

South-Western Pit Pit and Haul Road Site Management Plan

- Prepared for
Graymont (NZ) Ltd

-

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Acronyms and Abbreviations

AEP	Annual Exceedance Probability
AgL	Agricultural Lime
AQMP	Air Quality Management Plan
ARI	Annual return interval
CaCO₃	Calcium carbonate
COC	Certificates of Compliance
BCM	Bank Cubic Metres
CMP	Cultural Monitoring Plan
CFMP	Cropping Field Management Plan
eDNA	Environmental DNA
EcoBP	Ecological Betterment Plan
ELF	Engineered Landforms
ESCP	Erosion and Sediment Control Plan
FMP	Flocculation Management Plan
GAP	General All Passing
Graymont	Graymont (NZ) Ltd
HG	High Grade kiln stone

HSE	Health Safety and Environment
KRMP	Karst and Riparian Management Plan
LOM	Life of Mine
MCP	Mobile Crushing Plant
MIC	Maximum Instantaneous Charge
MMU	Mobile Mixing Unit
NEMS	National Environmental Monitoring Standards
NPSFM	National Policy Statement for Freshwater Management
NTU	Nephelometric Turbidity Unit (standard unit of measurement for turbidity)
NZPM	New Zealand Petroleum and Minerals
NZTM	New Zealand Transverse Mercator
OPQ	Oparure Quarry
PCP	Pit Closure Plan
P&HMP	Pit and Haul Road - Site Management Plan
RMA	Resource Management Act 1991
SCWP	South Catchment Western Pit
SG	Steel Grade kiln stone
SNA	Significant Natural Area
SRP	Spill Response Plan
ToMP	Topsoil Management Plan
TWT	Te Tokanganui-a-noho
TSS	Suspended solids
WDC	Waitomo District Council
WRC	Waikato Regional Council

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Te Kuiti 3910
New Zealand

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1.0 Introduction

The South-Western Pit ('**SW Pit**'), Pit and Haul Road Site Management Plan ('**P&HMP**') has been prepared by Graymont and applies to the South-Western Pit and Haul Road at the Oparure Quarry ('**OPQ**'). The SW Pit is wholly owned and operated by Graymont (NZ) Ltd ('**Graymont**'). This site management plan is in addition to, and does not replace, the 2023 Oparure Site Management Plan that applies to the existing Oparure quarry and its Northern extension, access road, site offices, processing plant and overburden disposal areas.

1.1 Purpose

The purpose of the P&HMP is to provide a framework for the SW Pit quarry operations and site personnel such that environmental compliance is achieved under the Resource Management Act ('**RMA**') and the conditions of the resource consents that relate to the SW Pit of the OPQ.

The OPQ Health Safety and Environment ('**HSE**') legal obligations and responsibilities under the Health and Safety at Work Act 2015, that are implemented by a Health and Safety Management Plan and Emergency Response Plan are addressed by the 2023 Oparure Site Management Plan and are not repeated here.

1.2 Objective

The objective of the P&HMP is to avoid, remedy, manage or offset the identified environmental effects of the SW Pit activities.

1.3 Scope

This P&HMP includes the following subparts:

- a) An outline of the new pit and haul road operation and processes (**Section 2**);
- b) An Ecological Betterment Plan ('**EcoBP**') (which includes, but is not limited to, a Cropping Field Management Plan ('**CFMP**') and a Karst and Riparian Management Plan ('**KRMP**'));
- c) An Air Quality Management Plan ('**AQMP**');
- d) An Erosion and Sediment Control Plan ('**ESCP**');
- e) A Spill Response Plan ('**SRP**');
- f) A Topsoil Management Plan ('**ToMP**');
- g) Descriptions of the contingency and control measures that are not set out within the EcoBP, AQMP, ESCP, ToMP or SRP and that are employed to avoid the

generation of adverse effects in the first instance. Description of the remediation and mitigation measures that are employed to minimise any adverse effects where avoidance is not practicable and/or is not required by the conditions of the resource consents; and

h) The reporting that is to be undertaken. This includes the detail of what is to be reported when for each year for the term of the resource consent.

The P&HMP excludes activities, authorisations and / or remedies / mitigation with the 'Existing Quarry Operation' including processing facilities and offices. As such, this site management plan is in addition to, and does not replace, the 2023 Oparure Site Management Plan that applies to the existing Oparure quarry and its Northern extension, access road, site offices, processing plant and overburden disposal areas.

1.4 Site Location

The SCWP site is located at approximate coordinates 1781590Me, 5753830Mn NZTM (refer to **Figure 1**).

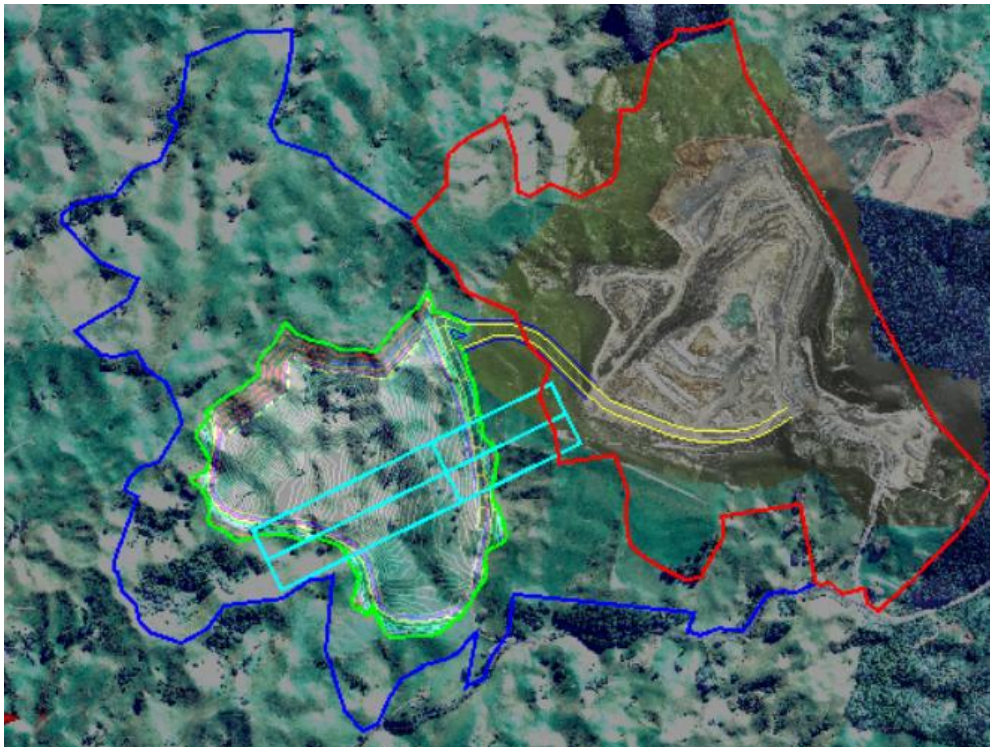


Figure 1: South-Western Pit

(Green line = extent of SW Pit, yellow line = haul road and light blue line = Camelot Cave Refinement Zone)

The SW Pit site address is:

806 Oparure Road

Te Kuiti 3910

New Zealand

The legal description of the land parcels the SW Pit is shown in **Table 1** below.

Table 1: Legal Description	
Quarry Component	Land Parcel
South-Western Pit	Lot 1, DPS 77130
	Lot 2, DPS 33442
	Lot 1, DPS 74022
Haul Road	Lot 1, DPS 74022
	Lot 2, DPS 77130
Notes: 1. Land Parcel definitions as of February 2019 downloaded from LINZ.	

2.0 South-Western Pit Operation and Processes

Quarrying at the SW Pit is opencast. The area to be disturbed over the lifetime of the pit would be 59.6 ha by 2053. However, only sections would be quarried in stages, and then rehabilitated as described below. Mining infrastructure associated with the pit would include a 1.3 km haul road.

After vegetation on the section of a quarry stage is cleared, a layer of topsoil will be stripped and stored in accordance with the ToMP.

Overburden below the topsoil will be removed, generally during dry periods, to expose the underlying limestone resource. Overburden will be placed into the pits from previous quarrying stages to restore the landscape to a natural form and then covered with the topsoil to reinstate productive farmland.

Drilling and blasting, at intervals of seven to 10 days will make the limestone available for extraction by front loaders, excavators and trucks moving along the haul road.

The manufacturing, processing, storage and transport facilities that service the existing Oparure Pit will also service the new pit. The only new manufacturing plant will be a mobile crushing plant.

Some of the limestone will be transported by road to the company's Ōtorohanga and Te Kuiti sites for processing to produce quicklime and hydrated lime. The truck traffic volumes will be limited to previous maximum truck numbers.

All heavy trucks and quarry vehicles will access the new pit via a haul road from the Oparure Pit. The existing light vehicle access to the woolshed will be retained. No new entrance way to Opārure Road is proposed.

The EcoBP sets out the various initiatives to achieve betterment, and the details on each of the proposed initiatives are contained in the relevant management plans described in **Section 1.3**. Ecological Betterment initiatives include:

- Reduction of sediment loads entering Camelot Stream catchment by reducing overland runoff to ephemeral gully streams through riparian planting and existing native vegetation enhancement (see KRMP);
- Reduction of sediment loads from the cropping fields located outside of the footprints of the new pit and haul road (see CFMP);
- Pest and predator management (including fencing) of significant forested areas, tomos and at entrances to caves;
- Restoration and enhancement of Significant Natural Areas ('SNA');
- Gate Spring enhancement;
- Enhancement and protection of cave entrances; and,

- Karst ecosystem protection.

2.1 Resource

The limestone resource quarried at the SW Pit is Otorohanga Limestone (Upper Te Kuiti subgroup). Overburden is the 'waste' material overlying the limestone resource. The overburden comprises predominantly of Mahoenui Group mudstone (Taumatamaire Formation), Kauroa Ash and Mairoa Ash (volcanic ash), minor ignimbrite and low quality limestone rock.

The resource is defined in seams based on the product end use and the calcium carbonate ('CaCO₃') grade:

- Agricultural Lime ('AgL') with $\geq 90\%$ CaCO₃;
- High Grade kiln stone ('HG') – higher quality limestone than AgL; and
- Steel Grade kiln stone ('SG') – higher quality limestone than HG, with fewer impurities.

Useful limestone products include:

- General All Passing ('GAP') product is typically used for farm races and also used onsite for haul roads, stockpile areas and building platforms;
- Dimension stone – landscaping and stone masonry; and
- Landscape chip – varies from 6 mm, 6 -15 mm and 15-25 mm used for landscaping.

The SCWP incorporates limestone resource to the west of the existing quarry with estimated life of mine ('LOM') of approximately 50 years.

2.2 Proposed Development

The Graymont SW Pit quarrying operations incorporate the additional limestone resource to the west into the current processing stream to meet expected future demand. The pit will be limited to the Camelot Stream catchment and will not extend north of the catchment boundary (**Figure 1**).

Approximately 7 million Bank Cubic Metres ('BCM') of overburden over approximately 50 years is expected to be encountered and removed in order to expose the limestone that can be quarried.

Quarrying at the SW Pit will be carried out by standard opencast methods, whereby a veneer of overburden is removed to expose the underlying limestone resource. Combined topsoil and overburden stripping is generally undertaken as targeted campaigns and carried out during anticipated dry periods. Occasionally stripping may be required during winter, though this is dependent on sales volumes and if campaigns are conducted in accordance with WRC winter works approvals.

2.3 Quarry Design

Graymont mining engineers have completed the preliminary quarry design and mine planning / staging. Designs are completed in accordance with international guidelines, New Zealand standards and the regulator's approved codes of practice for mining and quarrying.

The design of the quarry is the responsibility of Graymont mining engineers and quarry management. Updates to the standard design may occur throughout the life of the quarry.

Construction of the quarry is completed in accordance with the standard designs developed by the Graymont mining engineer and constructed with supervision from the Graymont quarry management.

2.3.1 Haul Road

All heavy trucks and quarry vehicles servicing the SW Pit will access via a haul road from the Oparure Pit to the eastern border of the SW Pit. Light vehicle access to the woolshed will be retained. No new entrance way to Oparure Road is proposed. The haul road between quarry sites is approximately 500 m long and will cover approximately 2.0 ha, with a total affected disturbed area of approximately 3Ha.

The haul road design is specific to the mining equipment used at the quarries. Haul road design (refer to **Table 2**) considers the gradient; operating widths; crossfall, shoulders and channels for drainage; and for traffic safety super elevation of corners, alignment, intersections and windrows.

Table 2: Haul Road Design		
Description	Criteria	Design ¹
Haul Road	Gradient ²	1:10
Lane widths ³	Two lane roads	19 m or 3.5 x truck width
	Single lane access	8 m or 1.5 x truck width
Windrows	Height	1.4 m or .66 x dia. largest wheel
	Base width	Based on angle of repose of blasted rock
Drainage	Cross fall	3 – 5 % In-pit unidirectional to pit slope. Fill ramps bidirectional from road centre
	Channels for drainage and catch ditches	1.5 m
Notes: 1. Based on critical truck dimensions of 60T Komatsu off highway truck with a width of 5.4m. 2. Steeper gradients may be used for temporary truck access permitted by Quarry Manager. 3. Designs may be changed by the Mining Engineer.		

2.3.2 Quarry Slopes

The objective of pit slope design is to maximise recovery of the resource and maintain control of physical stability and geotechnical hazards to allow safe extraction of the resource.

The overall slope angles and quarry bench design are based on the geotechnical characteristics of the rock and soil encountered at the site. The pit slopes are designed by Graymont mining and inputs by geotechnical experts experienced in mining and quarrying.

Open pit slope design parameters of the SW Pit are summarised in **Table 3** below.

Table 3: Pit Slope Design				
Material	Bench height (m)	Batter angle (°)	Berm width (m)	Inter Ramp² Slope (°)
Overburden – Volcanic Ash	10	15 – 26	N/A	N/A
Overburden Mahoenui Mudstone	15	35 – 45	7.5	27 – 34
Limestone	10 – 15	76	6 – 9	50
Working benches ³	10 – 15	N/A	20	N/A
Notes: 1. Pit slope designs are based on the recommendations in Adams Geotechnical Report 2018, Table 2: Geotechnical guidelines for preliminary quarry pit slope design at Oparure. 2. Overall slope angle does not include ramps / haul roads, i.e. inter ramp angle measured from horizontal. 3. Working benches are blasted rock, slopes should be controlled by safe operating procedures and equipment as per approved code of practice. Minimum operating width of safe truck movements.				

As part of geotechnical management and Life of Mine ('**LOM**') planning, the slope design parameters are reviewed annually by a geotechnical expert (or at an interval recommended by a geotechnical expert).

2.3.3 Overburden Stockpile

The overburden will be placed into quarried pits (the Oparure Pit and progressively the SW Pit after year 13) as overburden Engineered Landforms ('**ELFs**'). The methodology for the SW Pit will be similar to the Oparure Pit and involve:

- Placing an approximately 10 m high rock bund at the front face of the overburden ELF to form a rock fill buttress.
- Placing overburden behind the rock fill buttress and compacting.
- Having internal rock layering comprising 1 – 2 m thick layers of rock which is placed at 10 m intervals.

The overburden waste dumps geotechnical slope design parameters are developed by a geotechnical expert for long term stability. The mining engineer uses the parameters to design the slopes as required during the mine life. Slope instability of the final stockpile is unlikely and if it occurs will be contained within the quarry pit.

Overburden slope design parameters for the OPQ are summarised in **Table 4** below.

Table 4: Overburden Stockpile Design		
Backfill height (m)	Buttress width (m)	Final slope (°)
30	35	37
40	40	27
50	70	N/A ²
1. Notes: The slope design of waste dumps are based on recommendations by geotechnical experts PDP and Adams Geotechnical . 2. Other design options may be used to reduce buttress width to create a stable overall slope, such as reducing the overall slope angle. 3. Final slope angle requires site specific stability analysis to be complete, and advice from geotechnical expert is required.		

At this stage there are no planned ex-pit (fill placed outside the quarry pits) overburden stockpiles proposed for the SW Pit. Overburden stockpiles ex-pit would require additional geotechnical inputs and assessment to design for the ground conditions encountered and seismic stability.

As part of geotechnical management and LOM planning, the slope design parameters of the overburden stockpiles are reviewed annually by a geotechnical expert (or at an interval recommended by a geotechnical expert).

At site closure overburden and existing stockpiles shall be used for recontouring the site and capping exposed limestone. Refer to the **Conceptual Pit Closure Plan** for details.

2.3.4 Topsoil Management

Topsoil should be located to avoid any sensitive receiving environment, should be weed free and graded to prevent ponding. It should also be placed in areas that are accessible, flat and have dry/free draining. The topsoil stockpile will be designed and operated in a manner that minimise nutrient loss from the soil.

Where possible the recovered topsoil will be placed directly onto a rehabilitated surface. If no rehabilitation is planned, topsoil shall be stockpiled in a pile directly east of the SW Pit, between the SW Pit and Oparure quarry.

Graymont has prepared a ToMP (which is attached to and forms part of this management plan) which will be periodically reviewed and updated where

necessary to ensure the topsoil is stored in manner that ensures it be used in the rehabilitation that is undertaken.

The objective of the topsoil stockpile design and management is to:

- Retain nutrient value for use in rehabilitation;
- Minimise potential soil loss so as to maximise soil for rehabilitation of the waste dumps; and
- Minimise the potential adverse effects of sediment in stormwater runoff may have not the receiving environment (groundwater and / or possible surface waters).

Topsoil stockpiles are located on flat stable ground and protected from wind erosion and rilling (water erosion). Refer to the ToMP for further details on topsoil recovery and management.

2.3.5 Limestone extraction

The SW Pit will be operated and managed using the same quarrying methods implemented at the existing operation. This will include drilling and blasting of limestone of similar size and Maximum Instantaneous Charge ('MIC'), when required based on demand and weather conditions. This is estimated to be intervals of seven to 10 days to achieve a 40,000 to 80,000 T of limestone per month. For extraction machinery requirements, the SW Pit will have operating loaders, excavators and trucks moving along the haul road to the Oparure Quarry.

Drilling will be carried out by an Approved Contractor in accordance with a Blast Plan and Blast Parameters. All shot firing activities will be carried out in line with the Health and Safety at Work (Mining and Quarry Operations) Regulations 2016 and Health and Safety at Opencast Mines, Alluvial Mines and Quarries, Good Practice Guidelines (2015). Explosives will be supplied, loaded and fired by an approved Contractor. Once drilled and blasted, the limestone is collected and carted by dump trucks along to the processing facility.

Figure 1 and **Figure 2** show the footprint of the SCWP.

2.4 Stormwater Controls

An ESCP and ESC Toolkit have been prepared for the SW Pit. It is attached to, and forms part of this management plan. The objective of the ESCP is to outline the methods and techniques that are to be used by the consent holder to manage sediment loss as a result of the development of the haul road and new pit, and the on-going operation of both facilities so that they do not exceed the water quality limits set out in this resource consent.

The ESCP follows the principles in Environment Waikato's Erosion & Sediment Control Guidelines for Soil Disturbing Activities (ESCG) (EW 2009) and Auckland

Council's Guideline Document 2016/005 ('Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region', AC 2016).

The ESCP measures are required to manage stormwater for short term (<5 years or temporary) and long term (>5 years). The temporary and / or short-duration ESC measures are designed for a 20 year annual return interval ('ARI'). The long-term measures are designed to accommodate a 50 year ARI or 2% annual exceedance probability ('AEP') critical rainfall event.

2.5 Water Supply

Potable water supply is provided at the Oparure Quarry by onsite bore water. The bore water supplements non-potable water supply during dry periods / droughts.

Non-potable water supply from the surface water management system is used for dust suppression on the haul road, working benches, stockpiles and laydown areas, and for dust suppression in the processing facility.

Graymont is permitted to take surface water at 200 m³/day from the surface water lagoons¹. Additional stormwater ponds may be added to the non-potable water supply, provided that the water take is metered and the total take from surface water is in accordance with the resource consents (i.e. the aggregated abstraction is no more than 200 m³/day), as well as 100m³ per day of groundwater for dust suppression and for use in the processing plant under AUTH142709.07.

Firefighting water supply is from both potable and non-potable water supplies as required in emergencies.

2.6 Air Quality

Graymont will ensure that the activities associated with the SW Pit do not result in a discharge of airborne particulate matter that causes offensive or objectionable visible plumes or deposited dust beyond the boundary of the Site.

Graymont will engage an independent suitably qualified and experienced person(s) to prepare an AQMP which shall form part of this P&HMP. The objective of the AQMP is to:

- a) Set out the measures and methods that are to be implemented to avoid, remedy or mitigate any adverse effects of discharges of dust generated from the extraction of material and associated crushing activities undertaken at the Site;
- b) Promote proactive solutions to control dust discharges from the Site; and
- c) Ensure the effective and targeted use of available dust suppression water so that adverse effects of dust discharges are mitigated.

The AQMP will include, but shall not be limited to the following:

¹ Under Resource Consent AUTH140823.01.01

- a) The measures to be used to:
- i. Manage, mitigate and/or suppress dust emissions within the boundary of the site that have the potential to create dust impacts beyond the Site's boundary;
 - ii. Control discharges of dust to air from stockpiles;
 - iii. Limit exposed unconsolidated surfaces as much as practicable;
 - iv. Limit discharges of dust caused by vehicle movements;
 - v. Manage discharges associated with earthmoving and quarrying;
and
 - vi. Manage discharges of dust resulting from trucks being loaded / unloaded.
- b) The visual and meteorological monitoring that will be undertaken to monitor the effectiveness of its air quality controls; and
- c) The reporting that will be provided to the Chief Executive Officer of the WRC (or delegate) including the frequency of such reporting.

Dust prevention on site will implement a two-tier approach. Tier 1 controls will be employed routinely, and Tier 2 controls will be implemented additionally in the unlikely situation that the Tier 1 controls do not prove to be fully effective.

2.7 Noise²

The noise (rating) level from the activities authorised by this consent shall not exceed:

- a) 50 dB $L_{Aeq(15min)}$ between the hours of 7am and 10pm from Monday to Saturday and 8am to 5pm on Sundays and public holidays; and
- b) 40 dB $L_{Aeq(15min)}$ and 70 dB L_{AFmax} at all other times.

These noise limits shall not be exceeded at the notional boundary of any adjacent site except at 966 Oparure Road (where no noise limit applies). All noise measurements and assessments shall be in accordance with New Zealand Standards NZS 6801:2008 Acoustics – Measurement of environmental sound and NZS 6802:2008 Acoustics – Environmental noise.

Tonal reversing alarms shall not be used on any vehicles or plant that are based on the Site. Broadband alarms or non-tonal alternative devices are permitted.

No heavy machinery and plant for quarry development (this shall include but is not limited to trucks on haul roads, excavators, bulldozers, drilling, blasting, crusher operation and overburden removal) where there is a direct line of sight from the

² Authorised by RC WDC xxxx and subject to Condition 28 of the RC.

machinery to any notional boundary and the machinery is located 800 metres or closer to the notional boundary between the hours of 10 pm and 7am from Monday to Saturday and 5pm and 8am on Sundays and public holidays.

No quarrying shall be undertaken on the site on the following days (from 12.01 am to 11.59pm) of each calendar year (except as set for ANZAC Day):

- Christmas Day;
- Boxing Day;
- New Year's Day;
- Good Friday; and
- ANZAC Day (until 12pm noon).

2.8 Storage and Use of Hazardous Substances

All hazardous substance storage will occur at the existing Oparure Quarry which is not covered by this site management plan.

The Mobile Crusher Plant ('MCP') located in the SW Pit, which requires diesel, hydraulic fluids, oils and greases to operate, will have a spill response kit located at the plant. Diesel will be transported to the crushing unit using a tanker (5,000 L mobile diesel tank). The tanker will have appropriate spill protection measures including, but not limited to:

- An appropriate diesel transfer nozzle to restrict spill potential;
- Emergency shutoff systems to deactivate diesel dispensing; and/or
- Spill response kit located with the diesel tanker.

The MCP will also not be located in close proximity to stormwater management control devices or within the 200 m Camelot Cave Buffer Zone.

Graymont has engaged an independent suitably qualified and/or experienced person(s) to prepare the SRP which forms part of this P&HMP.

The objectives of the SRP are to

- (i) impose measures that will reduce, to a practicable minimum, the prospect of an accidental discharge of hazardous substances to land or water, and
- (ii) put procedures and responses in place to reduce, to a practicable minimum, the adverse effects of any accidental discharge that occurs.

The SRP includes, as a minimum, the following:

- a) The methods to be employed to minimise the potential for hazardous substances to be accidentally discharged or spilled to air, water and/or land;
- b) The methods to be employed to minimise any adverse environmental effects caused by any accidental discharge of hazardous substances;
- c) The measures / procedures that are to be established and followed to:
 - i. Store and transport hazardous substances (other than flocculation substances which are to be set out within the FMP within the Site;
 - ii. Report any accidental spill of hazardous substances that occurs to the WRC and other stakeholders; and
- d) The spill response procedures employed to capture any accidental discharge of hazardous substances to land and/or water.

2.9 Power Supply

No power supply is required for the quarry pit.

2.10 Extraction

2.10.1 Personnel

Personnel numbers vary throughout the year, approximately 18 to 30 staff are on site daily depending on the season, quarrying activities and bi-annual shutdowns.

2.10.2 Hours of Operation

No work shall be undertaken on the site on the following days (from 12.01 am to 11.59pm) of each calendar year (except as set for ANZAC Day in bullet point e)):

- a) Christmas Day;
- b) Boxing Day;
- c) New Year's Day;
- d) Good Friday; and
- e) ANZAC Day (until 12pm noon).

The site and quarry operations are not operational during bi-annual shutdowns. Shutdowns normally occur during winter (July) and summer (December).

2.10.3 Drill and Blast

The Quarry Manager and the Drill and Blast Coordinator are responsible for drill and blasting of limestone rock. Graymont personnel and contractors must hold relevant Certificate of Competence ('CoC') and qualifications to undertake and authorise blasting of rock.

No explosive products are stored on site. The actual drilling and blasting are undertaken by contractors. Explosive products are delivered by Mobile Mixing Unit ('MMU'). All explosives shall be handled, stored (temporarily) and used in accordance with the provisions in the HSNO Act 1996 and N.Z. Standard NZS 4403:1976 Code of Practice for Storage, Handling and Use of Explosives.

Graymont use a permit system for the preparation, drilling, design and loading of blasts, and for site clearance prior to blasting. A final pre-blast check list is completed and authorisation to proceed may only be given by the Graymont Drill and Blast Coordinator before firing the shot. Following the blast, the shot firer is responsible to ensure the site is safe prior to Graymont recommencing quarry operations.

Rock supply is typically planned to last 7 - 10 days and blasting is undertaken at this approximate interval at the site.

Noise and vibration generated at the site due to blasting is managed by the site Standard Operating Procedures for blasting. Monitoring of blast noise and vibration is undertaken at locations approximately 120 m (or more) from the centre of the blast.

Vibration from all blast events will not exceed a limit of 5mm/s PPV when measured on the foundation of any dwelling (not including 966 Oparure Road).

All blast event vibration measurements are within 500mm of ground level on the foundations, piles, footings or structural element on the perimeter of buildings not on the Site. All measurements and assessments shall be conducted in accordance with the requirements of DIN4150-3:1999 Structural vibration - Effects of vibration on structures;

The air over-pressure from all blast events will not exceed 115dB L_{ZPeak} when measured as the incident level at any dwelling on another site (not including 966 Oparure Road).

Not more than five blasts will be undertaken between the hours of 9am and 5pm on weekdays. No blasting will occur on weekends or public holidays.

2.10.4 Extraction

Grade control (i.e. limestone quality) is based on drill hole sampling and face mapping. Grade control is used to update the geological model and guide mine planning.

Interburden is low grade limestone that occurs within and between the seams and is identified by grade control. Interburden is mined as waste material and deposited into the overburden stockpiles or utilised as a dimension or landscaping rock.

Extraction of rock at the quarry sites is by excavator and off highway haul trucks. Blasted rock is delineated based on grade control and designated product. The blasted rock is then excavated and loaded onto trucks and directed to the primary crusher. Low grade cap rock / interburden (large size) is sent as dimension stone to the relevant stockpile or used as filter material at the quarry wall – overburden interface (for drainage) and as drainage layers within the overburden stockpile.

Extraction and production rates can be variable and are subject to product demand and weather constraints.

Graymont equipment currently used for extraction of limestone is listed below in **Table 5**. This is subject to change.

Table 5: Graymont Mining Equipment		
Equipment	Number	Size / Type
Loader	2	20 T Volvo
Off highway trucks	2	Komatsu HD605
Excavators	2	36T and 70 T Volvo
Tracked dozer	1	D8 CAT
Grader	1	D8 Dozer (contractors)
Mobile Crusher	0	30T (not currently being used)
<i>Notes:</i> 1. T = tonnes. 2. List does not include contractor's equipment for overburden removal or drill and blast. 3. Excavators increase to 5 during overburden removal. 4. Off highway haul trucks numbers can increase to 5 during overburden removal. 5. The equipment used at the quarry is at the discretion of Graymont to achieve its business and sustainability objectives. The actual equipment used by Graymont may vary.		

3.0 Health, Safety and Environment (HSE)

3.1 Corporate Policies

Graymont Ltd (the parent company) is an international business entity and has established policies and procedures that reflect a mature company operating in the mining and quarrying industry. The policies, procedures and commitments to HSE are available for public consultation and include:

- Mission Statement, Vision and Values;
- Code of Business Conduct and Ethics; and
- Sustainability.

Graymont is committed to fulfilling its objectives and exceeding regulatory compliance.

3.2 Environmental Objectives

Graymont is bound by New Zealand environmental law, the Waikato Regional Council and Waitomo District Council plans, and the resource consent conditions issued by the Councils. The conditions are enforced by the Councils to ensure the quarry operations do not adversely impact on the receiving environment. The quarry operation must comply with the following:

- Resource Management Act 1991;
- Waikato Regional Plan; and
- Waitomo District Plan.

Graymont environmental policies (amongst others) includes a commitment to:

- Zero environmental incidents;
- Enhance environmental stewardship through efficient, best in class operations and business practice by fostering a strong respect for the environment by efficiently and economically utilizing our natural resources;
- Striving for zero waste by focusing on reduction, beneficial reuse or elimination of traditional waste and co-product streams;
- Make certain that Graymont HSE standards comply with or surpass all relevant laws and regulations; and
- Require our business partners and contractors to adopt appropriate HSE practices.

3.3 Environmental Management and Sustainability

Environmental management is a principal factor for Graymont operations at the SCWP. Avoidance, remediation and mitigation of environmental effects by Graymont includes:

- Avoiding adverse effects on the Camelot Cave system and Camelot Stream;
- Erosion and Sediment Control Measures;
- Dust control systems;
- Blast vibration and noise monitoring;
- Hazardous substances and spill management;
- Ecological betterment (including improving karst and riparian areas, undertaking pest and weed control and managing the discharge of sediment of the land that is within the site but that is cropped / used for non-quarrying activities) (see **Section 3.5**); and
- Managing adverse effects on the indigenous bat and bird species that are known to frequent the site.

Graymont undertake environmental and community initiatives to conserve and protect the land and heritage sites. These initiatives include:

- Heritage and conservation sites;
- Protection of selected areas, including caves, and support of cave tourism operations;
- Annual scholarships with Maniapoto Maori Trust Board; and
- Charitable donations.

Graymont will continue ecological betterment, sustainability, and community initiatives.

3.4 Resource Consent Conditions

Graymont applied for resource consent to develop, operate and progressively rehabilitate the SW Pit for continued limestone production and for surface water take for dust suppression.

The Expert Consenting Panel granted resource consents [RC numbers] subject to consent conditions on [date]. The duration of the resource consents is 35 years. The resource consents applicable to the SW Pit are listed in **Table 6**.

Table 6: Resource Consents				
Consent Number	Activity Subtype	Activity Description	Date granted	Expiry date
Waikato Regional Council				
		The use of the water diverted for dust suppression		
		The discharge of stormwater to surface and groundwater		
		The discharge of stormwater to land		
		The diversion, take and discharge of water from Erosion and Sediment Control Measures		
		The diversion of surface/groundwater (not associated with Erosion and Sediment Control Measures)		
		The removal of overburden and the quarrying of limestone (and all associated discharge of sediment/compounds to water and air)		

Table 6: Resource Consents				
		The discharge (deposition) of overburden into the Pit from the Proposal (including the construction and maintenance of the haul road)		
Waitomo District Council				
		A quarrying activity in the Rural Zone		
		Extractive industries overlying the Digme-Camelot Cave overlay		
		Earthworks within 50 m or less upslope of a cave entrance		
		Exceedance of noise standards		

In the case of contradictions between this P&HMP and the Conditions of a resource consent, the Conditions shall prevail.

3.5 Ecological Betterment Plan

Intrinsic to Graymont's quarry plan are commitments on the Site and in the wider catchment which aim to:

- Compensate for the loss of indigenous terrestrial, karst and any impacts on aquatic (freshwater) habitat and provide betterment in accordance with the Vision and Strategy for the Waikato River;
- Reduce the net contribution that the new pit makes to the contaminant (sediment and nutrient) load that is discharged to the downstream surface and groundwater resources; and
- Advance measures and initiatives to address the actual and potential cultural effects of the Proposal.

Ecological Betterment initiatives associated with the SCWP include:

- Reduction of sediment loads entering Camelot Stream catchment by reducing overland runoff to ephemeral gully streams through riparian planting and existing native vegetation enhancement (see KRMP);
- Reduction of sediment loads from the cropping fields located outside of the footprints of the new pit and haul road (see CFMP);
- Pest and predator management (including fencing) of significant forested areas, tomos and at entrances to caves;
- Restoration and enhancement of proposed SNA;
- Gate Spring enhancement;
- Enhancement and protection of cave entrances; and,
- Karst ecosystem protection.

The EcoBP sets out the various initiatives to achieve betterment, and the details on each of the proposed initiatives are contained in the relevant management plans described in **Section 1.3**.

3.6 Camelot Cave System Refinement Zone³

An independent suitably qualified and experienced expert will undertake a comprehensive scientific assessment of the Camelot Cave System Refinement Zone (shown in **Figure 1**) and provide an opinion of whether the planned

³ WRC Conditions **14 to 18**

excavations, quarrying and/or disturbance activities will, in their expert opinion, adversely affect the Camelot Cave System and the Camelot Cave Stream.

Graymont will engage with the Oparure Marae over the assessment. A written record of the engagement that has been undertaken with the Marae will be provided to the Chief Executive Officer of the Waikato Regional Council (or delegate). The written record shall include all comments provided by the Marae to the engagement, and responses from the consent holder to the comments of the Marae.

The Camelot Cave System Refinement Zone shall not be disturbed, excavated or quarried until The Chief Executive Officer of the Waikato Regional Council (or delegate) confirms (in writing), based on the opinion of the suitably qualified and experienced expert, and taking the record of engagement into account, that excavations, quarrying or disturbance activities can proceed without adversely affecting the Camelot Cave System and the Camelot Cave Stream.

3.7 Management Plans

The Quarry Manager⁴ or Superintendent assumes overall responsibility for the quarry operations, environmental compliance and the health and safety at the site.

Management plans that address health and safety, and the specific environmental issues are summarised in **Table 7** below.

The Health and Safety Management Plan and Emergency Response Plan are separate Graymont documents and not appended to the P&HMP. These plans are referenced below only for completeness.

Table 7: Environmental Management Plans		
Management Plan	Document Reference	Resource Condition Reference
Health and Safety Management Plan	Graymont	Not Applicable
Emergency Response Plan	Graymont	Not Applicable
Cultural Monitoring Plan ('CMP')	[Xxxxxx]	AUTHxxxx: 8 - 13
P&HMP (this document)	[Xxxxxx]	AUTHxxxx: 24
Ecological Betterment Plan ('EcoBP')	[Xxxxxx]	AUTHxxxx: 26

⁴ Being the person who has responsibility for the quarry. The current title for this role is "Superintendent."

Table 7: Environmental Management Plans		
Management Plan	Document Reference	Resource Condition Reference
Cropping Field Management Plan ('CFMP')	[Xxxxxx]	AUTHxxxx: 26
Karst and Riparian Management Plan ('KRMP')	[Xxxxxx]	AUTHxxxx: 26
Air Quality Management Plan ('AQMP')	[Xxxxxx]	AUTHxxxx: 26
Erosion and Sediment Control Plan ('ESCP') (with associated ESC Toolkit and ESC Stage Plans)	[Xxxxxx]	AUTHxxxx: 26
Spill Response Plan ('SRP')	[Xxxxxx]	AUTHxxxx: 35
Topsoil Management Plan ('ToMP')	[Xxxxxx]	AUTHxxxx: 26
Pit Closure Plan ('PCP')	[Xxxxxx]	AUTHxxxx: 85
Flocculation Management Plan ('FMP')	[Xxxxxx]	AUTHxxxx: 65
Lizard Management Plan ('LMP')	[Xxxxxx]	Not Applicable
Bird Management Plan ('BiMP')	[Xxxxxx]	Not Applicable
Bat Management Plan ('BaMP')	[Xxxxxx]	Not Applicable

3.8 Water Quality Monitoring

The following resource consents have **water quality** monitoring requirements:

- [xxx]
- [xxx]
- [xxx]

Water quality monitoring and reporting is to be undertaken by an independent suitably qualified and/or experienced person/expert⁵.

3.8.1 Continuous Instream Monitoring

⁵ Resource Consent [xxx] Condition 21 defines the phrase 'Independent Suitably Qualified and/or Experienced Expert' means a person or persons:

- That is not an employee of the consent holder;
- Who has a recognised qualification(s) relevant to the topic being assessed; and/or
- Who has relevant experience in the topic being assessed.

Continuous water quality monitoring (at a 15-minute sample frequency) of the turbidity in the unnamed tributary that flows to the Camelot Stream and that is upgradient of both the New Pit and Gate Spring (at or about NZTM 1778110E; 5753300N) ("the Upstream Turbidity Monitoring Site"), and downstream of the Gate Spring / Mangawhitikau Stream confluence (at or about NZTM 1783190E; 5755350N) ("the Downstream Turbidity Monitoring Site") shall be undertaken⁶.

3.8.2 Camelot Cave System⁷

Once the physical works (excavations, quarrying or disturbance activities) associated with the SW Pit commence within the Camelot Cave System Buffer Zone, the purpose of the continuous turbidity monitoring is to identify if the turbidity at the Downstream Turbidity Monitoring Site exceeds the turbidity at the Upstream Turbidity Monitoring Site, with an initial trigger level of 2,000 NTU.

If the turbidity reading at the Downstream Turbidity Monitoring Site exceeds 2,000 NTU, the following protocol shall be followed:

- a) If the NTU at the Downstream Turbidity Monitoring Site is higher than the turbidity at the Upstream Turbidity Monitoring Site, with the concentration at the downstream site >2,000 NTU, then:
 - i. Action 1: a data exceedance alert shall be sent to the consent holder to review and track. The consent holder shall compare the turbidity reading at the Downstream Turbidity Monitoring Site to the turbidity reading at the Upstream Turbidity Monitoring Site, noting travel delay .
 - ii. Action 2: The Site manager shall be informed, and the current site activities shall be recorded.
 - iii. Action 3: The consent holder shall undertake a Site check of the sediment controls in the CCBZ or BVRZ .
- b) If the NTU at Downstream Turbidity Monitoring Site remains >20% higher than the Upstream Turbidity Monitoring Site and >2,000 NTU for >48 hrs, then:
 - i. Action 1: The data trend shall be assessed to determine if the turbidity levels are increasing, reducing, or stable. If the turbidity levels are reducing, the consent holder shall prepare a report to Council addressing the trigger exceedance, summarise available data and steps undertaken by the consent holder.
 - ii. Action 2: If the data trend is not reducing at the downstream site, works within the CCBZ or BVRZ will be put on hold until NTU

⁶ WRC RC xxx Condition 55

⁷ WRC RC xxx Condition 15

reduces below the turbidity at the upstream site or returns to <50 NTU.

- c) If the NTU at Downstream Turbidity Monitoring Site remains >20% higher than the Upstream Turbidity Monitoring Site and >2,000 NTU for >72 hrs, with no reducing trend, then:
 - i. Action 1: The consent holder shall not resume works within the CCBZ or BVRZ until NTU reduces below the turbidity at the upstream site or returns to <50 NTU and results as per action 2 (condition 20(c)(ii)) and action 3 (condition 20(c)(iii)) are confirmed.
 - ii. Action 2: The consent holder shall take an eDNA sample at Pōtea Spring and send it to an accredited laboratory for processing.
 - iii. Action 3: An independent suitably qualified and/or experienced expert(s) appointed by the consent holder shall undertake macroinvertebrate and deposited sediment surveys in the Mangawhitikau Stream 20 m upstream and 100 m downstream of the Pōtea Spring confluence. Macroinvertebrate samples are to be sent to an accredited laboratory for urgent processing. Samples to be taken when safe instream conditions allow.
 - iv. Action 4: The results of ecological monitoring shall be reviewed by an independent suitably qualified and/or experienced expert(s) appointed by the consent holder. The consent holder shall resume works in the CCBZ or BVRZ and prepare a report that shall be submitted to the Chief Executive Officer of the WRC (or delegate) no more than two weeks after works resume, if the following are met:
 - A <20% increase in deposited sediment percent cover at downstream Mangawhitikau Stream monitoring site compared to the upstream site;
 - MCI and QMCI scores remain in the same NPSFM attribute band at upstream and downstream Mangawhitikau Stream site.
- d) If condition 20(c)(iv) cannot be met, the independent suitably qualified, experienced person/expert(s) appointed by the consent holder shall prepare a report, investigating the actual and potential short- and long-term effects of the activity. This includes an investigation into the source of the increased turbidity. This report shall include:
 - i. Data collected, and actions taken by the consent holder.

- ii. A summary of site works immediately prior to the turbidity exceedances, weather conditions, and investigations into alternative sediment sources, if applicable.
- iii. Recommendation of measures to address the adverse effect(s) to the point whereby it will be, in the opinion of the independent suitably qualified and/or experienced expert(s), be acceptable. The recommended measures shall identify the timeframes associated with their implementation, and the monitoring that is to be undertaken (including its frequency and duration) to assess the effectiveness of the measures.
- iv. Recommended monitoring to determine persistence of effects.
- v. Recommend timeframes for restarting works.
- vi. Recommend mitigation, offsetting or compensation, if required. The consent holder shall submit the report referred to in this condition to the Chief Executive Officer of the WRC (or delegate) within six weeks of the monitoring referred to in condition 20(c)(iv) being taken.

All excavations / quarrying or other earth disturbance within the Camelot Cave System CCBZ or BVRZ shall not re-commence until the measures recommended by the independent suitably qualified and/or experienced expert(s) are in place / are being implemented.

3.8.3 Erosion and sediment control devices

Samples of the discharge from all lined erosion and sediment control devices on the Site shall be taken at least once per month and after all rainfall events where greater than or equal to 50mm of rainfall has occurred in the preceding 24 hours. The samples shall be taken within 24 hours of Graymont becoming aware that a rainfall event greater than 50mm has occurred in the preceding 24 hours⁸. If there has been no discharges from a lined erosion and sediment control device since the preceding sample being taken, the consent holder need not take a sample from that lined erosion and sediment control device. Further, no sample needs to be taken if there have been no discharges from the lined erosion and sediment control device after a rainfall event of the size (or larger) set out in Condition 63 of this resource consent.

The purpose of the samples is to determine if the suspended solids ('TSS') level of the stormwater discharging from the lined erosion and sediment control devices (as measured when the device is discharging to receiving catchment at the time of sampling) exceeds 100 milligrams per litre.

⁸ WRC RC xxx Condition 66

Samples are to be forwarded to a laboratory where they are to be analysed for TSS within five working days of taking any samples. The results of the analysis shall be forwarded to the Chief Executive Officer of the WRC (or delegate) within seven days of receiving results of the analysis.

3.8.4 Flocculant Management Plan

Should monitoring show that the TSS limit is being exceeded in any erosion and sediment control device, then a flocculation treatment system shall be implemented in the applicable sediment control device in order to reduce sediment discharges from the Site. The flocculation treatment system shall be installed and implemented in accordance with a FMP. The FMP shall be prepared so as to ensure that the following standards are achieved and that sufficient monitoring is undertaken to ensure that compliance is being achieved:

- a) The soluble aluminium concentration of any sediment retention pond discharge shall not exceed 0.2 g/m³; and
- b) The pH of any sediment retention pond discharge shall not be less than 7.5 pH units.

3.8.5 Reporting

Reporting must include the type of data collected and analyses completed, and also anything deemed of importance that may have impact on the data, analyses or have an effect on the environment.

The results of monitoring undertaken and a description of what mitigations have been installed (and their effectiveness in addressing any exceedances of the minimum compliance standards) shall be summarised in a single report that is attached to and forms part of the Annual Report that is prepared and supplied to the Chief Executive Officer of the WRC (or delegate).

3.9 Aquatic Ecology Monitoring⁹

Ecological monitoring shall be undertaken by a suitably qualified and/or experienced person⁵.

3.9.1 Location

Ecological monitoring shall be undertaken 20 metres upstream (at or about New Zealand Transverse Mercator ('NZTM') 1783138E, 5755338N) and 100 metres downstream (at or about NZTM 1783235E, 5755336N) of the Gate (Potea) Spring confluence with the Mangawhitikau Stream.

⁹ Required by condition no. 58 and 59 of resource consent [xxx].

3.9.2 Variables and Methodology

- a) Deposited fine sediment surveys (percent cover and depth) using the Sediment Assess Method 2 ('**SAM2**') method (Clapcott et al., 2011);
- b) Benthic macroinvertebrate sampling following the National Environmental Monitoring Standards ('**NEMS**') (2022) '200+ Fixed Count with Scan for Missed Taxa' method;
- c) Invertebrate drift sampling at Gate (Potea) Spring and Pumphouse Spring using 250 µm and 500 µm mesh nets; and
- d) Periphyton surveys (percent cover and type) following NEMS 2020 methods.

3.9.3 Minimum compliance standards¹⁰:

- a) ≤20% change in deposited sediment percent cover
- b) MCI and QMCI scores remain in the same National Policy Statement for Freshwater Management ('**NPSFM**') attribute band
- c) ≤20% change in periphyton percent cover, and
- d) ≤20% increase in daily mean turbidity.

Subsequent sampling shall be conducted in comparable habitat such that the results for deposited sediment, benthic macroinvertebrates and periphyton are compared against the relevant regional and national standards and guidelines and the compliance standards listed above. Following the first monitoring exercise undertaken the first round of data shall form the baseline for all future monitoring exercises.

3.9.4 Frequency

Ecological monitoring shall be undertaken annually between the 1st of December and the 30th of April of each year for five years after the commencement of the earthworks, and every three years thereafter.

3.9.5 Mitigation Measures¹⁰

In the event of an exceedance of the minimum compliance standards listed above, the independent and/or suitability experienced expert shall recommend mitigation options if the exceedances is, in the opinion of the independent and/or suitability experienced expert, caused by the establishment and/or operation of the new pit. When recommending the mitigation options the independent and/or suitability experienced expert shall set out when they must be installed by, what

¹⁰ WRC RC xxx Condition 58

operation, maintenance and specific monitoring is required, and what quarrying, earthworks and other land disturbance activities can occur on the site while the mitigation options are being installed.

3.9.6 Reporting¹¹

Reporting must include the type of data collected and analyses completed, and also anything deemed of importance that may have impact on the data, analyses or have an effect on the environment.

The results of monitoring undertaken and a description of what mitigations have been installed (and their effectiveness in addressing any exceedances of the minimum compliance standards) shall be summarised in a single report that is attached to and forms part of the Annual Report that is prepared and supplied to the Chief Executive Officer of the WRC (or delegate).

¹¹ WRC RC xxx Condition 59

4.0 Oparure Marae and Te Whare Te Tokanganui-a-noho

Graymont have consulted with Oparure Marae and Te Nehenehenui ('**TNN**') on the effects the quarry sites could have on Māori cultural values.

Graymont will, not later than three months prior to the quarrying of limestone from the SCWP, invite Oparure Marae to collaborate with Graymont in the preparation of a Cultural Monitoring Plan ('**CMP**')¹² for the Site and quarrying activities which are undertaken on land owned by Graymont. In the event that Oparure Marae do not accept the invitation to prepare the CMP with the Graymont, then the CMP will not be required.

Should the Oparure Marae accept the invitation extended by Graymont, then Graymont will fund the preparation of the CMP. Once the CMP has been prepared (and agreed to by Graymont), Graymont will submit the CMP to the Chief Executive Officer of the Waikato Regional Council ('**WRC**') (or delegate)¹³.

The objective of the CMP will be to both acknowledge mana whenua as kaitiaki, and to provide the opportunity for cultural monitors to participate in the monitoring (including the application of appropriate tikanga) undertaken by Graymont of the quarrying activities conducted on land Graymont owns in accordance with the conditions of the resource consent to avoid, remedy, manage or offset actual and potential adverse effects from the activities.

The CMP shall include, but is not limited to:

- a) Identification of culturally appropriate monitoring indicators and methods relating to:
 - i. the actual or potential effects of the New Pit on the Camelot Karst (cave) System;
 - ii. the EcoBP;
 - iii. culturally important plant and aquatic species (if identified);
- b) Protocols for the presence of cultural monitors on site on land that is owned by the consent holder; and
- c) Procedures for reporting and responding to cultural issues or concerns.

The CMP may be amended by Graymont to respond to new information or changing circumstances. Graymont will engage with Oparure Marae prior to submitting the amended CMP to the WRC.

Graymont will implement the approved version of the CMP.

¹² WRC RC xxx Conditions 8 to 13

¹³ WRC will not certify this CMP

5.0 Mining Permits and Regulatory Framework

Mineral resources (owned by the Crown) in New Zealand are administered and regulated by the Crown Minerals Act 1991 and Minerals Programme for Minerals 2013. New Zealand Petroleum and Minerals (NZPAM) issues permits under the act and sets the minimum work programmes and obligations to be fulfilled by the company that owns the permits.

5.1 NZPAM Permits

Graymont are allocated New Zealand Petroleum and Minerals ('NZPAM') (Tier 2) permits to explore and mine the Crown owned limestone resource at Oparure.

Graymont operates the OPQ under mining permits MP41694 and MP60802 as detailed in **Table 8**.

Table 8: NZPAM Permits			
Permit No.	Permit Type	Area (Ha)	Expires
41694	Minerals Mining	148.5	17 May 2041
60802	Minerals Mining	198.06	13 July 2024
<i>Notes:</i> 1. Permit information accessed online 23 July 2025 via NZPAM Permit Maps - Minerals http://data.nzpam.govt.nz/permitwebmaps/?commodity=minerals. 2. A Tier 2 permit means a permit that is not Tier 1 as does not include gold, silver, coal, platinum, iron sands and metallic minerals.			

Figure 2: Site Plan

GRAYMONT (NZ) LTD - SOUTH-WESTERN PIT
PIT AND HAUL ROAD SITE MANAGEMENT PLAN

