



Mudgee Stone Company Pty Ltd

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WATER MANAGEMENT PLAN

OBERON WHITE GRANITE QUARRY



WATER MANAGEMENT PLAN

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Endorsement of WMP by Mudgee Stone Company Director or Delegate

Director

Date



10 August 2017

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APPENDIX E - Approval of Suitably Qualified Person to Prepare the WMP

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ABBREVIATIONS

ARI	Average Recurrence Interval
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
CMA	Catchment Management Authority
CAP	Catchment Action Plan
DECC	Department of Environment and Climate Change (now OEH)
DPE	Department of Planning and Environment
DPI Water	Department of Primary Industries Water
EA	Environmental Assessment prepared by RW Corkery & Co Pty Limited
EMPs	Environmental Management Plans
EMS	Environmental Management Strategy
EPL	Environment Protection Licence
LDP	Licensed Discharge Point
MSC	Mudgee Stone Company
NATA	National Association of Testing Authorities, Australia
NSW EPA	NSW Environment Protection Authority
NOW	NSW Office of Water (now DPI Water)
OEH	Office of Environment and Heritage
POEO Act	Protection of the Environment Operations Act 1997
SWL	Standing Water Level
The Project	The Oberon White Granite Quarry operating under PA07_0122
The Blue Book (2008)	<i>Managing Urban Stormwater Volumes 1 and 2</i> Landcom (2004), DECC
WQO	Water Quality Objectives
WMP	Water Management Plan

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1 INTRODUCTION

1.1 Overview

Mudgee Stone Company (hereafter MSC) is a wholly owned subsidiary of Mudgee Dolomite and Lime Pty Ltd based in Mudgee, NSW. MSC own and operate the Oberon White Granite Quarry, located approximately 6 km east south-east of Oberon, NSW, covering an area of approximately 40 ha.

On 7 September 2012, the Minister for Planning approved the expansion of the Oberon White Granite Quarry, Project Approval (07_0122). The project includes expansion of the extraction area and the rate of extraction at the quarry resulting in recovery of up to 5 million tonnes of granite over a 30 year period, transported from the site via road.

MSC has an Environmental Management System to support commitments to minimising impact on the environment and community. The system has been prepared by MSC to establish the overarching framework for the monitoring and environmental management of activities undertaken at the Oberon White Granite Quarry in order to minimise environmental impacts, comply with legal requirements, and incorporate the principles of continuous improvement into environmental management at the site.

The components of the MSC Environmental Management System include:

- Environmental Management Strategy;
- Specific and separate Environmental Management Plans (EMPs), including this document, and Environmental Monitoring Programs which provide details on the management of environmental aspects and impacts;
- Site document control system including training records, monitoring results, site registers, environmental forms; and
- Management roles and accountabilities of key personnel.

This Water Management Plan details the management measures in three key management areas: Site Water Balance and Surface Water Management Plan; and Groundwater Management Plan, as depicted below in **Figure 1**.

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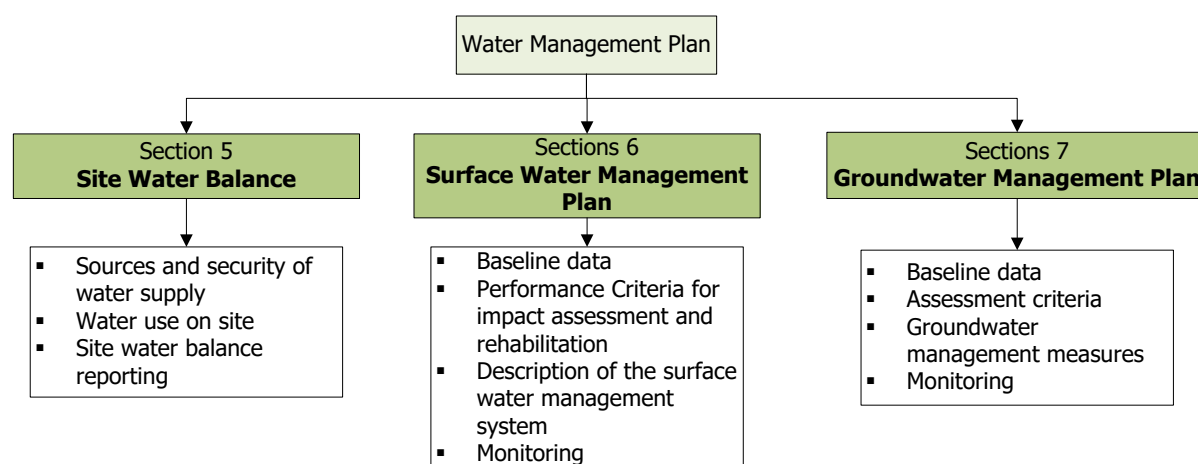


Figure 1: Overview of Water Management Plan

1.2 Scope

This Water Management Plan (hereafter WMP) has been prepared to manage operational impacts associated with water use and management for the Oberon White Granite Quarry. The scope of the plan applies to MSC operations, including MSC management, employees and contractors. The WMP provides provision for the safe management of ground and surface water.

A copy of this Water Management Plan will be made available to members of the public on the MSC website:

<http://mudgeedolomitelime.com.au/>

1.3 Objectives

MSC have developed this WMP to address the conditions outlined in PA (condition in **Appendix A**). The objectives of the WMP are to:

- To provide employees and contractors with a clear description of their responsibilities regarding water management issues.
- To identify management measures and procedures including: a site water balance; surface water management plan; and groundwater management plan.
- Address potential water management issues arising from MSC's operations, including assessment of water entitlements on privately owned land and the provision of compensatory water supply.
- Implement monitoring systems to assess the effectiveness of water management and ensure performance criteria are being met.
- Record data suitable to demonstrate compliance with the conditions of PA and protocol for contingency plan implementation; and

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- To provide direction for MSC staff to appropriately respond to receipt of water related complaints and incidents.

MSC will provide people, materials, resources and systems to properly perform requirements of the WMP. All MSC employees will be sufficiently competent, experienced and qualified to carry out the requirements, and specialist consultants will be engaged where required.

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2 STATUTORY REQUIREMENTS

This WMP has been developed to comply with the requirements of relevant legislation, Project Approval conditions and relevant standards and guidelines.

2.1 Legislation

The WMP was prepared by MSC in conjunction with suitably qualified persons in consultation with the EPA and DPI Water for approval by the DPE. Copies of the correspondence can be found in **Appendix B**.

The *Water Act 1912* and the *Water and Management Act 2000* contain provisions for the licensing of water capture and use and are the core legislation and regulatory instruments for water quality issues in NSW. MSC endeavour to meet requirements through compliance with approvals and licences, discussed below.

Statutory requirements are contained within the Project Approval; relevant licences and permits, and other relevant legislation. The Project Approval was issued under the *Environmental Planning and Assessment Act 1979*. An EPL (EPL 20551) for the quarry was issued under the NSW Protection of the Environmental Operations Act 1997 in June 2015.

Other legislation, guidelines and policies that may also be relevant to the implementation of the WMP and have been considered:

- Values outlined in NSW Water Quality and River Flow Objectives and technical information outlined in *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000). For each catchment in NSW, the state government has endorsed the community's environmental values for water known as WQO's. ANZECC (2000) includes trigger values for the protection of freshwater aquatic ecosystems for surface waters, and is currently under review;
- Aquifer Interference Policy (2012);
- The NSW State Groundwater Dependant Ecosystems Policy (2002);
- Water Sharing Plans:
 - Macquarie Bogan Unregulated and Alluvial; and
 - Murray Darling Basin Fractured Rock Groundwater;
- The Blue Book - Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom, 2004) and Volume 2E Mines and Quarries (DECC, 2008);
- Central West Catchment Management Authority (CMA) Catchment Management Plan (CAP), strategic statutory plan prepared under the

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Catchment Management Authorities Act 2003, which includes general principles for biodiversity, land and water management;

- Record data suitable to demonstrate compliance with the conditions of PA and protocol for contingency plan implementation; and
- To provide direction for MSC staff to appropriately respond to receipt of water related complaints and incidents.

MSC will provide people, materials, resources and systems to properly perform requirements of the WMP. All MSC employees will be sufficiently competent, experienced and qualified to carry out the requirements, and specialist consultants will be engaged where required.

2.2 Approvals and Licences

Table 1: MSC Statutory Approvals

Approval/Licence	Activity	Date	Authority
Approval 07_0122	Project Approval – ‘Oberon White Granite Quarry Project’	7 Sept 2012	NSW Department of Planning and Environment (DPE) formerly NSW Department of Planning and Infrastructure
EPL 20551	Licence – Premises Based	17 Jun 2015	NSW Environment Protection Authority (NSW EPA)

In areas where water sharing plans have commenced, such as the Project site, the issue of licences to take water from groundwater sources and, generally, to install a bore, is governed by the *Water Management Act 2000*.

MSC must submit to the DPI Water, a completed application form for a Water Access Licence (WAL) (refer to Section 61 of the *Water Management Act 2000*) prior to the commencement of any development/works if the activity will result in the interference of groundwater (under the *Water Management Act 2000*).

In regards to surface waters, the Project Area falls within the Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources which commenced on 4 October 2012. As such, surface water within the catchment is also managed under the *Water Management Act 2000*. The WMS will capture water for pollution control

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purposes, with this water use/reuse by the Project for operational dust suppression. Water captured for pollution control purposes in catchment dams or dams located on order 1 and 2 drainage lines are exempt from licensing provisions.

Water will also be captured in the operating pit for pollution control and will be used for dust suppression on site. During operations, approximately 8.0 hectares of clean upslope catchment flows into the WMS. Based on a property area of 40.0 hectares the maximum harvestable rights dam capacity (MHRDC) for the land holding is 3.8 ML. As Dam1 and Dam 2 are for pollution control purposes, their capacity does not have to be included when as part of the MHRDC. Dam 3 which primarily receives clean catchment runoff (except during rainfall events exceeding the 5 day 90th percentile rainfall event where Dam 1 and Dam 2 may overflow to Dam 3) has an estimated volume of approximately 1 ML. The average annual runoff from the upslope areas equates to 38 ML (based on an average regional runoff rate of 0.95 ML per hectare per year). As such, the clean water capture within the WMS lies within the MHRDC for the property (i.e. 1 ML < MHRDC of 3.8 ML). During the operational life of the quarry water take will not exceed the harvestable rights provisions and therefore a WAL for surface water is not required.

MSC have developed this Water Management Plan (WMP) to address the conditions outlined in the Project Approval (07_0122) (refer to **Appendix A**).

Project Approval (07_0122) (Schedule 3, Condition 26) requires the preparation and implementation of a Water Quality Management Plan which must include a:

- a) *Site Water Balance that:*
 - *Includes details of:*
 - *Sources and security of water supply, including contingency planning for future reporting periods;*
 - *Water use on site; and*
 - *Reporting procedures, including comparisons of the site water balance each calendar year; and*
 - *Describes the measures that would be implemented to minimise clean water use on site;*
- b) *Surface Water Management Plan, that includes:*
 - *Detailed baseline data on surface water flows and quality in the water bodies that could be affected by the project;*
 - *A detailed description of the surface water management system on site, including the:*
 - *Clean water diversion systems;*
 - *Erosion and sediment controls; and*
 - *Water storages;*
 - *Detailed plans including design objectives and performance criteria, for:*
 - *The water storage dams;*
 - *Reinstatement of drainage lines on the rehabilitated areas of the site;*

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- Control of water pollution from rehabilitated areas of the site;
 - Performance criteria for the following, including trigger levels for investigating any potentially adverse impacts, for the following:
 - The water management system;
 - Surface water quality of local waterways; and
 - Ecosystem health of local waterways;
 - Performance criteria for surface water quality attributes relevant to water quality impacts on biological diversity and aquatic ecological integrity, including salinity, heavy metals, sediment load, pH, hardness and biological oxygen demand;
 - A program to monitor
 - The effectiveness of the water management system;
 - Surface water flows and quality in local waterways; and
 - Ecosystem health of local waterways;
 - A plan to respond to any exceedances of the performance criteria, and mitigate and/or offset any adverse water impacts of the project; and
- c) Groundwater Management Plan, which includes:
- Detailed baseline data on groundwater levels, yield and quality in the area;
 - Groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts;
 - A program to monitor:
 - Groundwater inflows to the quarry operations;
 - The impacts of the project on local alluvial aquifers; and
 - Any groundwater bores and/or springs on privately-owned land that could be affected by the project;
 - A plan to respond to any exceedances of the groundwater assessment criteria.

The proponent will not carry out any development on the site under this approval before this plan has been approved by the Director-General.

Susan Shield (Umwelt Manager Water Resources Engineering) has been approved by DP&E to act as the suitably qualified person to prepare this WMP (refer to **Appendix E**).

1.1.1 EPL Monitoring Requirements and Criteria

EPL 20551 requires MSC to monitor water quality at three locations as follows:

- **Monitoring Point 1** is the discharge from Dam 3 and is the quarry's licensed discharge point (LDP) (shown as Dam 3 on **Figure 2**).
- **Monitoring Point 3** is an environmental monitoring point in the Duckmaloi River upstream of the quarry (shown as DRU on **Figure 2**).
- **Monitoring Point 4** is an environmental monitoring point in the Duckmaloi River downstream of the quarry (shown as DRD on **Figure 2**).

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The LDP discharge criteria are presented in **Table 2**. **Table 10** presents the monitoring parameters for all three monitoring points.

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3 PERFORMANCE CRITERIA

During the operation of the project, MSC will endeavour to implement best management practice to comply with statutory requirements and adopted performance criteria. Criteria will be monitored with reference to **Sections 11 & 12**. Compliance with EPL discharge water quality criteria is a primary indicator of environmental performance for MSCs' Oberon Quarry. Performance criteria adopted under the WMP is provided below and is refined in the relevant sub-section as indicated.

Table 2: Performance Criteria

Criteria		Note
Concentration limits for discharge from Dam 3 (LDP1 on EPL 20551) (Note: there are no volume limits for LDP1):		EPL 20551 criteria do not apply when rainfall exceeds the 5 day 90 th percentile rainfall depth (38mm).
Oil and Grease	10 mg/L	
pH	6.5 – 8.5	
Total Suspended Solids	50 mg/L	
Minimal substantiated complaints in regard to water management issues, for the life of operations. A specific numerical target will be set annually and at the adoption and review of the WMP.		MSC internally set target
MSC has established a goal for nil recorded incidents or near miss incidents in regard to water management issues, including unauthorised discharges, groundwater interception onsite and exceedances of water quality limits (as per Table 7).		MSC internally set target
All site water demands will be met using water sourced from dams that collect water for pollution control purposes and will be recorded in an annual Site Water Balance, as described in Section 5. MSC will ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of operations to match water availability.		Statutory requirement Schedule 3 Condition 21 of Project Approval (07_0122).
Establishment of surface water management structures prior to disturbance under the Project as described in Section 6 .		Statutory requirement Schedule 3 Condition 26 of Project Approval (07_0122).

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Implementation of measures to monitor groundwater impacts, avoiding impact to supply to neighbouring landowners, as described in Section 7 .	Statutory Requirement Schedule 3 Condition 26 of Project Approval (07_0122).
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4 WATER MANAGEMENT AND CONTROL MEASURES

MSC has committed to managing its operations to minimise impact on the environment, including in the case of water issues.

The water management and control measures are considered in three sub-plans within this WMP:

Sections 5 – Site Water Balance

Sections 6 – Surface Water Management Plan

Sections 7 - Groundwater Management Plan

The WMP is supported by the management measures in other management plans under the Environmental Management Strategy (EMS), especially where applicable to the rehabilitation components of watercourses and drainage areas, as in the Landscape Management Plan.

4.1 Overview of Quarry Water Management System

The WMS consists of two water management zones:

- i) “Clean” water zone - surface water runoff from catchments undisturbed by extraction, processing or related activities – referred to as Catchment C.
- ii) “Dirty” water zone - surface water runoff from disturbed catchments such as the active extraction area, that have the potential to produce significant concentrations of suspended sediment – referred to as Catchment D.

Runoff from Catchment C is directed around the disturbed areas via clean water catch drains to Dam 3. Runoff from Catchment D is directed to two separate sediment basins (Dam 1 and Dam 2). Dam 2 receives water collected in the extraction area sump (i.e. the operating pit). Dam 1 and Dam 2 overflow to Dam 3 during periods of high or prolonged rainfall which exceed the design criteria (refer to **Section 6**). The Dam 3 overflow point is the site’s licensed discharge point (LDP) as specified in EPL 20551. Dam 1 and Dam 2 have been designed manage runoff from a 5 day 90th percentile rainfall event (38 mm of rainfall over a continuous 5 day period).

Dirty water captured in the extraction area sump, Dam 1 and Dam 2 is either reused for operational purposes or treated to achieve EPL water quality limits (as required) and pumped to Dam 3 for discharge off site. **Figure 2** provides an aerial image of the site WMS and **Figure 3** presents a schematic overview of the site WMS.

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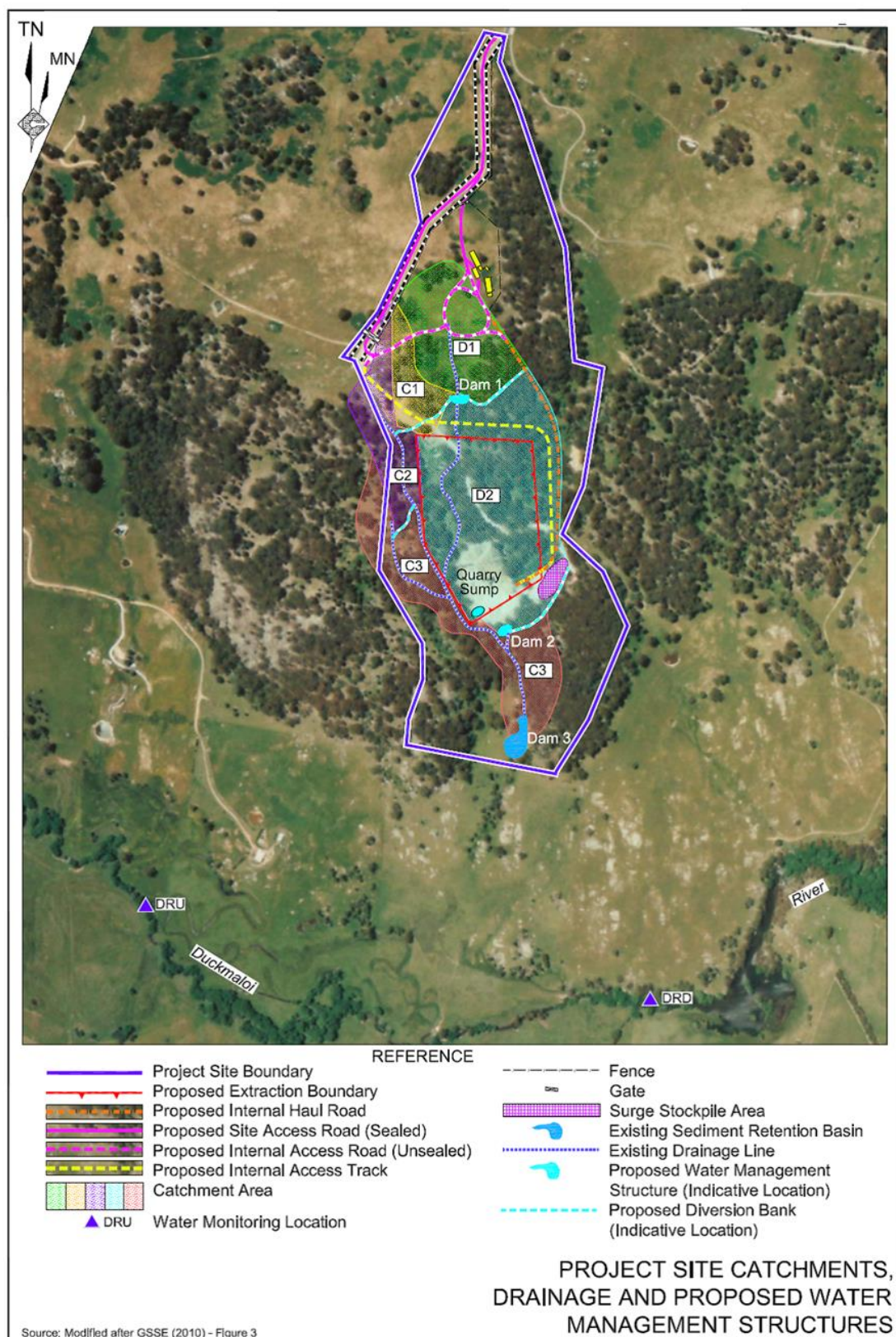


Figure 2: Project Site Catchments, Drainage and Proposed Water Management Structures

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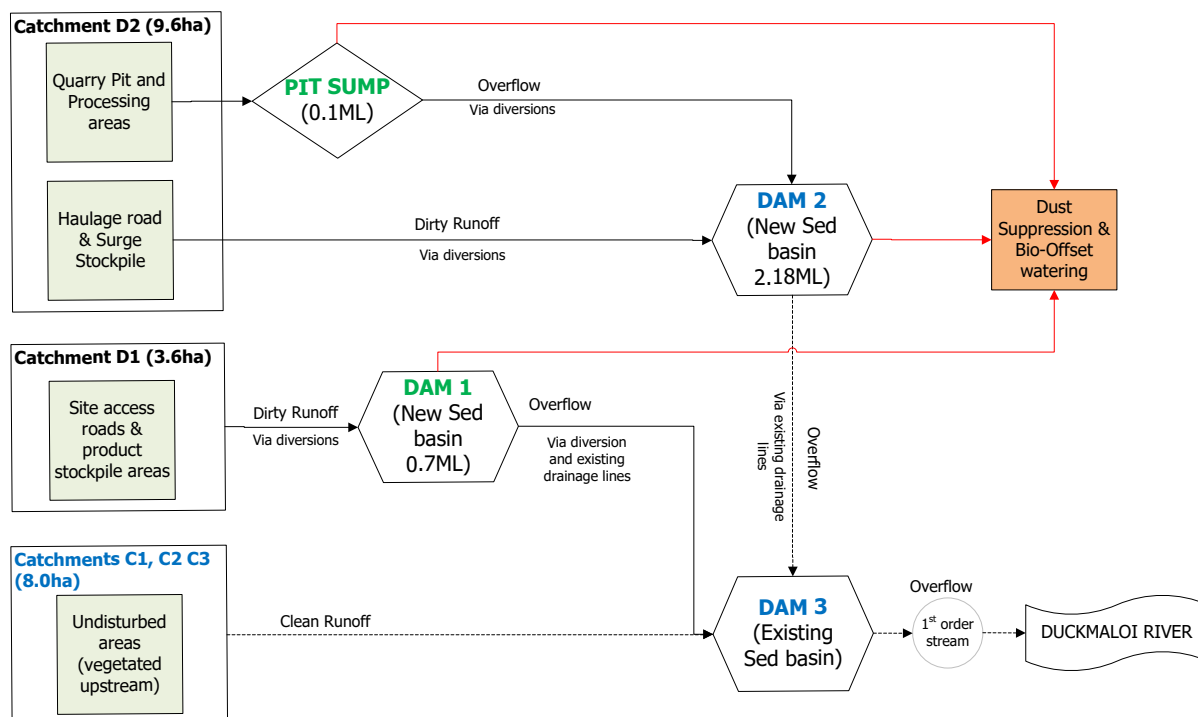


Figure 3: Water Management System Schematic

4.2 Additional Management Measures

4.2.1 On-Site Sewage

A Council-approved biocycle treatment system is to be installed and maintained adjacent to the amenities/facilities buildings for use by all site personnel and truck drivers. The system is to provide water for a landscaped area around the office and amenities/facilities buildings. This system will be installed to the satisfaction of Oberon Council and the EPA.

4.2.2 Storage of Chemicals

The storage of all chemicals and/or petroleum products on site is to be in accordance with Australian Standard AS1940-2004, *The Storage and Handling of Flammable and Combustible Liquids*. Storage areas will be appropriately signed, and store fuels/oils in appropriately bunded areas with impervious flooring and of sufficient capacity to contain 110% of the largest container stored within the bund. The flooring is to be designed in accordance with both the relevant Australian Standard and the EPA's *Storing and Handling Liquids: Environmental Protection – Participants Manual*.

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Fuel is to be brought daily on to the site as required with the eventual installation of a self-bunded fuel storage tank on site. The timing of this will be a response to economics and practicalities assessed by the Managers and Directors of MSC.

Without the use of mains power, it is estimated that up to 100 000L of diesel will be required per year at full production to generate the power to operate the crushing and screening plant and to operate the mobile equipment. It is proposed that a 5 000L mini tanker will service the mobile equipment and generators on an as needs basis. Whilst not in use, the mini tanker is to be parked adjacent the workshop. In the event mains power is used to operate the crushing and screening plant, annual fuel usage will likely drop to approximately 30 000L.

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SITE WATER BALANCE

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5 SITE WATER BALANCE

5.1 Water Management Catchment

As discussed in **Section 4.1**, the site WMS is divided into clean water (Catchment C) and dirty water (Catchment D) management zones.

Catchment C incorporates a total area of approximately 8.0 ha and, for the purposes of designing appropriate water management structures, can be divided into three sub-catchments C1, C2 and C3 (Refer to **Figure 2**).

Catchment D incorporates a total area of approximately 13.2 ha and can be divided into two sub-catchments D1 and D2. Catchment D1 has an area of 3.6 ha and includes the proposed stockpiling area which is located at the very top of the catchment with very little runoff flowing through the stockpiling area requiring management. Catchment D2 consists of a total area of approximately 9.6 ha and includes a small area north of the extraction area which contributes to runoff to the extraction area. For design purposes, it has been assumed that all water within Catchment D2 would contact disturbed areas.

Dam 1 and Dam 2 will overflow to Dam 3 via existing drainage lines. Overflow from Dam 1 and Dam 2 will only occur when the rainfall exceeds the 5 day 90th percentile rainfall depth of 38 mm. Therefore, the objective of the Water Management System (WMS) design (refer to **Section 6.1**) to segregate clean and dirty water is achieved except during high or prolonged rainfall events where dirty water overflow will mix with clean catchment runoff in Dam 3 prior to discharge off site.

5.2 Site Water Balance

As part of the Surface Water Assessment for the Project Environmental Assessment (EA), GSSE (2010) prepared a site water balance for the Project based upon the site water requirements and outputs and the water availability or inputs. The water balance was undertaken for dry, median and wet years (10th, 50th and 90th percentile rainfall years) with rainfall data obtained from the Bureau of Meteorology (BoM) monitoring station at Oberon (Station 063293).

As no significant groundwater is expected to be intersected during the extraction operation, groundwater seepage was not included as an input to the water balance. Outputs include evaporative losses from the proposed sediment retention basins (estimated 0.8 ML per year) and the use of 'dirty water' for dust suppression

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(approximately 15 ML per year). A surplus water balance for the dry, median and wet years was predicted in the EA.

Annual calendar year comparisons of site water balance are to be generated and reported within the elements of rainfall on site, site water usage and water discharges from the site (Refer to **Section 5.5**). During the last 12 months (i.e. October 2015 to October 2016) there has been in excess of 700 mm of rainfall recorded at the Oberon BoM with no off-site discharge recorded for the Project. A revised predictive water balance was prepared based on the average regional runoff and in consideration of performance over the last year. In the revised water balance, a small water surplus is predicted for average and wet rainfall years while a small deficit is predicted for a dry rainfall year. The predicted water balance results are presented in **Table 3**.

Table 3: Predicted Water Balance for the Oberon White Granite Quarry

Inputs and Outputs	Dry Yr (ML/Yr)	Avg Yr (ML/Yr)	Wet Yr (ML/Yr)
Input: Combined runoff from catchments C1, C2, C3, D1 & D2	14.2	20.1	23.9
Output: Evap. Losses and water from dust suppression	15.8	15.8	15.8
Water Balance	-1.6	4.3	8.1

5.3 Water Supply Management Measures

It is a prerequisite of the Project Approval that MSC has sufficient water for all stages of the project, and if necessary, that the scale of the project be adjusted to suit the water supply.

Water supply management measures include:

- **Planning Processes**

A monthly site planning processes will be undertaken by MSC management. This process will form the trigger to scale operations to match water supply. The Quarry Production Manager will ensure planned activities within the monthly work forecast are commensurate to the available water supply.

In the event that significant groundwater inflows into the extraction area are experienced, the water balance would need to be revised (refer to **Section 9.2**).

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- Surface Water Management System

The collection of surface water from site catchments forms the source of water for the development. MSC is to ensure the surface water management system is functioning as designed. The WMS Dams are designed to function as (type 'F' soils) sediment basins to accommodate the runoff from the design storm event as well as provide for some water storage for operational purposes. The dams are managed to ensure suitable freeboard is maintained to accommodate the runoff from the design rainfall event (refer to **Table 8, Section 6.5.1.2**). Implementation of an ongoing monitoring system is adopted that collects data on water usage, dam water depths, predicted and actual rainfall, water quality, and estimated water available for dust suppression.

- Segregation of non-production water usage

In addition to the quarry sump, Dam 1 and Dam 2 form the sources of water used for operational purposes. Also, potable water is not included. Any additional contingency supply needed will be purchased.

- Dust Monitoring

The Quarry Production Manager is to undertake ongoing dust monitoring and apply water as the key dust suppression technique. It is the responsibility of the Quarry Production Manager to restrict or stop operations if dust cannot be suppressed in conjunction with water availability knowledge.

5.4 Clean Water Use Minimisation Measures

Various strategies to reduce water usage on site and reliance on fresh water and production water used generally include:

- Water is to be sourced from dirty water catchment dams for dust suppression.
- Undergoing clearing campaigns outside of low rainfall times in order to reduce the need for dust suppression.
- Only utilising water jets fitted to the extraction and crushing equipment when necessary.
- Ongoing training for staff in water application activities.
- Monitoring of water application success in dust mitigation to avoid over watering in all situations.
- Use of treated effluent for watering of landscaping in the infrastructure area.
- Reducing water use in planted areas, prior to undertaking offset enhancement and rehabilitation, is to be considered in accordance with the LMP. Appropriate consideration will be given to site conditions, including soil type and condition, landform, time of year, climate, water availability, and vegetation community establishment outcomes.

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5.5 Monitoring And Evaluation –Site Water Balance

5.5.1 Reporting and Review – Site Water Balance

It is the responsibility of the Quarry Production Manager to ensure water usage monitoring has been performed. The site water balance will be regularly reviewed and reported externally on an annual basis and internally on a monthly basis. The site water balance elements of rainfall on site, site water usage and water discharges from the site will be included in the Annual Review and statutory reporting. Monthly water balance data will be utilised to plan future operations, and reported to the MSC Directors by the Quarry Production Manager.

Water balance monitoring will be undertaken using data collected as outlined in **Table 4**. Dam inspections are a component of the ongoing monitoring of surface water management measures. Regular inspections and checklists are to be utilised (refer to **Appendix C**).

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Table 4: Water Supply Monitoring

Parameter	Frequency	Method	Comment
Storage Dam volumes	Fortnightly survey	Levels on storage dams recorded against permanent depth gauges.	These dams will be monitored to ensure the dams are operating appropriately as sediment basins, and as an indicator of volume of water available for operations. (Approx. retained capacity to be compared against triggers).
Water taken for dust suppression/quarry operations	Daily	Number of water carts daily.	Trends regarding activities and water usage are able to be drawn. Seasonal variations to water usage will be monitored. This data will assist monthly planning processes.
Planned pumping from sediment basins to LDP to maintain available capacity for a 5 day 90 th percentile rainfall event (volume released)	Event based	Depth gauges used for volume estimation.	Water quality analysis to be performed within 24 hours of any discharge from Dam 3.
Rainfall	Monthly records	Project meteorological station.	Records can be compared to rainfall data for Oberon (Jenolan Caves Road Station 063293) i.e. nearest BoM stn.
Inflows of Groundwater	Any occurrence of groundwater interception is to be recorded by the Quarry Management. At least Monthly	Pit sump depth levels.	In the event that any permanent or significant inflows of groundwater were to occur, the water balance for the Project will be revised and the required management measures reviewed in consultation with the DPI Water.

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SURFACE WATER MANAGEMENT PLAN

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6 SURFACE WATER MANAGEMENT PLAN

6.1 Objectives – Surface Water Management

The principal objectives of surface water management at the Oberon White Granite Quarry are as follows:

1. To ensure that the water quality leaving the site meets the appropriate water quality criteria. This objective would be achieved by:
 - a) Diverting 'clean water' runoff away from disturbed areas and off site;
 - b) Directing sediment-laden runoff to designated sediment ponds
 - c) Maintaining sediment ponds to ensure that the settling zone capacity is available (i.e. sediment level monitoring (clean out as required) and freeboard for storm event capacity are maintained);
 - d) Storage of all hydrocarbons in accordance with the requirements of AS1940 – 2004 The storage and handling of flammable and combustible liquids (e.g. bunds to contain 110% of the largest storage vessel); and
 - e) Implementing an effective revegetation, maintenance and monitoring program.
2. To manage the soil resources of the site to minimise the risk of erosion and maximise the potential use of any stripped/disturbed soil in ongoing rehabilitation of disturbed areas.
3. To ensure appropriately designed and located water management structures are constructed and maintained to segregate "dirty" water from "clean" water.
4. To ensure that "dirty" water captured within the disturbed catchment of the Project Site is retained and water appropriately treated/managed to meet the water quality criteria.
5. To minimise erosion and sedimentation from all active and rehabilitated areas of the Project Site.
6. To monitor the effectiveness of surface water erosion and sediment controls and ensure the water quality criteria are met and that the Project Site has no adverse impact on water quality downstream, such as the Duckmaloi River.

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6.2 Baseline Data – Surface Water

Baseline data has been extracted from the EA compiled by R.W. Corkery & Co. Pty Ltd. Information was drawn from the water quality assessment undertaken by GSS Environmental (2010) which described the existing water quality, i.e. prior to quarry extension under Project Approval (07_0122).

6.2.1 Rainfall/Climate

There are two Bureau of Meteorology (BOM) sites in the Oberon area for which records are available. The Jenolan Caves Road site is data considered more representative and data is summarised below in **Table 5**. With the Project meteorological station installed prior to commencement, additional site specific data can be collected in future years. Rainfall data collected over the last 17 years at the Oberon Jenolan Caves Road BOM station (Station No. 063293) is summarised below. Whilst rainfall is reasonably well distributed through the year, there is a peak in Summer, with the lowest rainfall months being in Autumn and Winter. On average, January is the wettest month and April the driest, with the area experiencing an average 126.5 days of rain per year, and a mean total annual rainfall of 736 mm. The nearest BOM station that records evaporation is at Bathurst (Station No. 063005). Mean monthly evaporation data from the Bathurst BOM station from 1966 to present are also given in **Table 5**.

Table 5: Rainfall Data for Oberon (Jenolan Caves Road Station 063293)

Month	Mean Rainfall (mm)	Highest Monthly Rainfall (mm)	Lowest Monthly Rainfall (mm)	Highest Recorded Daily Rainfall (mm)	Mean No Days of Rain	Mean Evaporation (mm)
Jan	85.7	205.0	19.4	119.0	10.3	210.8
Feb	74.7	212.9	9.6	71.8	10.3	162.4
Mar	53.4	216.6	4.4	45.8	9.2	139.5
Apr	43.8	227.1	2.4	54.0	7.2	87.0
May	45.3	130.8	1.6	36.8	9.9	52.7
Jun	55.4	109.0	0.0	42.8	12.1	33.0
Jul	60.6	108.2	19.0	33.4	13.6	37.2
Aug	61.9	192.2	6.0	72.0	11.9	55.8
Sep	59.9	135.4	10.0	76.6	12.5	84.0
Oct	57.8	186.4	5.6	53.8	8.9	127.1
Nov	75.4	139.8	14.4	49.0	11.3	159.0
Dec	66.2	153.6	10.2	35.6	9.3	201.5
Year	736				126.5	1350.0

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6.2.2 Local and Project Site Drainage

The Project site falls within the southern reaches of the Central West Catchment Management Authority Area. The Project site catchments and drainage systems are shown in **Figure 4**). The Project Site drains to the Duckmaloi River, which forms part of the Fish River catchment, a tributary of the Macquarie River. The Duckmaloi River is located approximately 500 m south of the Project Site and flows in an easterly direction at this locality with the Duckmaloi Weir located approximately 300m downstream. The Duckmaloi Weir provides approximately 20 ML of water storage and forms part of the Fish River Water Supply Scheme. The scheme is a water source for Oberon and Lithgow Councils town water, the Sydney Catchment Authority to supplement town supplies in the upper Blue Mountains and the Wallerawang and Mount Piper power stations.

Within the Project Site, two ephemeral drainage depressions are located one to the east and one to the west of the existing extraction area. The drainage depression adjacent to the western edge of the extraction boundary is reasonably well defined but becomes less defined towards the north as the topography becomes flatter. These two drainage depressions converge south of the extraction area to become a 1st order stream which is a tributary of the Duckmaloi River and drains to an existing retention basin (Dam 3) located on the southern boundary of the Project Site before leaving the site.

A number of other minor ephemeral drainage depressions are also located within the Project Site including a southerly flowing depression commencing near the western boundary of the Project Site and joining with the drainage depression located adjacent to the western edge of the existing extraction area. A poorly defined southerly flowing drainage depression also commences immediately south of the proposed stockpile area and flows towards the existing extraction area (refer to **Figure 4**).

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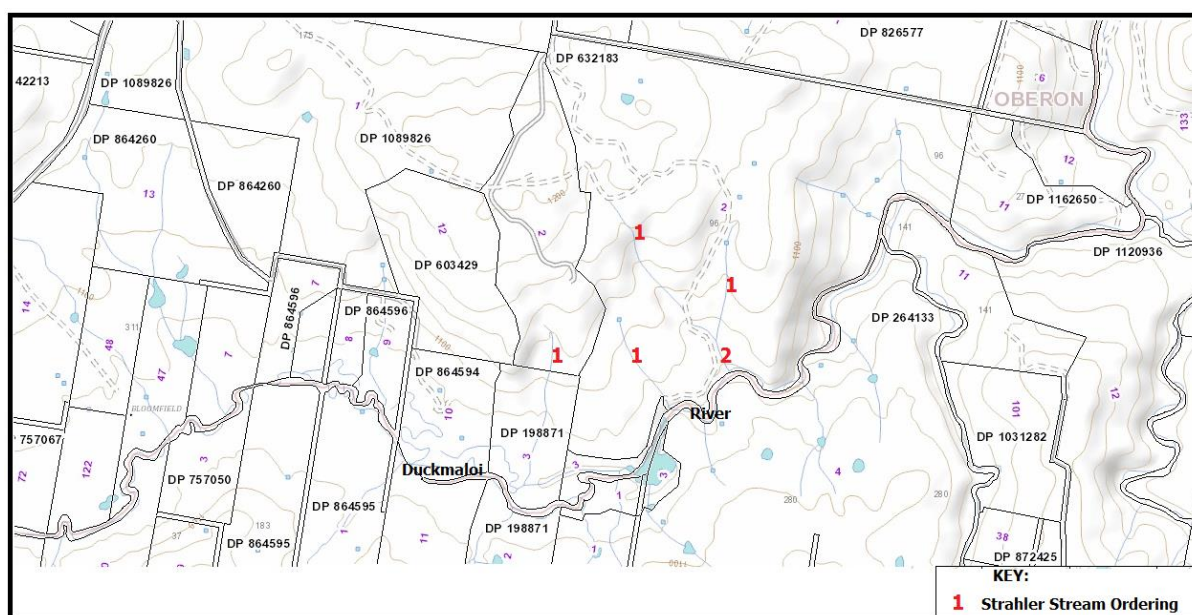


Figure 4: Strahler Stream ordering in vicinity of the Project Site

6.3 Existing Surface Water Quality

A water sample was collected from Dam 3 on 28 November 2007 and sent to a laboratory for analysis. Results of the water quality analyses are presented in **Table 6** together with the default water quality triggers from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)* (ANZECC), where applicable. The watercourses surrounding the Project Site are categorised as Upland Rivers according to ANZECC guidelines.

As shown in **Table 6**, the water results are generally consistent with the default trigger values specified in the ANZECC guidelines. It is noted that zinc and iron levels are slightly above the default ANZECC trigger values, however, pH, electrical conductivity and suspended solids are all well within the default ANZECC trigger values.

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Table 6: Surface Water Quality Baseline Data - Southern Retention Basin (Dam 3)

Analyte (unit)	Sample Taken from Existing Sediment Retention Basin 28/11/07 (Dam 3)	ANZECC Default Trigger Value for freshwater	Source
pH	6.51	6.5-8.0	ANZECC Table 3.3.2 (Trigger values for South-East Australia, upland rivers)
Conductivity (µS/cm)	79	30-350	ANZECC Table 3.3.3 (Trigger values for upland rivers)
Suspended Solids (mg/L)	5	<40	ANZECC Guidelines for Physio-Chemical stressors (freshwater)
Total Alkalinity as CaCO ₃ (mg/L)	12	-	-
Sulphate as SO ₄ ²⁻ (mg/L)	4	-	-
Chloride (mg/L)	7.7	-	-
Dissolved Major Cations			
Calcium (mg/L)	<1	-	-
Magnesium (mg/L)	<1	-	-
Sodium (mg/L)	12	-	-
Potassium (mg/L)	<1	-	-
Ionic Balance			
Total Anions (meq/L)	0.55	-	-
Total Cations (meq/L)	0.50	-	-
Total Metals			
Arsenic (µg/L)	2	24	ANZECC Table 3.4.1, 95% species protection level
Cadmium (µg/L)	<0.1	0.2	
Copper (µg/L)	<1	1.4	
Lead (µg/L)	<1	3.4	
Manganese (µg/L)	46	1900	
Zinc (µg/L)	9	8	
Iron (µg/L)	350	300	2000 ANZECC Guidelines for Recreational Water Quality and Aesthetics
Source: GSSE (2010) – Table 6			

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6.4 Performance Criteria - Surface Water Management

Performance criteria adopted under the Surface Water Management Plan are outlined in **Table 7** below. In accordance with the Project Approval Schedule 3 Condition 22, all surface water discharges from the site are to comply with:

- a. section 120 of the POEO Act; or
- b. the discharge limits set for the project in the EPL (EPL 20551).

Table 7 presents the site water discharge concentration limits from the site EPL (EPL 20551) in addition to a range of selected the trigger values adopted from the ANZECC guidelines. The trigger values have been adopted to initiate an investigation into the potential cause (e. quarry operations related) and the potential adverse impacts on the:

- site WMS;
- surface water quality of local waterways; and
- ecosystem health of local waterways.

Table 7: Performance Criteria for Surface Water Quality

Location	Parameter	Trigger/Criteria	Reference
Dams 1, 2 & 3 (WMS dams)	TSS	<50 mg/L	EPL 20551
	pH	6.5 – 8.5	
	Oil and Grease	<10 mg/L	
	EC	1500 µS/cm	Values consistent with Water Quality Objectives in EA as adopted by GSS Environmental (2010)
Local Water Way Duckmaloi River	pH	6.5-8.0	ANZECC Table 3.3.2 (Trigger values for South-East Australia, upland rivers)
	TSS	<40 mg/L	2000 ANZECC guidelines for Physio-chemical stressors (freshwater)
	EC	30-350 µS/cm	ANZECC Table 3.3.3 (Trigger values for upland rivers)
	Iron (dissolved)	300 µg/L	2000 ANZECC Guidelines for Recreational Water Quality & Aesthetics
	Manganese (total)	1900 µg/L	ANZECC Table 3.4.1 (Level of Protection 95% of species)

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6.5 Surface Water Management Controls And Measures

MSC has committed to managing its operations to minimise impact on the environment and community, including surface and ground water issues. Appendix C. The WMP is guided by the following surface water management measures.

6.5.1 Surface Water Management

6.5.1.1 Diversion of Clean Water

One of the primary objectives of water management on the Project Site will be the diversion of clean water away from the extraction area to adjacent drainage lines at non-erosive velocities. The following water management structures will be constructed to divert clean water runoff.

- **Diversion Banks (Low Flow)**

Two clean water diversion banks are constructed including one diversion bank north of the extraction area within Catchment C1 and a second diversion bank west of the extraction area within Catchment C3. The diversion bank to the north of the extraction area diverts water flowing from the top of the clean water catchment and any overflows from Dam 1 around the western side of the active extraction area into Catchment C2.

The second diversion bank diverts water from the ephemeral drainage depression on the boundary of the extraction area to the drainage depression located further west. The diversion bank is located towards the northern part of the drainage depression where the drainage line is much less defined and the topography is flatter.

The diversion banks are to be constructed and maintained generally in accordance with Blue Book (The Blue Book – Managing Urban Stormwater) Standard Drawing SD 5-5, with the following design specifications which have been based on 50 year ARI design calculations.

- Where longitudinal gradient exceeds 1% additional scour protection to be implemented, e.g. rock armouring.
- Height of the bank at least 0.3m.
- Channel depth of approximately 0.4m and base width of 1.0m.

A level spreader (or sill) constructed at the bank discharge point to reduce the risk of erosion.

Diversion banks will be sown with a non-persistent cover crop within 10 days of construction to prevent erosion of the bank and drain until native grasses and groundcover are established. As a contingency to achieve stabilisation, in the event

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native grass cover cannot be established due to climatic conditions etc within a 2months a geotextile alternative stabliser shall be utilised.

- **Road Crossings**

Part of the existing site access road will be retained as an internal access track. As shown in **Figure 4**, the diversion bank within Catchment C1 will cross the existing road. Despite the low flows expected in the channel, a pipe culvert will be installed to allow light vehicles to cross the diversion and minimise the potential for sediment mobilisation. Stabilisation works including use of geofabric and rock ballast will be undertaken within the diversion channel at the inflow and outflow points of the culvert.

- **Road Drainage**

Given the relatively steep gradient (from a surface water control perspective) of the internal haul road, spoon drains are to be constructed during initial site establishment along its length as necessary. The primary function of the spoon drain is to reduce the concentration and velocity of water flows within the road-side drainage and, therefore, minimise the potential for erosion and of sediment to discharge points.

6.5.1.2 Capture/Management of Dirty Water

The WMS consists of two separate dirty water catchments (Catchments D1 and D2) and three clean water catchments (Catchments C1, C2 and C3). Runoff from Catchments D1 and D2 is directed to two separate sediment basins (Dam 1 and Dam 2 respectively). Clean water catch drains direct runoff from the clean water catchments to Dam 3. Dam 1 and Dam 2 overflow to Dam 3 during periods of high or prolonged rainfall. The Dam 3 overflow point is the sites licensed discharge point as specified in EPL 20551. Dam 1 and Dam 2 have been designed accommodate the runoff from a 5 day 90th percentile rainfall event (38 mm of rainfall over a continuous 5 day period) as the EPL water quality discharge limits do not apply for discharges within 5 days of the design rainfall event.

Catchment D1 which consists of the site access roads and product stockpile areas drains to Dam 1. Dam 1 is a small sediment retention basin with a capacity of 0.70 ML (settling zone capacity) which is sufficient to adequately manage runoff from the D1 catchment (3.6 ha) during a 5 day, 90th percentile rainfall event. Dam 1 has been constructed in Catchment D1 immediately to the north of the proposed extended extraction area boundary. Dam 1 has been designed to exceed the requirements of a Type F sediment basin as defined by the Blue Book and provides a second level of

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protection in the event that sediment controls around the product stockpiles fail during an extreme rainfall event.

For runoff from Catchment D2 a 0.1 ML sump has been constructed in the southwestern corner of the extraction area and Dam 2 immediately south of the southern batter of the extraction area. Runoff within the extraction area initially flows to the quarry sump effectively containing all dirty water runoff from the internal haul road and extraction area within the extraction area. As required, excess water from the quarry sump will either be pumped or siphoned to Dam 2. A diversion bank will also be constructed immediately downslope of the surge stockpile area and will direct runoff from the surge stockpile area to northeast Dam 2.

Dam 2 has been designed to a Type F sediment basin in accordance with the Blue Book and has a capacity of 1.82 ML (settling zone volume) which is sufficient to adequately manage runoff from the D2 catchment (9.6 ha) during a 5 day, 90th percentile rainfall event (as stated in the EPL).

Dirty water captured in the extraction area sump, Dam 1 and Dam 2 will be either reused for operational purposes or treated as required and pumped to Dam 3 for discharge off site. (Refer to **Appendix C** Plans of Water Management Structures and Erosion Control Measures).

Table 8: Summary of Dam Volumes

Structure	Type	Settling Zone Capacity (ML)	Settling Zone Capacity (ML)	Total Capacity (ML)	Freeboard to Accommodate Design Storm Event (m) ¹
Dam 1 (sediment basin)	Type F sed basin	0.70	0.09	0.79	1.25
Dam 2 (sediment basin)	Type F sed basin	1.82	0.33	2.15	2.80
Quarry Sump	-	-	-	0.10	-
Total		2.52	0.42	3.04	-

Note 1: Freeboard distances are measures from top of dam wall (based on design drawings)

Dam 1 and Dam 2 will be managed to maintain freeboard to accommodate runoff from a 5 day 90th percentile rainfall event (as per the EPL). The sediment dams will be dewatered at a rate to discharge the settling zone capacity over a five day period to

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Dam 3. Water quality monitoring will be undertaken prior to dewatering of the sediment dams to ensure that the water pumped to Dam 3 meets the concentration limits in EPL 20551. Should the water contained in the sediment dams exceed any of the water quality criteria, appropriate treatment (e.g. addition of a flocculant to manage suspended solids) will be applied prior to dewatering.

6.5.1.3 Additional Sediment Protection

Additional sediment controls will be installed, particularly during site establishment and construction, to reduce the velocity of flows, and therefore reduce the potential for erosion within channels and at the discharge points.

Sediment fences will be installed on the downstream periphery of all stockpile footprint areas, including the proposed stockpile area and surge stockpile, and temporary disturbance areas where the area draining to the fence is less than 0.6 ha, the slope length is less than 60m and the slope is no greater than 1:2 (V:H). Straw bale filters and check dams may also be used as appropriate.

Exposed and disturbed areas will also be rehabilitated as soon as possible and practicable to minimise the erosion potential of the site.

6.6 Surface Water Management for Rehabilitated Areas

The site establishment and construction phase will result in the disturbance of a number of areas on the Project Site including: areas adjacent to the internal roads, the safety bund and channel, and new water management structures. Also, the existing Dam 3, near the southern boundary of the Project Site, requires stabilisation and rehabilitation works to be carried out during site establishment.

Such rehabilitation areas are to receive watering as required in accordance with the Landscape Management Plan. MSC will record the details of each rehabilitation campaign so that they are available for later interpretation of rehabilitation monitoring results with the aim of continually improving rehabilitation standards on site, including water application rates. Surface preparation techniques, planting techniques, fertiliser and water application rates will be developed in consultation with a rehabilitation expert or agronomist.

Runoff water is to be of an acceptable standard at all phases of construction and post site establishment rehabilitation. Temporary measures are to be installed such as sediment fence and removed only when groundcover and stabilisation is achieved.

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6.7 Monitoring and Evaluation –Surface Water

6.7.1 Monitoring Locations

Table 9 identifies the monitoring point locations, the type of monitoring point along with a brief description of the location and frequency. The frequency of sampling will be reviewed annually and adjusted in consultation with the EPA and DPI Water. It is noted that any change to the monitoring program will entail a change to the WMP which will require the approval of the Department.

Table 9: Proposed Monitoring Locations – Surface Water

Location	Type of Monitoring Point	Description of Location	Frequency
Dam 1	Water Quality	Proposed dam located above extraction area	Quarterly
Dam 2	Water Quality	Proposed dam located below extraction area	Quarterly
Dam 3	Water Quality	Existing dam located at southern boundary of the Project Site	Quarterly and monthly during discharge.
Duckmaloi River - Upstream (DRU)	Water Quality	Upstream of the Project Site	Annually (if creek flowing) and monthly during discharge from Dam 3.
Duckmaloi River – Downstream (DRD)	Water Quality	Downstream of the Project Site	Annually (if creek flowing) and monthly during discharge from Dam 3.
Project Site water management (erosion and sediment control) structures	Erosion and Sediment Control	All noted erosion and sediment control structures	Weekly and prior to and after significant rainfall events (>25 mm in 24 hours).
Source: GSSE (2010) – Table 13			

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6.7.2 Surface Water Monitoring Parameters

Table 10 presents the parameters that will be measured at each monitoring location. The recorded values for the parameters measured will be assessed against the existing water quality monitoring results and the default ANZECC trigger values presented in **Table 7**, and plotted to identify any trends over time. The range of analytes measured will be reviewed following the first 12 months of monitoring and a diagnostic set of analytes adopted for ongoing monitoring. Water quality monitoring results will be presented within each Annual Review. In the event that monitoring identifies an ongoing upward trend of one or more of the analytes, the water management measures will be reviewed in consultation with the Department, EPA and DPI Water. It is noted that any change to the monitoring parameters will entail a change to the WMP which will require the approval of the Department.

Table 10: Monitoring Parameters

Location	Parameters	Sampling Method
Dams 1,2 and 3 (EPA Point 1)	pH	Representative sample
	Total Suspended Solids	
	Oil and Grease	
	Electrical Conductivity	
Duckmaloi River – upstream (EPA Point 3) and downstream (EPA Point 4)	pH	Representative sample
	Total Suspended Solids	
	Total Dissolved Solids	
	Specific Conductance	
	CO ₃ (as CaCO ₃)	
	HCO ₃ (as CaCO ₃)	
	Calcium	
	Chloride	
	Iron (dissolved)	
	Potassium	
	Magnesium	
	Manganese	
	Sodium	
	Sulphur (as SO ₄)	
	Total Hardness (as CaCO ₃)	
	Oil and Grease	
Flow (visual observation)		
Source: Modified after GSSE (2010) – Table 14		
Note: Chemical species to be analysed for total (dissolved and undissolved) concentrations unless otherwise noted.		

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6.7.3 Ecosystem Health

Water quality monitoring results in the Duckmaloi River upstream and downstream of the Project will be used to provide an indicator of any potential impacts of the Project on ecosystem health. An investigation into the cause of a deviation outside of the adopted water quality trigger values for the Duckmaloi River will initiate an investigation into the potential cause of the deviation.

In the event of any indications showing that the health of the River is affected by quarry discharges, further monitoring will be implemented in consultation with the Department. (Macroinvertebrate sampling or SIGNAL assessment of stream health should be considered or the like).

6.7.4 Erosion and Sediment Control

Water management structures (as outlined in **Section 6.5**) including the diversion banks, sediment retention dams, spoon drains and sediment fencing will be inspected on a monthly basis or following a rainfall event of >25mm/24hr using the sediment and erosion control checklist (**Appendix D**). During inspections, assigned personnel will note the general condition and effectiveness of the on-site water management structures and remaining capacity. In the event that any upgrade or stabilisation works are required, these are to be completed as soon as possible.

Depth gauge boards are to be installed in all sediment dams during quarter 1 2017 (January to March). Upon installation of the depth gauge boards the Trigger Action Response Plans (TARPs) in **Appendix D** will be updated to include specific details of levels for sediment removal and water release.

- **Dewatering** - Construction activities and ongoing operations have the potential to expose & disturb large areas fine grained soils that are likely to generate turbid runoff. Runoff generated within the disturbance envelopes will be directed to sediment dams so that suspended sediments can be treated instead of discharging. As such when the sediment deposits require clean out, suspended soil particles will need to be removed by settlement and/or flocculation before water can be discharged and any sediment build up relocated to soil storage and/or reuse on site.

To remain functional, the sediment dams must have storage volumes managed and therefore the system of monitoring should be supported by the TARP including a trigger for dewatering (see levels in **Appendix D**). As the sediment dams have a water storage purpose as well as sediment treatment, the depth gauges are to be installed and monitored weekly and prior to significant rainfall events to ensure sufficient capacity is available to store the design rainfall event and monitor available water supply.

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Either perforated riser pipes (at various heights) with outlet stop gates, or pumps with floating suction hoses will be used to dewater the temporary ponds and traps. In line with procedures described in Chapter 6 of the "Blue Book" (2004) gypsum should be used as the flocculating agent. When triggered, flocculation can be achieved using a perforated 200 L drum (located half submerged just within the pond at top water level to enable trapped water to enter the drum), a portable flexi-drive pump and suction & discharge hoses, and a supply / stockpile of gypsum.

Gypsum at the rate of approximately 32 kg/100 m³ of stored pond water is emptied into the drum to create a slurry, and the mixture of Gypsum and water is sprayed over the entire surface of the basin. Flocculation may take between 36-72 hrs and the results of flocculation must be monitored before dewatering commences. Treated water must meet the appropriate water quality guidelines specified in EPL 20551 for LDP1. Details contained in Appendix E of the "Blue Book" Managing Urban Stormwater - Soils and Construction (Department of Housing 2004) are to be referenced before any flocculation and dewatering operations occur.

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GROUNDWATER MANAGEMENT PLAN

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7 GROUNDWATER MANAGEMENT PLAN

7.1 Objectives - Groundwater Management

The principal objectives of groundwater management at the Oberon White Granite Quarry are as follows:

1. The loss of groundwater availability at private licensed bore, local creeks and rivers is avoided.

The standing water level (SWL) within the closest registered groundwater bore, GW801330, is not adversely affected by quarrying operations (with reference to previous meteorological conditions, pumping records provided by the landholder and records of any groundwater inflows to the extraction area).

(This SWL is to be recorded and reviewed to obtain meaningful data and criteria reviewed after 12 months of monitoring).

2. Any groundwater seepage experienced is not to be used for quarrying operations as part of the water supply.

Observations are undertaken to identify groundwater inflows to the quarry sump (refer to **Section 5.5**).

3. Quarrying operations are to not cause detriment to the quality of groundwater.

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7.2 **Baseline Data – Groundwater**

Baseline data has been extracted from the EA compiled by R.W. Corkery & Co. Pty Ltd.

7.2.1 **Groundwater - Regional and Local Hydrology**

The nature and occurrence of the alaskite resource with its continuity as a massive rock body at depth, results in limited groundwater being present. Groundwater occurs either within shallow zones where localised weathering has allowed infiltrating rainfall to accumulate or localised fracture zones near the surface. Whilst groundwater occurrences are present, a continuous groundwater table is unlikely due to the localised nature of the weathering and/or fracture zones.

The groundwater resources present beneath the alaskite resource are invariably localised and whilst some may intersect the surface at local springs, the quantity of water available is limited. Beyond the boundary of the alaskite resource, the surrounding rocks are expected to contain a range of groundwater resources reflecting the presence of either natural permeability in the rock types or more likely the fractures created by faulting and jointing. There is predicted negligible connectivity between the groundwater resources in the rocks surrounding the alaskite resource and the localised groundwater occurrences within the alaskite itself.

7.2.2 **Groundwater Use, Availability and Quality**

Limited groundwater was intersected in nine out of 29 exploration bores drilled in May 2003, however, insufficient volumes of water were encountered to enable samples to be collected. These holes were drilled to a maximum depth of 23.4m with moist material encountered at varying depths between 9.1m and 16.9m below ground level. Based on the MSC's experience with the existing operation, the water intersected was representative of shallow and unconnected perched aquifers rather than a significant groundwater resource.

Limited data is also available from eleven registered bores within a 3km radius from the closest point of the proposed extraction boundary (see **Table 11** and **Figure 5**). The registered bores presented in **Table 11** and **Figure 5** were identified in the EA. No significant groundwater source is likely to be intersected by the extraction activities, as the lowest expected level achieved in the extraction area is 1 130m AHD. This is higher than the water level within the closest registered bore located GW801330 is located approximately 570m to the southwest of the closest point of the proposed extraction area, at approximately 1058m AHD. The next closest registered bores are located to the south (GW802990) and to the northwest (GW801754) approximately 1.4km and 2.3km respectively from the proposed extraction area. An

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inspection of the bore logs and geological map confirms that these bores are located in geological units separate from the Oberon alaskite, namely basalt and shale.

In addition to the registered groundwater bores, two surrounding landholders, A.A. & M. Apoleski and C.J. & V.T. O'Neill, advise that their properties contain spring fed dams which are used for stock watering and general purposes. It is also understood that water is obtained from an old exploration hole located on C.J & V.T O'Neill's property. Springs have also been reported to occur within a drainage line of two additional landholders, T.A. & J.M. Breed and H.R. and S.P. Webb.

MSC has inspected the springs/seeps and exploration bore located on C.J. & V.T. O'Neill's, H.R. and S.P. Webb's and T.A. & J.M. Breed's properties. The springs on these properties are located within drainage lines and it is understood that the springs flow following rainfall and then continue to seep for varying periods. Similarly, the exploration bore provides intermittent water supply providing most reliable water supply following rainfall. No water quality data is available.

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Table 11: Registered Groundwater Bores

Bore	Usage	Collar Elevation (m AHD)	Distance to closest point of proposed extraction area (m)	Final Bore Depth (m, below surface)	Water-bearing Zones (mbgl)
GW801326	Domestic Stock	1150	2480	40	18 – 18.3 27.1 – 27.4 35.5 – 36
GW070870	NA	1170	2520	NA	NA
GW801754	Domestic Stock	1140	2360	50	45.2 – 45.5
GW801330	Domestic Stock	1070	570	36	30 – 30.3
GW800135	Domestic Stock	1155	1930	58	36.3 – 36.4 51 – 51.3
GW056745	Domestic Stock	1140	1910	38.1	18.2 – 18.5 24.3 – 24.6 32.9 – 33.2
GW801331	Domestic Stock	1130	2360	42	34 – 36
GW801718	Domestic Stock	1090	3440	45	18.3 – 18.6
GW033430	Domestic	1100	3320	27.4	18.3 – 25.6
GW801530	Domestic Stock	1150	2870	88	NA
GW050377	Domestic Stock	1150	3170	31.4	15.2 – 15.8 25.3 – 25.6
GW801443	Domestic Stock	1150	3090	75	72 – 72.1
GW801662	Domestic Stock	1140	3120	54	51.1 – 51.5
GW802327	Domestic Stock	1130	3170	42	25 – 26
GW801585	Domestic Stock	1150	2940	43	40.1 – 40.4
GW801173	Domestic Stock	1150	2840	42	33 – 33.5 39 – 39.5
GW070273	NA	1160	2970	46	31 – 33.2 41 – 43
GW802007	Domestic Stock	1110	3620	60	47.1 – 47.4
GW803863	Domestic Stock	1170	2695	NA	NA
GW802989	Domestic	1130	2020	82.5	19 – 19.5 41 – 41.5 62 – 62.5 73 – 73.5
GW802990	Stock	1120	1450	39	7 – 8 10 – 10.5 16 – 16.5 26 – 26.5 32 – 32.5
GW802718	Domestic	1140	3950	104	12 – 12.5 31 – 31.5 83 – 84 90.5 – 91
Source: DECCW Groundwater Database. NA- Not Available mbgl – meters below ground level					

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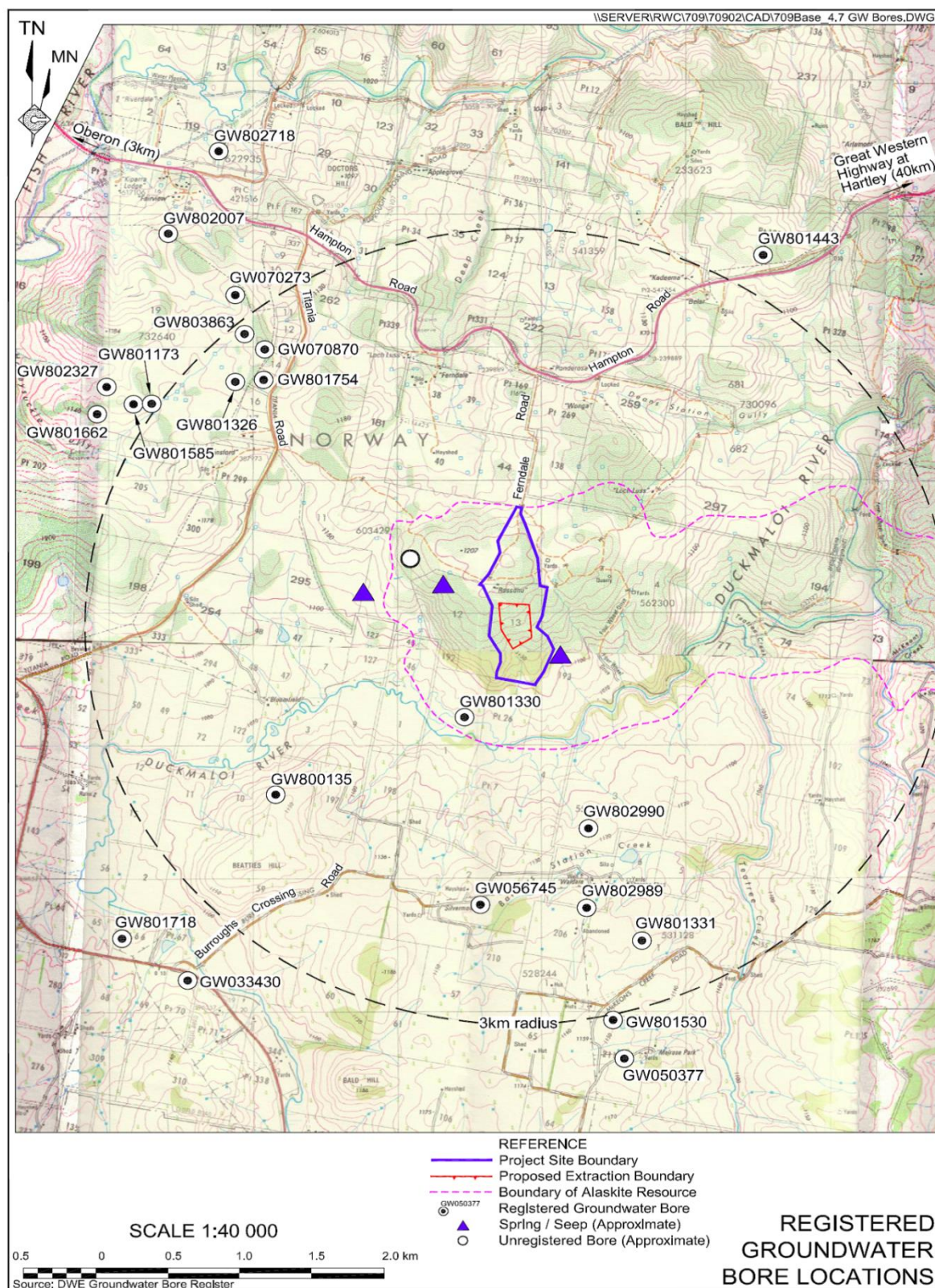


Figure 5: Registered Groundwater Bore Locations

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7.3 Groundwater Interception Risks

Groundwater extraction that may potentially occur due to the development will be limited to seepage into the pit. This may be from localised shallow and unconnected perched aquifers. Any future occurrence of groundwater seepage and rainfall collected will not be pumped off-site. All water will be directed to the pit sump for infiltration and/or evaporation. As described a continuous groundwater table is unlikely due to the localised nature of weathering and/or fracture zones. There is expected negligible connectivity between the groundwater resources in the rocks surrounding the alaskite resource and the localised groundwater occurrences within the alaskite itself. Thus any interception of groundwater on site carries a low risk of affecting neighbouring bores and any groundwater dependent systems, although there are no known occurrences of such systems.

Predicted impacts of the final landform on the groundwater regime have been considered. Under the final landform, assuming no interception of groundwater occurs, the proposed remaining void and pond/sump areas have the potential to increase infiltration to localised aquifers (offset by evaporation). However, the impact is considered to be negligible outside the alaskite resource. The direction of broader groundwater flow is not expected to change significantly between final development and post development.

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7.4 Groundwater Management Controls and Measures

MSC has committed to managing its operations to minimise impact on the environment and community, including surface and ground water issues. The WMP is guided by the following groundwater management measures.

7.4.1 Groundwater Management Measures

7.4.1.1 Control and Mitigation Measures

The best practice surface water controls and mitigation measures outlined in the WMP which limits potential contamination of surface water from sediments and hazardous materials equally are applicable to protect the groundwater resources.

7.4.1.2 Seepage in the Extraction Area

Any minor seepage into the extraction area will be collected within the quarry sump with the volume reduced by evaporation and infiltration. Any overflow will be directed to sediment retention basin (Dam 2) and will be managed with captured dirty surface water runoff. Seepage volumes are not to be utilised as part of the available water for the Project.

In accordance with **Section 5.5**, in the event that any permanent or significant inflows of groundwater were to occur, the water balance for the Project will be revised and the required management measures reviewed in consultation with DPI Water.

7.4.1.3 Water Management Plan Monitoring and Response

Ongoing monitoring as described in **Section 7.5** and water management responses discussed in **Section 9.2** are to be implemented for the life of the Project. Due to the limited presence of groundwater within the extraction area, no further management controls are considered necessary.

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7.5 Monitoring and Evaluation –Groundwater

7.5.1 Groundwater Quality

Infiltration of collected surface water and any seepage in the quarry sump potentially may impact on groundwater quality, however, this is considered unlikely due to the prediction of limited groundwater interactions in the EA. Quality testing at nearby bores is also not considered pertinent due to the limited presence of groundwater predicted. However should observations and monitoring detect impacts in groundwater, in consultation with the Department, the WMP monitoring program will be expanded to include additional water quality monitoring of bores.

Ongoing water quality monitoring within the existing and proposed sediment retention basins will continue to be undertaken to assist in identify any potential risks to groundwater quality.

7.5.2 Groundwater Levels

Monitoring of surrounding groundwater bores will be undertaken with the agreement of landholders for the monitoring of groundwater levels (see **Section 7.5**). In order to demonstrate that the Project does not result in adverse impacts upon surrounding groundwater users, in consultation with the respective landowners, the MSC monitoring program, includes monthly monitoring of water levels for nearby groundwater users. Monitoring locations are provided in **Table 12**. MSC will continue to liaise with local landholders in regards to access to monitor groundwater.

Table 12: Proposed Monitoring Locations - Groundwater

Location	Type of Monitoring Point	Description of Location	Frequency
GW801330	SWL	Closest registered groundwater bore, located approximately 570m to the southwest of the extraction area.	Quarterly*
Exploration hole within C.J. & V.T. O'Neill's property	SWL	Property to Northwest of project area.	Quarterly*
*Frequency of monitoring to be regularly reviewed throughout the life of the Project.			

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The standing water levels will be reviewed in light of previous meteorological conditions, pumping records provided by the landholder and records of any groundwater inflows to the extraction area. The frequency of monitoring and/or need for ongoing monitoring will be regularly reviewed throughout the life of the Project to ensure only meaningful data is being collected.

The results of the monitoring will be presented within each Annual Review. In the unlikely event that groundwater levels are considered to have been affected as a result of the Project, the Proponent is to undertake further consultation with EPA, DPI Water and the affected landholder to mitigate or compensate for those impacts.

7.5.3 Groundwater Inflows

Should groundwater be intercepted as a result of quarry operations the approximate volume of inflow to the extraction area will be recorded and reported in the Annual Review.

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8 CONTINGENCY PLAN

Where water management measures have been instigated in accordance with the WMP, and unauthorised impact is considered likely, contingency measures will be implemented:

- As soon as practicable for direct impacts; and
- After appropriate evaluation, consultation, planning and design for indirect impacts.

Contingency measures will be at the discretion of the Production Manager in consultation with DPI Water and the EPA.

Measures include:

- Quarry operations will cease or be modified until issues can be determined and managed.
- Utilising chemical additives in water carts to act as dust suppressants

MSC Management will undertake review and ensure that ongoing impacts are within acceptable limits or issues resolved as quickly as possible. Measures adopted in the WMP will be revised accordingly.

8.1 Compensatory Water Supply

Schedule 3, Condition 23 of the Project Approval requires that MSC provide a compensatory water supply to the owner of any privately owned land whose water supply is adversely affected by the project. The amount supplied by MSC should be equivalent to the amount lost and be provided within 24 hours of loss being identified.

Options for this compensatory water supply include:

- If/when this incident occurs, the purchasing and delivery of water by road tanker to the property; and/or
- The purchase of a licence to pump water from the Duckmaloi River to the property of the affected property.

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9 INCIDENT RESPONSE PROTOCOL

9.1 Incident Management in accordance with the Environmental Management Strategy

All incidents must be reported to the Production Manager immediately. Every person is responsible for reporting accidents and near miss incidents, without delay after the occurrence. Incidents will be responded to in accordance with the Incident Response Communication Protocol outlined in **Figure 6**.

The Production Manager will assess the incident and where deemed necessary will stop all operations of the quarry immediately until a full investigation of the incident is carried out and the safety of all employees and environmental factors on site are determined.

In accordance with the requirements of the Condition 7, Schedule 5 of the Project Approval, MSC shall notify the Secretary and any other relevant agencies (including the EPA) of any incident that has caused, or threatens to cause, material harm to the environment. Within 7 days of the date of the incident, MSC shall provide the Secretary and any relevant agencies with a detailed report on the incident.

The people listed in the **Table 13** below are authorised to manage the response to any incident. The particulars are 24 hour contact details.

Table 13: Details for People Responsible for Incident Management

Position	Individual	Phone Number
General Manager/Director	Robert Murdoch	0438 722 389
Production Manager	John O'Heir	0467 171 416

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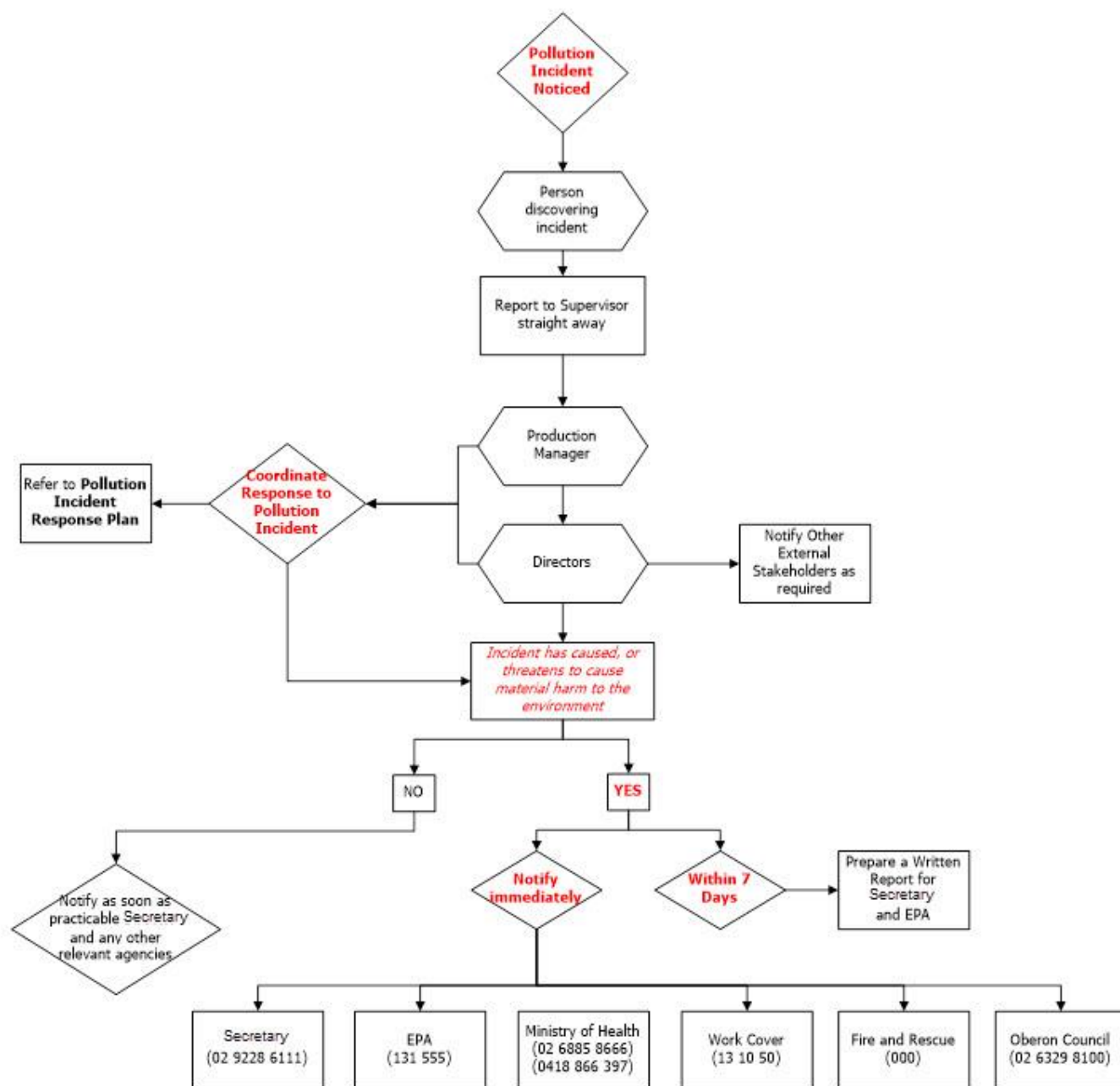


Figure 6: Incident Response Communication Protocol

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9.2 Water Management Responses

In the event that quarry operations result in adverse impacts to the surrounding surface waters and ground water a series of appropriate response actions have been developed. **Table 14** summarises the potential water management issues that may arise and the appropriate response to be taken by relevant staff.

Table 14: Summary of Water Management Response Actions

Potential Water Management Issues	Response
Surface water and groundwater monitoring reports result outside the adopted criteria.	<ul style="list-style-type: none"> Initiate the protocol outlined in Section 11 Criteria Exceedance Protocol.
Unauthorised discharge (outside of EPL limits).	<ul style="list-style-type: none"> Follow Incident Response Communication Protocol (refer to Figure 6). Including report of discharge to the EPA; Refer to the '<i>Pollution Incident Response Plan</i>' for actions. Investigate discharge, considering any mitigating factors where applicable; and Review adequacy of existing water management infrastructure and controls.
Complaint of loss of groundwater availability at private licensed bore etc (monitoring sites).	<ul style="list-style-type: none"> Investigate loss of groundwater availability, considering any mitigating factors where applicable; Provide feedback to complainant, where relevant; Report complaint to senior management; and Where relevant initiate the process outlined in Section 9.2.1.
Leakage from local alluvial aquifers into open cut pits.	<ul style="list-style-type: none"> Investigate the cause of any increased seepage from the alluvial aquifers into open cut pits; and Where relevant initiate the process outlined in Section 9.2.2.
Unforeseen impact.	<ul style="list-style-type: none"> Initiate protocol outlined in Section 9.2.3.

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9.2.1 Response Protocol for Adverse Impacts in Existing Groundwater Supplies

In the event that a complaint received from a landowner regarding loss of groundwater availability at private licensed bore etc (monitoring sites), remains unresolved, MSC are to:

- Provide a copy of the landowner complaint to DPI Water and DPE and inform both agencies of the intention to conduct an independent review;
- Commission an independent review including investigation of;
 - relevant groundwater levels and groundwater quality monitoring results;
 - any changes to land use that may have affected groundwater levels and quality over time;
 - meteorological conditions over the relevant period of record; and
 - whether the loss of bore water may be attributable in part or solely to MSC operations.
- Provide a copy of the independent review report to the landowner, DPE and DPI Water;
- If the investigation concludes that the bores have been affected by quarry operations at the MSC site then, depending on the most appropriate response, MSC will compensate for the water supply with water of equivalent quality and quantity.
- Develop and implement appropriate mitigation and management strategies, where relevant; and
- Implement additional monitoring as necessary to measure the effectiveness of the strategies undertaken.

Possible mitigation and management strategies for surface and groundwater supplies will include providing the affected landowner with an alternate water supply. The initial water supply will be made available within 24 hours of confirming that the water loss is attributable to MSC's operations. MSC shall provide alternative long-term supply to the satisfaction of the Secretary.

If MSC and the landowner cannot agree on the measures to be implemented, the Independent Resolution Process will be entered into.

9.2.2 Response Protocol for Leakage from Alluvium into Quarry Area

Groundwater inflow from local alluvial aquifers into the quarry area could have the potential to inhibit quarry operations as well as remove groundwater from the surrounding environment. Groundwater inflow from local alluvial aquifers was not assessed in the EA as this potential impact was considered to be of negligible risk.

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Continued monitoring of any groundwater seepage will be undertaken as part of the Project.

In the event that the monitoring programs identify groundwater inflows from the interception of alluvia, the responses outlined below will be implemented. MSC are to:

- Initiate an investigation by suitably qualified personnel into the cause(s) and extent of the groundwater inflow from the alluvium into the quarry pit;
- Where appropriate, identify contingency measures such as:
 - Installation of a cut-off wall, grout curtain or measures performing a similar function to seal off areas of high permeability;
 - Relocation of the pit boundary to avoid intersection of highly permeable areas; and
 - Installation of diversion drains, where possible.

9.2.3 Unforeseen Impacts Protocol

In the event of unforeseen impacts associated with surface waters or groundwater at the MSC, the following protocol will be implemented. MSC are to:

- Conduct a preliminary review of the nature of the impact, including:
 - Any relevant monitoring data; and
 - Current quarry activities and land use practices;
- Mitigate impacts and causal factors where possible;
- Commission of an investigation where necessary by an appropriate qualified expert into the unforeseen impact to confirm cause and effect and consider relevant options for amelioration of impact(s) as appropriate;
- Prepare an action plan in consultation with the appropriate regulatory agency; and
- Implement additional monitoring as necessary to measure the effectiveness of the controls implemented.

The implementation of any mitigation measures will be undertaken in consultation with DPE, DPI Water and EPA. Consultation will seek to confirm any assessment and licensing requirements. The outcomes of this protocol will be reported in the Annual Review.

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10 COMPLAINTS RESPONSE

The MSC community complaints response process outlined in the EMS details how to receive, respond to, and record any community complaints. Where possible a proactive approach will be taken to engage the community in discussing proposed activities that may affect them. Any complaints received will be recorded and responded to in a professional and timely manner by the Production Manager, Director or delegate. The community complaint recording requires information including:

- The nature of the complaint;
- Method of the complaint;
- Monitoring results, meteorological data, at the time of the complaint;
- Site investigation outcomes;
- Site activity and activity changes; and
- Any necessary actions assigned.

Mudgee Stone has a phone number advertised in the local media, displayed at the site entry and available at <http://mudgeedolomitelime.com.au/> for the community to report complaints.

Complaints will be recorded and reported to the Production Manager, Directors or appropriate delegate who will respond to all complaints received and attend to required action items. Complaints details will be retained in a register on site. Records of complaints will be kept on site for at least 4 years. An overview of the community complaint management process is detailed within **Figure 7**.

Every effort will be made to ensure that concerns are addressed in a manner that facilitates a mutually acceptable outcome for both the complainant and MSC. If required, the Independent Dispute Resolution Process will be entered into. This process is illustrated in the EMS.

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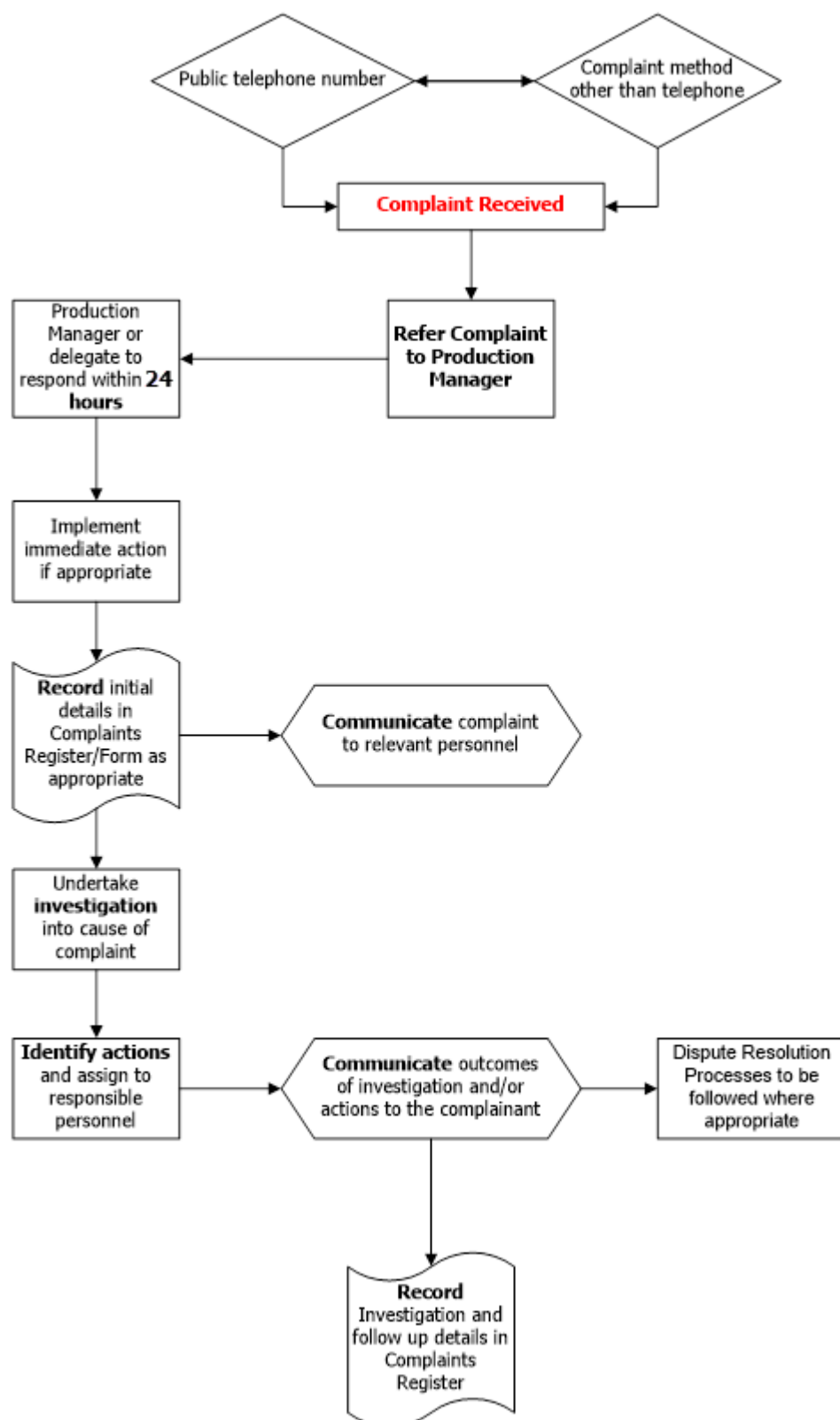


Figure 7: Community Complaints Response Process

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11 NONCOMPLIANCE, CORRECTIVE ACTION AND PREVENTATIVE ACTION

Any actual or potential non-compliance against environmental criteria will be investigated initially by the Production Manager. Environmental incidents will then be recorded on the Incident Form. Corrective actions and relevant reporting will be implemented, if necessary, according to the EMS and the process below.

Monthly inspections, along with the review of environmental monitoring results, and any incidents and/or community complaints, will determine any trends and need for preventative action or identify compliance issues and be reported to the Directors on a monthly basis. Refer to **Figure 8** the protocol for managing any non-compliance with statutory requirements, and exceedances of the assessment criteria and/or performance criteria.

Internal reporting will occur in accordance with the provisions within the EMS. Externally, in accordance with the requirements of Project Approval (07_0122), at the earliest opportunity of detecting an exceedance of the limits/performance criteria, MSC shall notify the DPE and other relevant agencies of the exceedance/incident.

MSC will take all reasonable and feasible measures to ensure that the exceedances do not recur. A report to the DPE considering reasonable and feasible options and preferred remediation measures or other course of action will be prepared.

11.1 Criteria Exceedance - Surface Water and Groundwater Monitoring Programs

MSC will monitor surface water and groundwater in accordance with the Surface Water and Groundwater Monitoring Programs. If the surface water or groundwater monitoring reports result(s) are outside the adopted criteria and further investigations are required, then MSC are to follow the Protocol outlined in **Figure 8**. The following is noted regarding this protocol, MSC will endeavour to:

- Confirm the timing and general location of the exceedance(s);
- Confirm the meteorological conditions at the time of the exceedance(s) (where relevant);
- Identify any potential contributing factors;
- Assess the monitoring results against background trends to identify any anomalies or causes;
- Determine if the exceedance is an environment incident.
- Report the exceedance in accordance with the reporting mechanisms adopted.

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- Assess the water management system for its effectiveness based on results of the routine monitoring program, if the water quality exceedences are attributable to the MSC.
- Develop and implement appropriate mitigation and management strategies where the exceedance is potentially attributable to the MSC.
- Implement additional monitoring and regular reviews where mitigation and management strategies have been implemented, to measure the effectiveness of the strategies undertaken.

(It is noted that any change to the monitoring program will entail a change to the WMP which will require the approval of the Department).

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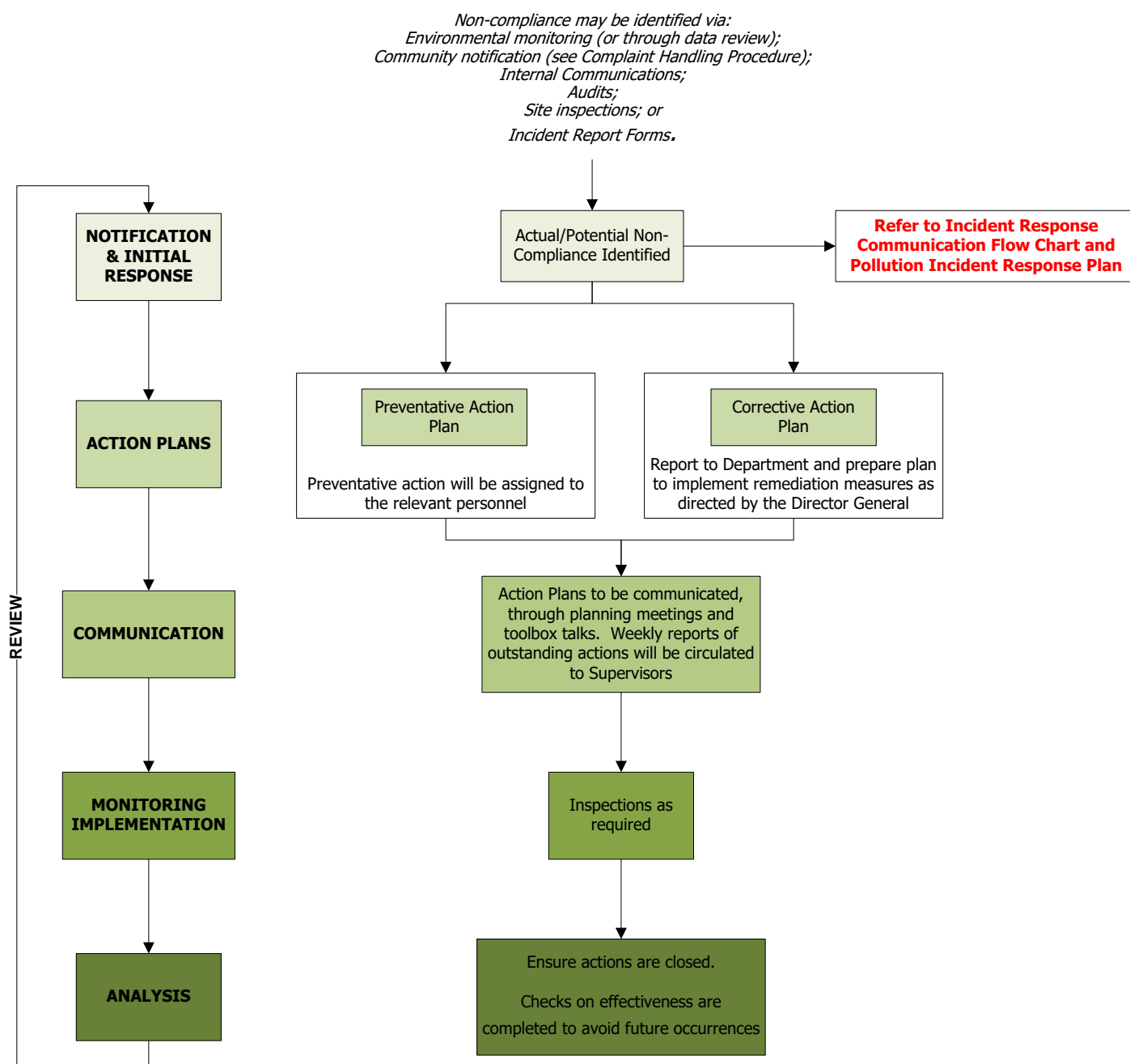


Figure 8: Protocol for Managing Non-Compliance with Statutory Requirements and Exceedances of Assessment Criteria &/or Performance Criteria

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12 REVIEW

MSC will review the WMP to ensure it is appropriate and is being implemented effectively. Changes may arise from a change of scope, incident management or from opportunities for improvement.

The WMP will then be updated to reflect any changes which have occurred. The revised document and the input which led to the revisions will be reviewed by MSC directors, approved internally and then forwarded to the Secretary, EPA and DPI Water for their record.

The planned target dates (or frequencies) at which the WMP will be subject to formal review and the personnel who will participate in the review are identified below:

This WMP will be reviewed:

- Every three (3) years and / or;
- When triggered by any event, incident or finding(s) that identifies improvement in the controls that effectively manage the identified hazards;
- Within 3 months of any changes to Project Approval or licence conditions relating to pollution incidents;
- Following an independent environmental audit which recommends changes to the plan;
- If there is a relevant change in technology or legislation.
- When EPL conditions relating to water management are revised.

At the conclusion of each calendar year after the commencement of development on the site under Project Approval (07_0122), a review will be undertaken regarding the environmental performance of the project that addresses the criteria given in Condition 4 of Schedule 5 of this Project Approval and, if necessary, within three months of submission revise the strategies, plans, and programs required under this approval.

MSC will maintain records of any review.

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13 TABLE OF RESPONSIBILITIES

Position	Task	Timing
Directors	Provide adequate resources to implement the WMP	During budget planning
Production Manager or delegate	Coordinate relevant reviews of the WMP	Tri-annually and as required
	Approve erosion and sediment control designs	As required
	Notify regulatory authorities and affected residence of any exceedance of water criteria	As required
	Liaise with affected landowners regarding mitigation measures for the return of water supply	As required
	Coordinate and implement response protocols	As required
	Coordinate the measurement of monthly pumping volumes	Monthly
	Calculate water balance	Monthly
	Prepare all regulatory reports relating to water management	Annual Review and as required
	Coordinate water quality monitoring as outlined in the WMP	Monthly and as required
	Review the results from the water monitoring program	Monthly
	Measure dam levels including sediment dams	Weekly and prior to significant rainfall events.
Quarry Supervisor	Provide training for all employees and contractors in environmental awareness, legal responsibilities, and water management methods	As required
	Perform regular inspections of erosion and sediment controls	Weekly and prior to and after significant rainfall events.
	Implement erosion and sediment control structures	Prior to site disturbance
	Perform/coordinate regular maintenance of erosion and sediment controls	As required
All employees	Report defective water management systems or water wastage (eg. Leaking pipes)	Immediately after identifying defective water management systems or water wastages

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14 REFERENCES

R.W. Corkery & Co. Pty. Limited, 2010, Environmental Assessment for the Oberon White Granite Quarry.

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APPENDIX A

TABLE OF STATUTORY REQUIREMENTS

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Condition Number	Action	Section Addressed
Schedule 3, Condition 21	The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of quarry operations to match its available water supply.	Section 3 & Section 5.3
Schedule 3, Condition 22	The Proponent shall ensure that all surface water discharges from the site comply with: A) section 120 of the POEO Act; or B) the discharge limits (both volume and quality) set for the project in any applicable EPL.	Section 6.4
Schedule 3, Condition 23	<p>The Proponent shall provide a compensatory water supply to the owner of any privately-owned land whose water supply is adversely impacted (other than an impact that is negligible) as a result of the project, in consultation with NOW, and to the satisfaction of the Director-General.</p> <p>The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the project. Equivalent water supply should be provided (at least on an interim basis) within 24 hours of the loss being identified, unless otherwise agreed with the landowner.</p> <p>If the Proponent and the affected landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution. If the Proponent is unable to provide an alternative long-term supply of water, then the Proponent shall provide alternative compensation to the satisfaction of the Director-General.</p> <p>Note: The Water Management Plan prepared in accordance with condition 25 shall describe the procedures for assessing the impacts of the projects on water entitlements on privately owned land and the provision of compensatory water supply.</p>	Section 8.1
Schedule 3, Condition 24	The Proponent shall manage on-site sewage to the satisfaction of Council and EPA.	Section 4.2.1
Schedule 3, Condition 25	<p>The Proponent shall ensure all chemicals and/or petroleum products on site are stored in accordance with Australian Standard AS1940-2004, The Storage and Handling of Flammable and Combustible Liquids, and in appropriately bunded areas with impervious flooring and of sufficient capacity to contain 110% of the largest container stored within the bund. The flooring and bund(s) shall be designed in accordance with:</p> <p>A) the requirements of relevant Australian Standards; and B) the EPA's Storing and Handling Liquids: Environmental Protection – Participants Manual.</p>	Section 4.2.2
Schedule 3, Condition 26	The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the Director-General. This plan must be prepared in consultation with the EPA and NOW by suitably qualified and experienced persons whose appointment has been approved by the Director-General.	This Plan

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Condition Number	Action	Section Addressed
	<p>In addition to the standard requirements for management plans (see condition 3 of Schedule 5), this plan must include a:</p> <p>A) Site Water Balance that:</p> <ul style="list-style-type: none"> includes details of: <ul style="list-style-type: none"> sources and security of water supply, including contingency planning for future reporting periods; water use on site; and reporting procedures, including comparisons of the site water balance each calendar year; and describes the measures that would be implemented to minimise clean water use on site; <p>B) Surface Water Management Plan, that includes:</p> <ul style="list-style-type: none"> detailed baseline data on surface water flows and quality in the water-bodies that could be affected by the project; a detailed description of the surface water management system on site, including the: <ul style="list-style-type: none"> clean water diversion systems; erosion and sediment controls; and water storages; detailed plans, including design objectives and performance criteria, for: <ul style="list-style-type: none"> the water storage dams; reinstatement of drainage lines on the rehabilitated areas of the site; control of water pollution from rehabilitated areas of the site; performance criteria for the following, including trigger levels for investigating any potentially adverse impacts, for the following: <ul style="list-style-type: none"> the water management system; surface water quality of local waterways; and ecosystem health of local waterways; performance criteria for surface water quality attributes relevant to water quality impacts on biological diversity and aquatic ecological integrity, including salinity, heavy metals, sediment load, pH, hardness and biological oxygen demand; a program to monitor <ul style="list-style-type: none"> the effectiveness of the water management system; surface water flows and quality in local water ways; and 	<p>Site Water Balance Section 5</p> <p>Surface Water Management Plan Section 6 Section 6.2, Section 6.3 Section 6.5</p> <p>Appendix C Section 6.5, Section 6.6</p> <p>Section 3, Section 6.4</p> <p>Table 7</p>

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Condition Number	Action	Section Addressed
	<ul style="list-style-type: none"> ○ ecosystem health of local water ways; • a plan to respond to any exceedances of the performance criteria, and mitigate and/or offset any adverse surface water impacts of the project; and c) Groundwater Management Plan, which includes: <ul style="list-style-type: none"> • detailed baseline data on groundwater levels, yield and quality in the area; • groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts; • a program to monitor: <ul style="list-style-type: none"> ○ groundwater inflows to the quarrying operations; ○ the impacts of the project on local alluvial aquifers; and ○ any groundwater bores and/or springs on privately-owned land that could be affected by the project; • a plan to respond to any exceedances of the groundwater assessment criteria. <p>The Proponent shall not carry out any development on the site under this approval before this plan has been approved by the Director-General.</p>	<p>Section 9 & Section 11</p> <p>Groundwater Management Plan Section 7.</p> <p>Section 7.1 & Section 7.5</p> <p>Section 7.5</p> <p>Section 9, Section 11</p>

Statement of Commitments

Desired Outcome	Action Number	Action	Timing	Section Addressed and Comments
4. Surface Water				
Minimisation of erosion and sedimentation	4.1	Construct a sediment retention basin (Dam 1) with a capacity of at least 0.7 ML immediately to the north of the proposed extended extraction area boundary to capture and divert clean water runoff.	During site establishment	Section 6.5.1.2
	4.2	Construct a sediment retention basin (Dam 2) with a capacity of at least 2.78 ML at the southern base of the amenity bund to manage sediment laden water.	During site establishment	Section 6.5.1.2 The required capacity of Dam 2 to meet the 5 day

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Desired Outcome	Action Number	Action	Timing	Section Addressed and Comments
				90 th percentile rain event given in the EA was 2.18 ML (includes sediment zone volume). The figure of 2.78 ML appears to be a typographical error.
	4.3	Construct clean water diversion banks north of the extraction area to divert clean water into the existing drainage lines west of the extraction area.	During site establishment	Section 6.5.1.1
	4.4	Pump or siphon excess water from the quarry sump to Dam 2.	As required.	
	4.5	Install additional stabilisation works, such as geofabric and rock ballast, within the channel at the entrance and exit of the pipe culvert for the crossing of the diversion bank by the internal access track.	During site establishment	Section 6.5.1.1
	4.6	Construct spoon drains along the internal haul road at lengths as necessary to reduce the concentration and velocity of the water flows within the road-side drainage.	During site establishment	Section 6.5.1.1
	4.7	Install and maintain sediment fences on the downstream periphery of all stockpile footprint areas, including the proposed stockpile area and surge stockpile, and temporary disturbance areas where the area draining to the fence is less than 0.6 ha, the slope length is less than 60 m and the slope is no greater than 1:2 (V:H).	Ongoing.	Section 6.5.1.3
	4.8	Rehabilitate exposed and disturbed areas as soon as possible and practicable.	As areas become available.	Section 6.5.1.3
	4.9	Sow the diversion banks with a non-persistent cover crop within 10 days of construction to prevent erosion of the bank and drain until native grasses and groundcover are established.	Following construction of diversion banks.	Section 6.6
Implementation of a comprehensive surface	4.10	Prepare a Surface Water Management and Monitoring Plan.	Within 6 months of Project Approval.	Section 6

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Desired Outcome	Action Number	Action	Timing	Section Addressed and Comments
water monitoring program.	4.11	Monitor surface water quality within Dams 1, 2 and 3 for pH, EC and TSS.	Quarterly and following discharge (up to four times per year).	Section 6.7.2 EPL 20551 requires monitoring of Dam 3 monthly during discharge.
Implementation of a surface water monitoring program.	4.12	Monitoring water quality within the Duckmaloi River upstream and downstream including pH, TSS, TDS, specific conductance, C3, HCO3, Calcium, Chloride, Iron (filterable), Potassium, Magnesium, Manganese, Sodium, Sulfur and Total Hardness.	Annually and following discharge (up to four times per year).	Section 6.7.2 EPL 20551 requires monitoring of the Duckmaloi River monthly during discharge from Dam 3 for EC, Oil and Grease, pH and TSS.
	4.13	Review the monitoring program following the first 12 months of operation and determine a diagnostic set of analytes for long-term monitoring.	Following first 12 months of operation.	Section 6.7.2
5. Groundwater				
Demonstration that no significant groundwater impacts are occurring as a result of operations.	5.1	Prepare a Groundwater Management Plan.	Within 6 months of Project Approval.	Section 7
	5.2	Monitor the standing water level within the closest registered bore (GW801330) and springs on the adjacent landholdings (with landholder permission).	Monthly during operations.	Section 7.5.2
	5.3	Record the approximate volume of any groundwater inflows into the extraction area.	Ongoing during operations.	Section 7.5.3
	5.4	Review the frequency of monitoring/need for ongoing monitoring.	Annually.	Section 7.5.2

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APPENDIX B

COPIES OF CORRESPONDENCE

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Department of
Primary Industries
Office of Water

Emma Yule
Minespex
PO Box 604
MUDGEE NSW 2850

Contact Tim Baker
Phone 02 6841 7403
Mobile 0428 162 097
Fax 02 6884 0096
Email Tim.Baker@water.nsw.gov.au

Our ref ER21245

Dear Emma

OBERON WHITE GRANITE QUARRY –WATER MANAGEMENT PLAN 2013

I refer to your letter dated 13th August 2013 requesting comments from the NSW Office of Water in relation to the draft Water Management Plan for the Oberon White Granite Quarry. It is recognised this request is in accordance with Schedule 3, Condition 26 of Project Approval 07_0122. The NSW Office of Water appreciates the opportunity to comment and recommends the following points be considered and incorporated prior to finalising the document.

- Figure 8.1 provides a broad overview of the site and delineation of catchments. This scale and detail is inadequate to interpret the site characteristics and proposed management measures. A detailed plan is requested at a reduced scale with the inclusion of contours and site specific management measures including diversions, erosion and sediment controls, water storages and other water conveying structures. As these issues are discussed further in Section 9.5.1 it may be appropriate to provide the figure in that section. A separate drainage plan and erosion and sediment control plan may also be useful.
- Table 8.2 refers to the monitoring of sediment basins however it is unclear of the process to ensure sufficient capacity is available to store the design rainfall event. This is a particular issue as the sediment basins are designed as both water storage structures and sediment basins. Section 9.7.3 briefly refers to this matter however it is recommended specific triggers and processes for sediment and water removal be established.
- Section 9.5.1.1 refers to the stabilisation of the diversion banks with a non-persistent cover crop until native grasses are established. The Office of Water is concerned of the ability to establish native grasses within a short timeframe and the potential for erosion to occur. Confirmation is therefore requested as to the process and timeframe to establish native grasses to ensure stability is achieved and what contingencies would be put in place if an erosive resistant cover is not established.
- The proposed sediment fences downslope of stockpiles is supported. These will aid in minimising sediment entering the diversion channels and sediment dams hence maximising their function. Ongoing maintenance of these structures will be critical.
- The Office of Water supports its notification of any complaint related to groundwater loss and the provision of the independent review report.
- In the event of the response protocol in Section 12.2.2 being enacted it is requested Office of Water be consulted to confirm any assessment and licensing requirements.

www.water.nsw.gov.au | NSW Office of Water

209 Cobra St, Dubbo | PO Box 717 Dubbo NSW 2830 | t 02 6884 2560 | f 02 6884 0096

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Should you have any further queries in relation to this submission please do not hesitate to contact Tim Baker on (02) 6841 7403.

Yours sincerely



Mitchell Isaacs
Manager Strategic Stakeholder Liaison
28 August 2013

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Emma Yule

From: Andrew Helms <Andrew.Helms@epa.nsw.gov.au>
Sent: Friday, August 23, 2013 11:42 AM
To: Emma Yule
Subject: EPA comment on Oberon White Granite Quarry - Water Quality Management Plan
Attachments: Additional conditions re extreme rainfall events - 1.08.13.doc

Hi Emma,

I refer to the above document forwarded to this office for comment. For the sake of expediency, and given that a lot of people in this office are either in the field or on leave, I'll reply to you via e-mail.

The usual EPA comment regarding the fact that we don't usually review management plans applies to this document however I did pick up two things which I thought that I'd pass on to you.

1. I'm sure you've noticed by now however there is a problem with the numbering of the document and this appears to start in Table 3.1 of Section 3 and then flows through to the rest of the document.
2. With many of our coal and quarry licences, we have been inserting conditions on the licence that provide the licensee with a bit of latitude during periods of extreme rainfall. Typically this involves the water quality limits at surface water discharge points not applying in the event that a certain rainfall value (over a period of 5 days) is exceeded – assuming that the site dams have been designed appropriately (usually Type D basins are referenced). The rainfall value we use is usually the 95% number quoted in the Blue Book (page 6-24). For this site we would use the Lithgow value (similar yearly mean to Oberon) of 56 mm. We would use the 95% value rather than 90% given the sensitive nature of the receiving waters. I've attached an example of this condition FYI. This sort of thing can be discussed in more detail when your client makes an application for an EPL.

Regards,

Andrew Helms

Regional Operations Officer - Bathurst | **NSW Environment Protection Authority** |

☎: (02) 6332 7604 | Mobile ☎: 0427 069 568 | 📠: (02) 6332 7630 | ✉: andrew.helms@epa.nsw.gov.au

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APPENDIX C

Plans of Water Management Structures and Erosion Control Measures

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FORMS / CHECKLISTS

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APPENDIX E

APPROVAL OF SUITABLY QUALIFIED PERSON TO PREPARE THE WMP

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Planning Services
Resource Assessments & Compliance
Contact: Genevieve Seed
Phone: 9274 6489
Email: genevieve.seed@planning.nsw.gov.au

Mr Luke Bettridge
Principal Environmental Consultant
Umwelt (Australia) Pty Ltd
78 York St
Teralba NSW 2284

Dear Mr  Bettridge


**Oberon White Granite Quarry Project (MP 07_0122)
Management Plan Expert Approval**

I refer to your letter dated 15 November 2016, seeking the Secretary's approval of nominated experts to prepare the Water and Landscape Management Plans for the Oberon White Granite Quarry Project.

The Department has reviewed the qualifications and experience of the nominated experts and the Secretary has approved Ms Susan Shield to prepare the Water Management Plan and Mr Travis Peak to prepare the Landscape Management Plan.

If you require any further information, please contact Genevieve Seed at the details above.

Yours sincerely


Howard Reed *18.11.16*
Director Resource Assessments
As nominee of the Secretary

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