

18 January 2019

Great Barrier Local Board
by email

Dear [name of Board member],

Blackwells Quarry, Great Barrier Island

Following the Skype workshop we had on 23 October 2018, Panuku Development Auckland (Panuku) met with Fulton Hogan on 26 October to discuss the issues raised by the Great Barrier Local Board. An update on the Quarry is as per below.

Quarry Development

The extraction and production of aggregates follows an annual cycle at Blackwells quarry as determined by the resource consent conditions. The process of quarry development begins with removal of overburden in preparation for drilling and blasting. The blasting occurs in August of each year, the rock is then removed to the quarry floor by an excavator for subsequent crushing.

The crushing begins in mid-October and continues through to December each year. The resulting stockpiles remain at the quarry and supply the aggregate demands of GBI until the next campaign of crushing the following October.

The nature of the quarry, and the methodology employed to undertake the stripping and blasting, leaves very little opportunity to remedy unforeseen issues with the feedstock. Additionally, the quality of the parent rock can be highly variable depending on the location in the quarry from where it is sourced.

Quality

Production testing is conducted during the crushing operation to ensure compliance with the product specifications. Occasionally, there may be an issue with the quality of the feedstock prior to crushing and where this is apparent, the material is separated as far as practical so that it can be utilised for a lower quality product. It is this particular problem that has led to variable quality with aggregate produced in 2017 where separation of the lower quality materials has not been effective.

Product quality may also be compromised by segregation and/or contamination of the stockpile after crushing has finished. Segregation can occur through prolonged periods of wet weather with the finer material becoming unevenly distributed nearer the bottom of the stockpile. This can

result in material that has been produced to specification becoming non-compliant with the specification over time, this problem is compounded when feedstock quality is also compromised.

Annual Volumes

Resource consent conditions dictate that the maximum volume that can be extracted and processed annually is 16,000m³ (loose measure). Additionally, the Management Agreement specifies the product range that must be produced and made available. The agreement also contains an indicative quantity for each product so that the proposals for the operation of Blackwells Quarry could be priced, these are not to be inferred as minimum quantities.

It is up to the quarry operator to decide the volume of each type of aggregate to produce so long as the product range as specified is met and the reasonably foreseeable requirements of the council and other customers on the Island is accommodated. When deciding the annual volumes to extract and process, consultation with Auckland Council and Auckland Transport is undertaken. Sales to other customers during the preceding 12mths is also considered in order to forecast the volume of stockpiles to produce.

The forecast volume is then balanced against remaining stock levels to determine the extraction and production volumes.

Current & Future

The current crushing of aggregate is proceeding well and is being directly supervised by the Resources Divisional Manager. Sampling of the products produced is ongoing, the first suite of results is expected in late November. There are no concerns at present regarding the quality of the feedstock or compliance with the product specifications.

Following completion of the crushing campaign we propose to furnish an Extraction and Production report that will outline the blasting and crushing in detail and will have the test results appended. Currently, product testing is performed by Fulton Hogan at its IANZ accredited laboratory in Mt Wellington. It has been suggested that an independent laboratory be used to verify the results in order to give assurance to the local community that the specifications are being met.

Given the historic quality issues over the past two years, for reasons explained above, Fulton Hogan agree there is a need to restore confidence in the product at Blackwells Quarry. We respectfully suggest that secondary testing of the full range of products is unwarranted and propose that selected high use construction products are tested. We feel that GAP40 and BM20 are the two products that should be tested independently and will arrange for this to occur. The independent test results will be included in the report mentioned above.

Please find outlined below the responses to your further questions on the Blackwells Quarry.

1. What are the issues on the capacity of the quarry – What is the lifespan of the quarry?

The currently consented quarry profiles have sufficient resource to allow extraction at maximum consented rates until the expiry of the resource consents. The last calculation indicated there would be surplus material remaining at the expiry of the consents. As the quarry develops the extraction becomes more difficult and expensive due to access and topography.

2. *What's the difference between builders mix & concreting mix?*

The main difference between builders mix and a concrete aggregate is a much tighter specification. Fulton Hogan have reproduced a standard concrete aggregate specification and the BM20 specification, **Appendix A**. Aside from a much finer control on the particle size distribution the concrete aggregate has a much higher crushing resistance and far more rigorous testing requirements. The BM20 is an aggregate that can be produced at the quarry with mobile crushing equipment and serves the purpose of a non-structural concrete aggregate. As the BM20 specification states, for structural applications further testing will be required.

3. *Who ensures that FH meets the needs of the community supply?*

When deciding the proportion of products to be produced each year the historic demand and any specific requests are considered. This is done by the Quarry Manager and Resources Divisional Manager.

4. *What is the Management plan for managing overburden?*

Management of overburden is done by isolating it in the North West corner of the quarry. Under usual circumstances, overburden is removed by trucks, this has become increasingly difficult as the quarry has progressed due to access to the western end of the quarry. Remaining overburden is likely to be removed by side casting in future, depending on how the western faces are developed, there is a stakeholder that lives adjacent to the quarry who has been very vocal about development of the western faces.

5. *How much metal is being brought over?*

Blackwells Quarry has not imported any material in recent years. Fulton Hogan are aware of the importation of aggregate for specific jobs that the quarry was unable to supply (either by volume or specification), the most recent of which was an Auckland Council job for a seawall reconstruction. The extraction & production each year aims to create maximum stockpile quantities allowed by the consent conditions.

We hope this answers your questions we have put together with the help of Fulton Hogan.

Yours Sincerely,

Ian Wheeler

Director Portfolio Management
Panuku Development Auckland

Appendix A

Appendix A

Specification for Supply of Concrete Aggregate

1. Scope

This specification sets out the requirements for concrete aggregates to be used for the manufacture of ready mix concrete products.

Please read this specification in conjunction with:

NZS 3111:1986, Methods of Test for Water and Aggregate for Concrete

NZS 3121:1986, Water and Aggregate for Concrete

NZS 3104:2003, Specification for Concrete Production Grade

2. Source Properties

The source properties shall tested and conform to the following regime:

Table 1: Source Property Information

Item		Frequency	Limits
1	Type of Rock - Petrographic Examination	Once only	N/A
2	SSD Density/Specific Gravity + Bulk density NZS 3111, Sections 12 and 16	Quarterly	Supplier nominated value shall have tolerance of $\pm 30\text{Kg}$
3	Crushing Resistance - 10% Fines Crushing (KN) NZS 3111, Section 14	Yearly aggregate only	320KN minimum

4	Absorption NZS 3111 Sections 12 and 16	Quarterly	2.0% maximum
5	Impurities	Yearly	Shall Comply with AS2758 Part 1
6	Weak Particle test	Once only	Maximum 0.5%
7	Sodium Sulphate Loss (ASTM C88 – 13)	Once only	Maximum 6%
8	Los Angeles Abrasion – NZS4407:1997 Test 3.12	Once only	Maximum. 30%
9	Outline the process and equipment used to make this material, including a description of the quarry.	As necessary	

Concrete Aggregate Specification 20052015

3. Production Properties

3.1. Coarse Aggregate

Coarse aggregate is defined as the fraction of the combined and blended aggregate that is retained on the 4.75mm sieve. The coarse aggregate is to be supplied in the following grades; CA19, and CA11 graded chip.

Cleanness

When tested in accordance with NZS 3111:1986 Section 13, the cleanness value when tested on the CA19 product shall be not less than 75, provided the average of any 3 consecutive results shall be greater than 80 and the minimum target is 80. The aggregate shall consist of clean, tough particles, free of soft, weathered, disintegrated or deleterious material. Testing is to be conducted at source Quarry. The frequency of testing shall be a minimum of one test per week during concrete aggregate production.

Grading

When tested in accordance with NZS3111:1986 Section 6 coarse aggregate shall comply with the requirements in Table 2. The frequency of testing shall be a minimum of one test per day of production for each grade of product.

Sieve Size (mm)	CA19	CA11
26.5	100	
19.0	90 - 100	100
13.2	30 - 55	90 - 100
9.5	0 - 10	65 - 90
4.75		0 - 3
Intermediate Test Sieve Size	13.2mm	9.5mm

Table 2, Coarse Aggregate Grading Targets

Consistency

- i) Not less than 18 of the last 20 consecutive grading test results shall comply with the AML grading requirements.
- ii) The percentage material passing the intermediate sieve shall not vary by more than 10 from the average of the last 10 sieve analysis tests.

3.2. Fine Aggregate

Fine aggregate is defined as the fraction of the aggregate that is passing on the 4.75mm sieve.

Concrete Aggregate Specification 20052015

Sand Equivalent

The Sand Equivalent when tested in accordance with NZS3111:1986 Section 18 shall not be less than 45, material which has a SE less than 45 but greater than 40 shall be accepted provided the clay index test gives a value less than 3.0. The frequency of testing shall be a minimum of one test per week during concrete aggregate production.

Grading

When tested in accordance with NZS3111:1986 Test 6, the fine aggregate shall comply with the requirements detailed in Table 3. The frequency of testing shall be a minimum of one test per week during concrete aggregate production.

Sieve Size (mm)	Fine Aggregate
	PAP5
9.5	100
4.75	95 - 100
2.36	56 - 76
1.18	35 - 53
0.60	20 - 35
0.30	14 - 24
0.15	8 - 16
0.075	0 - 8

Table 3, Fine Aggregate Grading Targets

The Fineness Modulus when tested in accordance with NZS3111:1986 Section 6.5.2 shall be between the range of 3.20 and 3.55 with a target FM of 3.60.

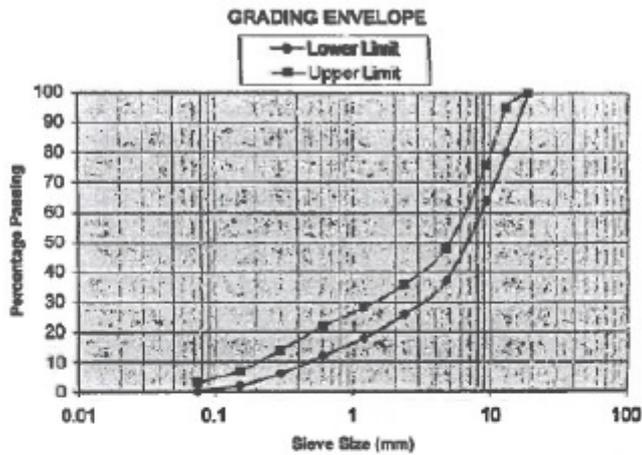
Consistency

Not less than 45 of the last 50 consecutive test results shall comply with:

- (i) The sand shall not contain more than 5% retained on the 4.75mm sieve.
- (ii) The individual fineness modulus shall not vary by more than 0.2 from the average fineness modulus of the last 50 samples.

Builders Mix (BM20)

The product termed Builders Mix shall meet the following grading criteria.



Builders Mix Aperture Size (mm)	Percentage Passing	
	Lower Limit	Upper Limit
19	64	96
13.2	80	96
9.5	64	76
4.75	37	48
2.36	28	36
1.18	18	28
0.6	12	22
0.3	6	14
0.15	2	7
0.075	0	3

General Materials Properties

The aggregate source proposed as a supply for Builders Mix (BM20) covered by this specification shall have the following material properties.

Source Properties

- Sand Equivalent, based on NZS: 4407 Test 3.5 of not less than 40
- Clay Index, based on NZS: 4407 Test 3.5 of not greater than 3
- Plasticity Index, based on NZS: 4407 Test 3.2 of less than 5
- The parent aggregate shall have a crushing resistance, based on NZS: 4407 Test 3.10 of greater than 130KN

Note: This material may not comply completely with NZS 3121: 1986. Specific testing will be required for specific structural applications