have been open woodland with structure and floristics as follows:

Canopy
Red Bloodwood (*Corymbia gummifera)*, Scribbly Gum (*Eucalyptus haemastoma*) and Grey Gum (*Eucalyptus punctata*)(also likely to be other species present, but only limited survey in adjoining bushland was undertaken). Yellow Bloodwood (*Corymbia eximia)* was also present as an occasional tree. Height – 9-15m, projective foliage cover 15% approx. Cover locally very variable.

Small Tree Stratum
Black She-oak (*Allocasuarina littoralis)* [Green Wattle *Acacia parramattensis* rare] – ht: 6-10m; PFC 20% variable. *Allocasuarina* tended to occur in groups.

Shrub Stratum
Yellow Teatree (*Leptospermum polygalifolium,*) Paperbark Teatree (*Leptospermum trinervium*), Hopbush (*Dodonaea triquetra)*, Grey Spider Flower (*Grevillea buxifolia)* and Red Spider Flower (*G. sericea*), with Dwarf Applebox (*Angophora hispida)* being locally common. White Tick Bush (*Kunzea ambigua)* is likely to have been common in the Bushland Restoration Zone. Ht: 0.5-3m; PFC 60%. Local grassy patches occurring with few shrubs.

Ground Covers
Impossible to identify from a distance and in the time available, but assumed to be similar to recorded species in the subject property – particularly in the Bushland Restoration Zone prior to clearing[5]. Generally sparse, except localised patches where Kangaroo Grass (*Themeda australis*) seemed to be the dominant. Sedges were locally common in seepage zones. Bracken Fern (*Pteridium esculentum*) was common in drier soils.

Angophora / Sydney Peppermint Woodland

Based on the adjoining property's intact lower slope vegetation, the general vegetation of the **lower slopes** was likely to have been open woodland with structure and floristics as follows

Canopy
Sydney Peppermint (Eucalyptus piperita), Sydney Red Gum (*Angophora costata)* and Red Bloodwood (*Corymbia gummifera*). Occasional Grey Gum (*Eucalyptus punctata),* with Yellow Bloodwood (*Corymbia eximia*) as a rare occurrence at the upper margins. Ht: 10-20m. PFC is unclear, but probably naturally 25-40%.

Small Tree Stratum
Black She-oak (*Allocasuarina littoralis*), Old Man Banksia (*Banksia serrata)* and NSW Christmas Bush (*Ceratopetalum gummiferum).* Ht: 6-10m; PFC approx 10%

Shrub Stratum
Flax Wattle (*Acacia linifolia)*, Myrtle Wattle (*Acacia suaveolens)*, Eggs and Bacon (*Dillwynia* spp), Grey Spider Flower (*Grevillea buxifolia), Red Spider Flower (G. sericea)*, Paperbark Teatree (*Leptospermum*

[5] Assumptions are based on the structure and floristics of the adjoining vegetation, but also on the species regeneration naturally in the disturbed portions of the property (i.e.' the Bushland Restoration Zone).

trinervium, Slender Rice Flower (*Pimelea linifolia*), White Tick Bush (*Kunzea ambigua*,) Yellow Teatree (*Leptospermum polygalifolium*) and Hopbush (*Dodonaea triquetra*.) Ht: 0.5-3m, PFC 20-60%.

Ground Covers
Narrow-leaf Panic Grass (*Entolasia stricta*), *Senecio hispidulus*, Bracken Fern (*Pteridium esculentum*), *Cyathochaeta diandra* and Kangaroo Grass (*Themeda australis*). Ht: 0-0.4m; PFC 5-25% variable.

The structure of the above two (2) plant communities was based on observations of vegetation occurring at the site and on nearby land and some extrapolation was based on likely typical assemblages in the area. Based on site variability (seepage zones, soil depth and profile types & species distribution), it is expected that the boundary between the two (2) communities was not uniform.

Existing regeneration of native species appeared to be occurring as determined by highly modified conditions in a few locations (eg lack of topsoil, site drainage). It is recommended that where regeneration was advanced and viable, no soil be replaced over these areas even if there is a slight shift in local patches from what is considered to have been the original vegetation composition.

2.4.3 Species

A list of plant species recorded within the Bushland Restoration Zone[6] is provided in Appendix 2, along with an indication of their relative abundance. This is NOT intended to be a comprehensive list of all species present within the subject property, and represents only those species that were recorded while undertaking searches for native species of National or State conservation significance known for, or expected to occur in the Region. This list can, however be used as a basis of comparison when monitoring progress of regeneration (see Section 7.6).

Acacia bynoeana - listed as 'endangered' under the NSW *TSC Act* - was found within the Bushland Restoration Zone. This plant is also listed as 'vulnerable' under the *EPBC Act*. Four (4) Individuals were found growing in open conditions on the rocky exposed batter below the existing haul road and on the exposed flat ground to the west of the larger dam. The locations of the four (4) Acacia bynoeana plants are shown on Figure 2.3.

No other flora species of National or State conservation significance listed as a ROTAP (Rare or Threatened Australian Plant, Briggs and Leigh 1996), or listed on the Schedules of the *EPBC Act* or *TSC Act* were located within the subject site (i.e. the Bushland Restoration Zones).

The flora species listed in Table 2.3 are considered to be inadequately conserved in Western Sydney (NPWS 1997). These species are therefore considered to be of regional conservation significance. These species were recorded in the Bushland Restoration Zone – observed to be regenerating naturally.

[6] As identified as regenerating seedlings and/or saplings

Table 2.3: Flora Species with Regional Significance Recorded in the Bushland Restoration Zone

Key

R = Regionally Rare

REG = Regionally Significant

V1 = All regionally significant taxa and/or rare (5 or less records).

V2= Vulnerable taxa which are uncommon (6-10 records).

V3 = Common to widespread taxa (>10 records). (NPWS 1997)

SPECIES	COMMON NAME	STATUS
Acacia bynoeana	Bynoes Wattle	REG, V1
Acacia rubida	Red-stemmed Wattle	R, V1
Baeckea linifolia		V2
Bossiaea scolopendria		R, V2
Comesperma ericinum	Pink Matchheads	R, V2
Eriostemon australasius		V2
Eucalyptus haemastoma	Broad leaved Scribbly Gum	V2
Hibbertia empetrifolia		V3
Juncus pallidus		
Grevillea buxifolia	Grey Spider Flower	V2
Grevillea speciosa	Red Spider Flower	REG, R, V1
Leucopogon microphyllus var. microphyllus	White Beard-heath	R, V2
Olax stricta		V2
Schoenus imberis		
Senecio hispidulus		V3
Zieria pilosa		V2

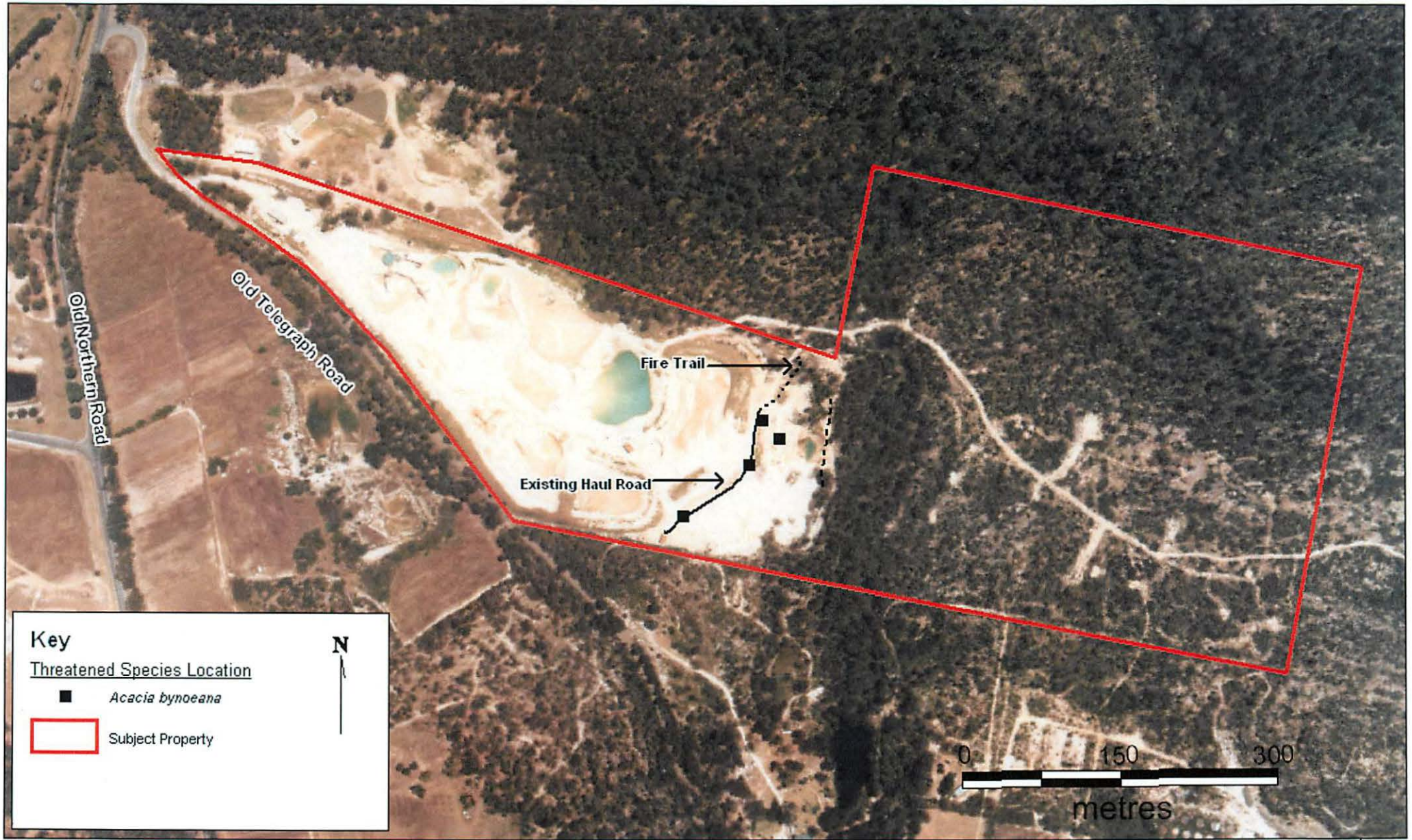

Figure 2.3 Location of Acacia bynoeana

2.4.4 Weeds and Introduced Species

The greater part of the subject property inspected was free of significant weed species.

The upper slopes adjacent to Old Telegraph Road have been turfed with introduced grasses, mainly Kikuyu (*Pennisetum clandestinum*) and Common Couch (*Cynodon dactylon*), and there are a number of commonly occurring herbaceous weeds in this area – mainly along roads and tracks.

The steep eastern slopes (which have in part, been subject to extractive operations) support very few weeds, except for those wetter soil areas which carry overland flow, which serves to introduce weed propagules from weedy areas upslope.

However, the stockpiles of soil (removed from the Bushland Restoration Zone as the result of clearing), are slowly being colonised by weed grasses and herbaceous weeds such as Inkweed (*Phylotacca octandra*), Tobacco Bush (*Solanum mauritianum*), Crofton Weed (*Ageratina adenophora*) and Striking Roger (*Tagetes minuta*). There were no significant woody weeds recorded.

The very poor nutrient sandy soils, and shallow rocky topsoil are not conducive to weed growth and establishment, and it is anticipated that those weeds that do occur can be controlled with regular monitoring and target weed treatment (as required).

Note: that the flora survey undertaken as part of the BR&RP extended only for a distance of ~10 metres from the outside edge of the Bushland Restoration Zone. The (relatively undisturbed) bushland in other parts of the subject property was not inspected.

3 BUSHLAND RESTORATION & REHABILITATION STRATEGY

This chapter provides a brief discussion of the management strategies required to reinstate the area of damaged bushland on the subject property.

The subject property at 311 Old Telegraph Road Maroota includes an extensive area of bushland, comprising a Grey Gum-Scribbly Gum Woodland on the ridges and upper slopes, and a Peppermint-Angophora Woodland on the lower slopes, which extends into the nearby gully.

The subject property is zoned AE (Large Holdings – Extractive), which restricts extractive activities to those parts of the property identified under Development Consent #342/1998. The area inadvertently cleared is located close to a watercourse in the north-eastern corner of the subject property, outside the area identified for extraction. As the landowner, Vella is required to comply with Council's direction to re-instate the area of cleared/damaged bushland according to the strategies and actions identified in the BR&RP (this document

While large areas of bushland within the subject property have been cleared for mining operations, natural regeneration is proceeding rapidly in most parts of the site inadvertently cleared – i.e. the Bush Restoration Zone.

The natural regeneration occurring within the Bushland Restoration Zone is however not evenly distributed or homogenous in nature, so that it has not been possible to accurately pinpoint specific areas on a map for the replacement of topsoil and/or protection of natural regeneration.

This has already been done on a micro-site by micro-site basis with the Quarry Manager, and it has been agreed that earthworks will be carried out under the supervision of the Restoration Ecologist or a suitably qualified bush regenerator. It is also proposed to discuss this strategy on-site with Council staff before proceeding with further works.

It is anticipated that natural regeneration will rapidly re-establish the native plant community on the disturbed land. However, where topsoil is replaced in areas of poor natural regeneration, a basic revegetation program will be undertaken to speed the rehabilitation process. Details of the restoration and rehabilitation strategy are set out below.

3.1 PROTECT AREAS OF GOOD NATURAL REGENERATION

The basic restoration strategy will be to protect the regenerating bushland and continue to encourage natural regeneration by removing competing weeds and in selected sites, spreading seed-bearing brush (brush matting) and hand broadcasting native seed.

As discussed above, natural regeneration in the Bushland Restoration Zone appears to be occurring in a 'patchwork' fashion. Large areas of exposed soil are being colonised by native seedlings representing trees, shrubs and a variety of herbaceous species, while cracks and crevices in exposed sandstone rock shelves and 'floaters' display similarly diverse natural regeneration – particularly where overland water flow occurs. Other areas, for example in the large central depression, are not regenerating as well, possibly because of the drier nature of the subsoil, although some native seedlings were recorded.

It is suggested that the stockpiled soil be replaced in the large central depression and in other sites which are similarly depauperate in plant growth. However, earthworks will have to be undertaken carefully, and sites for placement of soil identified 'on the ground' as the work progresses. It is suggested that the Restoration Ecologist or a trained Bush Regenerator be on-site during the earthworks to guide the machine operator. In this way, damage to regenerating areas will be minimised.

3.2 PROTECT THREATENED SPECIES

The location of individual plants of the endangered *Acacia bynoeana* – is shown on Figure 2.3. Four (4) plants were observed to be growing on the steep batter below the exiting haul road and adjacent to the central part of the Bushland Restoration Zone. In this position, they are unlikely to be disturbed as the result of any site rehabilitation works.

Vella is aware of the position of the threatened Acacia and has agreed to protect the plants. It is suggested that star-pickets with flagging tape be erected close to the shrubs growing on the batter and exposed ground so that their locations are clearly visible to machine operators. No soil should be placed on or near the specimen growing on exposed ground to the west of the larger dam. Once mining operations cease in this part of the property, these star-pickets can be removed.

The monitoring program proposed (see Section 3.9) should include a periodic inspection of the *Acacia bynoeana* and a quick search to see if any new plants have established. The location of any new plants should be added to the site map.

3.3 CONTROL WEEDS

The subject property supports very few introduced species other than patches of introduced grass and scattered herbaceous species common to most disturbed soil sites. Similarly, the adjacent bushland to the east supports very few weed species (having been burnt in about 10 years ago) so there is no significant adjacent weed source. No species listed as noxious weeds in Hornsby Local Control Area were recorded for the subject property.

Those weeds present within the subject property can be economically managed employing techniques such targeted spot spraying with a selective herbicide. Similarly, weeding in the Bushland Restoration Zone itself is expected to be minimal, and can be managed by periodic monitoring and targeted herbicide application, or by careful hand weeding in areas of regenerating natives[7].

Note: spray drift will harm native seedlings and sapling, so hand weeding is recommended in such areas. Such work should be undertaken by a trained Bush Regenerator.

A list of target weed species for the Bushland Restoration Zone is presented in Table 5.1.

3.4 REPLACE TOPSOIL & LANDFORM

Where topsoil has been removed from a site for some reason and stockpiled, it is usual to recommend the replacement of topsoil to encourage natural regeneration from seed in the soil seed bank. However, considering the time that has elapsed since the initial clearing (approximately 17 months), and the good natural regeneration of native species in most parts of the disturbed area, it is considered that the widespread replacement of topsoil at this time would be counter-productive.

However, there is some scope to move the large stockpiles of soil that remain and to distribute them over those parts of the Bushland Restoration Zone that are not regenerating as well as others, and also to reform the landscape to reduce the angle of slope and create a more 'natural' landform. This will result in the loss of some small number of native seedlings, but this cannot be avoided. As these stockpiles are located next to and between areas of natural regeneration, it is recommended that topsoil redistribution be supervised by the attendance of the Restoration Ecologist or a trained Bush Regenerator.

[7] Initial weed control extending from the upper slopes to the lower end of the BCZ (including stockpiles) was undertaken under supervision immediately following the initial site inspection by UBM.

3.5 RESTORE LOCAL DRAINAGE PATTERNS

A number of silt ponds have been created to contain soil wash and siltation of the watercourse downslope. These silt ponds have been very effective, with inspection showing that the quality of the watercourse has not be impacted by the clearing. These ponds are rapidly being colonised by native aquatic and semi-aquatic species, and were observed to be providing habitat for invertebrates, native birds and frogs.

Although these silt ponds were not *in situ* prior to clearing, if they do not interfere significantly with the natural drainage patterns from the ridge top to the creek, it would perhaps be advantageous from an ecological point of view to retain them after restoration works are completed. The ponds will provide further protection against sedimentation of the watercourse and they are providing additional fauna habitat. There is therefore no objection to one or more of these ponds being retained.

Note: the restoration of pre-clearing drainage patterns and local landform should be guided by advice from Vella's Geological and Environmental Consultants R.W. Corkery & Co. P/L, and undertaken only after discussion with Council staff.

3.6 ERECT EROSION CONTROL MEASURES, INCLUDING FENCING

The Bushland Restoration Zone is to be protected by the erection of a temporary exclusion fence around the site perimeters. This will clearly identify the restricted area and prevent accidental incursion by machinery.

Where large areas of exposed soil occur (e.g. where stockpiled soil has been redistributed) a silt fence is to be erected around the downslope edges to contain potential soil wash. If necessary, additional protection can be provided by placing and securing hay bales inside the silt fence. All new and existing silt fences are to be retained in good order, and maintained in place until such time as the soil surface has been stabilised.

Note: large sandstone outcrops/floaters occur across the slopes within the Bushland Restoration Zone, with cracks and crevices supporting a range of native plants. These rock outcrops should be left exposed and undisturbed.

3.7 ENHANCE NATURAL REGENERATION

It is anticipated that most if not all of the damaged bushland 1.4 ha will regenerate naturally, without replanting. It is therefore also assumed that the native soil seed bank in the stockpiled soil remains intact – in fact, seedlings are regenerating on these stockpiles (see Appendix 2 and Plates).

It is proposed to protect those areas of good natural regeneration (see Sections 3.1 and 3.2) and where stockpiled soil is spread over those area of low natural regeneration it is recommended that seed bearing brush be cut from elsewhere on the property and spread over the bare soil in the herringbone[8] pattern. Brush must be used fresh, preferably on the day it is cut (or shortly thereafter) as the stored seed will drop quickly.

Species identified in the adjoining bush and known to be suitable for brush matting include:

- Forest She-oak (*Allocasuarina littoralis*)
- Teatree (*Leptospermum polygalifolium, L. trinervium*)
- Conesticks (*Petrophile pulchella*)
- Needlebushes (*Hakea sericea, H. dactyloides*)
- Hopbush (*Dodonaea triquetra*)

[8] A herringbone or cross-hatch pattern will help to secure the brush on the steeper slopes

- Old Man Banksia (*Banksia serrata*) – just gather the cones
- Wattles (*Acacia* spp) – only when in seed

Stockpiled timbers should be returned to the regeneration site and spread across the slopes. Although this timber is unlikely to retain any useful seed after this time, it will still be useful to anchor the brush matting and will serve to protect new seedlings and also help stabilise soil. Large timbers will create additional habitat for native fauna, and these too should be carefully replaced on site.

When native grass seed is available (usually mid to later summer), handfuls of seed may be gathered and spread directly into the brush, where it will drop down and hopefully germinate. This should be done several times, and should be coordinated to coincide with the recommended six (6)-monthly monitoring and weeding sessions.

3.8 PROVIDE A SITE MAINTENANCE PROGRAM

Regular weed control during the regeneration phase will be essential. Six (6)-monthly visits by a qualified bush regenerator are recommended (see Figure 7.1). Maintenance weeding is to continue for the lifetime of the BR&RP (i.e. 2-years).

It is proposed that all on-ground works (especially earthworks) should be undertaken by or under the supervision of a qualified Bush Regenerator, with monitoring and reporting undertaken by the Restoration Ecologist appointed by the landowner.

It is suggested that access to the site should be restricted (no vehicles should be allowed) to bush regenerators and/or the landowner undertaking routine maintenance activities.

3.9 PROVIDE A MONITORING AND REPORTING PROGRAM

This BR&RP has been prepared to cover a two (2)-year period. Considering the location of the damaged site close to intact native bushland, and the excellent potential for site recovery, it is anticipated that the bushland can be restored and rehabilitated within this timeframe.

It is proposed to monitor the natural regeneration process every six (6)-months to evaluate the progress of natural regeneration on the site. At the end of Year 1 (or 12 months, which equates to one growing season), natural regeneration has not occurred with the diversity and abundance required to restore the plant community (particularly of tree species), enrichment planting may be required[9]. Refer to Council's publication *Indigenous Plants for the Bushland Shire* (Pasqualini 1997) for a list of suitable species.

In the timeframe of the BR&RP, four (4) monitoring sessions are proposed (6-monthly) and a brief report detailing the progress of regeneration/recovery are to be submitted to Council at the end of both Year 1 (progress report) and Year 2 (final report).

The Final Report will be prepared and submitted to Council at the conclusion of works. This Report is to include a summary of all monitoring events, including photographs, a list of native plant species occurring on the regenerated site, with densities and abundance.

Actions to be carried out are set out in chronological order are set out in Figure 7.1.

[9] Select from tree species growing on site (see Section 2.4 and Appendix 2)

4 BASIS FOR MANAGEMENT OF URBAN BUSHLAND

The following section – Basis for Management – is largely generic in nature. It has been included in the BR&RP for 311 Old Telegraph Road Maroota in order to provide essential background information and to provide a framework for the restoration of native bushland using a Bush Regeneration approach, although Protocols for indigenous revegetation (planting) and weed control are also included.

4.1 GUIDING PRINCIPLES

The management of any natural area should be guided by the following broad principles:

- To **protect** bushland remnants from further loss and the effects of existing and future threatening processes;
- To **identify** all biodiversity and geo-diversity elements;
- To **conserve** significant items/areas by mitigating or removing threatening process and promoting those natural processes required to ensure long-term viability;
- To **enhance** species diversity in highly simplified or degraded remnants not capable of restoration and in non-remnant areas;
- To **provide** corridors and linkages between remnants to facilitate movement and to encourage the flow of genetic material; and
- To **provide** opportunities for passive recreation in a controlled manner consistent with its ecological values.

In preparing the BR&RP for 311 Old Telegraph Road Maroota, each of the above-listed principles has been considered, and relevant management issues addressed.

4.2 BUSH REGENERATION

The most commonly used approach to the rehabilitation of native plant communities (bushland) is Bush Regeneration, which is defined by the Australian Association of Bush Regenerators as:

> *.....the practice of restoring bushland by focusing on reinstating and reinforcing the system's on-going natural regeneration processes* (AABR, no date).

The Bush Regeneration approach (basically removing weeds and encouraging native plant regeneration from *in situ* seed sources) is suitable only for those sites the soil seed bank is intact, where mature native plants occur in sufficient numbers to provide source material, and where there is sufficient species diversity to restore the major structural components of the vegetation community (i.e. each stratum).

Representative species of each stratum – i.e. the canopy, shrub and groundcover – must be present or (potentially) be present in the soil seed bank for natural regeneration to function as the primary rehabilitation process. Such bushland is described as 'structurally intact', and conforms to the definition provided by *State Environmental Planning Policy No-19 – Bushland in Urban Areas*[10]. Regeneration of the native plant community from existing seed sources cannot occur where the potential for regeneration (site resilience) is absent.

The potential for damaged bushland to recover over time will depend primarily on the site's ability to recover naturally after disturbance – i.e. on its natural resilience.

[10] SEPP-19 definition of "bushland" means land on which there is vegetation that is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation.

4.3 ECOSYSTEM RESILIENCE

Ecosystem Resilience is defined as "the degree, manner and pace of restoration of the structure and function of the original ecosystem after disturbance" (Westman 1978) or more simply, as the ability of an ecosystem to recover from disturbance.

When assessing site resilience, key indicators are the standing biomass of remaining native plants (particularly naturally regenerating indigenous seedlings), and the potential reservoir of propagative material (seeds, spores, rhizomes) in the soil seed bank, although the latter is difficult to assess accurately without extensive trials.

Where site resilience is 'moderate to high', comprising targeted weed control followed by detailed hand weeding to encourage the regeneration and establishment of the native plants will be required. Where site resilience is 'low or absent', other rehabilitation methods will have to be employed. These are discussed below.

4.4 BUSH REGENERATION METHODS

The **Bush Regeneration Approach** incorporates a number of methodologies or strategies – the most commonly used are:

Natural Regeneration – which involves removing weeds; using a combination of hand weeding methods and the application of selective herbicides; then caring for the native seedlings which subsequently colonise the site.

Assisted Natural Regeneration – which combines traditional bush regeneration methods (eg. weeding) with seed collection, propagation and planting of locally indigenous tubestock to supplement natural (unassisted) regeneration.

Restoration or Reconstruction – which is used where a native plant community has been completely lost, but where the biophysical attributes of the site (eg. soil type, soil nutrient status, hydrological regime) are still within levels which remain tolerable to local native species. Reconstruction techniques centre on the planting of locally indigenous species in the proportions, range and densities similar to those present in the original (pre-disturbance) plant community.

Fabrication – which is used where the original native plant community is no longer present, and where the site's biophysical attributes have changed to the point where the original plant community cannot be reconstructed or recreated (i.e. where site conditions have changed so dramatically that simply replanting with local native species is impractical). Fabrication of a new plant community will necessarily take place over a long period of time (up to or more than 10-years). The timeframe for fabrication will depend on the feasibility of ameliorating site impacts and of course, resources available for on-ground works.

In the Bushland Restoration Zone at Maroota, it is anticipated that provided no future disturbance occurs, Natural Regeneration over time will effectively restore the native plant communities in most part of the site.

Assisted Natural Regeneration via the placement of seed-breaking brush (brush matting) and scattering of selected native seed is recommended for those bare soil sites where topsoil is redistributed, where natural regeneration is slow to occur, or does not occur with sufficient density/diversity.

Monitoring after 12 months is suggested to allow for the assessment of progress of natural regeneration. A decision on whether to plant tubestock will be made at that time.

5 WEED ECOLOGY

The information provided in the following section, while again largely generic in nature, has been included in the BR&RP for 311 Old Telegraph Road, Maroota to provide guidelines for weed control, indigenous revegetation (planting), and on-going site maintenance.

5.1 DEFINITIONS

> *A plant is only a weed where it interferes with a man's use of the land for particular purposes, with his well being, or with the quality of his environment* (Moore 1975).

Invasion by unwanted plants is a major constraint on the conservation and management of habitat for native flora and fauna. Unwanted plants in a natural or man-made environment are generally called 'weeds'.

This generic term includes such diverse groups as:

- Plants harmful to agriculture, human health and the community (**'noxious weeds'**);
- Horticultural escapes from gardens and amenity plantings (**'environmental weeds'**);
- Plants introduced from other parts of Australia, or local native plants growing out of their normal range (**'alien'** or **'non-indigenous native plants'**);
- Plants commonly found in crops and pasture land (**'agricultural weeds'**); and
- Plants that commonly grow in wasteland, on roadsides and in other disturbed areas ('ruderal weeds').

5.1.1 Keystone (Target) Weeds

Some introduced species pose serious and immediate threats to the vegetation community they invade, eventually modifying the ecosystem to such a degree that many native plants are unable to survive. These ecosystem modifies are called 'keystone weeds' or 'primary target weeds', and they must be given priority in weed control program.

A keystone weed may have a legal designation as a 'noxious plant' (*Noxious Weeds Amendment Act 2005*), or the species may be recognised as 'an environmental weed' in the local area – i.e. a plant that naturalises readily in bushland to the detriment of the native flora.

Typical keystone weeds in Sydney bushland, and represented in the locality (but not found in that part of the subject property inspected) include Lantana (*Lantana camara*), Privets (*Ligustrum* spp), and Blackberry (*Rubus fruticosus*).

5.1.2 Secondary Weeds

Not all weeds constitute a threat to the plant communities they invade. Some annual weeds or herbaceous perennials may be naturalised in the plant community, and many are hardy pioneer species that establish in the early stages of recovery (succession). They are usually short-lived, and although they produce a copious amount of seed, these pioneering species will not survive once a shading canopy is re-established.

Because they are highly visible, often grow in dense thickets, and give an 'untidy' appearance to a rehabilitation site, secondary weeds are often targeted first – unfortunately to little benefit, as they quickly recolonise bare soil sites created by weeding. Unless unlimited resources are available, secondary weeds do not warrant early treatment in the weeding schedule, as there are other, far more environmentally damaging weeds to contend with, especially when resources are limited.

Secondary weeds in the subject property and environs include (primarily) herbaceous species such as Fleabanes *(Conyza* spp), Paddy's Lucerne (*Sida rhombifolia*), Purpletop (*Verbena bonariensis*), Pigeon Grasses (*Setaria* spp), and Couch Grass (*Cynodon dactylon*).

5.2 PRIORITY OF WEED CONTROL WORKS

Although there are no significant weeds on site at this time, should any weeds invade the regeneration site in the following months and years, weed control is to be carried out in the following order of priority.

Priority of works is to be determined according to the status of weeds present in each infestation. The following hierarchy is given to target weed infestations:

1. Weeds of National Significance ('WONS'); then
2. Noxious Weeds (Hornsby Local Control Area); then
3. Environmental Weeds – keystone species only.

No WONS or Noxious Weeds were recorded in the Bushland Restoration Zone or on immediately adjoining land.

Table 5.1: List of Target Weeds for Control in the Bushland Restoration Zone

Botanic Name	Common Name	Control Method
Woody Weeds		
Sida rhombifolia	Paddys Lucerne	Spray or cut-stump/poison
Solanum mauritianum	Tobacco Bush	Spray or cut-stump/poison
Herbaceous Weeds		
Grasses		
Andropogon virginicus	Whiskey Grass	Spray
*Cynodon dactylon**		Spray but only to protect seedlings
Paspalum urvellei	Vasey Grass	Spray or Slash before seeding
Pennisetum clandestinum	Kikuyu Grass	Spray
Setaria pumila	Pigeon Grass	Spray
Flowering Forbs		
Ageratina adenophora	Crofton Weed	Spray or Slash before seeding
Bidens pilosa	Cobblers Pegs	Spray or Slash before seeding
Conyza spp	Fleabanes	Spray or Slash before seeding
Coreopsis lanceolata	Coreopsis / Black-eyed Susan	Spray
Hypochoeris radicata	Flatweed	Spray
Phylotacca octandra	Inkweed	Spray or Slash before seeding
Plantago lanceolata	Plantago	Spray
Tagetes minuta	Stinking Roger	Spray or Slash before seeding
Verbena bonariensis	Purpletop	Spray or Slash before seeding
Xanthium sp	Noogoora Burr	Spray

* Couch Grass is holding the soil surface together on the steep slopes throughout the property, so it should be left *in situ* as much as possible.

6 REVEGETATION WORKS

The following guidelines are again basically generic in nature, and have been included in the BR&RP for the as an aid to implementing an indigenous planting program in native bushland reserves in the urban and peri-urban environments.

Revegetation in bush regeneration projects usually comprises 'enrichment' or supplementary planting in areas of low species diversity; and 'bush landscaping' on edge sites and buffer zones, or in landscaped garden beds to create an extended native habitat.

Enrichment Planting is carried out to increase existing species diversity by planting small shrubs, herbs, grasses and occasionally, new canopy trees. Enrichment planting can also be used to increase habitat for native fauna, and/or to re-introduce species which are known to have once been part of the local plant community, but for some reason have now been lost.

Bush Landscaping refers to the placement of new plants to in-fill clearings or gaps and link remnants, to create buffer zones between bushland and developed areas, and to create complementary native gardens on adjoining sites.

Indigenous Revegetation – whether enrichment planting or bush landscaping – should attempt to utilise only plant material grown from local native species (i.e. indigenous species) in order to maintain the genetic integrity of the bushland remnant, but also to maintain 'local character'.

6.1 SITE PREPARATION

Soil Conditions

The success of any planting program is largely dictated by site conditions, and particularly the structure and chemical composition of the site soils. Prior to planting, a series of basic soil tests should be carried out using one of the proprietary soil testing kids available commercially. Despite the costs involved in carrying out basic soil tests, the whole program could fail if the soil proves to be unsuitable for planting with native species[11].

If the soil pH or salinity levels are outside the 'normal' range (read product label), advice on soil remediation should be sought from a qualified horticulturalist or landscape gardener. The local office of the NSW Department of Primary Industry may also be able to offer practical advice.

If imported (or fill) soils already *in situ* on the property are suspected of being contaminated in some way, soil samples should be sent to a professional laboratory for analysis. Similarly, if site soils are thought to contain asbestos or a similar macro-pollutant, contact Council's Environment Unit or the Health Department without delay.

In the Bushland Restoration Zone at Maroota this will not apply unless it is suspected that builder's rubble has been dumped (cement, bricks, asphalt, asbestos and the like) or other pollutants are present.

6.2 SELECTION OF APPROPRIATE FLORA SPECIES

In selecting species for planting in bush regeneration sites, a number of issues must be considered. The species chosen should not simply be made from a broad selection of native plants known to occur in the locality but should be:

- Representative of the locally occurring native vegetation communities;

[11] That is, soil may be too high in plant nutrients, particularly Phosphorus (P) or Nitrogen (N); too high in clay content, or it may contain micro or macro pollutants.

- Readily obtainable from a reputable plant nursery, or easily propagated by seed collected from existing local material;
- Niche-specific, i.e. suitable for planting in existing habitats and micro-habitats within the subject site;
- Hardy and tolerant of variable soil conditions, and easy to establish under open and exposed field conditions;
- Be of appropriate size (height/breadth) to achieve an appropriate balance in the proportion of trees and shrubs and groundcovers in the replicated vegetation community;
- Provide a range of habitat, foraging and shelter sites for native fauna (especially around high-usage sites such as ponds and open grasslands);
- On edges and interface sites between bushland and development, be carefully selected so as to create an effective 'buffer' between designated bushland restoration and private property boundaries; and when
- Planting in buffers and interface sites, should utilise only fire-retardant species (or those with reduced flammability), with planting made at reduced densities and (where appropriate) with a simplified structural form[12].

A list of locally indigenous plants appropriate for enrichment planting may be obtained by referring to Council's publication *Indigenous Plants for the Bushland Shire* (A. Pasqualini 1997). Further, any of the flora species listed in Appendix 2 (already occurring on site) may be used.

6.3 Densities and Spatial Arrangement

Planting density should be based on the final size of the relevant species used and aim to recreate a naturalistic arrangement. For example, small-sized plants (generally less than 500 millimetres in height) should be planted in groups at a density of approximately 3 to 5 units per square metre. Larger species may also be planted in groups of three (3) to seven (7), but should be placed sufficiently close together to enable a sufficiently dense cover to form (where this is appropriate, and will not suppress light-demanding groundcovers).

As a general guide, in the subject property at Maroota, pre-disturbance tree canopy cover would have been ~20% or slightly less on the upper slopes, increasing in density to ~30% on the lower slopes. Restoration via natural regeneration and/or selected revegetation should aim to create this type of tree density.

Small trees and shrubs will occur naturally in groups, scattered across the landscape where depth of soil allows them to get their roots into cracks in the underlying rock. A density of ~25-35% is anticipated after restoration. The understorey species (grasses and flowering forbs) will occupy the remainder - i.e. about 50-60% coverage.

6.4 Planting Aids

Plant Fertilisers

A specially formulated native plant fertiliser (low in phosphorus) should be used when planting native tubestock. Regular applications of dilute fertiliser should be used twice yearly (spring and early autumn) or when plants show signs of yellowing or spindly growth (at least until the plants become established and drought hardy).

The use of a plant fertiliser is recommended to assist plant establishment in the first 6-12 months of the planting program. As the vegetation cover is re-established, and organic matter is re-cycled into the topsoil, there will be less need for supplementary nutrient input.

[12] See publications from the Rural Fire Service or view their website (**www.rfs.nsw.gov.au**).

Complete native plant fertilisers are available in granular form or as tree tablets. Soluble fertilisers are preferable to granular forms, although tree tablets (or pellets) are useful at planting time.

Water Retaining Granules/Soil Wetters

Products such as Debco, Saturaid, Terracottem (or similar) should always be used in harsh conditions and/or where post-planting watering may be a problem, and they are useful in free-draining sandy soils. In current drought conditions, no planting should be undertaken without the use of water retaining granules or soil wetters.

These products are inert, and do not react with fertilisers or herbicides. If used at planting time, watering times can be reduced by up to 50%. Experience using such granules in bush regeneration sites in the Sydney Region has allowed a greater survival rate than previously achieved.

Mulching and Weed Matting

Mulch is crucial to the success of most planting projects as it keeps the soil cool and moist and suppresses weed growth. Mulching around planted tubestock can utilise chipped eucalypt mulch or if costs allow, commercial 'leaf mulch' may be used.

Chipped mulch from woody weeds should never be used. All imported mulch must be of known provenance and weed free. Alternatively, it is possible to foliar spray dense weed grasses with a selective herbicide (eg Fusilade) and to leave the dead thatch in place as mulch[13].

Mulch must be applied at the time of planting, after thorough soil wetting. When planting in large open areas, plants should be grouped to allow mulch to be applied around each 'planting island' or cluster. This reduces the edge effect (weed invasion, drying) and makes plant maintenance easier.

Weed Matting (such as Jutemaster, Enviromat, coconut fibre) is useful for retaining soil moisture and suppressing weed growth. Individual weed mats may be used around each plant at planting time, or broad-scale weed matting can be placed over a large area. If the latter approach is used, the matting must be firmly anchored with long metal pins.

Note also the importance of leaving bare soil on sites where natural regeneration is anticipated

In the Bush Regeneration Zone at Maroota, the use of the stockpiled timbers and the gathering and spreading of cut brush will serve as mulch. No additional mulch is required.

6.5 IRRIGATION

It may not be possible to water the planting sites over a long period, therefore the planting program should be planned to coincide with the period of maximum (and regular) rainfall. In the Western Sydney Region, optimal planting time is middle to late autumn.

It is also important to ensure adequate watering at planting, applying 1-1.5 litres of water to each new plant. Additionally, the use of a water-retaining compound and some form of surface mulch are strongly recommended to retain soil moisture and decrease the need for on-going watering.

Plants should be soaked for at least 30 minutes prior to planting (before being removed from their pots), watered thoroughly at planting and thereafter, watered once each week for a period of 4 weeks (weather conditions dictating frequency). After this period, watering comprising one (1) litre of water / plant each month will be required until the plants have established.

[13] A systemic herbicide such as glyphosate is not recommended as a foliar spray to control weed grasses where other native plants are growing in close proximity as this herbicide is non-specific.

If current drought conditions prevail, a permanent watering period may have to be extended to ensure plant survival. A drip irrigation system is best and (unless regulations change) complies with Sydney Water restrictions on watering gardens. Watering is best carried out in the early morning (watering at dusk encourages fungal attack in some species).

In the Bushland Restoration Zone at Maroota, the above-described methods should be used if any tubestock planting is undertaken (Year 2 only).

6.6 REVEGETATION METHODS

6.6.1 Tubestock Planting

Planting 'forestry tubes', hykos (small tubes) and/or advanced tubestock is the most reliable method of establishing woody native plants (trees, shrubs), and is also useful in establishing most of the native tussock grasses (e.g. *Themeda australis*, *Echinopogon* spp, *Poa* spp.).

Bushland restoration in degraded areas, in bare sites or in large clearings (> 10 sq metres) will generally rely on the placement of tubestock, wherever possible supplemented by other methods of revegetation. Other methods that can be used include hand broadcasting of seed, brush layering and transplanting seedlings and or leaf litter from nearby bushland areas. Such supplementary methods may also be used to 'fill in the gaps' between planted tubestock.

Where natural regeneration is slow to occur or does not occur with adequate diversity or density planting of advance tubestock planting is recommended. Tubestock is the best way of establishing native plants and they grow quickly.

Virotubes or virocells are smaller and cheaper, but they are less hardy and should only be used where permanent (fixed) irrigation is available

Advanced plant stock (8" or 12" pots) may be used for specimen trees or shrubs in order to create an 'instant effect'. However, this approach is best reserved for landscaped areas, and not used where natural bush is being encouraged to regenerate naturally.

6.6.2 Hand Broadcasting of Seed

Seed of hardy pioneer species such as Wattles (*Acacia* spp) and *Dodonaea* spp (Hop Bush) may be collected from local bushland and scattered on bare (prepared) soil between tubestock plantings[14]. As hand sowing (or direct seeding) is wasteful of seed, seed collected from most other species should be propagated as tubestock.

If native grass seed is available, hand sowing between tubestock planting may also be used. Grasses such as Blady Grass (*Imperata cylindrica*), Longhair Plume Grass (*Dichelachne crinita*), Bordered Panic (*Entolasia marginata*), and sedges with large sized seed such as Knobby Club-rush (*Isolepsis nodosa*); some of the local Cyperaceae, and *Juncus usitatus* (Soft Tussock Rush) would also be suitable for hand sowing. However, grasses with more precise germination requirements such as Kangaroo Grass (*Themeda australis*) are best established via tubestock or transplanting.

6.6.3 Brush Matting (Brush Layering)

The use of mulched timber as a soil cover and to provide microhabitat is a cheap and effective way of re-establishing vegetation if sufficient source material is available. If a source of local brush is available, it is strongly recommended that brush layering be used (possibly in addition to tubestock planting) as it provides a large amount of seed very cheaply and the brush itself provides extra protection for the new seedlings.

[14] Acacia seed must be treated prior to sowing. ~50% of the seed should be treated by pouring boiling water over it. Seeds should be soaked for 1-2 minutes, drained and allowed to dry.

If brush layering is used, then plants must bear ripe fruit/cones, and the branches must be cut and spread over bare (prepared) soil before the seed drops. The stress of cutting will release seed, so that cut brush cannot be stored for long period of time. Brush is best used on the day it is cut.

In the Bush Regeneration Zone at Maroota, the use of stockpiled timbers and the gathering and spreading of cut brush will supplement natural regeneration. Broadcasting of seed as it becomes available is also recommended. It is anticipated that the need for tubestock planting will be minimal, and that this will only be undertaken after a 12 month period – if at all.

7 IMPLEMENTATION & REVIEW

7.1 POLICY & PERFORMANCE

The policies established in this BR&RP provide a management framework consistent with the site's potential for bush restoration (as determined by ecological constraints), the availability of resources necessary for on-ground bush regeneration and related works, and after consultation with the Bushland Biodiversity Team, Hornsby Shire Council.

The priority tasks to be carried out are outlined in Section 7.3, below. Unless adequate resources are available over the lifetime of the Plan, some of the objectives listed for the bushland restoration project (see Section 1.3) may not be realised.

7.2 REVIEW

This BR&RP is designed to cover a two (2) year period, with six (6)-monthly monitoring sessions to review the progress of regeneration. At the conclusion of the two (2)-year period, the Plan should be reviewed and the outcomes of the BR&RP assessed using the Performance Indicators outlined in Section 7.7. If necessary, the strategies and actions set out in this Plan should be amended after discussion with Council.

Prior to the preparation of the Final Report, an updated flora survey of the Bushland Restoration Zone should be carried out with the emphasis on identifying species densities and abundance, and if possible, actual or potential shifts in the floristic composition or structural integrity of the plant community should be identified and any obvious trends flagged.

7.3 WORK PRIORITIES

The following key tasks are listed in order of priority. .

1. Timeframe for implementation of the BR&RP agreed and procedures signed-off between Council and the landowner Vella.
2. Resources for a Bush Regeneration Program over a period of two (2) years committed.
3. Strategies and actions are to comply with the recommendation of the BR&RP. A qualified bush regeneration contactor is to be engaged by the landowner.
4. Site preparation (weed control, replacement of stockpiled soil - but only where this will not cause further damage); minor earthworks and attention to drainage lines [only if required].
5. Brush matting installed and stockpiled timbers placed on regeneration site to provide fauna habitat (etc).
6. Temporary fencing erected, with emphasis on protection of drainage lines (as required).
7. Maintenance program set in place.
8. Quantitative monitoring program set in place to assess the progress of natural regeneration and establish trends in floristic diversity.
9. Monitoring and Reporting Program agreed between Council and landowner (6-monthly monitoring and reporting recommended).

The proposed timeframe for the actions set out above have been set out in graphic form in Figure 7.1.

7.4 WORKS PROGRAM

7.4.1 Licences and Permits Required

The undertaking of works in an endangered ecological community (weed control, seed collection, planting or other works) requires the issuing of a Section 132C licence from the NPWS Division of the NSW Department of Environment and Climate Change ('**DECC**').

Hornsby Shire Council holds such a licence from the Department on behalf of its bush regeneration contractors and community Bushcare volunteers. A condition of this licence is that volunteers must work under the supervision of those Council staff named on the licence.

Research or related studies which potentially impact on a threatened species, population or ecological community or their habitats (*TSC Act*), or on any protected species listed under the *National Parks & Wildlife Act* (1974) may only be carried out by suitably qualified workers holding a current Section 132C Scientific Licence from the DECC. The obtaining of a Scientific Licence is the responsibility of the individual worker/contractor. Workers seeking to trap, capture or collect native fauna are also required to obtain an Ethics Licence from Department of Primary Industry.

Note: As the subject property at Maroota does not support any endangered ecological community, no special permits or licences will be required by the bush regeneration contractor undertaking work on this site. However, due to the presence of the endangered shrub *Acacia bynoeana*, Council will possibly want to approve the choice of bush regeneration contractor.

7.4.2 Implementation and Timing of Works

The long-term nature of a bush regeneration project is strongly emphasised. Priority actions set out in the Plan have been limited to a two (2)-year timeframe, with a recommendation for review this time. However, after this period of time the bushland should continue to be managed in accordance with the principles and guidelines set out in this BR&RP.

Timing of on-ground works are summarised in Figure 7.1 (Gantt chart). This provides an indication of both the duration and the chronology of *each* item listed within the two (2)-year bushland regeneration and rehabilitation program, and including a site maintenance program (which basically consists of regular weeding and monitoring site recovery).

7.4.3 Site Maintenance

A regular maintenance program will be required for all areas after the completion of initial weeding. Any planted areas are to be maintained as weed free by regular (monthly) sessions.

Actions embedded within the site maintenance program are:

- Regular weeding to remove competitive weeds;
- Care of any planted areas (including watering, disease control, application of native plant fertilisers and replacement of lost or failed plants); and
- Rubbish removal, maintenance of fencing, and care of edges and buffer zones.

7.5 LABOUR & RESOURCES

Trained bush regenerators should be used to work in environmentally sensitive areas or where threatened species or stands of native vegetation could be harmed. A trained Bush Regenerator is one who has successfully completed the accredited Bushland Weed Control Certificate course offered by NSW TAFE (or interstate equivalent), and who has completed at least 350 hours in the field. Bush Regeneration Programs are usually carried out on a contract basis.

7.6 MONITORING & ASSESSMENT

A simple monitoring program is recommended to assess the success of the bushland restoration and rehabilitation program. The bush regeneration contractor employed to carry out on-ground works should undertake monitoring, to the guidelines set out in this BR&RP.

Monitoring should continue for a period *at least* equal to the lifespan of the current Plan (i.e. two [2] years).

Monitoring procedures should be simple and straightforward, as well as inexpensive to implement. Monitoring should provide both qualitative (visual/photographs) and quantitative (statistical/quadrats) assessment. Reports should provide findings in a manner that is readily interpreted by all stakeholders.

Monitoring procedures, frequency and duration of survey, and reporting format should be agreed between the contractor and the client at the outset of the restoration project. Should the rehabilitation project itself extend beyond the two (2)-year lifetime of the BR&RP, procedures should be reviewed and updated as required.

Assessments should preferably be quantitative in nature (although photo-points will also form part of the monitoring process) and these must be measured against the Performance Indicators set out in Section 7.7.

Should monitoring and review indicate that the performance measures are not being met in a timely fashion, the strategies set out in the BR&RP should be reviewed, and the strategies set out in the Plan amended.

A generic guide to monitoring success of bushland restoration program has been included as Appendix 4.

7.7 PERFORMANCE INDICATORS

Performance Indicators ('**PI's**') are used to demonstrate that the objectives and outcomes of the Bushland Restoration & Rehabilitation Plan have been achieved.

The following simple PIs have been developed to serve as a general guide to monitoring the progress of the bushland restoration and rehabilitation program.

1. No erosion or soil surface wash, and no sediment reaching the nearby watercourse.
2. Floristic and structural diversity created and/or maintained
3. An increase in the cover of indigenous vegetation in each layer or stratum (quantified via quadrat sampling).
4. Flowering and fruiting of each indigenous plant species recorded.
5. No net loss of threatened, vulnerable or other significant flora species recorded (*Acacia bynoeana*).
6. Increase in the diversity of fauna habitat types and niches available (qualitative assessment suitable).
7. Where bush regeneration contractors are employed, a decrease in the number of hours performing follow-up weed control and maintenance activities.

Figure 7.1: Proposed Timetable of Works

Item / Task	Year 1 1-6 months	Year 1 7-12 months	Year 2 13-18 months	Year 2 19-24 months
Planning & Administration				
BR&RP approved by Hornsby Council and agreed with landowner Vella	■			
Resources Allocated for 2-year Program	■			
Appoint Bush Regeneration Contractor	■			
Establish Monitoring & Reporting Program	■			
Prior to Earthworks	■			
Erect soil erosion control measuers and protective fencing	■			
Protect & mark endangered *Acacia bynoeana*	■			
Implementation				
Primary weed control	■			
Remove stockpiled soil from site perimeters. & Redistribute as Instructed	■			
Spread seed bearing brush on bare soil sites				
Replace large timebrs in selected locations on regenration site				
Site Maintenance				
Maintenance Weeding (6-monthly)	■	■	■	■
Enrichment Planting & Care of Plants (i/r) **dependent on natural regeneration*			■	■
Monitoring & Reporting				
Monitoring (6-monthly)	■	■	■	■
Review of Outcomes & Sign-off from Council				■

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9 APPENDICES

APPENDIX 1: CORRESPONDENCE/ORDER FROM HORNSBY SHIRE COUNCIL

712.

Copy

CENTENARY OF HORNSBY SHIRE
HORNSBY SHIRE COUNCIL
Celebrating 100 Years
1906-2006

Our Reference
Contact person: Rod Pickles
Hours: 8.30 am to 4.30 pm
Telephone: 9847 6760
Fax: 9847 6996

RECEIVED
04 JUL 2367

Mrs K A Vella and Mr A A Vella
PO Box 73
DOONSIDE NSW 2767

NOTICE OF COUNCIL'S INTENTION TO ISSUE ORDER

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979, SECTION 121B ORDER NO. 15 – TO COMPLY WITH DEVELOPMENT CONSENT

PREMISES: Lot 2 DP 748820 No. 311 Old Telegraph Road, MAROOTA NSW 2756

An inspection of the subject premises on 20 March 2006 by an officer of Council disclosed that use of the subject premises for the purpose of extracting sand and clay is not being undertaken in accordance with Development Consent No. 342/1998.

As a result, it is Council's intention to give you the attached proposed order.

You may, if you wish, make representations to the Council, either yourself or through your Barrister, Solicitor or agent, concerning the issue of the proposed order, why the proposed order should not be given, or the terms of, or period for compliance with the proposed order. Those representations should be made to the undersigned in writing within twenty eight (28) days from the date of this notice.

On expiry of the Notice Council will consider whether to serve the Order, serve a modified Order or not to serve an Order.

Yours faithfully

R PICKLES
Team Co-ordinator
Planning Division

Attachments: Proposed Order

THE BUSHLAND SHIRE
PO Box 37, Hornsby, NSW 1630
296 Pacific Hwy, Hornsby, NSW 2077
Tel: (02) 9847 6666 Fax: (02) 9847 6999 TTY: (02) 9847 6577

DX: 9655 Hornsby
www.hornsby.nsw.gov.au
Email: hsc@hornsby.nsw.gov.au
ABN 20 706 996 972

CHECKED

PROPOSED ORDER ONLY

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979, SECTION 121B ORDER NO. 15 – TO COMPLY WITH DEVELOPMENT CONSENT

PREMISES: Lot 2 DP 748820 No. 311 Old Telegraph Road, MAROOTA NSW 2756

Council hereby Orders you as the owner of the subject premises to rectify the non compliance with the conditions 68, 69, 70, 71 and 72 of Development Consent No. 342/1998 in accordance with the scope of works set out below:-

SCOPE OF WORKS

1. In accordance with Condition 68 of Development Consent No. 342/1998 restore the bushland within the designated area, as shown in red on the attached property map in accordance with the following:

   - The designated area is to be surveyed by a qualified surveyor and the designated area, as shown on the attached property plan is to be clearly marked by the qualified surveyor.
   - A qualified and experienced bushland restoration company is required to be engaged in order to prepare a bushland restoration/rehabilitation plan restore and rehabilitate the bushland within the designated area that has been cleared and disturbed.
   - The Bushland Restoration/Rehabilitation Plan is to be prepared and implemented by a qualified and experienced bushland restoration company for the area of the property within 150 metres west of the watercourse that has been disturbed and cleared without Council consent. The Plan shall include a detailed site map and include, but not limited to, the following restoration actions/strategies:

     (a) Replacement of excavated topsoil and subsoil to recreate the natural profile of the land.

     (b) Weed control strategy with details of weed removal and suppression methods using bush regeneration techniques and on-going weed management in the rehabilitation area.

     (c) Bush regeneration methods to promote natural regeneration from the soil seed bank. This should include brush matting and spread of native grass seeds collected from the site. Note: It is not anticipated that any revegetation works with purchased plant stock is required as the site is likely to respond well to natural regeneration. However, if

revegetation is required the areas to be revegetated are to be mapped and details provided on plant stock.

(d) Erection of protective fencing to protect the rehabilitation area. The fence should be a star picket and 3 strand wire fence or a chain wire mesh fence, if more appropriate.

(e) Details of watering of rehabilitation area in dry periods.

(f) Details of sediment and erosion control including the erection of sediment control fences.

(g) Threatened species management and protection strategies for the endangered *Acacia bynoeana* located in the excavated area.

(h) Stabilisation of sediment basin in the rehabilitated area including any required revegetation works.

(i) Site monitoring, reporting and schedule of works outlining when tasks are to be undertaken.

2. In accordance with Condition 69 of Development Consent No. 342/1998 erect a protective barrier mesh fence along the edge of the internal haul road to protect the restricted bushland area.

3. In accordance with Condition 70 of Development Consent No. 342/1998 erect a fence around the "restricted zone" in order to protect all threatened species located within the "restricted zone".

REASONS FOR THE ORDER

1. The property is zoned Rural AE (Large Holdings – Extraction) and Environmental Protection B (River Catchment) as defined by the Hornsby Shire Local Environmental Plan 1994.

2. An inspection of the subject premises conducted 20 March 2007 revealed the following:

   - Clearing of native vegetation and extraction of sand has been undertaken within a "restricted zone", contrary to Condition No. 68 of Development Consent No. 342/1998.

PERIOD FOR COMPLIANCE WITH ORDER

This Order is to be carried out within 28 days from the date of this Order.

RIGHT OF APPEAL

You and any other person affected by the Order may appeal to the Land and Environment Court against the order or a specified part of the Order.

The appeal must be made within twenty eight (28) days after the service of this Order on you.

FAILURE TO COMPLY WITH ORDER - PENALTY

It is an offence under Section 125 of the Environmental Planning and Assessment Amendment Act 1979 to fail to comply with this Order. A person guilty of an offence against this Act is liable for a penalty not exceeding $1,100,000 and a further daily penalty not exceeding $110,000.

Alternatively, a penalty infringement notice may be served pursuant to Section 127A of the Act. In this regard the penalty is $1,500.00.

APPENDIX 2: FLORA SPECIES RECORDED WITHIN THE BUSHLAND RESTORATION ZONE

KEY
Species Frequency of Occurrence within the Site
V - Very common
C - Common
O - Occasional
R - Rare
L - Localised distribution only

Plant Communities

Red Bloodwood - Scribbly Gum open woodland - List 1

Sydney Peppermint - Smooth-barked Apple open forest and woodland - List 2

			1	2
Trees				
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak	V	C
Cunoniaceae	*Ceratopetalum gummiferum*	Christmas Bush		O
Myrtaceae	*Angophora costata*	Smooth-barked Apple	R	V
	Corymbia eximia	Yellow Bloodwood	R	
	C gummifera	Red Bloodwood	V	C
	Eucalyptus haemastoma	Scribbly Gum	O	R
	E piperita	Sydney Peppermint	R	V
	E punctata	Grey Gum	R	O
Shrubs				
Apiaceae	*Platysace linearifolia*		R	R
Dilleniaceae	*Hibbertia empetrifolia*		R	
Epacridaceae	*Epacris pulchella*		R	R
	Leucopogon microphyllus			R
Euphorbiaceae	*Phyllanthus hirtellus*		R	R
Fabaceae	*Bossiaea heterophylla*		O	O
	B obcordata		O	O
	B scolopendria		O	R
	Daviesia acicularis			R

	Dillwynia floribunda		O	R
	D ramosissima		O	O
	D retorta	Eggs & Bacon	O	O
	Gompholobium grandiflorum		O	O
	Mirbelia rubiifolia		R	R
	Phyllota philicoides	Heath Phyllota	O	O
	Acacia bynoena	Bynoes Wattle	R	
	A linifolia	Flax Wattle	C	C
	A rubida	Red-stemmed Wattle	O	
	A suaveolens	Sweet-scented Wattle	O	O
	A ulicifolia	Prickly Moses	R	R
Myrtaceae	*Angophora hispida*	Dwarf Apple	O	
	Baeckea linifolia			O
	Kunzea ambigua	Tick Bush	O	O
	Leptospermum polygalifolium	Yellow Tea Tree	O	O
	L trinervium	Paperbark Tea Tree	O	O
Olacaceae	*Olax stricta*			R
Polygalaceae	*Commesperma ericinum*	Pink Matchheads	R	
Proteaceae	*Banksia ericifolia*	Heath Banksia	R	
	B oblonga		C	R
	Grevillea buxifolia	Grey Spider Flower	O	O
	G speciosa	Red Spider Flower	O	O
	Hakea dactyloides		R	R
	Persoonia lanceolata		R	
	P laurina		R	
	Petrophile pulchella	Conesticks	R	
Rutaceae	*Boronia ledifolia*	Leden Boronia	C	O
	Eriostemon australasius		R	R

	Zieria pilosa			R
Sapindaceae	*Dodonaea triquetra*	Common Hop Bush	R	R
Thymeliaceae	*Pimelea linifolia*	Common Rice Flower	C	C
Herbs - Ferns				
Dennstaedtiaceae	*Hypolepis muelleri*	Harsh Ground Fern	O	
	Pteridium esculentum	Bracken Fern	O	O
Herbs - Dicots				
Apiaceae	*Centella asiatica*	Pennywort	R	
Asteraceae	*Senecio hispidulus*		O	O
Campanulaceae	*Wahlenbergia gracilis*	a Bluebell	R	
Caryophyllaceae	*Gypsophila australis*	Annual Chalkwort		O
Chenopodiaceae	*Chenopodium hastata*		R	
Droseraceae	*Drosera spatulata*	a Sundew	C	
Goodeniaceae	*Velleia lyrata*		R	
Haloragaceae	*Gonocarpus micranthus*		C	
Loganiaceae	*Mitrascame polymorpha*		O	R
Herbs - Monocots				
Cyperaceae	*Baumea sp*		O	
	Cyathochaeta diandra		R	R
	Gahnia erythrocarpa	a Saw-sedge	O	
	Schoenus imberbis		C	C
Juncaceae	*Juncus pallidus*		R	
	J prismatocarpus		C	
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	R	
	L obliqua	Fishbone Mat-rush		R
Poaceae	*Echinopogon caespitosus*	Hedgehog Grass		R
	Entolasia stricta	Wiry Panic	C	C
	Eragrostis brownii	Browns Love-grass	O	C

	Microlaeana stipoides	Weeping Meadow-grass	R	R
	Stipa pubescens		R	R
	Themeda australis	Kangaroo Grass	R	

Vine

Lauraceae	*Cassytha pubescens*	Devils Twine	R

APPENDIX 3: SPECIES PROFILE ACACIA BYNOENA

Acacia bynoeana (a shrub) - endangered species listing

NSW Scientific Committee - final determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list the shrub *Acacia bynoeana* Benth. as an ENDANGERED SPECIES on Part 1 of Schedule 1 of the Threatened Species Conservation Act and as a consequence to omit reference to that species as a VULNERABLE SPECIES on Schedule 2 of the Act. Listing is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. *Acacia bynoeana* Benth. (Family Fabaceae) has been described (Flora of New South Wales, Vol 2, Harden 1991) as: Erect or spreading shrub, 0.2-1m high; branchlets more or less terete, more or less hairy. Phyllodes rigid, straight or subfalcate, 1-4 cm long, 1-2 mm wide, 3 longitudinal veins prominent, apex pungent-pointed; glands absent or 1 gland at base; pulvinus <2 mm long; stipules more or less spinescent, c. 1 mm long. Heads 10-25 flowered, golden yellow, 1 in axil of phyllodes; peduncle 3-6 mm long, hairy. Pod sometimes woody, straight to strongly curved, more or less flat, 1-2.8 cm long, 3-4 mm wide, margins thickened, brown; seeds longitudinal; funicle expanded towards seed. Flowers summer. Mainly in heath and dry sclerophyll forest on sandy soils; west of Frenchs Forest through to Berrima and Mittagong areas.

2. The species is currently known from about 30 locations. The size of populations where known is very small (1-5 plants) with only a few sites with 30-50 individuals.

3. Most of the known sites are not reserved, although populations are known from several reserves including Marramarra National Park, Castlereagh Nature Reserve, Lake Macquarie SRA, Blue Mountains National Park. Recent vegetation surveys in Royal National Park have not located the species. The species was also known from one site within Ku-ring-gai Chase National Park, but several subsequent searches of the site have failed to find any plants.

4. The main threats to *A. bynoeana* are habitat disturbance (including road, trail and powerline maintenance, recreational vehicle use), clearing, weed invasion and too frequent fire. Due to the fragmented nature of the populations, their small size, fire mitigation activities and the proximity of urbanisation, the species is susceptible to catastrophic events and localised extinction.

5. In view of 2, 3 & 4 above the Scientific Committee is of the opinion that the species is likely to become extinct in nature in NSW unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

Proposed Gazettal date: 17/9/99
Exhibition period: 17/9/99 – 22/10/99

APPENDIX 4: GENERIC GUIDE TO MONITORING PROGRESS OF WORKS IN BUSHLAND REHABILITATION PROGRAMS

The set up of a simple monitoring program at the outset of the restoration project is of high importance. Monitoring will provide an objective measurement of progress and record the slow and often subtle changes. A monitoring program will enable the project manager and bush regeneration contractor to assess the Performance Indicators listed in Section 7.10 this report.

As many changes are not readily visible in the short-term, it is recommended that monitoring events be carried out every six (6) months. However data should be collected over a number of years so that trends can be determined. A simple generic guide to monitoring the progress of bushland rehabilitation projects has been included below.

Note that a project-specific monitoring program should be designed for each bush regeneration and rehabilitation site prior to commencement of work.

ESTABLISHING PERMANENT TRANSECTS AND QUADRATS

This method is the traditional way to measure changes in plant community structure and diversity. The simplest way to record changes is to count the numbers and types of seedlings regenerating in a measured plot over a period of time.

Establishing permanent transects and quadrats will be sued to monitor Performance Indicators 2 and 3.

In the absence of more specific guidelines in Recovery Plans, for all Management Units, at least one permanent quadrat will be established (as per Threatened Species Survey & Assessment Guidelines NPWS). Sampling is to occur on at least once a year (but monthly for the first six (6) months after treatment).

In addition to the NPWS guidelines, information recorded will include indigenous plant species including the number of naturally regenerating seedlings and cover (using the Braun- Blanquette method).

Baseline data will be collected in each quadrat before the commencement of any ecological restoration works. Sampling will allow for comparison between areas with different soil seedbank treatments, including areas that have not been treated.

Recording of all ecological restoration works will use standard NPWS or Liverpool City Council recording sheets, and will include hours of weed control performed per bushland management zone or sub-zones.

CHOOSING THE PLOT SIZE

This is often the hardest decision to make: the area has to be large enough to take in the major life forms and small enough to be manageable. In grassland a plot of one (1) m^2 is adequate to gain a representative sample; for shrubs – three (3) m^2 is adequate, but in a treed area, plots of 10 m^2 or larger may be necessary.

ASSEMBLING FLORA LISTS

The assembly of flora lists is basic to all bushland projects. The purpose of the bush regeneration project is not to accumulate an ever-increasing list of new species, but rather to record the diversity and abundance of the plant community and to monitor any changes that take place as the project proceeds.

Flora lists should be updated regularly and the location(s) of any unusual, rare or threatened species should be marked on the base map and the relevant authorities should be informed (eg. National Herbarium, NPWS).

In addition to the information recorded in permanent quadrats, comprehensive lists of plant species will be maintained and updated for each management zone. This will be performed as per Threatened Species Survey & Assessment Guidelines NPWS.

ASSEMBLING FAUNA LISTS

The recording of fauna follows the same guidelines as for flora and is of equal importance. In the first instance a simple list of fauna sighted (or evidence of) can be used.

Ultimately, comprehensive (both exotic and native) fauna lists will be compiled and maintained. Data will be collected as per NPWS Wildlife Atlas Format.

ASSEMBLING A LIST OF FLOWERING & FRUITING TIMES

For the native species, a long-term project will be useful since this project calls for local seed collection and propagation.

Adapting weed-clearing activities to coincide with natural seeding times and germination patterns of desirable natives is advised, as clearing weed growth increases germination sites and increases seedling survival chances.

For each indigenous plant species, the flowering and fruiting period will be recorded each year as a week of year figure (i.e. 1 to 52 weeks). This is to monitor for pollination and seed set.

Keeping a record of flowering and fruiting times for local weed species can make weed control easier. For example, if it is known that Pampas Grass flowers and as the seed ripens locally between March and May, plan to treat Pampas Grass well before that time. If berry-fruited weeds like Cotoneaster, Lantana or Privet are present, remove the plants before the berries are ripe and attractive to birds.

It is recommended that quantitative measurement be used within each management zone in order to provide information relating to:

- Type and % cover of weed species before and after bush regeneration work;
- Type and % cover of native plant species before and after weed removal; and
- Type and % cover of native plants species regenerating after regeneration.

MONITORING SOIL SEEDBANK TRIALS

These trials will allow the testing of a range of strategies designed to stimulate native plant regeneration.

Quadrats will be monitored every three (3) months for 12 months. Results will be quantified by measuring % cover using Braun-Blanquet (see Moore & Chapman 1986), visual analysis and photographs taken from a series of fixed photo-points.

THREATENING PROCESSES

All threatening processes operating within the bushland, including key threatening processes listed under *TSC Act* must be noted, and relevant data collected.

Monitoring of any Threatening Processes that occur will be consistent with the relevant Threat Abatement Plans.

PHOTOGRAPHS

Taking photographs is an easy way to record changes in vegetation structure. A photograph captures the subtle changes that are often missed when working closely on a site over time. Photographs are useful in recording sequence shots at various stages in the project to illustrate the techniques used and the results obtained, and are also valuable teaching tools.

Photography in the bushland environment is not particularly easy for amateurs, as plants cast shadows and without the correct lens filters, everything looks 'green'. Obtain professional advice about ASA ratings and take photographs early in the morning or when conditions are overcast.

A number of permanent photo-points will be selected and marked with a short wooden stake. The location of these photo-points will be recorded on a base map. Photographs will be taken from the same spot every six (6) months.

OTHER MONITORING VARIABLES

Other useful variables recommended include:

Temperatures - These can be recorded using a wet-dry bulb thermometer. Data may be graphed to show that as the canopy re-forms (regardless of height above the ground) fluctuations of temperature become less extreme. Changes in temperature can be related to the type and numbers of native plants regenerating. Recording sites (marked and recorded on a base map) can be selected and regular soil temperature readings taken with the bulb just under the soil surface (e.g. 2-4 mm) and air temperature readings taken about two (2) metres above the ground.

Light readings - These may be taken using a light meter, first at ground level, and again at a height of two (2) m. Relate the light intensity to the type and number of native plants regenerating and/or to those already growing on the site. The lowering of the light levels in a rainforest/closed forest (by reforming the canopy) promotes the regeneration of rainforest canopy species, but reducing light levels in dry sclerophyll woodland or heath decreases the diversity and numbers of indigenous species and promotes the growth of wet gully species and frequently of exotic moisture-loving weeds. Light readings can be taken in correlation with the soil temperature readings set out above. Readings should be taken both in clearings or light gaps and under the tree canopy.

The health of the litter layer - This can be recorded by observing the cyclical build-up and breakdown of the fallen leaves, the appearance of the soil (whether compacted or friable), the presence of small animals in the litter layer and the production of soil fungi, as indicated by fruiting bodies on the surface and thread-like mycelia in the soil. Simple measurements such as the depth of litter or percentage of groundcover are important. This information will provide clues to other processes occurring on the site over time.

Rainfall readings - These can be obtained from the local meteorological station or taken on site. Determine the local rainfall pattern. Avoid weeding in hot weather when the soil is hard or in the wet season when the ground is so boggy that mud is churned up. Very dry periods are reflected in the survival rate of seedlings, so if tubestock planting is planned, defer planting until regular rains are expected.

APPENDIX 5: PLATES

1 View to north showing Bushland Restoration Zone with silt dams (haul road to LHS photo)

2 View to north-east towards the Creek, showing silt dams and stockpiled soil. Haul road across cental part of photo, forming western boundary of Bushland Restoration Zone

3 Stockpiled timbers to be replaced over redistributed topsoil. Note large sandstone floater RHS of photo

4 Existing haul road and sound buffer along western side of Bushland Restoration Zone

5 Native flora recruitment occurring within disturbed area – young eucalypts growing in gravelled subsoil

6 View to south showing silt dam with fringing stockpiled soil. Flora recruitment occurring in and around the silt dam.

7 View to east showing silt dams. Specimen of *Acacia bynoeana* located between the left silt dam and the existing haul road seen at the bottom of the photo.

8 View from upper slopes showing undisturbed Scribbly Gum/Grey Gum Woodland on adjacent property.

9 View along eastern boundary of Bushland Restoration Zone showing proposed new haul road. Note silt fence (roughly on property boundary) and stockpiled soil to LHS photo.

10 Toe of haul road embankment showing native plant recruitment and habitat for *Acacia bynoeana*

Attachment 10

Soil and Water Management Plan for the Eastern Precinct of Lot 2 DP 748820 Old Telegraph Road, Maroota

January 1999, Morse McVey & Associates Pty Ltd

COPY

Soil and Water Management Plan for the eastern precinct of Lot 2, DP 748820 Old Telegraph Road, Maroota

Prepared by:

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January 1999

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1 Introduction

This *Soil and Water Management Plan* was prepared at the request of Nexus Environmental Planning Pty Ltd, on behalf of Mr F. & K. Vella, to provide additional information for an Environmental Impact Statement (EIS) for a proposed extractive industry. The EIS has already been presented to Hornsby Shire Council to support a proposed sand and clay extraction at Lot 2, DP 748820, Old Telegraph Road Maroota (figure 1). Specifically, Morse McVey and Associates Pty Ltd were requested to prepare a surface *Soil and Water Management Plan (SWMP)* for the eastern precinct of the development.

1.1 Important Site Considerations

Table 1.1 Important site characteristics

Constraint/Opportunity	Value
Rainfall erosivity	moderate (*R*= 2410)
Soil erodibility (water) for subsoil	low to moderate (*K* = 0.013-0.029)
Soil erodibility (wind)	high for dry pulverised materials
Calculated soil loss from bare subsoil	430 tonnes/ha/yr
Soil Loss Class	Class 4
Slope gradients	moderate (7-15%)
Soil texture group (topsoil)	*Type C* or coarse (92% >0.02 mm)
Soil texture group (subsoil)	*Type C* or coarse (59-90% >0.02 mm)
Percent dispersibility (whole subsoil)	not significant (all soils < 5% TDC)
Runoff coefficient	moderate to high (0.76)
Soil Landscape	Sydney Town (Gosford-Lake Macquarie sheet)

The likely soil loss is calculated with the Revised Universal Soil Loss Equation *(RUSLE)*. The values adopted for other *RUSLE* factors are: *LS* of 4.728 taken from the steepest slopes measured on the eastern precinct, and slope length assumed to be 100 metres; *P*-factor (erosion control practice) is 1.3 for surface mining sites that have compacted bare surfaces; and the *C*-factor (ground cover) is assumed to be 1.0 for bare earth surfaces. Soil loss for the steeper eastern precinct is 430 tonnes/ha/yr (Appendix II).

Calculations for the basin size (Appendix IV) are conservative, assuming a non-draining (*Type F*) basin although the site's soils are coarse (*Type C*) as noted in Table 1.1 above. The storage volume calculated exceeds Council's requirement to have basins which retain at least the equivalent volume of 10mm depth of runoff over the entire disturbed areas they serve. Calculations assume a volumetric runoff coefficient of 0.5 over five days, with a rainfall depth of 34.8 mm in the 80th percentile 5-day rainfall event (Department of Housing *et al*, 1998). They also allow for an additional water storage volume that can be used for dust suppression and watering of areas under rehabilitation.

2 Soil and Water Management Plan Specifications

2.1 Introduction

2.1.1 The *Soil and Water Management Plan* for the eastern precinct (from now on called the *Plan, Appendix VII*) will be read with the *Rehabilitation Plan,* any operational plans, and any other written instructions that may be issued in relation to development at the study site.

2.1.2 Contractors will ensure that all erosion and sediment control works are undertaken as instructed in this specification and constructed following the Department of Housing *et al's* guidelines, *Managing Urban Stormwater: Soils and Construction* (1998) [Appendix I].

2.1.3 All employees will be informed of their responsibilities in minimising the potential for soil erosion and pollution to downslope areas.

2.2 Land Disturbance

2.2.1 The soil erosion hazard on the site will be kept as low as practicable by minimising disturbance. Some ways of doing this are outlined in Table 2.1.

Table 2.1 Limitations to access

Land use	Access Limitations	Comments
Extraction site	Limited to within five (preferably two) metres beyond the edge of the operations shown on the work plans.	All site workers should clearly recognise these areas and they should be clearly marked – suitable materials include barrier mesh, sediment fencing, etc. The project manager shall determine their actual location on site. They can vary in position so as to best conserve existing vegetation while being considerate of the needs of efficient works activities.
Access roads	Limited to a maximum width* that is the minimum necessary to allow safe operation of heavy equipment.	
Remaining lands	Prohibited except for essential management works.	

[a 6.0 metre wide carriage way will be provided for internal haul roads.]*

2.2.2 Extraction will take place within the defined work area and materials will be screened/processed at the plant located in the western precinct. No vehicular access or land disturbance will occur in the restricted buffer areas.

2.2.3 Rehabilitation will commence within 20 days from the completion of works so that only land affected by current extraction will be exposed to accelerated erosion processes. Land not involved directly in the extraction process will be marked as restricted areas and preserved as natural bushland.

2.3 Works Sequence

2.3.1 Surface works will be undertaken in the following sequence.

(a) Before any site disturbance proceeds for the eastern precinct:

(i) establish the boundary of the restricted buffer areas around the central creek line by installing barrier or sediment fence in accordance with SD 6-7 (Appendix V), as shown on the *Plan* (Appendix VII);

(ii) install five sediment traps and sediment fence in accordance with SD 6-7 (Appendix V) along the existing route of the internal haul road, as shown on the *Plan* (Appendix VII);

(iii) construct a non-draining (clay lined) Sediment Basin as shown on the *Plan* (Appendix VII) and in accordance with SD 6-4 (Appendix V). Spillway capacity of Sediment Basin 3 shall be designed to meet the 20-year time of concentration (tc) storm event and stability will meet the 100-year tc event;

(iv) construct the earth banks as shown on the *Plan* (Appendix VII) according to SD 5-2 (Appendix V) to convey water to Sediment Basin 3 and divert water around the topsoil stockpile; and

(v) upgrade the internal haul road to the eastern precinct using crushed sandstone from on-site in accordance with the engineering plans. Also, construct the table drain on the southern side of the haul road.

(b) Then:

(i) Stockpile any topsoil removed within the extraction area along the southern boundary in bunds (according to SD 4-1, Appendix V) as shown on the *Plan* (Appendix VII). These bunds are to act as wind breaks for the precinct and will be rehabilitated for temporary stabilisation;

(ii) undertake sand and clay extraction according to the operational plans and adjust the position of earth bank 1 (SD 5-2), sediment fence (SD 6-7) and Sediment Basin 3 (SD 6-4) as necessary. Sediment Basin 3 will need to move south-east to within the quarry floor (RL 160 boundary marked on

the *Plan*) once extraction moves below the floor of the existing basin. It will then be located in the north-western corner of the quarry pit;

(iii) progressively rehabilitate areas where extraction is complete after re-establishing batters of 4(H):1(V) and replacing topsoil from the stockpiles on the southern boundary; and

(iv) ensure suitable techniques are carried out to minimise areas being affected by wind erosion by dampening exposed surfaces with water or by spraying with a soil binder.

(c) Rehabilitate all disturbed lands after completion of extraction activities (see Section 2.4.5 for details), and establishment of final levels for the precinct and within 20 days. Topsoil shall be used from the stockpile bunds along the southern boundary of the extraction area.

2.4 Erosion Control

2.4.1 Clearly visible barrier fencing will be installed to ensure traffic control and to prohibit unnecessary site disturbance and dust as determined by the site manager, particularly in the restricted buffer areas (Table 2.1). Vehicle movements on the site will be limited to that essential for extractive industry and associated activities.

2.4.2 Earth batters will have maximum gradients of 2(H):1(V) during the works program but will be laid back to lower gradients before rehabilitation begins on any area. Suitable maximum gradients for rehabilitation are 4(H):1(V) on northerly and westerly facing batters and 3(H):1(V) on easterly and southerly facing batters.

2.4.3 All table drains, earth banks, spillways and outlets will be constructed to be stable in the 20-year time of concentration storm event. To help in this, grass will be established on all soil surfaces that are to carry channelised flow. Flows will be limited to maximum channel velocities of:

- 1.8 metres/ second for prostrate couch varieties
- 2.5 metres/ second for kikuyu.

In addition, rock check dams (SD 5-1, Appendix V) can be placed in the table drain at twenty metre intervals to reduce scour where the project manager considers this necessary.

2.4.4 Temporary earth banks (low flow) will be constructed according to SD 5-2 (Appendix V) on the internal haul road at 80 metre intervals to reduce erosion of the pavement, whenever periods of rain are expected and/or the site will be temporarily shut down (e.g. weekends). Water will be directed into the table drain on the southern side of the road.

2.4.5 Undertake rehabilitation as follows:

(a) Waterways and their inlet and outlet structures will be rehabilitated where they are intended to remain effective for more than two weeks. This will be done when practicable and within two weeks from their final shaping. The program adopted should achieve a C-factor (Table 2.3, figure 2) of less than 0.05.

(b) Stockpiles will be rehabilitated where they are scheduled to remain unattended for a duration of more than two weeks. The program adopted should achieve and maintain a C-factor (Table 2.3, figure 2) of less than 0.15.

(c) Other exposed materials will be rehabilitated where they are scheduled to remain unattended for a duration of more than one month. The program adopted should achieve and maintain a C-factor (Table 2.3, figure 2) of less than 0.15. The C-factor can be reduced to these levels with vegetation, mulches, biodegradable blankets, etc. A suggested listing of agricultural species for temporary cover is shown in Table 2.2. Foot and vehicular traffic should be prohibited in rehabilitated areas.

Table 2.2 Plant species for temporary cover

Sowing season	Seed mix
Autumn / Winter	oats @ 40 kg/ha Japanese millet @ 10 kg/ha
Spring / Summer	Japanese millet @ 20 kg/ha oats @ 20 kg/ha

2.4.6 Topsoil management shall be undertaken as follows:

(a) Topsoil management will follow a general plan to strip topsoil layers from a minimum work compartment of about two to five hectares and use the topsoil to form a bund along the southern boundary of the extraction area. This topsoil will be revegetated for the duration of operations.

(b) As the final levels are reached, and operations go on to a new compartment, newly stripped topsoil will be used for any operations areas ready for rehabilitation.

(c) Before stripping topsoil, bulky vegetation will be cleared and stockpiled for respreading as a surface stabiliser or for chipping.

Table 2.3 C-factors for construction sites *(Meyer and Ports, 1976 and Goldman et al, 1986)*

Type of cover	Soil loss factor
No mulching or seeding, no plant roots	1.00
Little or no above-ground plant material but roots still intact and undisturbed	0.45
Straw anchored to the soil at	
(i) 2.2 tonnes/ha and	
(a) 6-10% slope, up to 30 m long	0.20
(b) ≤5% slope, up to 60 m long	0.20
(ii) 4.5 tonnes/ha and	
(a) 34-50% slope, up to 10 m long	0.20
(b) 26-33% slope, up to 15 m long	0.17
(c) 21-25% slope, up to 22.5 m long	0.14
(d) 16-20% slope, up to 30 m long	0.11
(e) 11-15% slope, up to 45 m long	0.07
(f) 6-10% slope, up to 60 m long	0.06
(g) ≤5% slope up, to 120 m long	0.06
Temporary seeding after 60 days (average conditions)	
(i) ryegrass (perennial)	0.05
(ii) millet	0.05
Undisturbed native vegetation or well established exotic grasses providing 100% cover	0.02

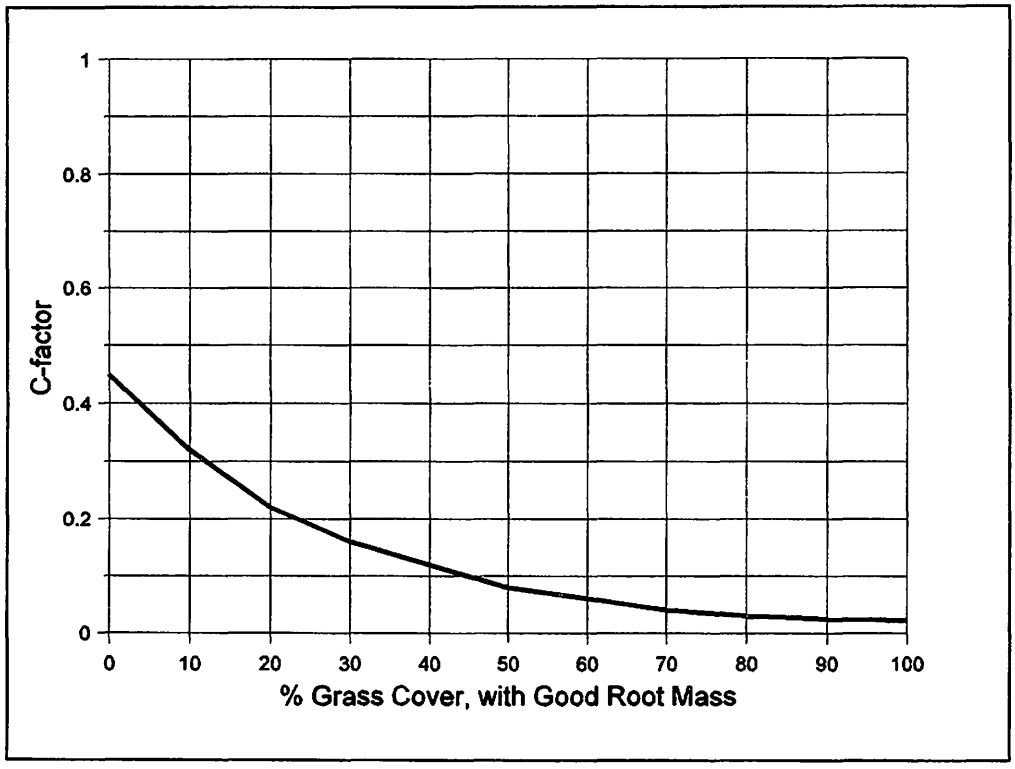

Figure 2 C-factors for established grass cover

(d) Topsoil will be stripped in moist condition to avoid pulverisation and dust.

(e) Topsoil will be removed and replaced (SD 4-2, Appendix V) in two layers according to its organic matter content. Organic matter is reflected in the darker colour of the upper 50 to 100 mm of soil. The darkened layer will be replaced uppermost over about 200 to 250 mm of lighter coloured material spread over a ripped surface.

(f) At the completion of each extraction stage, topsoil will be respread to an even, but roughened surface with moderate compaction for optimum seedbed tilth according to SD 4-3 (Appendix V).

2.4.7 During windy weather and heavy traffic movements, large, unprotected areas will be kept moist (not wet) by sprinkling with water to keep dust under control. In the event water is not available in sufficient quantities, soil binders, mulches and dust retardants will be used or the surface left in a cloddy state that resists removal by wind.

2.4.8 Schedule the final rehabilitation program so that a duration of less than 20 working days will elapse from final land shaping to permanent rehabilitation. The rehabilitation program will ensure that a C-factor (Table 2.3, figure 2) of less than 0.1 is achieved within twenty working days and a program is set in motion that will ensure it will drop permanently by vegetation, paving, armouring, etc. to less than 0.05 within a further 60 days.

2.4.9 Lands planted recently with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Follow-up seed and fertiliser will be applied as necessary in areas of minor soil erosion and/or inadequate vegetative protection.

2.5 Sediment Control

2.5.1 The sediment basin will be located as shown on the *Plan* (Appendix VII) and figure 1, and constructed according to SD 6-4 (Appendix V). Sediment Basin 3 will require regular cleaning out. Sediment build up will be regularly monitored through the placement of a marker within the basin.

2.5.2 The water will be flocculated (Appendix VII) within 48 hours of the completion of a storm event and allowed to settle for three days. Water retained will be used for dust suppression and for watering of temporary vegetation on the topsoil stockpile.

2.5.3 The sediment basin will incorporate an impermeable barrier in the dam wall.

2.5.4 Sediment removed from any trapping device will be relocated where further pollution to downslope lands and waterways will not occur.

2.5.5 The earth bank (SD 5-2 in Appendix V) will be constructed as shown on the *Plan* (Appendix VII) before works commence.

2.5.6 Sediment fence (SD 6-7 in Appendix V) will:

(i) be installed as shown on the *Plan* (Appendix VII) and elsewhere at the discretion of the site manager to contain the coarser sediment fraction; and

(ii) have catchment areas not exceeding 800 square metres, a storage depth (including both settling and settled zones) of at least 0.5 metres, and internal dimensions that provide maximum surface area to passage of stormwater.

2.5.7 Stockpiles (SD 4-1 in Appendix V) will be placed as a bund on the precinct's southern perimeter, as shown on the *Plan* (Appendix VII).

2.6 Other Matters

2.6.1 Soil tests will be undertaken within the site chosen for construction of the sediment basin to assess grading, dispersibility and *USCS* characteristics. Construction specifications, including compaction and batter angles will be varied according to the results of this assessment.

2.7 Site Monitoring & Maintenance

2.7.1 Waste receptacles will be emptied as necessary. Disposal of waste will be in a manner approved by the site manager.

2.7.2 The site manager will inspect the site at least weekly paying particular attention to:

(i) ensuring that drains operate properly and effect any necessary repairs;

(ii) removal of spilled sand or other materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows especially waterways and access roads;

(iii) removal of trapped sediment whenever less than design capacity remains for the sediment basin or sediment traps;

(iv) ensuring rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading as appropriate;

(v) constructing additional erosion and/or sediment control works as might become necessary to ensure the desired water control is achieved, i.e. make ongoing minor changes to the *Plan;*

(vi) maintaining erosion and sediment control measures in a functioning condition until all earthwork activities are completed and the site is rehabilitated; and

(vii) removal of temporary soil conservation structures as the last activity in the rehabilitation program.

2.7.3 The site manager will keep a log book, making entries at least weekly and immediately before forecast rainfall and/or site closure, recording:

(i) the volume of any rainfall events;

(ii) the condition of any soil and water management works;

(iii) applications of any flocculating agents to sediment basins;

(iv) volumes of water discharged from sediment basins; and

(v) remedial works.

The book will be kept on-site and made available to any authorised person on request.

3 Appendixes

Appendix I Bibliography

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Rosewell, C.J. and Turner, L.B. (1992). *Rainfall Erosivity in New South Wales.* Technical Report No. 20. Department of Conservation and Land Management, Sydney.

Rosewell, C.J. (1993). *SOILOSS, A Program to Assist in the Selection of Management Practices to Reduce Erosion.* Department of Conservation and Land Management, Gunnedah.

Appendix II Calculation of Potential Soil Loss

R-factor. Our *R*-factor was calculated using the Department of Land and Water Conservation's '*RAINER*' model which computes '*R*' from interpolated rainfall values drawn directly from *AR&R* tables.'*RAINER*' assigned Maroota an '*R*' value of 2410.

K-factor	Sample 11(2)	.013
	Sample 16(3)	.029

A worst case scenario was assumed for the eastern precinct. As such, 0.029 was adopted for the eastern precinct.

LS factor. Our slope length was based on a maximum of 100 metres, this being normal practice for properly managed sites. There was no reason to vary this as soil loss potential was found to be quite low. The slope gradient was based on the survey plan provided.

Maximum slope (Eastern precinct): 15 percent LS factor = 4.728

P-factor. Erosion Control Practice *(P)* was that assigned to disturbed construction sites as 1.3.

C-factor. Surface Cover Factor *(C)* was that assigned to disturbed construction sites as 1.0 *(bare soil).*

Soil loss

The Soil Loss *(A)* for the site is 430 tonnes per hectare per year on the steeper eastern precinct.

Soil Loss Class

The Soil Loss Class system described here places sites into seven groups that differ because of varying calculated soil loss (Table 3.1). These groups assume that a soil loss of 37.5 tonnes per hectare per fortnight (half-month) can be managed easily using conventional erosion and sediment control techniques (Morse and Rosewell, 1996).

Table 3.1 The Soil Loss Classes (adapted from Morse and Rosewell, 1996)

Soil Loss Class	Calculated soil loss (tonnes/ha/yr)	Erosion hazard
1	0 to 250	very low
2	251 to 300	low
3	301 to 375	low-moderate
4	376 to 500	moderate
5	501 to 750	high
6	751 to 1,500	very high
7	1,501 to 3 750	extreme

Allowances for Seasonal Influences

Table 3.2 Percentage of average annual *EI* that normally occurs in the first and second half of each month for each rainfall zone (Rosewell and Turner, 1992)

Zone	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Highest six half months
1	6	6	7	8	8	8	6	5	5	4	3	2	2	2	2	2	2	2	2	3	3	4	4	4	43
2	10	9	9	8	7	5	2	2	1	1	2	1	1	1	1	1	3	3	3	4	5	6	7	8	51
3	6	8	9	9	10	7	7	4	2	2	2	2	2	1	0	1	2	2	2	3	3	4	6	6	50
4	6	6	8	8	8	5	5	3	3	2	2	2	2	3	3	2	2	3	3	3	5	5	5	6	42
5	2	3	7	13	13	10	11	6	3	2	3	2	2	2	1	1	1	3	3	3	3	2	2	2	60
6	11	10	10	9	6	5	2	2	2	1	1	1	1	1	1	1	2	2	4	3	5	5	8	7	55
7	9	9	7	8	4	5	3	3	2	3	2	1	2	1	2	2	2	3	4	4	4	6	7	7	47
8	7	8	7	8	5	6	4	3	2	2	2	1	2	1	2	2	2	2	4	4	6	6	7	7	44
9	8	9	8	7	6	5	3	3	2	2	1	2	1	1	1	2	3	3	5	5	5	6	6	6	44
10	7	6	9	7	7	6	4	4	3	2	1	1	2	1	1	2	2	3	4	5	6	6	5	6	42
11	10	11	11	9	10	5	3	1	1	1	1	1	1	1	2	2	1	2	2	5	6	6	6	6	57
12	10	9	8	7	5	4	4	2	2	1	1	2	1	1	1	2	3	4	3	4	4	6	7	9	50

The *R*-factor in the RUSLE is the long-term average annual sum of the rainfall erosion index (*EI*) at a location, where the *EI* is the product of the rainfall energy and maximum 30 minute intensity for each storm (Equation 2).

$$EI = \text{Rainfall energy} \times I_{30,\,max} \quad \ldots\ldots\ldots \text{ Equation (2)}$$

In New South Wales, half-monthly *EI* data are available suggesting when the most erosive rains are likely (Table 3.2) in particular rainfall zones. Half-monthly data provide a good indication of seasonality. For example, 43 per cent of Sydney's *EI* occurs

in the first three months of the year while only 12 per cent occurs over July, August and September (Table 3.2, Zone 1). Rainfall zones are derived from local rainfall statistics.

Application of this System should result in most land disturbance activities:

- occurring in those periods that do not contribute significantly to the *EI*
- having calculated soil losses of less than 37.5 tonnes per hectare per half-month.

It means that Soil Loss Classes 1 to 3 can be developed in Sydney throughout the year, including periods when rainfall erosivity is high, while development on higher Classes is confined to the latter half of the year (Table 3.3). Of course, application of the System assumes the regular suite of best management practices outlined elsewhere in this manual are installed. Where land disturbances are not confined as suggested here, it is expected that more stringent controls than those given in this manual will be implemented to compensate for any increased erosion hazard. So, the System offers incentives to develop in months when the *EI* is low.

In Sydney, the majority of lands are in the Classes 1, 2 and 3, so application of the System will only affect a few sites. In fact, development sites with calculated soil losses of more than 1 200 tonnes per hectare per year are rare around Sydney. However, in areas like Coffs Harbour where the *R*-factor is higher (double that for Sydney but in the same Zone), the effect will be much more significant because many more lands are in higher Classes.

Table 3.3 Soil Loss Class range where a regular suite of BMPs are normally adequate to protect the environment (adapted from Morse and Rosewell, 1996)

Rainfall Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1*	1-4		1-3	1-4	1-5			1-6			1-5	

* Rainfall zone 1 includes the whole of the Sydney region

Appendix III Rainfall Intensity, Frequency, Duration Tables for Maroota

********** RAINER **********
DEPARTMENT of CONSERVATION and LAND MANAGEMENT
Date: 17/04/1998

Rainfall Intensity (mm/h) for MAROOTA
1 hour, 2 years : 32.50
12 hour, 2 years : 6.80
72 hour, 2 years : 2.00
1 hour, 50 years : 59.00
12 hour, 50 years : 14.00
72 hour, 50 years : 4.75
Skewness : 0.05
Geographical factor F2 : 4.30
Geographical factor F50: 15.90

\DUR ARI	5m	6m	10m	20m	30m	1h	2h	3h	6h	12h	24h	48h	72h	User
1	82	77	63	45.8	37.3	25.4	16.5	12.7	8.12	5.21	3.31	2.04	1.50	0.00
2	105	98	80	59	47.6	32.4	21.1	16.3	10.5	6.78	4.33	2.70	1.99	0.00
5	133	124	101	74	60	40.5	26.8	20.9	13.6	8.92	5.83	3.72	2.78	0.00
10	148	139	113	82	67	45.1	30.0	23.5	15.5	10.2	6.75	4.36	3.29	0.00
20	170	159	130	94	76	51	34.4	27.1	17.9	11.9	7.94	5.18	3.93	0.00
50	198	185	151	109	88	60	40.2	31.7	21.2	14.2	9.55	6.29	4.81	0.00
100	219	205	167	121	97	66	44.6	35.3	23.7	15.9	10.8	7.17	5.51	0.00
User	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Estimated Rainfall Factor (R): 2410 Estimated 1:10 Storm (S10): 1610

Expanded Rainfall Intensity table for MAROOT

	Years						
min	1	2	5	10	20	50	100
7	73	93	117	131	150	175	194
8	69	88	111	124	142	166	184
9	66	84	106	119	136	158	175
10	63	80	101	113	130	151	167
11	60	77	97	109	124	145	160
12	58	74	94	105	120	139	154
13	56	72	90	101	115	134	149
14	54	69	87	98	112	130	144
15	53	67	85	95	108	126	139
16	51	65	82	92	105	122	135
17	49.6	63	80	89	102	118	131
18	48.2	62	78	87	99	115	127
19	47.0	60	75	84	96	112	124
20	45.8	59	74	82	94	109	121
21	44.7	57	72	80	92	106	118
22	43.7	56	70	78	89	104	115
23	42.8	55	69	77	87	102	112
24	41.8	53	67	75	86	99	110
25	41.0	52	66	73	84	97	107
26	40.2	51	64	72	82	95	105
27	39.4	50	63	70	80	93	103
28	38.6	49.3	62	69	79	92	101
29	37.9	48.4	61	68	77	90	99
30	37.3	47.6	60	67	76	88	97
31	36.6	46.8	59	65	75	87	96
32	36.0	46.0	58	64	73	85	94
33	35.4	45.2	57	63	72	84	93
34	34.9	44.5	56	62	71	82	91
35	34.3	43.8	55	61	70	81	90
36	33.8	43.2	54	60	69	80	88
37	33.3	42.5	53	59	68	79	87
38	32.8	41.9	52	59	67	77	86
39	32.4	41.3	52	58	66	76	84
40	31.9	40.7	51	57	65	75	83
41	31.5	40.2	50	56	64	74	82
42	31.1	39.6	49.6	55	63	73	81
43	30.7	39.1	49.0	55	62	72	80
44	30.3	38.6	48.4	54	61	71	79
45	29.9	38.2	47.8	53	61	70	78
46	29.5	37.7	47.2	53	60	69	77
47	29.2	37.2	46.6	52	59	69	76
48	28.8	36.8	46.0	51	58	68	75
49	28.5	36.4	45.5	51	58	67	74
50	28.2	36.0	45.0	50	57	66	73
51	27.9	35.6	44.5	49.6	56	65	72
52	27.6	35.2	44.0	49.0	56	65	71
53	27.3	34.8	43.5	48.5	55	64	71
54	27.0	34.4	43.0	48.0	55	63	70
55	26.7	34.1	42.6	47.5	54	63	69
56	26.4	33.7	42.2	47.0	54	62	68
57	26.2	33.4	41.7	46.5	53	61	68
58	25.9	33.0	41.3	46.0	52	61	67
59	25.7	32.7	40.9	45.6	52	60	66

Appendix IV Storm flow and Sediment Basin Capacity Calculations

Storm Flow Calculations

Peak flow or discharge is given by the Rational Formula:

$$Q_Y = 0.00278 \cdot C_{10} \cdot F_Y \cdot I_{Y,tc} \cdot A$$

where:
- Q_Y is peak flow rate (m^3/sec) of average recurrence interval (ARI) of "Y" years
- C_{10} is the runoff coefficient (dimensionless) for ARI of 10 years
- F_Y is a frequency factor for "Y" years
- A is the area of catchment in hectares (ha)
- $I_{Y,tc}$ is the average rainfall intensity (mm/hr) for an ARI of "Y" years and a design duration of "tc" (minutes or hours)

Catchment area, A = 5.6 (ha)

Time of concentration (tc) = $0.76 \times (A/100)^{0.38}$ (Chapter 5 of *AR&R*, 1987)
= $0.76 \times (5.6/100)^{0.38}$
= 0.25 hours
= 15 minutes

Peak flow runoff coefficient C_{10} = 76 %

Table 3.4 Peak flow calculations

ARI storm event	Storm intensity (mm/hr)	Frequency factor (F_y)	Peak flow (m^3/s)
1 yr, tc	53	0.62	0.39
20 yr, tc	108	1.12	1.43
100 yr, tc	139	2.57	4.23

Sediment Basin Volume - Type C soils *(Dept. Housing, 1998)*

Basin volume = Settling zone volume + Sediment storage volume

(a) *Settling Zone Volume*

The settling zone volume for Type C soils is calculated to provide capacity to allow the design particle (eg. 0.02 mm in size) to settle in the peak flow expected from the design storm (eg. 0.25 year ARI). The volume of the basin's settling zone (V) can be determined as a function of the basin's surface area and depth to allow for particles to settle.

Peak flow/discharge for the 0.25 year, ARI storm is given by the Rational Formula:

$$Q_{tc,0.25} = 0.25 \times [0.00278 \cdot C_{10} \cdot F_1 \cdot I_{1yr,tc} \cdot A] \ (m^3/sec)$$

where:
- $Q_{tc,0.25}$ = flow rate (m^3/sec) for the ARI storm event
- C_{10} = peak runoff coefficient (dimension less) for ARI of 10 years
- F_1 = frequency factor for 1 year
- $I_{1yr,tc}$ = ave rainfall intensity (mm/hr) for the 1 year storm
- A = area of catchment in hectares (ha)

$$Q_{tc,0.25} = 0.25 \times 0.00278 \times 0.76 \times 0.62 \times 53 \times 5.6 \ (m^3/sec)$$
$$= 0.097 \ m^3/sec$$

The basin surface area (A) is dependent on the flow rate into the basin ($Q_{tc, 0.25}$ above) and the settling velocity of the soil particles.

Basin surface area (A) $= \dfrac{Q_{tc,0.25}}{Vel_{settling}}$
$= 0.097/0.00029$
$= 335 \ m^2$

Settling zone volume = Basin surface area (A) × depth
$= 335 \ m^2 \times 0.6 \ m$
$= 201 \ m^3$

(b) *Sediment Storage Volume*

Sediment storage volume = estimated average 2 month soil loss as estimated by the RUSLE (as LS factor is > 2)

$$RUSLE = \frac{0.17 \ A \ (R.K.LS.P.C)}{1.3} \ m^3$$

$$= 315 \ m^3$$

(c) Total basin volume = settling zone volume + sediment storage volume
= 516 m^3

Sediment Basin volume *(Hornsby Shire Council's Extractive Industries Maroota DCP)*

V = 5.6 ha × 10 mm

= 560 m^3

Sediment Basin Volume – Type F & D soils *(Dept. Housing, 1998)*

Basin Volume = Settling Zone Volume + Sediment Storage Zone volume

The settling zone volume for *Type F* and *D* soils is calculated to provide capacity to contain all runoff expected from up to the 80th percentile rainfall event. The settling zone volume (V) can be determined by the following equation:

$$V = 10 \cdot C_v \cdot A \cdot R_{80th\ ile,\ 5\ day}\ (m^3)$$

where 10 = a unit conversion factor
C_v = the volumetric runoff coefficient defined as that portion of rainfall that runs off as stormwater over the 5 day period
R = is the 5-day total rainfall depth (mm) which is not exceeded in 80 per cent of rainfall events
A = area of catchment in hectares (ha)

V = 10 . 0.5 . 5.6 . 34.8
= 974 m^3

Total basin volume = V + 50%V
= 974 + 487
= 1461 m^3 (1465 m^3 rounded)

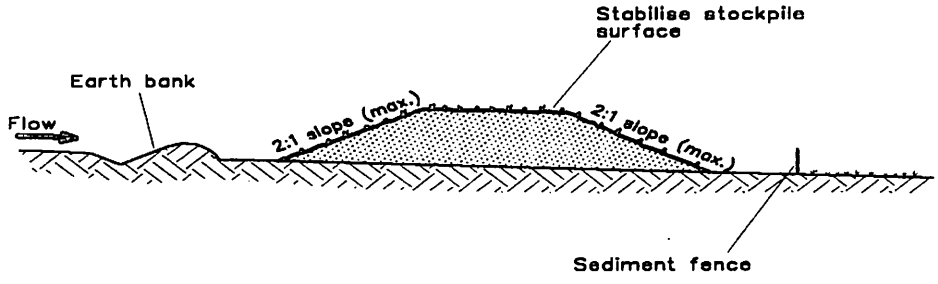
Additonal volume for water storage = 410 m^3

Basin volume = 1465 m^3 + 410 m^3

= 1875 m^3

Choosing the largest calculation, adopt 1875 m^3 as the sediment basin volume.

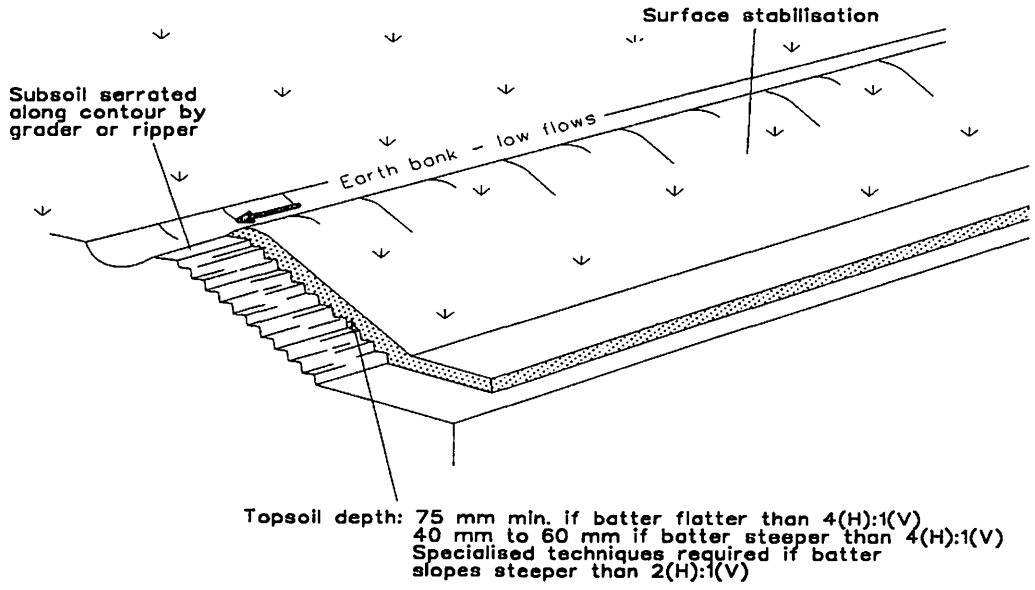
Appendix V Standard Drawings for Best Management Practices



Construction Notes

1. Locate stockpile at least 5 metres from existing vegetation, concentrated water flows, roads and hazard areas.
2. Construct on the contour as a low, flat, elongated mound.
3. Where there is sufficient area topsoil stockpiles shall be less than 2 metres in height.
4. Rehabilitate in accordance with the SWMP/ESCP.
5. Construct earth bank (Standard Drawing 5-2) on the upslope side to divert run off around the stockpile and a sediment fence (Standard Drawing 6-7) 1 to 2 metres downslope of stockpile.

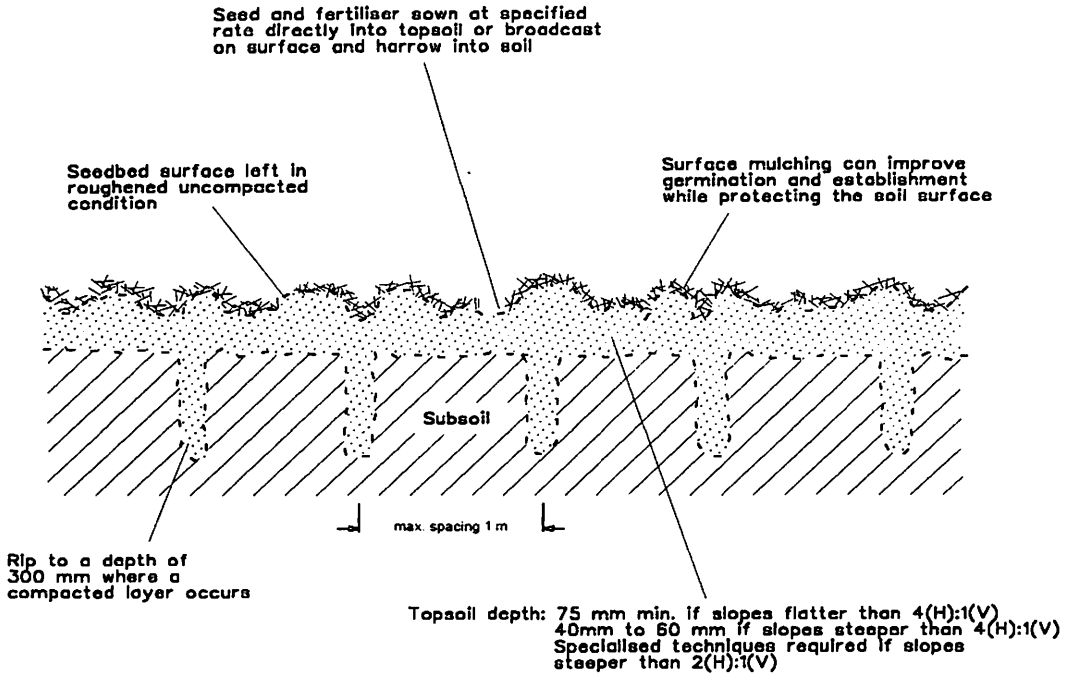
STOCKPILES **SD 4-1**



Construction Notes

1. Scarify ground surface along the line of the contour to a depth of 50 mm to 100 mm to break up any hardsetting surfaces and provide a good bond between the respread material and subsoil.
2. Add soil ameliorants as required by the SWMP/ESCP.
3. Rip to a depth of 300 mm where a compacted layer occurs.
4. Replace topsoil.

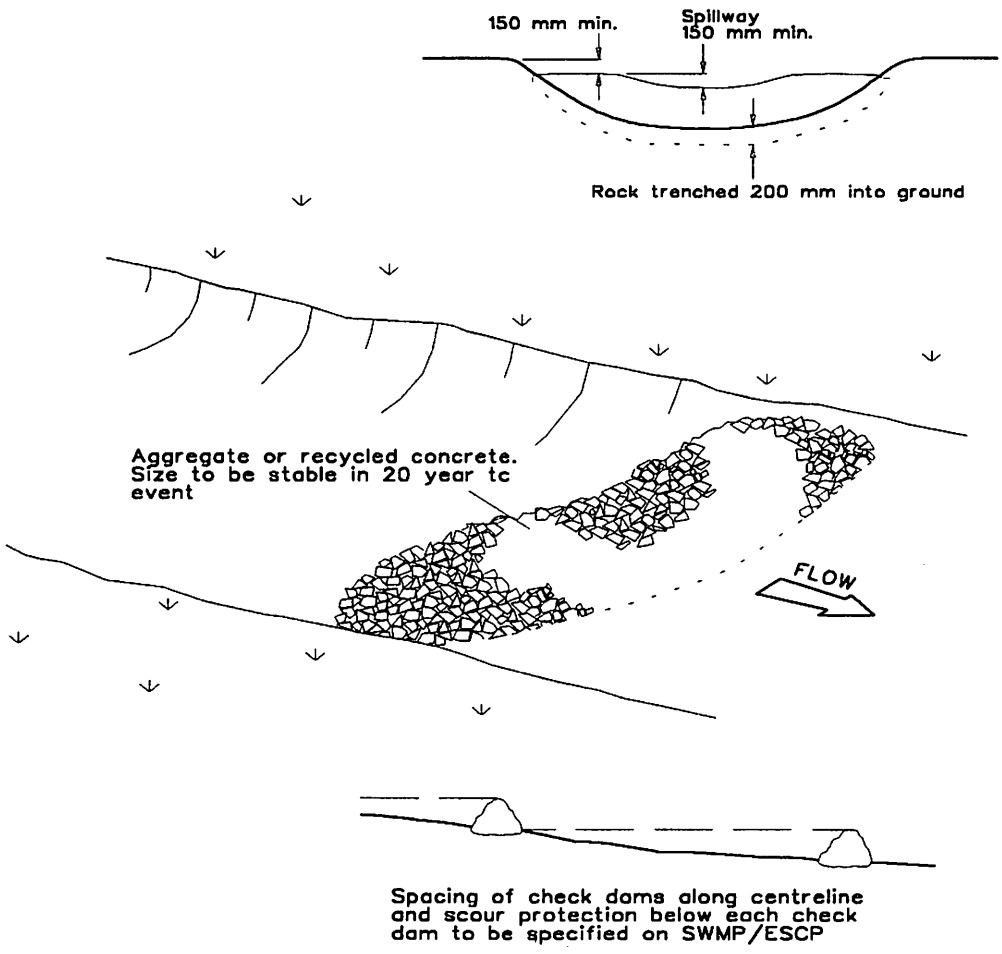
REPLACING TOPSOIL **SD 4-2**



Construction Notes

1. Loosen compacted soil before sowing any seed.
2. Work the ground only as much as necessary to prepare a good seedbed. Do not over-cultivate ground.
3. Cultivate soils rich in organic matter as little as possible.
4. Avoid rotary hoe cultivation.
5. Avoid cultivation in very wet or very dry conditions.
6. Cultivate on the contour where possible.

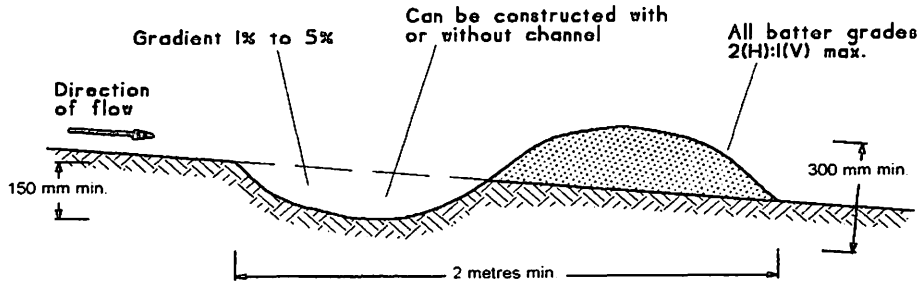
SEEDBED PREPARATION SD 4-3



Construction Notes

1. Trench structure 200 mm into ground surface wherever the structure contacts the gully base. Fill trenches to 100 mm above ground surface to reduce risk of undercutting.
2. Ensure height of spillway is less than 1 metre above the gully floor.
3. Space checks so the toe of the upstream dam is level with the spillway of the next downstream dam.

ROCK CHECK DAM **SD 5-1**

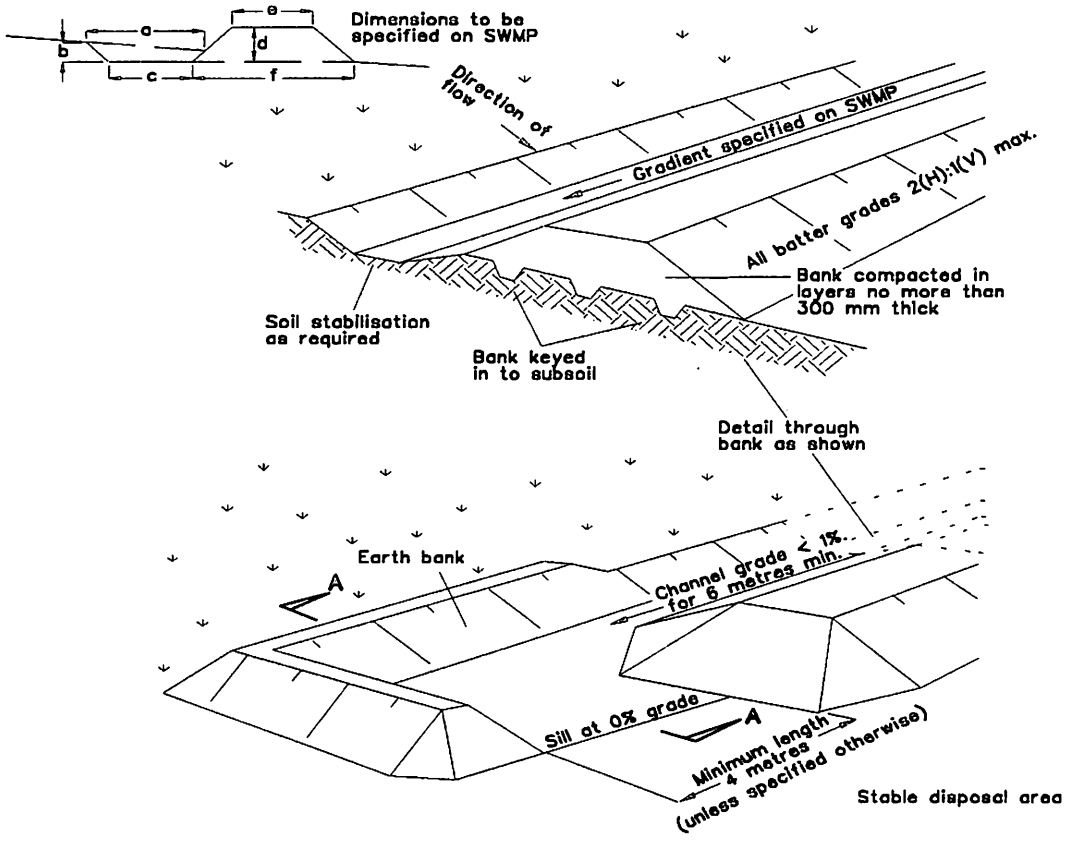


NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

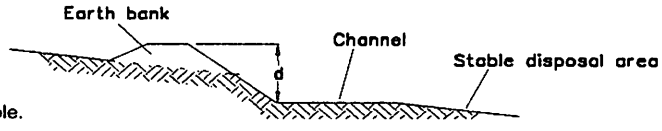
Construction Notes

1. Construct with gradient of 1 per cent to 5 per cent.
2. Avoid removing trees and shrubs if possible.
3. Drains to be of circular, parabolic or trapezoidal cross section as opposed to V-shaped.
4. Earth banks to be adequately compacted in order to prevent failure.
5. Permanent or temporary stabilisation of the earth bank to be completed within 10 days of construction.
6. All outlets from disturbed lands are to feed into a sediment basin or similar.
7. Discharge runoff collected from undisturbed lands onto either a stabilised or an undisturbed disposal site within the same subcatchment area from which the water originated.
8. Compact with a suitable implement in situations where they are required to function for more than five days.
9. Earth banks to be free of projections or other irregularities that will impede normal flow.

EARTH BANK (LOW FLOW) SD 5-2



Level Spreader (or Sill)

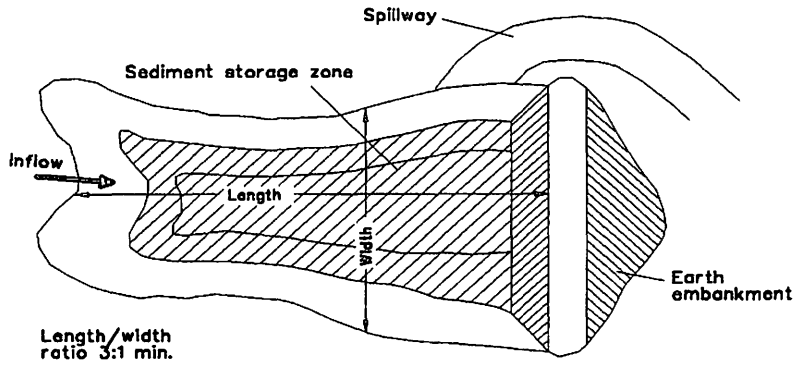


Section AA

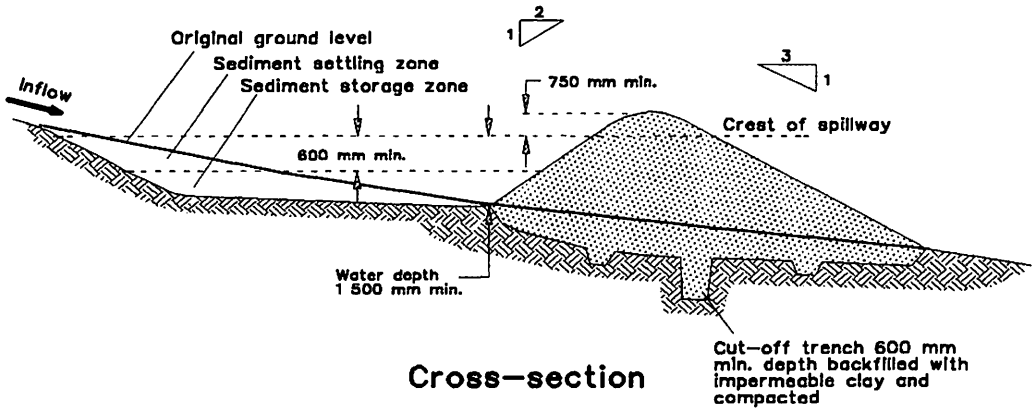
Construction Notes

1. Construct along gradient as specified.
2. Avoid removing trees and shrubs if possible.
3. Drains to be of parabolic or trapezoidal cross section as opposed to V-shaped.
4. Earth banks to be adequately compacted in order to prevent failure.
5. Permanent or temporary stabilisation of the earth bank to be completed within 10 days of construction.
6. All outlets from disturbed lands are to feed into a sediment basin or similar.
7. Discharge runoff collected from undisturbed lands onto either a stabilised or an undisturbed disposal site within the same subcatchment area from which the water originated.
8. Compact with a suitable implement in situations where they are required to function for more than five days.
9. Earth banks to be free of projections or other irregularities that will impede normal flow.

EARTH BANK (HIGH FLOWS) SD 5-3



Plan View



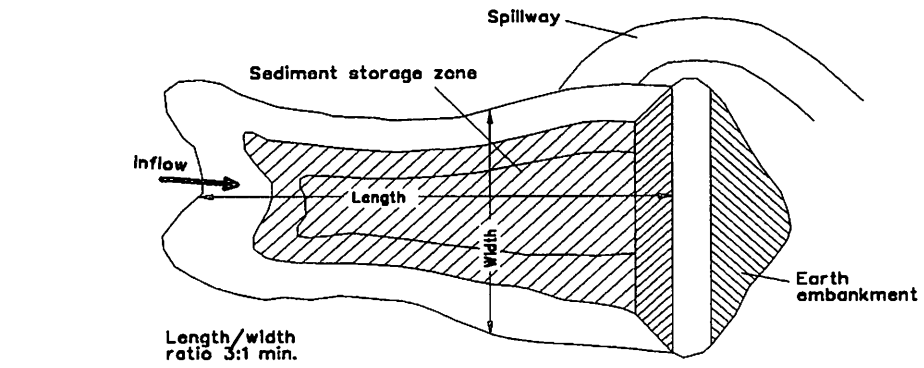
Cross-section

Construction Notes

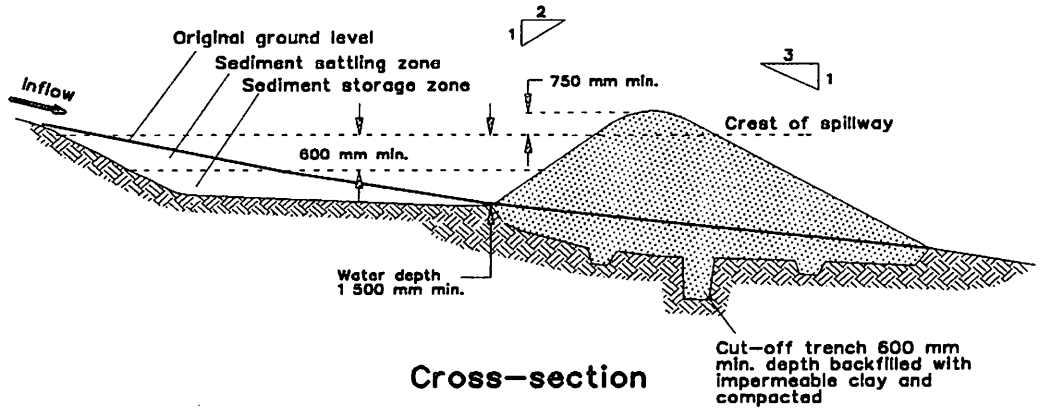
1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1 200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill according to the directions of the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping at least 100 mm deep to help bond compacted fill to existing substrate.
6. Spread fill in 100 mm to 150 mm layers and compact at optimum moisture content in accordance with the SWMP.
7. Construct emergency spillway.
8. Rehabilitate structure in accordance with the SWMP.
9. Place a "Full of Sediment" marker to show when less than design capacity occurs and sediment removal is required.

EARTH BASIN - WET **SD 6-4**

(APPLIES TO *TYPE D* AND *TYPE F* SOILS ONLY)



Plan View



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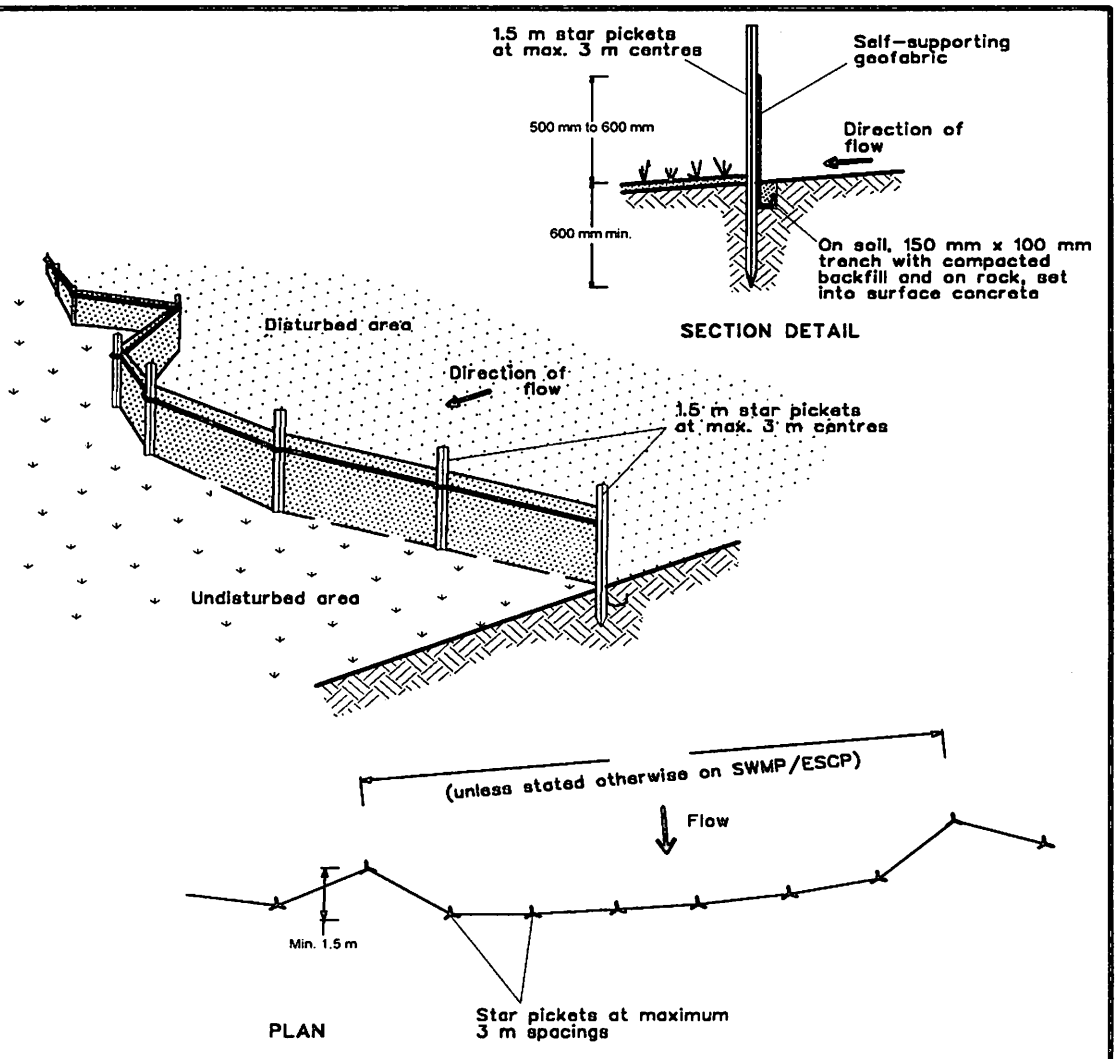
EARTH BASIN - WET **SD 6-4**

(APPLIES TO *TYPE D* AND *TYPE F* SOILS ONLY)



Construction Notes

1. Construct sediment fence as close as possible to parallel to the contours of the site.
2. Drive 1.5 metre long star pickets into ground, 3 metres apart.
3. Dig a 150 mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
4. Backfill trench over base of fabric.
5. Fix self-supporting geofabric to upslope side of posts with wire ties or as recommended by geofabric manufacturer.
6. Join sections of fabric at a support post with a 150 mm overlap.

SEDIMENT FENCE **SD 6-7**

Appendix VI Flocculation

Here, dispersible soils are those where the clay and fine silt particles (<0.005 mm) are in a state of separation into extremely fine colloidal units. Effectively, these particles can remain suspended in water forever. Flocculation reverses this state by causing the colloidal particles to clump into larger units or "flocs" that can either settle in a reasonable time or be filtered.

Traditional Flocculating Agents

Many flocculating agents exist, including gypsum, alum, lime, ferric chloride, ferric sulfate, polyelectrolytes (long-chain natural and synthetic organic polymers) and salt (sodium chloride). Gypsum and alum have traditionally been applied to captured stormwater runoff. Gypsum (calcium sulfate) and alum (aluminium sulfate) are suitable chemicals for this purpose and are applied within 24 to 48 hours of the conclusion of each storm event as follows:

(i) in larger ponds - mixed into a slurry with water (figure 3) and then sprayed over the pond surface; or

(ii) in smaller ponds and tanks - by simply broadcasting it over the surface by hand.

Whichever method is chosen, it is essential that the flocculating agent is spread evenly over the entire pond surface for proper treatment of water unless local experience or other criteria suggest differently - see below. Gypsum should be applied at a rate of about 32 kilograms per 100 cubic metres of stored water. Conversely, alum should be applied at 10 to 30 kilograms per 100 cubic metres of stored water (higher rates are more effective but can influence water pH more). Care should be taken with the choice of an agent, its dosing rate and any special conditions to ensure that toxic situations are not created with consequent damage to the ecology.

When choosing a flocculating agent, note that:

(i) the trivalent positive aluminium (Al^{3+}) ion is 2 000 times more effective than the monovalent positive sodium (Na) ion; and

(ii) the bivalent positive calcium (Ca^{2+}) ion is only 50 times more effective than sodium (Barnes, 1981).

As such, alum produces a faster flocculation rate than gypsum, which has been shown for sediment basins in New South Wales (Goldrick, 1996). Table 3.5 below summarises some characteristics of common flocculating agents.

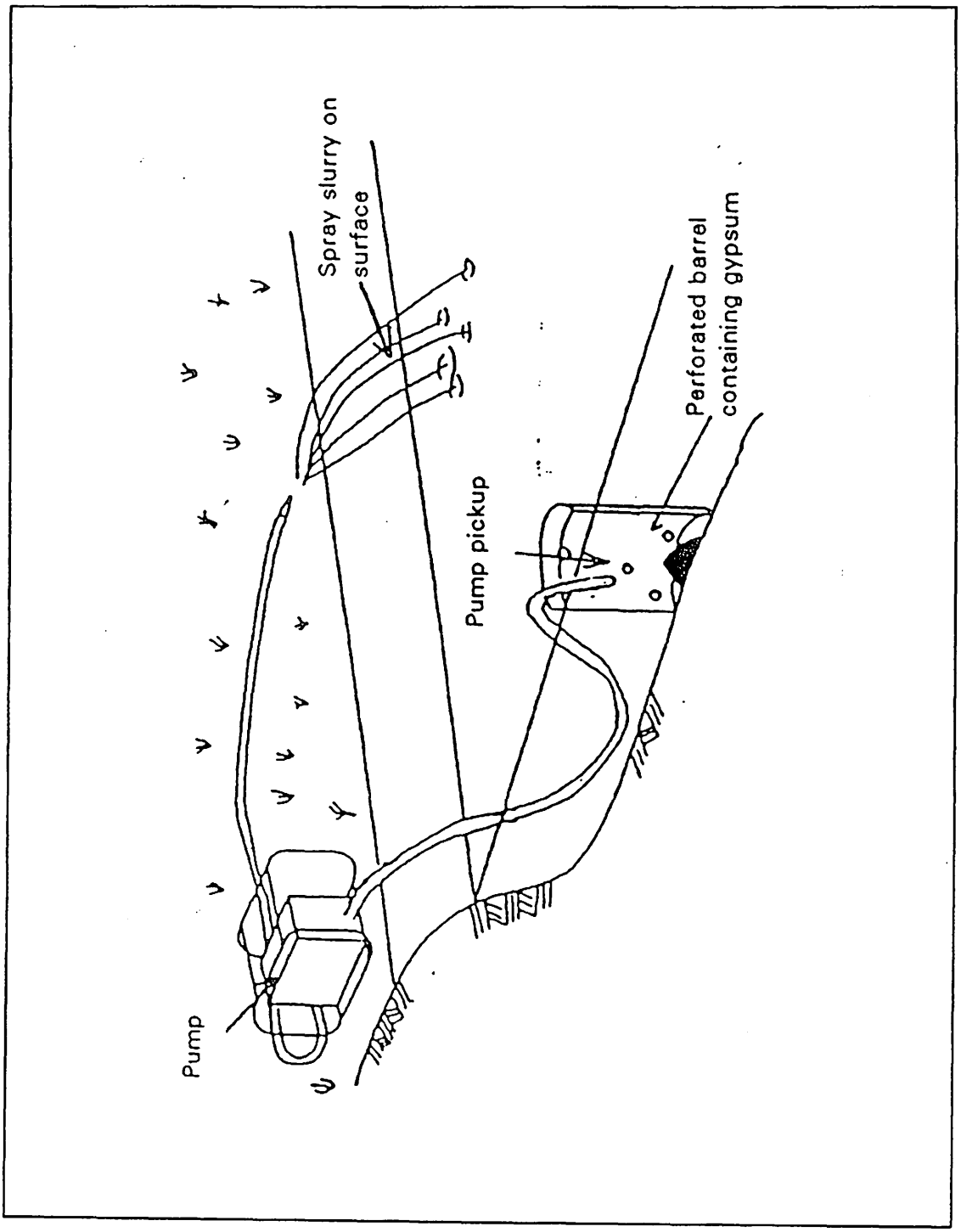


Figure 3 Application of gypsum. Ideally, the drum has about a 50 litre capacity and holes about 25 mm diameter drilled on a 150 mm grid so pond water can enter

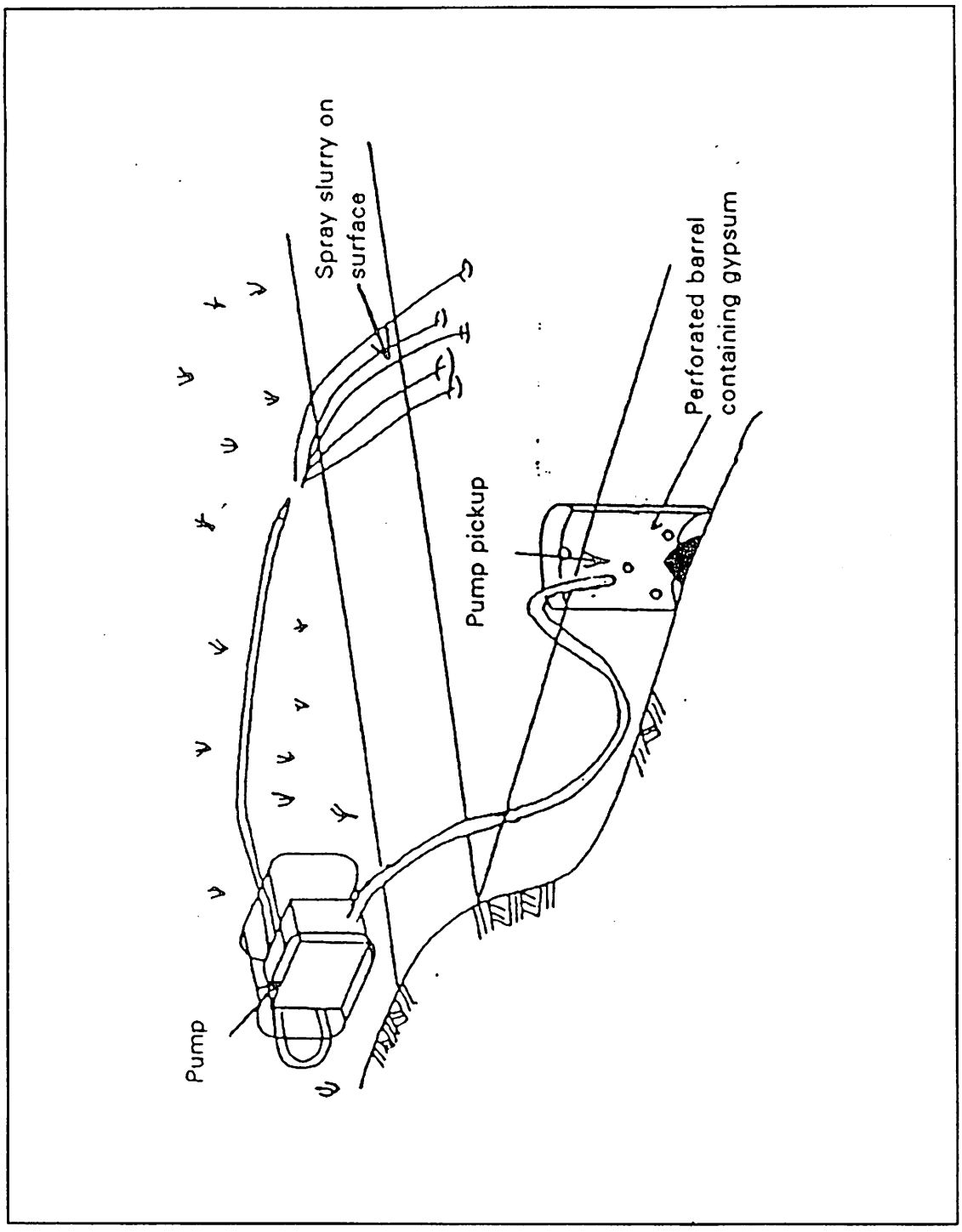


Figure 3 Application of gypsum. Ideally, the drum has about a 50 litre capacity and holes about 25 mm diameter drilled on a 150 mm grid so pond water can enter

Table 3.5 Characteristics of various flocculating agents (adapted from Freeman & Howells, 1995)

Agent/ionic charge	Solubility (% w/w)	Recommended dosage	Comments
Gypsum (2+) (calcium sulfate)	0.24%	30 kg/100 cubic metres	Little pH change, slight increase in salinity, needs to be spread evenly across pond, can cause scum deposits in equipment.
Alum (3+) (aluminium sulfate)	47%	1-30 kg/100 cubic metres	Produces stable sludge that binds pollutants, optimum pH 6 to 7.4, do not overdose as pH will be lowered. Likely toxic impacts on ecology at pH levels <5.5 due to release of dissolved aluminium.
Lime (2+) (calcium hydroxide)	0.2%	30 kg/100 cubic metres	Increase in pH, slight increase in salinity, usually contains insoluble impurities, requires constant stirring due to being sparingly soluble in water.
Ferric chloride (3+)	50%	1-30 kg/100 cubic metres	pH greater than 5 is required or it might lower oxygen levels, very corrosive, needs rubber or glass containment, do not overdose.
Ferric sulfate (3+)	hydrolysed (chemically changed)	1-25 kg/100 cubic metres	pH greater than 5 is required or it might lower oxygen levels, stored in wooden containers, do not overdose.
Polyelectrolytes (>3+) (long-chained polymers)	-	0.05-0.2 kg/100 cubic metres	Careful preparation needed and adequate mixing with water body needed, little pH or salinity change, might be toxic – a few are banned for use with potable water in some countries due to possible monomer impurities, do not overdose.
Salt (1+) (sodium chloride)	36%	175 kg/100 cubic metres or 5.25 cubic metres of seawater* per 100 cubic metres of freshwater	Not environmentally appropriate or practical (given the large amounts required) away from estuarine areas, not as efficient as gypsum or alum.

* Seawater contains 35 000 milligrams per litre salt

Normally, sufficient of the dispersed materials will have flocculated and settled within about:

- 36 to 72 hours in the case of gypsum
- 24 hours in the case of alum

leaving a suspended solid content of less than about 50 milligrams per litre. A practical field test that approximates this level is to fill a clear plastic or glass 65 mm diameter soft drink bottle with the water and hold it up to the light. If seeing clearly through the sample is not possible, it is probably above about 50 milligrams per litre and needs further treating.

Despite the above comments, each pond should be calibrated after the first two storm events to assess the actual flocculent application rate and settling time required. Standard jar tests are the usual method (Barnes, 1981).

The water can be discharged from the basin once the suspended solid load has been lowered to an acceptable level. Achieve discharge with a system that:

(i) permits drainage of the pond in less than 24 hours; and

(ii) has a floating inlet to prevent flocculated sediments being removed as well - it is essential that materials from the sediment layer are not discharged in the pumping process.

In areas where repeated high intensity storms are likely, it is recommended that gypsum dosage rates be increased to 70 kilograms per 100 cubic metres. Depending on the clay mineralogy, this can achieve flocculation within 24 hours allowing discharge within two days from the conclusion of a storm.

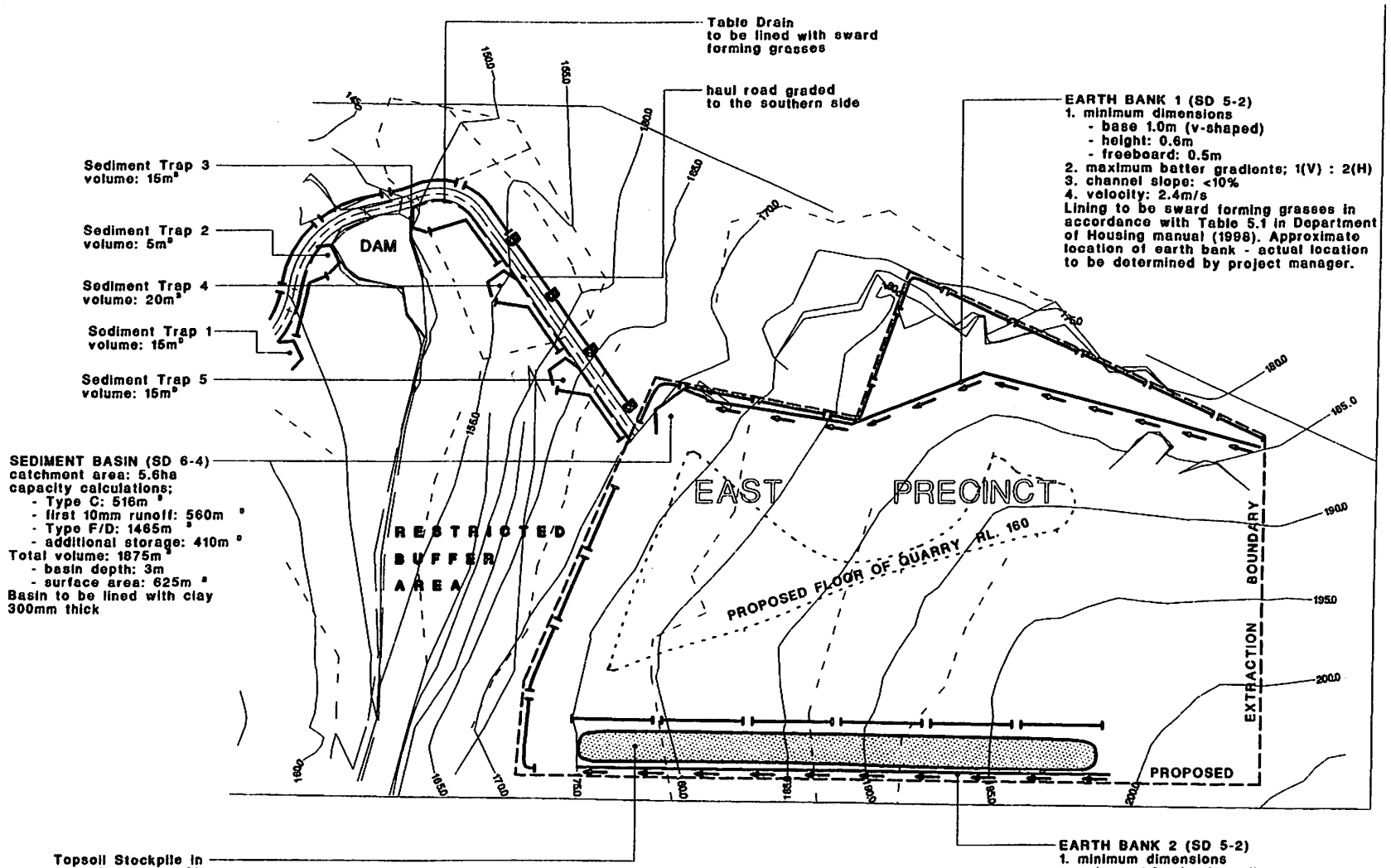
Warnings

(a) With use of alum, accurate measurement of water pH must be undertaken to ensure that values remain in the range of 6.0 and 8.5. Values lower than pH 5.5 will result in environmentally toxic concentrations of soluble aluminium that can kill fish and other aquatic life. Further, treated waters should not be discharged if the pH is below 6.0 unless ecotoxicity assessment shows that it is safe to do so.

(b) Excessive dosing with polyelectrolytes can:
- result in the release of materials that can kill fish and other aquatic life
- reduce the effectiveness of the flocculent.

Appendix VII Soil and Water Management Plan (eastern precinct)

FIGURE 2



LEGEND

- earth bank (SD 5-2)
- sediment fence (SD 6-7)
- table drain
- barrier fence
- sediment basin (SD6-4)
- stockpile area (SD 4-1)

SURVEY BY:
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CASTLE HILL NSW 2154
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ALL LEVELS TO AHD

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Facsimile: (02) 4677 1709
email: rmorse@ozemail.com.au

PLAN
SOIL AND WATER MANAGEMENT PLAN
EASTERN PRECINCT

PROJECT
PROPOSED QUARRY
F. AND K. VELLA

LOCATION
LOT 2, DP748820
OLD TELEGRAPH ROAD, MAROOTA

SCALE: 1:2000
DRAWN: A. Ball
CHECKED: R. Bayley
DATE: January 1999

Confirm all dimensions on site prior to start of construction. Use figured dimensions in preference to scaling.

All dimensions in millimetres unless stated otherwise.

PLAN NUMBER:
985059-02