

Attachment 1

Stormwater Management Plan

BROMELTON NORTH QUARRY

STORMWATER MANAGEMENT PLAN

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FIGURES

Figure 1 Stormwater and ESC Plan (Drawing No. 740.DRG.484)

1 Introduction

1.1 Overview

Groundwork Plus have been engaged by The Neilsen Group Pty Ltd (**Neilsens**) to prepare a new Stormwater Management Plan (**SMP**) for the Bromelton North Quarry located at 291 Sandy Creek Road, Bromelton, properly described as Lot 1 on RP98576 (the site).

The SMP is prepared to demonstrate adequate stormwater controls are in place for the quarry, and support a development application to alter the quarry footprint and to increase the annual extraction volumes from 400,000 to 800,000 tonnes per annum.

1.2 Site Details

The location details of the site for the activities are summarised in **Table 1 – Summary of Land**.

Table 1 – Summary of Land

Property Description	Lot 1 on RP98576
Address	291 Sandy Creek Road, Bromelton

1.3 Objectives of the SMP

The scope of this SMP includes the following items:

- Demonstrate existing stormwater controls are suitable for the quarry;
- Operational Management Procedures to support the DA sought; and
- Implementation and maintenance strategy for stormwater management measures and systems.

This SMP outlines the details and operational management procedures to be adopted in order to integrate stormwater management into daily operations. The objective of water management is to ensure that water resources are utilised efficiently on the site and the quality of water leaving the site does not impact on the environmental values downstream. The guiding principles for water management at the site include:

1. Runoff from clean catchments will be diverted around disturbed areas to the extent practicable;
2. Land disturbance will be minimised to the extent necessary;
3. Stormwater control elements will be installed prior to land disturbance and in a logical progression;
4. Water requirements will be collected on-site and recycled to the maximum practical extent; and
5. Visual monitoring and maintenance will be undertaken to confirm the effectiveness of water treatment systems, erosion and sediment control measures and also to program maintenance.

6. Commence rehabilitation of completed extraction areas as soon as practicable and in a progressive manner.

1.4 Operating Conditions

The site's existing EA (EPPR00540113) prescribes conditions relating to stormwater and water quality management which are summarised in **Table 2 – Proposed Surface Water Operating Conditions** and addressed in **Section 2 – Operational Procedures**.

Table 2 – Proposed Surface Water Operating Conditions

<u>Condition Number</u>	<u>Condition Details</u>
Agency Interest - Water	
WA1	<i>Contaminants must not be directly or indirectly released from the premises to which this environmental authority relates to any waters or the bed and banks of any waters except to a sewer as permitted or otherwise agreed from time to time by the relevant Local Government.</i>
WA2	<i>Except as otherwise provided by the conditions of this environmental authority, the environmentally relevant activity must be carried out by such practicable means necessary to prevent and/or minimise the release or likelihood of release of contaminated runoff from the premises to which this environmental authority relates to any stormwater drain or waters or the bed or banks of any such waters.</i> <i>"Contaminated runoff" for the purposes of this condition means stormwater and/or stormwater runoff that contains contaminants that may cause environmental harm.</i>
WA3	<i>All contaminated stormwater runoff from the stockpile(s) and the areas utilised for the operation of the stockpile(s) and processing areas must be collected and treated in the sediment ponds.</i>
WA4	<i>Erosion control and sediment control structures must be maintained at all times during the periods of operation or rehabilitation and checked, repaired or replaced as required after each rain event.</i>
WA5	<i>Diversion drains, appropriate drainage grades or equivalent must be installed to ensure surface waters from disturbed areas, including operational or trafficable areas, are diverted to the sediment control system(s).</i>
WA6	<i>All contaminated stormwater/wastewater runoff from the stockpiles and the areas utilised for the operation of the stockpiles must be directed to the sediment control system(s).</i>
WA7	<i>Drainage through and from all trafficable areas and production activities must be designed to minimise surface flow velocities.</i>

<u>Condition Number</u>	<u>Condition Details</u>
Agency Interest - Water	
WA8	<i>All sedimentation ponds used for the storage or treatment of contaminated stormwater / wastewater must be installed and maintained to prevent any discharge through the bed or banks of the pond to any waters (including groundwater).</i>
WA9	<p><i>Reasonable and practicable measures must be taken to prevent short-circuiting in sedimentation pond(s) and the sediment control system(s).</i></p> <p><i>Reasonable and practicable measures for ensuring that water does not short circuit within an individual pond include:</i></p> <ul style="list-style-type: none"> <i>(i) ensuring relatively uniform velocities through the pond; and</i> <i>(ii) ensuring that the pond inlet and outlet are located at opposite ends of the pond along the long axis; and</i> <i>(iii) ensuring that the ponds are periodically desludged to maintain efficiency in the settlement of solids; and</i> <i>(iv) ensuring that sufficient capacity is available within the pond system such that stormwater flows do not flush out settled solids; and</i> <i>(v) ensuring that there are no obstructions, such as vegetation, within the pond, that materially alters the velocities of water flowing through the different sections of the pond.</i>
WA10	<i>Sediment collected in sedimentation ponds must be removed whenever the volume of the basin is reduced by thirty percent (30%), or on other occasions as required by the administering authority, such as where sediments are contaminated, or where a build-up of sediments has occurred or may occur around the outlet structure.</i>

2 Operational Procedures

An overview of the proposed Operational Procedures for implementation at the site are summarised below. These are to be regularly reviewed and updated to reflect changes in quarrying practices.

Aspect	Details
Purpose	The Operational Procedures have been prepared to manage potential environmental impacts that may result from the operation in relation to stormwater management.
Risk Sources and Potential Impacts	<p>Adverse impacts resulting from current and future operations may include the following:</p> <ul style="list-style-type: none"> • Overtopping of clean water dams and/or sediment basins; • Overland flow from disturbed areas, including unsealed internal access and haulage roads; • Overland flow from topsoil, overburden, raw material and product stockpile areas; • Overland flows from storage and handling areas of oils, greases, fuels and other chemicals; • Wastewater from vehicle wash-down facility; • Construction and maintenance of carpark, roads and hardstands; • Spillage during handling of materials; and • Use and storage of oils, greases, fuels and other chemicals.
Performance Targets	<p>The overarching performance targets for the site relating to site release and monitoring targets will be detailed in the site EA. The EA conditions are as outlined in Section 1.4 – Operating Conditions.</p> <p>The site can only release at the release points Release Point 1 and Release Point 2 as shown on Figure 1 – Stormwater and ESC Plan.</p>
Responsibilities	The Quarry Manager will be primarily responsible for the implementation of this SMP.
Strategies/mitigation measures	<p><u>Sediment basin and clean water dam infrastructure</u></p> <p>The infrastructure required to manage the requirements of the EA conditions and associated performance targets are outlined in Section 4 – Stormwater Quality Management, comprising a number of sediment basins and associated drainage features.</p> <p>The sediment basins will be operated and maintained in accordance with Section 4 – Stormwater Quality Management and the requirements below:</p>

- Freeboard must be maintained in each sediment basin and clean water dam prior to rainfall events occurring to ensure adequate capture volume is available to meet EA conditions;
- All releases from the site to waters must be carried out in accordance with the nominated EA water quality limits.

Diversion of clean surface water runoff

The site is subject to upstream surface water from external catchment areas. The quarry must monitor and divert upstream catchments away from site operations wherever practical.

Any drains or bunds proposed for diversion should have greater than 80% vegetation coverage where applicable or stabilised using an alternative material (rock lined, geofabric, erosion matting etc.).

This coverage is required to be in-place at all times. Seeding of the exposed areas using approved native grass species. The grass species will be required to have the following characteristics (as per IECA 2008):

- Plants with a fibrous root system.
- Plants that primarily grow horizontal rather than upright clumping plants.
- Leguminous plants.
- Non-invasive plants.

Oil separators, and Bunding of Fuels and Chemicals

Clearly designate storage areas and do not deviate from assigned bunded areas for storage of chemicals and fuels unless a suitable secondary bund is provided. Oil separators to be provided where necessary.

Storing and handling of hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids in accordance with the relevant legislative requirements and Australian Standards including but not limited to the provisions of:

- AS 1692-2006 – Steel tanks for flammable and combustible liquids
- AS 3780:2008 – The storage and handling of corrosive substances
- AS 1940:2004 – The storage and handling of flammable and combustible liquid
- AS 3833:2007 – Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers

	<p><u>Stockpile areas</u></p> <p>Stockpiles must be:</p> <ul style="list-style-type: none"> • Adequately protected from wind, rain, concentrated surface flow and excessive upslope stormwater surface flows. • Located to direct drainage water to sediment basin systems in event of surface water runoff. • Maintained in a moist state including by use of sprinklers to minimise the risk of movement by wind.
Auditing	Stormwater management reviews are required to be carried out on a periodic bases to assess the implementation of the management strategies.
Identification of Incident or Failure	<p>Non-compliance with the performance criteria herein will be identified by:</p> <ul style="list-style-type: none"> • Lack of monitoring at the frequencies indicated in the EA. • Stormwater in treatment system exceeds capacity after rainfall event due to insufficient freeboard. • Release of contaminants from the site. • Poor vegetation establishment • Poorly maintained, damaged or failed stormwater management devices
Corrective Action	The authorised representative shall be responsible for identification of incident or failure and completion of corrective actions. Following identification of incident or failure, the source/cause is to be immediately identified and rectified with records kept preventing future incidents occurring.
Internal Reporting	A copy of all incidents and complaints will be stored at the site within the incident and complaint register.
External Reporting	Reporting of non-compliance events including discharge of contaminants from the site are to be reported in accordance with EA requirements.

An inspection and maintenance program should be implemented as detailed in **Table 3 - Inspections and Maintenance of Erosion and Sediment Control Devices**. A summary schedule of the various inspections, performance criteria and responses that shall be performed on site is shown below.

Table 3 - Inspections and Maintenance of Erosion and Sediment Control Devices

Device	Minimum Frequency	Performance Criteria	Required Actions
Sediment Basins / Cleanwater Dams	Annually, prior to wet season	<ul style="list-style-type: none"> adequate freeboard volume available, excess sediments removed prior to wet season (basin should not lose more than 30% capacity) 	<ul style="list-style-type: none"> captured water to be reused on site and treated as required for use in operations
Inspect drainage lines including catch drains, Contour drains and diversions	Annually, prior to wet season	<ul style="list-style-type: none"> erosion in areas adjacent to water conveyancing structures 	<ul style="list-style-type: none"> eroded areas shall be rehabilitated / rip rapped as soon as practicable
		<ul style="list-style-type: none"> overtopping of water conveyancing structures (i.e. clean water diversion drains) (identified by the scouring of the drain batters perpendicular to the direction of flow) 	<ul style="list-style-type: none"> eroded areas shall be repaired and stabilised
Waste containers	Weekly	<ul style="list-style-type: none"> waste is stored in appropriate containers waste receptacles labelled 	<ul style="list-style-type: none"> ensure waste material is stored and disposed of properly and in accordance with conditions of approval
Spill response stations	Weekly and following use	<ul style="list-style-type: none"> equipment is properly maintained 	<ul style="list-style-type: none"> maintain equipment replace used equipment
Maintenance / refuelling area	Weekly	<ul style="list-style-type: none"> fuel, oil spills 	<ul style="list-style-type: none"> clean up fuel spills and investigate source
		<ul style="list-style-type: none"> equipment maintenance 	<ul style="list-style-type: none"> maintain equipment maintenance records
		<ul style="list-style-type: none"> fuel storage integrity maintained 	<ul style="list-style-type: none"> investigate and repair potential leaks

3 Site Based Stormwater Management

3.1 Stormwater Quantity Management Objective

In accordance with the DES Stormwater Guideline *Environmentally relevant activities*, stormwater runoff from disturbed areas for the proposed development, generated by (up to and including) a 24 hour storm event with an average recurrence interval of 1 in 5 years is proposed be retained on-site, or managed to remove contaminants before release.

Refer to **Figure 1 – Stormwater and ESC Plan** for catchment layouts, drainage features, site discharge points and details of the sediment basins to be constructed and operated at the site.

3.1.1 Hydrologic Modelling

Hydrologic modelling was undertaken using DRAINS (a computer simulation program by Watercom) as shown in **Diagram 1 – DRAINS Schematic**. Site-based rainfall polynomial coefficients were obtained using the Design Rainfall Data System 2016, available on the Bureau of Meteorology's website.

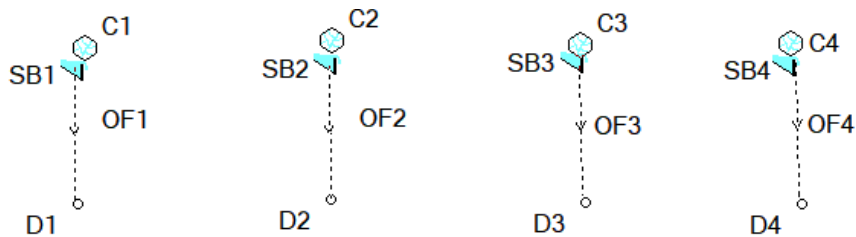


Diagram 1 – DRAINS Schematic

The IFD data is shown in **Table 4 – Intensity Frequency Duration (IFD) Data**. The existing case conditions were modelled and then compared to the future extension of the quarry footprint.

Table 4 – Intensity Frequency Duration (IFD) Data

Duration of Rainfall	Exceedance per Year (EY)						
	6EY	4EY	3EY	2EY	1EY	0.5EY	0.2EY
5 min	43.2	55.7	64.4	76.6	97	122	153
10 min	34.9	45.3	52.7	62.9	80.3	101	127
15 min	29.3	38.2	44.4	53.2	68.2	85.7	108
20 min	25.3	33.0	38.4	46.1	59.1	74.4	93.3
25 min	22.3	29.1	33.9	40.7	52.3	65.7	82.4
30 min	20.0	26.1	30.4	36.4	46.9	58.9	73.9
45 min	15.4	20.0	23.3	28.0	36.0	45.2	56.7
1.0 hour	12.6	16.4	19.0	22.8	29.4	36.9	46.3
1.5 hour	9.39	12.1	14.1	16.9	21.8	27.3	34.4
2.0 hour	7.58	9.78	11.4	13.6	17.6	22.0	27.8
3.0 hour	5.59	7.19	8.35	10.0	12.9	16.2	20.5
4.5 hour	4.14	5.31	6.16	7.39	9.58	12.0	15.3
6.0 hour	3.35	4.31	5.00	6.00	7.79	9.8	12.5
24 hour	1.31	1.69	1.97	2.38	3.15	4.01	5.27

3.1.2 Peak Discharge Results

Results of estimated peak discharge for the proposed future quarry development scenario is shown in **Table 5 – Peak Discharge Results**. Peak discharge was modelled on a 1 hour storm duration (deemed as critical storm) for each AEP event, as shown.

As shown, due to managing the sediment basins to retain the 1 in 5 year 24 hour duration event, there will be no discharge from the sediment basins, and subsequently the site discharge locations for all events up to and including the 1% AEP (1 in 100 year ARI) peak discharge event.

Table 5 – Peak Discharge Results (m³/s)

Discharge Location	Annual Exceedance Probability (AEP)					
	1%	2%	5%	10%	20%	50%
Sediment Basin SB1	0.0	0.0	0.0	0.0	0.0	0.0
Sediment Basin SB2	0.0	0.0	0.0	0.0	0.0	0.0
Sediment Basin SB3	0.0	0.0	0.0	0.0	0.0	0.0
Sediment Basin SB4	0.0	0.0	0.0	0.0	0.0	0.0

3.2 Stormwater Quality Management Objective

The site stormwater quality management objective is to comply with the EA conditions regarding site retention and quality release limits. In order to achieve compliance, the site must manage the sediment basins in accordance with the retention of the upper settling volumes prescribed below. The total upper settling storage requirements for sediment basins were estimated based on the following formula (DES 2014):

$V_s = A * C_v * R$ (1 in 5; 24hr), where:

A = Catchment Area (m²)

C_v = Coefficient of Discharge

R = Rainfall depth (m) from 24 hour storm, and ARI of 1 in 5 years

Table 6 – Sediment Basin Storage Requirements details the sediment basin storage requirements for each stage, based on a rainfall depth (R) of 0.126m, from an adopted average intensity of 5.27mm/h (Source: Bureau of Meteorology).

Table 6 – Sediment Basin Storage Requirements

Catchment ID	Catchment Area (Ha)	Upper Settling Volume (ML)	Sediment Storage Volume (ML)	Total Volume (ML)
C1	15.11	15.61	7.80	23.41
C2	11.02	9.96	4.98	14.95
C3	1.31	1.38	0.68	2.03
C4	18.45	19.05	9.53	28.58

Sediment basins are to be maintained in accordance with **Section 2 – Operational Procedures**, including ensuring that sediment collected in the basins are removed whenever the basin is reduced by 30%.

The primary method of de-silting the sediment control devices includes the emptying of all containing water from the device. All removed sediment would be allowed to dry to create a hardened clay resource. This resource is then collected and repurposed for other uses, including but not limited to the following:

- blended into final material products where suitable;
- used to make environmental controls (e.g., diversion bunds) on the site; and
- for site rehabilitation purposes as a fill/growth material.

3.3 Seqwater Performance Outcomes

The site falls within the Bromelton State Development Area (**SDA**) and the proposed development involves the State Interest for Water Quality, as specified in the State Planning Policy July 2017 (**SPP**). The SPP mapping shows the proposed development within the Water Resource Catchment and Water Supply Buffer Area for the Logan River, supplying the Beaudesert Water Treatment Plans and future Wyaralong Water Treatment Plant.

As such, the proposed development must comply with the Seqwater Development Guidelines: *Water Quality Management in Drinking Water Catchments 2017* (**Seqwater Development Guidelines**), as referenced in the SPP.

The relevant stormwater quality and quantity performance outcomes of the Seqwater Development Guidelines are shown below in **Table 7 – Seqwater Development Guidelines**. An outline of the proposed measures to address each of the performance outcomes has been identified.

Table 7 – Seqwater Development Guidelines

Performance Outcome	Acceptable Outcome	Proposed Measures
<p>PO7</p> <p>Manage stormwater at the construction phase to protect drinking water supply environmental values and facilitate the achievement of water quality objectives for receiving waters.</p>	<p>AO7.1</p> <p>At the construction stage, an erosion and sediment control program (ESCP) demonstrates that stormwater achieves the design objectives listed in Table A of the SPP (appendix 2): Construction Phase – Stormwater management design objectives (all parts).</p> <p>OR</p> <p>AO7.2</p> <p>An ESCP demonstrates how stormwater quality will be managed at the construction stage in accordance with an acceptable regional or local guideline so that target contaminants are treated to a design objective at least equivalent to Table A of the SPP (all parts).</p> <p>OR</p>	<p>Refer to Figure 1 – Stormwater and ESC Plan for proposed details of construction for the quarry stormwater quality and quantity controls including sediment basins, diversion drains and bunds. The Erosion and Sediment Control (ESC) Plan complies with Table A of the SPP.</p> <p>Construction will be managed to protect drinking water supply Environmental Values and facilitate the Water Quality Objectives for the Logan River basin with construction erosion and sediment control measures consistent with the EA conditions and International</p>

Performance Outcome	Acceptable Outcome	Proposed Measures
	<p>AO7.3</p> <p>Stormwater run-off generated during construction is captured and transferred off-site or captured and treated to any applicable re-use standards and reused on-site.</p>	<p>Erosion Control Association guidelines.</p> <p>Once operational, the site must maintain ongoing compliance with the EA conditions.</p>
<p>PO8</p> <p>Manage stormwater during operational (post-construction) stages to protect drinking water supply environmental values and facilitate the achievement of water quality objectives for receiving waters.</p>	<p>AO8.1</p> <p>Development does not involve an impervious area greater than 1,000m².</p> <p>OR</p> <p>AO8.2</p> <p>Development is for reconfiguring a lot that; a. will not create more than two additional lots; or b. involves a land area less than 1000m².</p> <p>OR</p> <p>AO8.3</p> <p>Stormwater run-off generated during operation (post-construction) demonstrates a minimum reduction in mean annual load from unmitigated development that achieves the following stormwater management design objectives: • 85% reduction in total suspended solids; • 65% reduction in total phosphorus; • 45% reduction in total nitrogen; and • 95% reduction in gross pollutants.</p> <p>OR</p> <p>AO8.4</p> <p>Stormwater run-off generated during operation is captured and transferred off-site or captured and treated to any applicable re-use standards and reused on-site.</p>	<p>Seqwater propose that release limits during large storm events should meet the Water Quality Objectives for drinking water quality outlined in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 Schedule 1 for the Logan River.</p> <p>However, the site sediment basins will retain all water onsite up to and including the 1% AEP (1 in 100 year ARI) critical storm (refer Section 3.1.2). Therefore the site complies with AO8.4 with stormwater run-off being captured and treated in accordance with EA conditions and reused onsite for dust suppression and processing.</p> <p>The site release limits will comply with the EA conditions and this is deemed adequate for compliance with the Seqwater development guidelines.</p>

4 Responsibilities

4.1 Monitoring Management Measures

The following management measures will be implemented during facility operations:

- The Quarry Manager or authorised representative is to regularly inspect the ESC management devices, particularly prior to forecasted wet weather and following major rainfall events to ensure that these devices are in good working order. All inspections are to be documented (including photos) and available on site at all times.
- The Quarry Manager shall carry out general surveillance to qualitatively assess any stormwater releases from site during discharge events.
- A surface water quality monitoring program may be implemented to assess performance from time to time. Any sampling conducted shall be undertaken by a suitability qualified person.

4.2 Auditing and Review

The effectiveness of the SMP will be reviewed as necessary (e.g. following a change in site operations) and at least once every year. The review shall take into account changes to site activities, available surface water monitoring results, any complaints, pollution incidents and any corrective actions taken.

4.3 Responsibility

The following details the responsibilities with regard to the ongoing management of stormwater at the site:

- The Quarry Manager will be responsible for the implementation of this SMP and for training of site personnel in their responsibilities in relation to this SMP.
- The Quarry Manager will be responsible for ensuring that all stormwater devices constructed on the Site have adequate free water storage capacity.
- All complaints pertaining to water quality received will be recorded in the complaints register/log maintained on-site.
- The Quarry Manager or a suitably qualified consultant will prepare water monitoring records if and when required by the regulatory authority.
- Records, including results of any monitoring program undertaken on-site, complaints or incidents will be kept on-site for a minimum of five (5) years.

4.4 Identification of Incident or Failure

An incident or failure may include, but not be limited to:

- Deterioration in surface water quality within waters discharged from site.
- Receipt of a stormwater quality release complaint.
- Not maintaining on-site stormwater controls or treatment devices.

Any identification of incident or failure will be recorded on site.

5 Environmental Incidents

The **Quarry Manager** will be responsible for ensuring that all employees at the Site are familiar with the procedure for incidents recording. Any employee becoming aware of an incident with actual or potential environmental implications, shall be reported to the **Quarry Manager**, or delegate immediately.

The **Quarry Manager** will notify upper management regarding any environmental incident. An Environmental Incident Report must be completed for all incidents.

Should reporting of an **environmental incident** to the relevant regulatory authority be required, this will be undertaken in accordance with the following.

When an environmental incident occurs, the **Quarry Manager** will notify administering authority via telephone and in writing.

The contact details of the administering authority are as follows:

Department of Environment and Science
Phone: 1300 130 372
Email: PollutionHotline@des.qld.gov.au

Following notification against this condition, an investigation and further reporting will be required, as per Section 5.1 and 5.2 below.

5.1 Investigation

All incidents should be investigated. The investigations should include:

- Determining what activities were being carried out at the time of the complaint/incident and any equipment involved.
- Identifying whether equipment or activities on-site were the cause of the incident or complaint.
- Determining what potential actions may be carried out to resolve the matter and/or minimise the likelihood of further impacts.

An assessment is to be conducted to determine what corrective actions are to be taken to remedy the matter and/or prevent a similar incident from occurring in the future. If monitoring is to be undertaken to investigate an incident or complaint these results should be supplied with the final report to the administering authority.

5.2 Responsibility

A written notice detailing the following information may need to be provided to the administering authority, following the initial notification. General information likely to be required for any further reporting to the administering authority may include the following:

- The name of the operator.
- The name and telephone number of a designated contact person.
- A description of the event.
- The results of any monitoring performed in relation to the event.
- Actions taken to mitigate any environmental harm caused by the event.
- Proposed actions to prevent a recurrence of the event.

6 Conclusion

This SMP outlines the appropriate treatment measures and operational procedures to be adopted to integrate adequate stormwater management into daily operations and site activity. Specifically, this document has prepared to ensure that appropriate measures have been developed to meet the requirements of the site approval conditions, and support the extension to the quarry footprint.

Operational procedures outlined in this SMP will assist to ensure compliance as a minimum standard.

FIGURES
