

**BEFORE THE HEARINGS PANEL  
FOR THE WELLINGTON CITY COUNCIL**

**IN THE MATTER** of the Resource  
Management Act 1991

**AND**

**IN THE MATTER** of Proposed Plan  
Change 83 to the  
Wellington City District  
Plan

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**STATEMENT OF EVIDENCE OF DARCY ALAN MADDERN**

**19 November 2018**

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## **1 INTRODUCTION**

**1.1** My full name is Darcy Alan Maddern.

**1.2** I have 35 years of experience in the extractives industry throughout New Zealand. I was the Operations Manager from 2005 to 2013 at the Oparure Limestone Quarry (which is located in close proximity to the Waitomo Tourist Caves). I am currently the Operations Manager for the Bombay Quarry in the Auckland Region and also responsible for overseeing the current and future development of the Kiwi Point Quarry (KPQ) in the Wellington Region for Holcim (New Zealand) Ltd (HNZL). I have held this role since 2014.

**1.3** I hold a current A Grade Quarry Managers Certificate of Competence, Shot Firers (Explosives) Certificate and Approved Handlers Certificate.

**1.4** I am a member of the Institute of Quarrying New Zealand and for the past four years I have been on the Executive Board representing the Quarrying Industry. Since 2015 I have been undertaking oral examinations on behalf of WorkSafe New Zealand for Quarry Managers requiring A or B Grade Quarry Certificates of Competence.

My involvement in Plan Change 83 commenced in the latter part of 2013 when I undertook a review of the current available aggregate resources at KPQ (of which included an assessment of the remaining life at other local quarries from publicly available information) against known infrastructure projects in the Wellington Region. In 2014 the Wellington City Council (WCC) was informed of the outcome of this review. It was concluded that there would be a significant gap in the aggregates required for the Wellington Region compared to the life expectancy of KPQ (and other local quarries in the region).

**1.5** While I understand that the present hearing is not a matter to which the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note (2014) applies, I confirm that I have approached the preparation of this evidence in the same manner as I would for Environment Court proceedings and have complied with the requirements of the Code. I confirm that the issues addressed in this

evidence are within my area of expertise and the opinions I have expressed are my own except where I have stated that I have relied on the evidence of other people. I have not omitted material facts known to me that might alter or detract from my evidence.

## **2 SCOPE OF EVIDENCE**

**2.1** I have been asked by Wellington City Council to prepare evidence on its behalf, as Proponent of Proposed Plan Change 83.

**2.2** The evidence I was asked to prepare, specifically relates to Quarry Operations at KPQ and the Management of Environmental Effects as a result of quarrying operations at KPQ.

**2.3** My evidence will address the following points:

(a) Quarry Development Method;

- ❖ Quarry Design;
  - Exploration Drilling;
  - Geotechnical Assessment;
  - Resource Modelling;
  - Final Design
- ❖ Quarry Development;
  - Stripping (vegetation and overburden removal);
  - Overburden disposal;
  - Blasting; and
  - Product Processing and Dispatch.
- ❖ Quarry Rehabilitation.

(b) Management of Environmental Effects;

- ❖ Noise and Vibration;
- ❖ Dust;
- ❖ Water;
- ❖ Erosion and Sediment Control; and
- ❖ Light Spill;
- ❖ Cultural/Heritage.

**2.4** The key documents and information that I have referred to and relied on in preparing my evidence include:

- (a) **Ormiston and Associates Limited:** Proposed Development of the South Ridge; February 2016.
- (b) **Geoscience Consulting New Zealand Ltd:** October 2014, “Kiwi Point Quarry Slope Stability Review” October 2014,
- (c) **Geoscience Consulting New Zealand Ltd:** “Kiwi Point Quarry Slope Stability Review”; February 2015.
- (d) **Geoscience Consulting New Zealand Ltd:** “Kiwi Point Quarry Slope Stability Review”; August 2015.
- (e) **Wildlands Consultants Limited:** “Mitigation options for the potential loss of Indigenous vegetation and habitat at the proposed Kiwi Point Quarry Wellington”; November 2018.

### **3 EXECUTIVE SUMMARY**

**3.1** KPQ operates as a permitted activity under provisions in the Wellington City District Plan. KPQ has been managed by the WCC since the 1920's. In 2006 the quarry operations were leased to Atom Hire Ltd and in 2009 Holcim New Zealand Ltd purchased the Quarry Lease from Atom Hire Ltd.

**3.2** The rock resource in the Northern Resource is nearing the end of its economic life. In 2013 planning commenced to quarry the portion of the Southern Resource area zoned Business 2. The area approved for quarry activities in the Southern Resource (known as Area H) was modelled with the data from drilling program completed in 2014. Analysis of resource modelling data identified that extraction of the high grade rock in area H in isolation would be uneconomical due to the volume of available resource compared to the overburden required to be stripped to gain access to these reserves.

**3.3** Further modelling was undertaken, combining Area H and Open Space B, this model showed that the economics and viability of expanding the southern face into Open Space B that would extend the life expectancy of the KPQ by approximately 15 to 20 years (the basis for Plan Change 83).

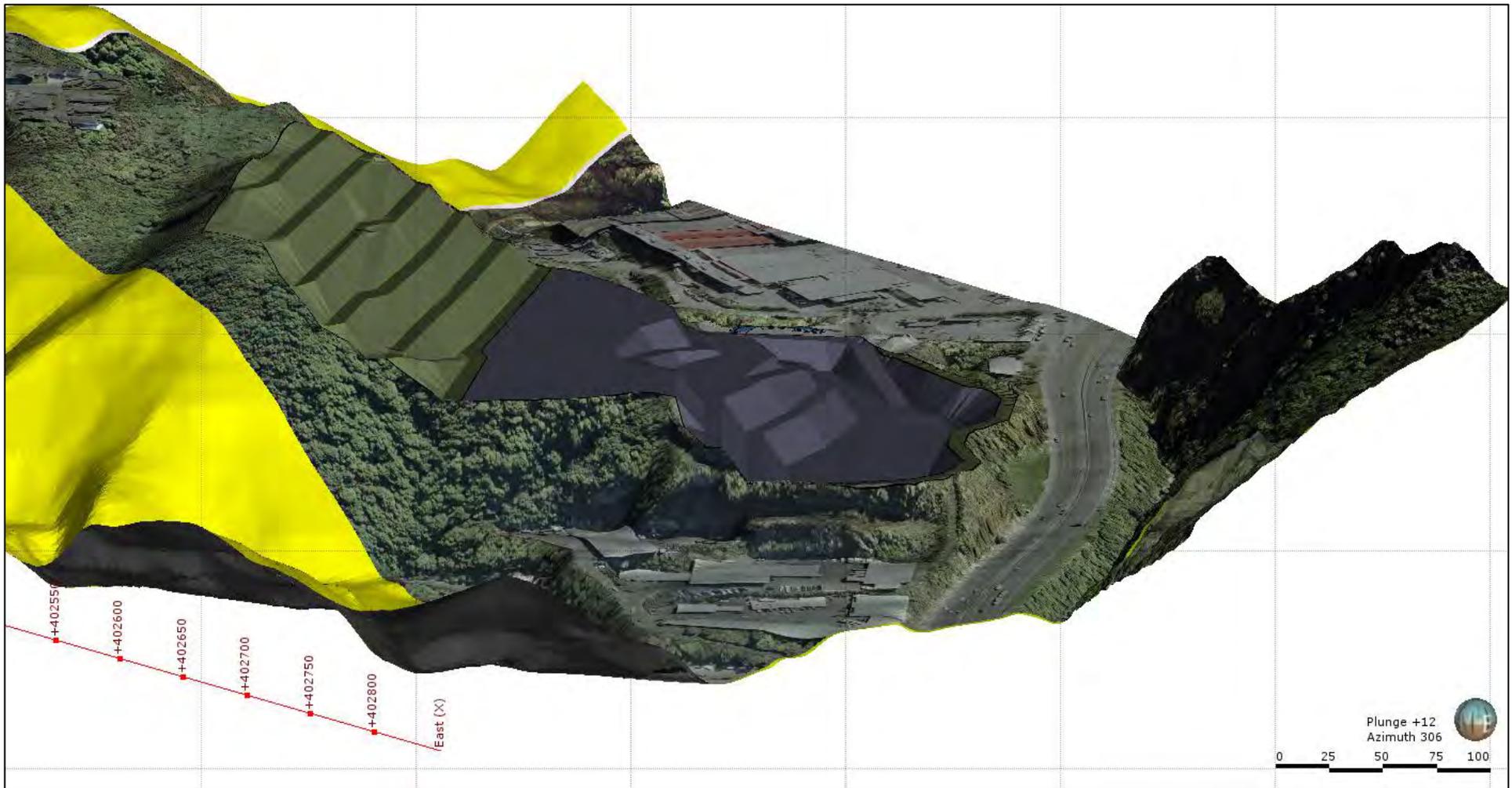
## 4 QUARRY DESIGN

- 4.1 This section describes the proposed quarrying of the Southern Resource at KPQ. The Southern Resource Pit design was completed by Ormiston Associates Ltd with reference to geotechnical studies completed by Geoscience Consulting Limited (now ENGEO Limited).
- 4.2 The proposed Southern Resource Pit has been designed to meet best practice standard guideline titled “Worksafe New Zealand’s Good Practice Guidelines: Health and Safety at Opencast Mines, Alluvial Mines and Quarries, November 2015”.
- 4.3 **EXPLORATION DRILLING:** Exploration drilling was undertaken in the Southern Resource in 2014. Approximately 372 lineal meters of diamond core drilling was completed over several holes. The results of these test holes has allowed geotechnical and geological specialists to closely study and document the structure and types of rocks contained in the Southern Resource.
- 4.4 **GEOTECHNICAL ASSESSMENT:** A Geotechnical Assessment (slope stability review) was carried out on the exposed faces of the Southern Resource by Geoscience Consulting Ltd (now ENGEO Limited) in August 2015. This assessment has been critical in the development of a pit design for the Southern Resource Pit to identify any significant hazards and potential failure mechanisms which would affect the ultimate pit design. The Geotechnical Assessment also determined the direction of working face heights and other controlling factors which are factored into the design (including slope batter angles for the individual benches).
- 4.5 Detailed geotechnical and resource drilling investigations carried out in the Northern Resource were also analysed. This information was compared to the analysis and measurements made from exploratory drill holes undertaken in the Southern Resource to give the most likely configuration for the batters and benches to ensure stable slopes during and post quarrying.
- 4.6 Given the seismic activity of the Wellington region Geotechnical Assessments are completed quarterly in the Northern Resource to ensure that the slopes remain safe and this will also be undertaken in the Southern Resource once development commences. This information as mentioned was also incorporated into the design of the

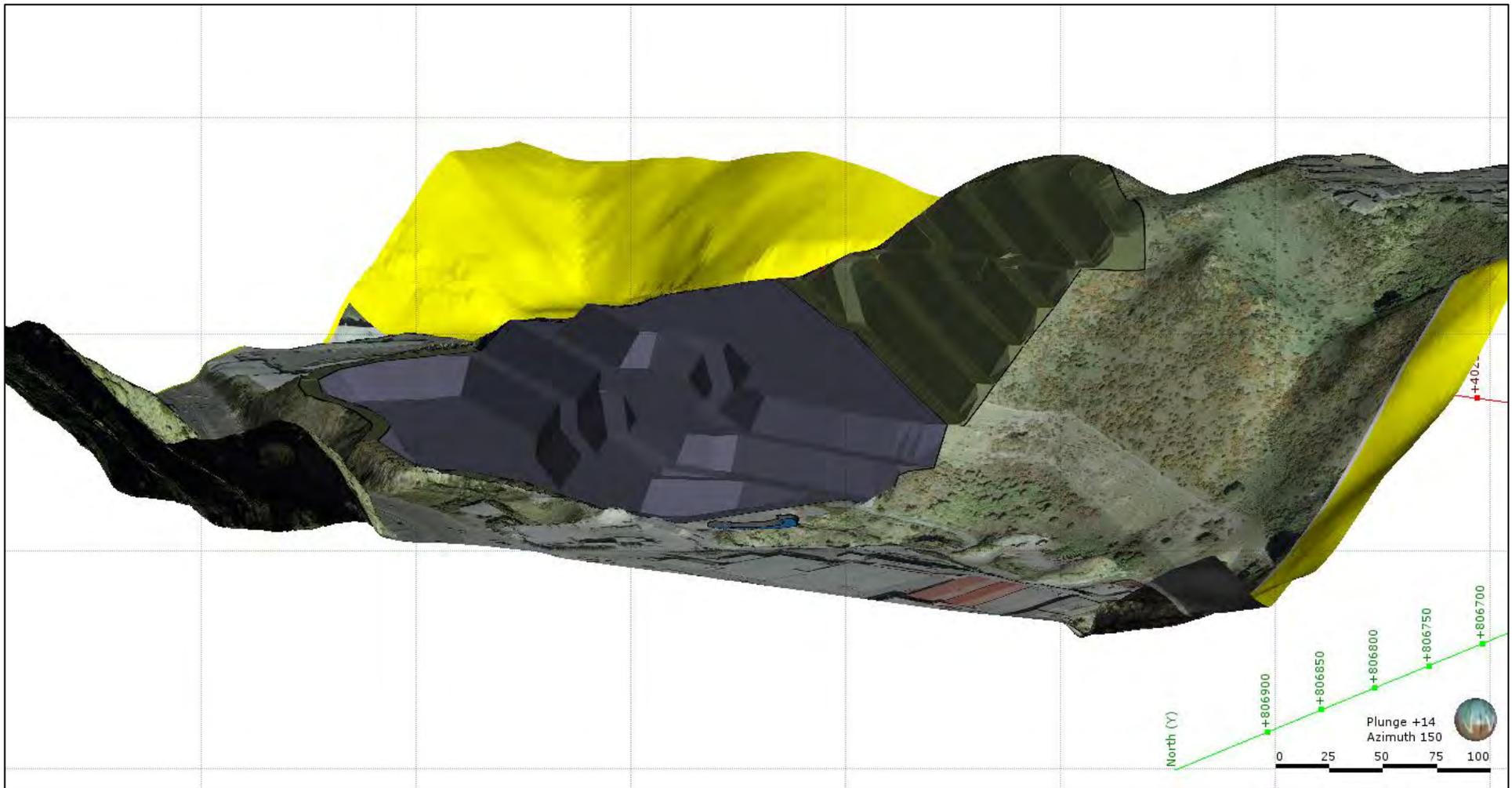
Southern Resource Pit.

- 4.7** KPQ receives information from “RapidaAlert” which records earthquake information from the Newlands Accelerometer Station (horizontal component of movement). KPQ follows a strict procedure in the event of an earthquake which involves geotechnical assessments by engineers and monitoring.
- 4.8 RESOURCE MODELLING:** Information from exploratory drilling and other assessments were then used to produce a three dimensional (3D) model of the quarry resource from which a pit design was developed (incorporating such things as batter angles, face heights, bench widths, location of haul roads and water control devices) whilst factoring in site constraints.
- 4.9** The initial draft 3D model was then analysed internally by Mine Engineers to ensure the extraction of the Southern Resource could be undertaken safely and ensure that minimal reserves would be sterilised as a result of incorrect placement of haul roads, processing plants and other infrastructure needed to operate the quarry.
- 4.10 FINAL DESIGN PARAMETERS:** As a result of modelling and specialist assessments, the development of the proposed Southern Resource Pit has been designed with 15 metre high batter slopes, initially at 30 - 35 degrees from horizontal in the weathered clay, 45 degrees in the highly weathered Greywacke (Brown Rock). As the depth of the rock increases the weathering effects decrease allowing the batter slope angles to be increased to 55 degrees from the horizontal (competent rock).
- 4.11** Between the toe and crest of each face an 8 metre wide bench will be formed to allow access to the benches for maintenance and rehabilitation. The design of the bench widths may be reduced to 5 metres (5 metre bench widths are within the guidelines provided by WorkSafe New Zealand) and would only be contemplated following a geotechnical report confirming the strength and structural integrity of the rock.
- 4.12** A 3D design of the Southern Resource is shown in Figures 1, 2 and 3. It should be noted that the final design of the Southern Resource Pit may change depending on the rock conditions encountered during extraction activities.

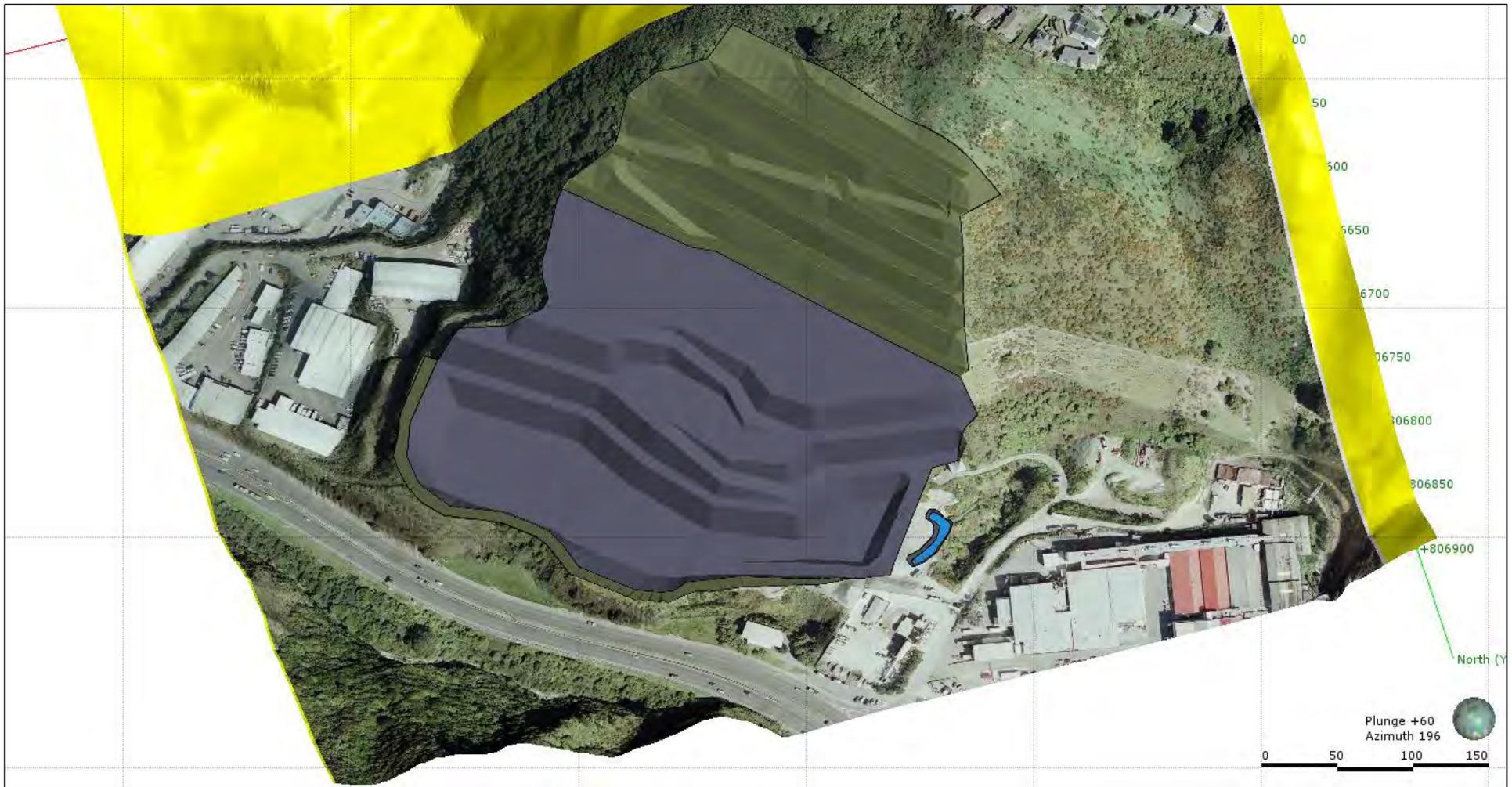
Figure 1: Finished Quarry (Stage 4) Looking East



**Figure 2:** Finished Quarry (Stage 4) Looking West



**Figure 3:** Finished Quarry (Stage 4) Birdseye View



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## 5 QUARRY DEVELOPMENT

**5.1 QUARRYING METHODOLOGY:** Quarry development and extraction will be carried out with a range of mechanical equipment including (but not limited to), hydraulic excavators, bulldozers, dump trucks and blasting of rock with the use of explosives.

**5.2** All quarry development operations will continue to be conducted in accordance with the following documents;

- ❖ Worksafe New Zealand: Good Practice Guidelines: Health and Safety at Opencast Mines, Alluvial Mines and Quarries; November 2015; and
- ❖ Kiwi Point Quarry; Quarry Management Plan, Wellington City Council; June 2014 and any subsequent versions;.

**5.3 STRIPPING:** Development of the quarry would commence with the removal of vegetation/topsoil and then overburden from the planned boundary of the Pit with the use of excavators, bulldozers and dump trucks. Topsoil is considered to be the upper most layer of soil (~5 to 20 cm) and has the highest concentration of organic matter. Overburden (also called waste or spoil) is the material that lies above rock and below topsoil.

The stripping program in the Southern Resource will be completed in stages. Two options have been proposed, the timing of which will be largely determined by the remaining life of the Northern Resource and the timeframe required for securing access to the Southern Resource high grade reserves by stripping vegetation topsoil and overburden.

- ❖ Option 1 – Commence stripping operations from the top benches at RL 175, 160 and 145;
- ❖ Option 2 – Commence stripping operations at RL 145. Option 2 will only be undertaken if the Northern Pit resources deplete at a higher rate than forecast.

**5.4 Stripping – Vegetation:** At the commencement of stripping operations, indigenous vegetation identified by Wildlands Consultants

Limited<sup>1</sup> (mainly Ngaio/Mahoe Forest) will be removed and where possible replanted in areas identified in Figure 4 and 5. The relocation and replanting of identified indigenous vegetation is likely to involve the use of specialist arborists to ensure the transplanted vegetation has the best chance of survival.

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<sup>1</sup> **Wildlands Consultants Limited:** "Mitigation options for the potential loss of Indigenous vegetation and habitat at the proposed Kiwi Point Quarry Wellington"; August 2018

Figure 4: Mitigation Planting Area (Stage 1)

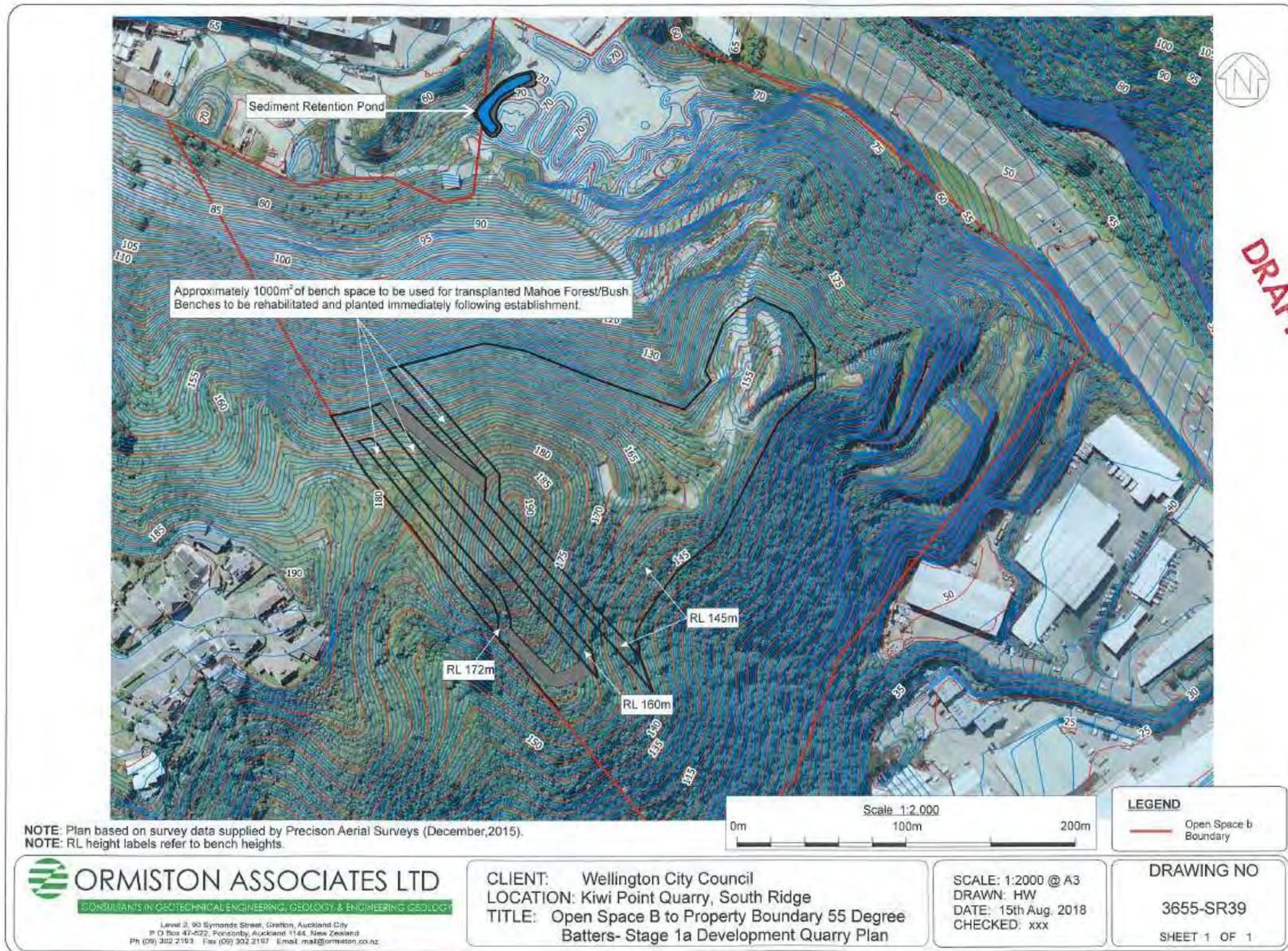
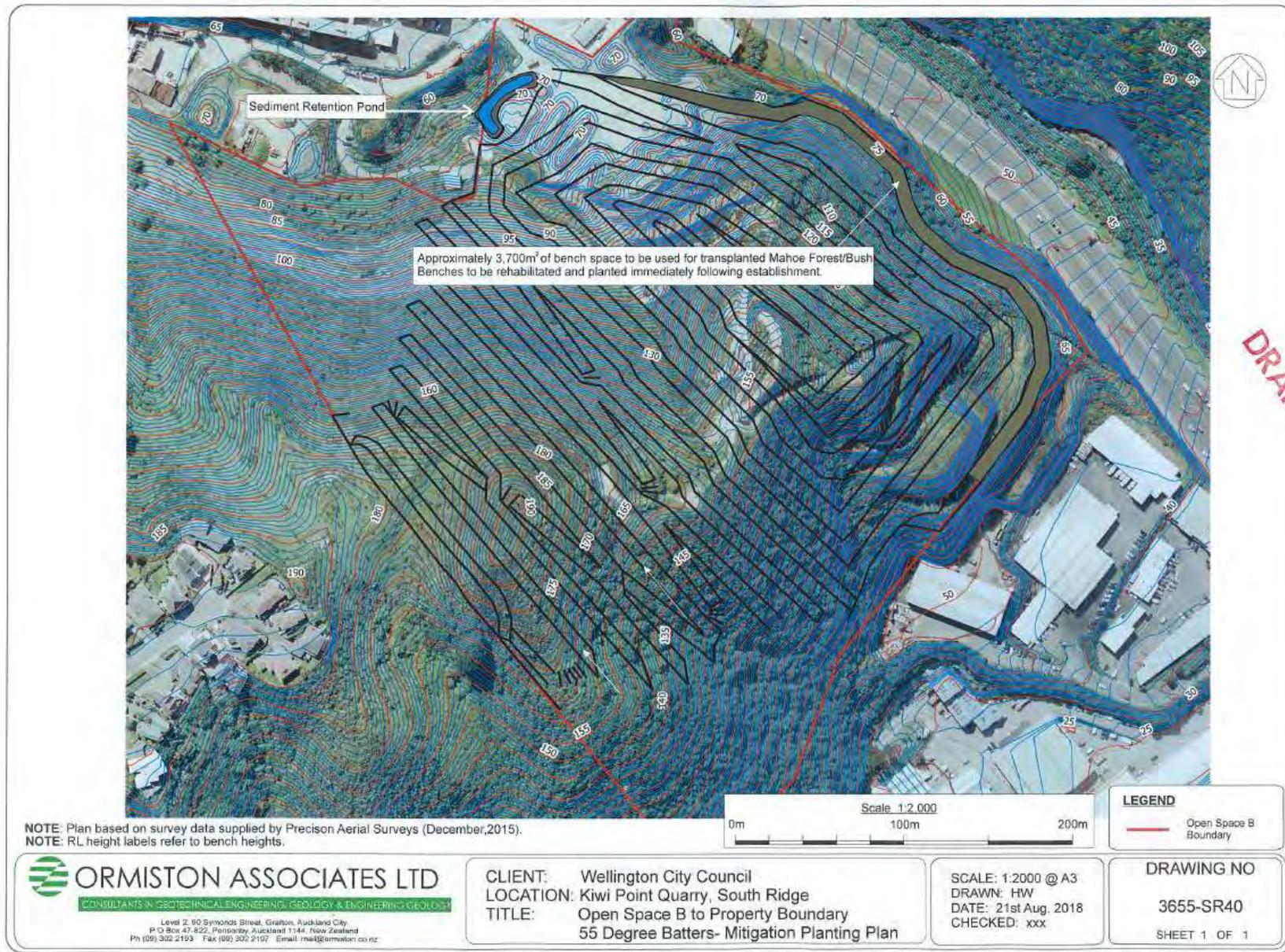
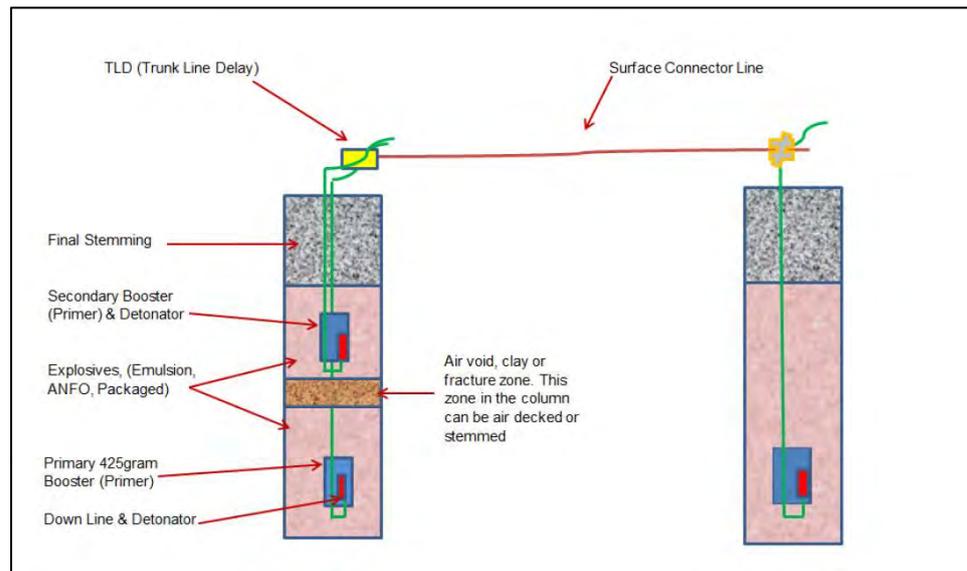


Figure 5: Indigenous Vegetation Mitigation Planting Areas



- 5.5** Vegetation removal will be undertaken in a staged process as the Southern Resource is developed. The initial vegetation, topsoil and overburden stripping will encompass approximately 4 - 6 hectares. Following the initial stripping program, further stripping of overburden required may vary each year and would be primarily based on staged access to high grade reserves.
- 5.6** **Stripping – Topsoil:** Given the topography at KPQ, there is likely to be minimal topsoil in the Southern Resource. Every effort will be made to retain as much topsoil as possible. Topsoil will be placed in a secure stockpile in an area not likely to be disturbed by operational activities. The stockpile will be hydroseeded to minimise soil loss and the generation of silt laden water. Runoff from this stockpile will be directed towards the sediment control pond(s) to protect sediment laden water entering the Ngauranga Stream.
- 5.7** **Stripping – Overburden:** Once topsoil removal has been completed, overburden removal will commence. Overburden removal will typically be completed with excavators, bulldozers and dump trucks and then transferred via haul road or over land conveyor to the Northern Resource as quarry backfill. Where possible overburden will be disposed of offsite and sold as hard fill to other construction and infrastructure projects.
- 5.8** Material used as backfill in the Northern Resource Pit will be compacted in 300mm thick layers to ensure it is stable. Stormwater runoff from this process will be directed into the Northern Resource Pit to allow sediment to settle. Once the backfilling of the Northern Resource Pit is completed, the area will be used for raw material processing and stockpiling.
- 5.9** **BLASTING:** Once stripping is complete, extraction of the viable greywacke resource will commence. Depending on the hardness of the rock being targeted, it may need to be blasted to allow extraction. Blasting will be undertaken by a specialist drill rig which bores holes up to 15m deep. The holes are then filled with explosives and detonators as shown in Figure 6.

**Figure 6: Blast Hole Configuration**



- 5.10 Blast Design:** Prior to the commencement of blasting activities, a series of drill holes will be strategically located in the rock mass. These are called signature drill holes and will be drilled to a certain depth and loaded with explosives.
- 5.11** Prior to detonation of one of the signature holes, blast monitoring devices will be positioned in pre-determined areas to record “Peak Particle Velocity” (PPV) (which is a measurement of maximum ground particle movement speed specified in mm). When recording PPV, the blast monitors record radial, traverse, and vertical movement in the rock, with the highest recording of any of these measurements is the PPV of the blast. The monitors also record blast air over pressure and noise.
- 5.12** Information from monitoring signature blast holes, allows a robust blast design to be developed which minimises vibration, blast air over pressure and noise. This process will continue throughout the life of the resource to ensure minimal effects on people and the surrounding environment. Data collected from the blast vibration monitors will be captured in a database for continual review and improvement.
- 5.13** Geological factors such as face orientation, joints hardness and abrasiveness of the rock and bedding planes highly influence blast results and therefore the ultimate stability of the rock faces. These factors must be understood by the Quarry Operator and Blasting

Contractor to ensure blasts are conducted in a way which does not adversely affect ongoing stability of rock batters.

**5.14** When designing a blast, consideration is given to the following parameters;

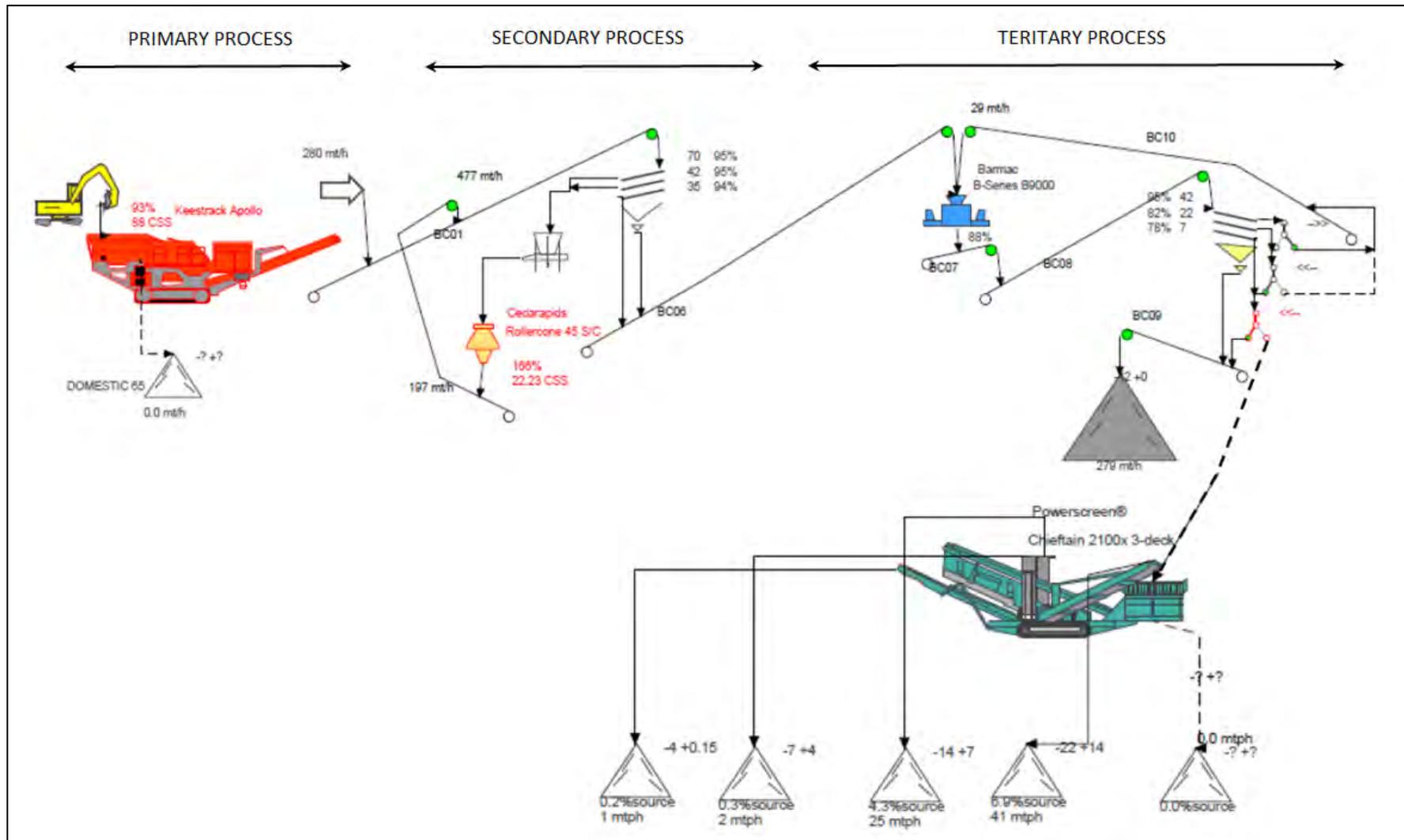
- ❖ The geology of the rock in the immediate area;
- ❖ Drilling logs;
- ❖ Previous blast results in the area (review vibration and air blast (overpressure) data);
- ❖ Inspection of the face to ensure the toe is not undercut or protruding, face height, and free from immediate obstruction;
- ❖ Drill hole angle;
- ❖ Diameter of drill hole;
- ❖ Type of explosive to be used and
- ❖ Safety zones, blast hole profiling and bore tracking.

**5.15** This information is then used to determine the burden (distance back from face), spacing and depth of each blast hole. Once completed, a blast plan is given to and discussed with the Drilling Contractor, who then logs each drill hole. The Shot Firer then reviews the blast plan and bore tracking information (bore tracking measures the accuracy of the drill holes in a blast to ensure they do not intersect each other or deviate). If there are any issues identified the blast hole(s), they can be re-drilled or the explosives load (volume of explosives per hole) can adjusted to account for differing ground conditions (such as pockets of clay, fractured rock zones, air cavities or drill hole deviation).

**5.16** **PRODUCT PROCESSING:** The blasted raw material will initially be processed through a mobile jaw crusher sited in the Southern Resource before being transferred by dump truck via a haul road or overland conveyor to the processing plant located in the Northern Resource. Processing of raw materials will continue through a primary, secondary and tertiary series of crushers and screening plants to produce the graded aggregates required for road construction, concrete manufacturing and construction projects in the Wellington region. Figure 7 shows a typical process flow for aggregate manufacture at KPQ (please note that plant arrangement may be subject to change).

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Figure 7: KPQ Typical Process Diagram



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- 5.17 Primary Process:** The mobile jaw crusher forms what is known as the primary crushing stage of the process. During the blasting process the solid mass of rock is reduced to a size compatible with the jaw crusher, in this instance we target a product <500mm but also minimise the fines produced during blast process. The jaw crusher is equipped with hydraulic settings that control the output size of the rock. From the jaw crusher material is conveyed to the primary screen where the aggregate is graded, material >42mm is conveyed to the secondary crushing and screening process while material <35mm is conveyed to the tertiary crushing screening and wash process.
- 5.18 Secondary Process:** Material is conveyed to the cone crusher screening process for grading on a continuous cycle, which reduces <42mm sized material down to <25mm. This material is then placed into stockpiles for testing at an aggregate laboratory to determine if that product has meet the required specifications for the intended use and assigned a lot number for traceability.
- 5.19 Tertiary Process:** Processing through the tertiary plant is the final stage of the process. Material passes through a barmac shaping crusher which gives the aggregates shape and broken faces which are required in many aggregate specifications. From the barmac the material is conveyed to another screening operation where the <7mm product is removed, stockpiled, tested and on sold as an asphalt filler.
- 5.20** The remainder of the material is conveyed to the sand processing stage which consists of a washing and screening plant. This process involves applying water to remove dirt and clay from the <3mm aggregate of which is used in concrete and road construction. The fine particles from the <3mm product are transferred through water to the on site sediment control ponds, while the coarser particles are processed through a sand screw to produce manufactured sand which is used in asphalt and concrete manufacture.
- 5.21 Product Testing and Despatch:** All manufactured materials are continuously stockpiled and tested at an aggregate laboratory to determine that the product has meet the required specifications for the materials intended use and each stockpile is assigned a unique lot number for traceability.

**5.22** Testing undertaken on manufactured aggregates include, grading (product size), cleanliness value, sand equivalent and fineness modulus. Once a product has passed the required tests, the stockpile the sample originated from is classified as either open or closed. Products that do not meet the required specifications (closed) may require a retest or the product is re-processed. The products that meet specification (open) are despatched via road truck to the customer sites. This information is entered onto the weighbridge despatch documents when trucks exit the Quarry.

**5.23** Table 1 sets out the current range aggregate products manufactured at KPQ and their use.

**Table 1: Aggregate Product Manufacture**

Product	Material Use
GAP 40	Asphalt and Road Construction Materials
GAP 65	
Transit NZ (TNZ 40)	
Grade 5 Chip	
PAP 7	
Manufactured Sand	
14/5mm Chip	
20/10mm Chip	
13mm Chip	Concrete Aggregates
19mm Chip	
Manufactured Sand	
Bedding Sand	Drainage Materials
Pea Metal	
Grade 4 Chip	
20mm Drainage	
40mm Drainage	

## **6 QUARRY REHABILITATION**

- 6.1** The three benches created during the initial overburden removal operations at elevation RL 172, 160 and 145 will be rehabilitated immediately upon completion in the first twelve to eighteen months of operation. These three benches encompass approximately 1000 square metres (see Figure 4). This area of the Southern Resource has been allocated for mitigation planting of the Ngaio/Mahoe forest and or other native species, the bench faces that are created will be hydro-seeded.
- 6.2** Removal of overburden will occur over several years as each bench is completed as will the rehabilitation of that area. At elevation RL 70 on the eastern and southern boundary's an eight metre wide bench will be created that will produce an area of approximately four thousand square metres for the mitigation planting of the Ngaio/Mahoe forest and or other native species (see Figure 5). Following the completion of rock extraction, the remaining pit will be backfilled with cleanfill to create a flat area for future development by WCC.

## **7 MANAGEMENT OF ENVIRONMENTAL EFFECTS**

- 7.1** In this section I will deal with the environmental matters in relation to day to day management of KPQ, although more specific evidence will be given on those matters by the respective experts.
- 7.2** HNZN is committed to continuously improving its environmental performance. All HNZN sites have achieved ISO 14001 accreditation, the international standard for environmental management systems.
- 7.3** Principles followed by HNZN and as defined in our Environmental Policy include (but not limited to):
- ❖ Continuous improvement;
  - ❖ Compliance with applicable environmental laws, regulations, standards and voluntary agreements;
  - ❖ Identification, development and implementation effective controls to monitor, minimise or prevent the release of pollutants to the environment (air, water, and soil) from our operations;
  - ❖ Using resources efficiently, reducing waste wherever possible;

- ❖ Reusing and recycling waste wherever practicable;
- ❖ Ensuring environmental management systems are integrated into our business processes and all employees are trained to understand and implement these;
- ❖ Conducting regular audits of our environmental performance;
- ❖ Requiring our contractors and suppliers to meet our environmental standards; and
- ❖ Assessment and mitigation of our impacts on surrounding communities, including (but not limited to) fugitive dust, noise, vibration and traffic.

**7.4 RESOURCE CONSENT COMPLIANCE:** WCC currently holds GWRC resource consent WGN170175 for the operation of KPQ of which covers the Northern Resource and part of the Southern Resource (zoned Business 2). WGN170175 incorporates the following consents which permit the following activities onsite;

- ❖ **[34508]:** Land use consent to undertake soil disturbance and vegetation clearance on erosion prone land.
- ❖ **[34510]:** Water permit to divert and take water from the Ngauranga stream for the purpose of dust suppression and aggregate washing.
- ❖ **[34512]:** Discharge permit to discharge treated sediment laden storm water and wash water to the Ngauranga stream.
- ❖ **[34513]:** Discharge permit for the discharge of contaminants to land associated with the operation of a cleanfill.
- ❖ **[34514]:** Discharge permit to discharge contaminants (dust) to air in association with the operation cleanfill.
- ❖ **[34515]:** Land use to construct and maintain an intake structure in the bed of the Ngauranga Stream.

**7.5** HNZN is committed to ensuring that it complies with WCCs resource consents wherever possible. In the event of an unplanned event which results in an exceedance of any of the parameters outlined in site consents, the process outlined in section 7.6 is followed. In addition as required by consent conditions any complaints from any person or organisation, the process outlined in section 7.7 is followed.

**7.6 EXCEEDANCE PROCESS:** Any incident which contravenes a consent condition will be reported to the Greater Wellington Regional

Council (GWRC) as soon as possible following the event (within 24 hours). Reporting of incidents which require a sample to be analysed to determine if the event is a noncompliance, the incident is reported following receipt of sample results. An investigation will be undertaken if requested by GWRC and provided within 7 days, however If warranted HNZN will generally undertake their own investigation to determine root causes so that the problem can be remedied to prevent reoccurrence.

**7.7 INCIDENT and COMPLAINTS:** All incidents at KPQ including complaints, hazards and near misses are entered into HNZN's incident management system (INX). This system allows incidents to be recorded, tracked, investigated and closed out. Incidents are periodically audited to ensure issues have been appropriately investigated, actioned and closed out.

**7.8** Any complaints regarding any aspect of our operation the following information is recorded in INX and the event reported to the GWRC and WCC within 24 hours.

- ❖ The name and address of the complainant (if provided);
- ❖ Date and time of the alleged event;
- ❖ Weather conditions at the time of the alleged event;
- ❖ Investigations undertaken by Holcim in regards to the complaint and any measures adopted to remedy the effects of the incident/complaint;
- ❖ Measures put in place to prevent reoccurrence of a similar event if necessary; and
- ❖ Feedback provided to the complainant regarding any remedial actions/

**7.9 NOISE and VIBRATION:** Noise monitoring is currently conducted on a regular basis at the quarry boundaries to determine compliance with noise limits specified in the Wellington City District Plan. Peak limits on the monitor are noted and comments recorded regarding any ambient background noise which may influence readings for example, birds, road/highway traffic, trains and aircraft. This monitoring is completed on a regular basis or a when a change in onsite process has occurred.

- 7.10 Blasting Noise and Vibration:** To ensure that the neighbours nearest to the quarry are not surprised by blasting they are notified by email seven days prior to blast activities occurring. This process is repeated again within forty eight hours of the scheduled plan and then again on the morning scheduled for blasting when the actual time of the blast is confirmed. Five minutes prior to blasting activities a call is made to two neighbours who have requested this. Complaints received from the blasting process are entered into HNZL's incident management system (refer to section 7.7). The blasting notification process will continue during the development of the Southern Resource (and include any new neighbours wishing to be notified of any pending blast).
- 7.11 DUST MANAGEMENT:** Minimisation of potential dust generation from quarry activities will be achieved by implementing a Dust Management Plan. Mitigation of dust effects will be achieved by (but not limited to) the following;
- ❖ Installation of a Weather Station;
  - ❖ Use of water cannons, sprinklers or water trucks on or near working faces, stockpiles and other dusty areas;
  - ❖ Limiting vehicle speeds where necessary;
  - ❖ Sprinkler systems traversing haul road;
  - ❖ Replanting of disturbed areas as soon as possible by hydro seeding; and
  - ❖ Cease operations, if mitigation measures cannot control dust.
- 7.12** The processing plant is fitted with an automated dust suppression system, which is activated on plant start up and is fitted to the mobile jaw crusher, the secondary and tertiary processing plant(s).
- 7.13** Dust emitted from dump trucks and other mobile equipment is controlled by either automated sprinkler control or by a heavy vehicle mounted with a water tank and pressure pump.
- 7.14** Dust monitoring is currently carried out on the property boundary using depositional dust pots, which measure dust deposited over a 30 day period. Dust pots are used in most extractive industry sites as a means to determine if there is dust migrating beyond the property boundary. The results are recorded and monitored against the limits recommended by the Ministry for the Environment. Dust pots can

identify if additional mitigation measures need to be implemented. If the site boundary limits are exceeded, the sample is sent to an external laboratory for further analysis as the sample may contain organic matter or other particles which allows the site to determine if the dust originated from the quarry and allow implementation of mitigation measures as required.

**7.15 WATER MANAGEMENT:** The key components of the quarry water management system for the site include the following;

- ❖ **Water Abstraction:** Water usage in the current operation is monitored via an electronic data logger which has pre-set limits to ensure the site does not exceed consented water abstraction rates. If the site is in “Low Flow” conditions whereby water consumption is restricted, the data logger can be changed online to restrict water consumption. Water consumption is reported to the GWRC on a weekly, quarterly and annual basis.
- ❖ **Water Recycling:** The site recycles water during the production process; water used to wash the aggregates is piped underground to a series of three settling ponds where the aggregate sediment settles out of the water. A pumping system is sited at the third settling pond where the water is then recycled back to the process operations. Water for the process operations is also pumped from the quarry pit to reduce the abstraction required from the consented water take in the Ngauranga Stream.
- ❖ **Water Discharge:** All discharge points are fitted with data loggers and flow restriction valves which allow the operation to reduce the flow of discharge depending on weather conditions. Currently if the site is experiencing Dry or Extended Dry conditions the rate of water able to be discharged decreases.
- ❖ In wet weather (where there is more than 5mm of rainfall over 12 hours at Seton Nossiter Rain Gauge) then there is limit to discharge volumes (although it must comply with water quality conditions). If there is less than 5mm of rain then the discharge is restricted to <5l/s depending on low flow conditions in the Porirua Stream (Town Centre) .

**Low Flow** During dry or extended dry conditions water consumption and discharge from the quarry can be restricted. Table 2 outlines low flow restrictions at KPQ. The process of restricting discharge or abstraction is managed by the Operations Manager who receives an e-mail notification if water flow in the Porirua Stream is approaching low flow conditions and again at the differing low flow levels (see table 2).

**Table 2: KPQ Low Flow Conditions**

Porirua Stream (Town Centre) Flow	Maximum Water Take L/s
<131 L/s	No water Take
>131 and <150 L/s	2.5 L/s max
>150 but <180 L/s	5.0 L/s max

If a notification of low flow is received then the flow restriction valve on the discharges is adjusted to the required discharge limit. Discharge flow and quantity measurements are recorded by data logger, which can then be cross referenced with low flow data.

- ❖ **Discharge Quality:** Prior to discharging the Laboratory Technician or Quarry Manager undertakes a preliminary assessment of the water to be discharged by assessing the colour and clarity compared to pre-made samples which have differing suspended sediment levels. If the colour and clarity match the required discharge standard then water is able to be discharged. In addition a sample of the discharge water from sample point is also sent to a laboratory to confirm the suspended solids level. All sample results are then entered into a database.

The site uses water treatment ponds (primary, secondary and tertiary ponds) to settle any sediment in process water prior to it being reused or discharged. Flocculent is also used to further settle any sediment in the water treatment ponds (if required). Treatment ponds are cleaned out weekly ensure the system is working efficiently, in the event of an on site system

failure, process water is also able to be diverted to the extraction pit for the sediment settling process.

- 7.16** Once quarrying commences in the Southern Resource all water consumption and discharge points across the entire site will be recorded and monitored by the way of data loggers which enable the data to be closely tracked against consents.
- 7.17** During stripping of the Southern Resource there is a potential that greater control of water will be required due to heavy rainfall events. A detailed Sediment and Erosion Control Plan will be implemented for the stripping operations to ensure that water and sediment control are well managed.
- 7.18** **SEDIMENT AND ERSION CONTROL:** A preliminary sediment and erosion control plan has been completed for the Southern Resource which allows for the controlled flow of water from all benches to be directed to a sediment treatment pond which will be constructed on the proposed pit floor. The pond has been designed for the total area of the proposed footprint of the quarry.
- 7.19** The sediment pond has been designed with a fore-bay to allow sediment to settle before entering the main pond which has a storm water riser installed with adjustable decants to ensure any discharge of water from the site is within the consented limits. Drainage to the pond will be rock-lined to dissipate water energy which aid in the retention of sediments along the length of the drain. Monitoring of and testing for suspended solids during any discharge will be undertaken (as already occurs in the Northern Resource) to ensure discharge standards stipulated in resource consent will be met.
- 7.20** **LIGHT SPILL:** The site operates Monday to Friday 5.30am to 5.00pm and Saturdays 5.30am to 12 noon. There are also occasions that the despatch products are required outside of normal operational hours. This is dictated by road paving requirements in Wellington Region that cannot be completed safely during the hours of daylight due to high traffic and pedestrian volumes. During this time limited lighting is switched on at the quarry. In addition there is minimal lighting used on site outside of the operational areas for security purposes. Flood lighting will only be used when required on site for safety reasons.

HNZL will ensure that all lighting complies with the requirements of the District Plan

- 7.21 ACCIDENTIAL DISCOVERIES:** If koiwi, taonga or other archaeological material is discovered in any areas during quarrying, work will immediately cease and GWRC, Port Nicholson Block Settlement Trust, Te Rūnanga o Toa Rangatira and Heritage New Zealand will be notified (depending on the archaeological material found). If human remains are found, the New Zealand Police will also be contacted. Work will not resume unless told by the relevant authority it can recommence. If required an application to disturb an Archaeological site may be required.

## **8 RESPONSE TO ISSUES RAISED IN SUBMISSIONS**

- 8.1 Blasting Impacts on Centennial Highway:** During the design phases of the blasting process all surrounding safety and environmental risk aspects will be highlighted and a mitigation plan developed in consultation with relevant parties.
- 8.2 Dust Concerns:** The process for the mitigation dust has been described in the section 7.11.
- 8.3 Noise Concerns:** HNZL will continue to monitor noise levels from the Quarry, this monitoring will initially be increased to monthly during works in the Southern Resource. In addition all blasts will be monitoring as outlined in section 7.10. HNZL will prepare a Noise Management Plan prior to commencement of works in the Southern Resource.
- 8.4 Communication:** There is an opportunity to communicate with immediate residents/neighbours of KPQ through the establishment of a Community Liaison Group and the development of a Charter. This process will allow HNZL to inform the community of future developments such stripping operations, rehabilitation and also allow the residents/ neighbours to discuss any issues relating to KPQ. The Liaison group would not only consist of HNZL representative and the residents/neighbours but also include a representative from GWRC and WCC.

**8.5 Buffer Planting:** The Wellington City District Plan highlights the requirement for screen planting on the western side of the Ngauranga Gorge; an eight metre bench will be constructed for this and will also incorporate approximately four thousand square metres for mitigation planting of the Ngaio/Mahoe forest.

## **9 CONCLUSION**

**9.1** The development of KPQ as outlined in District Plan Change 83 would create a valuable asset to the Wellington region. As the regions infrastructure continues to grow, the need for these resources is important. District Plan Change 83 will allow access to approximately 15 to 20 years of high grade blue Greywacke rock for the production of medium to high quality aggregates and also the blue brown rock that is suitable for lower quality aggregates.

HNZL believe that this project can be implemented with less than minor effects on people and the environment by the implementation of a range of management measures. In addition HNZL are proposing to establish a Community Liaison Group to ensure better communication between HZNL and its neighbours.

**Darcy Alan Maddern**

**19 November 2018**

