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Pioneer Construction Inc.

Potential Aggregate Quality Evaluation
Of
Pioneer Claims
Township of Neelon
District of Sudbury
Northeastern, Ontario

(N.T.S. 41 I/10)

By: David Pilkey

May 22, 2019

(Covering site inspection and aggregate testing from April and May 2019)

INTRODUCTION

Pioneer Construction Inc. has the mining rights to portions of claims # 100877, 100878, 212916, 260908 and 212916, located in Neelon Township in the District of Sudbury. The property is currently undeveloped, North of Hwy 17 near the town of Coniston Ontario. The property is characterized by an abundance of rock outcrops along the east and southern boundaries of the claim group, with lower swampy land in the northwest sector. A site visit in May 2019 identified two prominent lithologies including gabbro/diabase within the south and eastern portion and metasedimentary rocks running through the center of the claim group.

The author obtained samples of both lithologies to assess the potential for use as construction minerals. Four grab samples, two from each rock type were taken back to Pioneer's CCIL certified aggregate testing lab for further analysis.

The results and observations from these samples form the basis of this report.

LOCATION AND ACCESS

Pioneer Construction Inc's claim block lies Northwest of the town of Coniston, Ontario on the North side of Hwy 17. The author reached the claims by following an established bush trail located North of Hwy 17, 75m west of the lights, at the intersection of MR 93, 2nd Avenue and Hwy 17. The trail intersects and follows the powerline for an additional 1.1 kms to a point just South of the Southeast corner of the claim block. Hiking due North from this point for approximately 850m brings you to the Northeast corner of Pioneer's claims.

The area is characterized by an abundance of outcrop over most of the claim area. Occasional low lying, swampy areas are found throughout except in the Northwest corner of the claims were a low swampy zone dominates.

The claim block location is provided in figure 1.

Figure 1: *Pioneer Construction Inc. Claim Block Location Map*

REGIONAL GEOLOGY

All rocks of the general area are Precambrian in age and are dominated by units from the Southern and Grenville Provinces, with historical work defining the boundary along the Grenville front lying to the South of the property. The transition is defined by both structural and metamorphic changes in the area lithologies.

Lithologies of the Southern Province, consisting of relatively homogenous meta-quartzite and meta-greywackes, of Huronian age, (Card, 1968) are locally intruded by rocks of gabbroic to granite composition.

South of Coniston the lithologies transition into units of the Grenville Province, consisting of metamorphic amphibolite and gneisses, of varying composition and mineralogy. Local, strong migmatization has been identified.

Structurally the Wahnapitae fault lies to the South of the claim group and is best observed in the vicinity of Baby Lake where it is highlighted by a quartz stockwork (Grant et al. 1962).

PROPERTY GEOLOGY

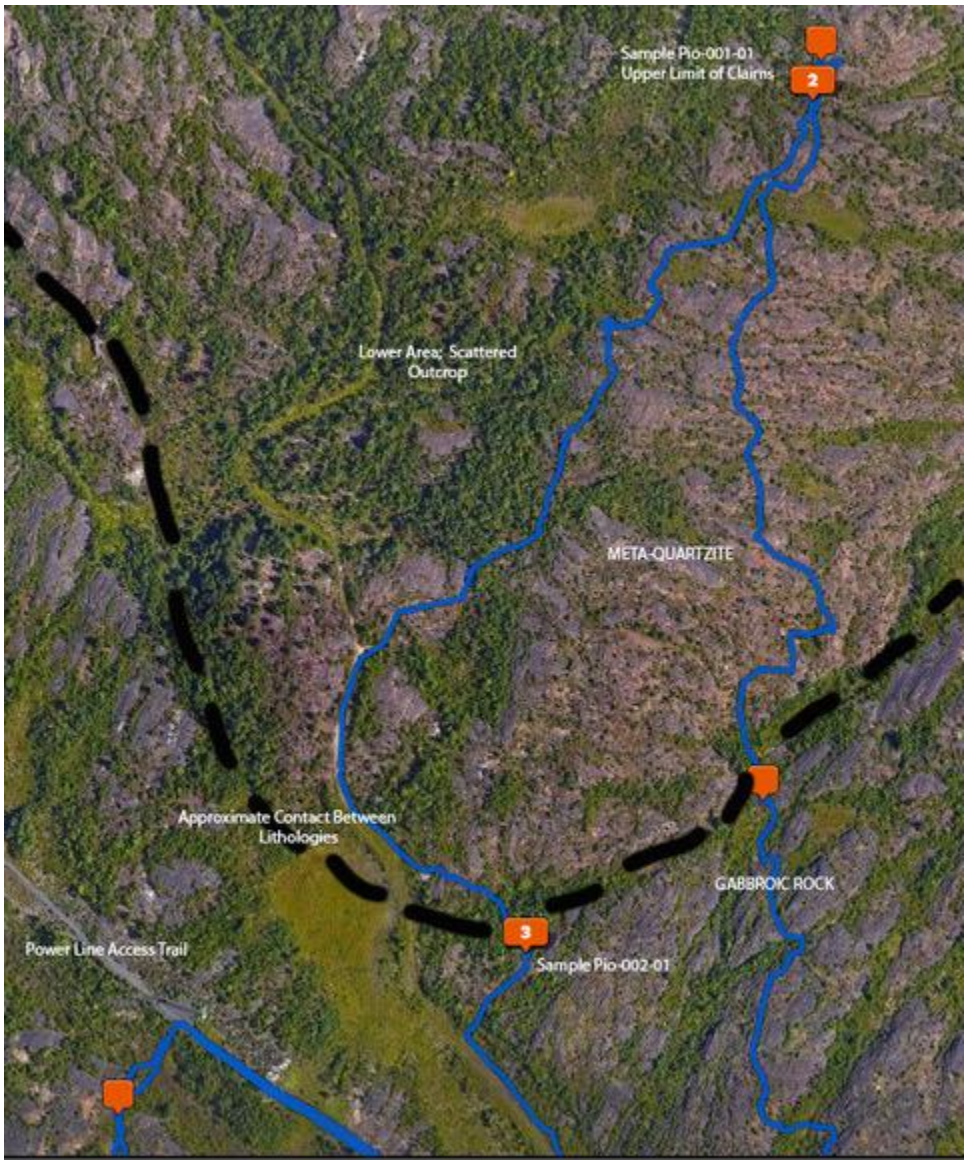
The Pioneer's claims have extensive outcropping, with limited vegetation are characteristic of this area, with the Northwest corner being the only exception. On a property scale the overall geological trend is highlighted by small, elongate troughs trending roughly Northeasterly.

The property consists of two dominate lithologies with a transition running through the properly at an approximate bearing of 020^{o}, then turning Westerly close to the Southern boundary of the claims. The Southeast and Southern portions of the claims are dominated by Meta-gabbroic rock that appears mostly massive, homogenous in character. The unit is medium to coarse grained, grey to greenish grey in colour with variable amounts of amphiboles and feldspar. Some areas appear slightly more dioritic in appearance. Surface staining due to historical smelting in the area maps foliation identifications difficult but are locally visible when well developed.

In the Northwest portion of the claim block the lithology changes to Meta-quartzite. The material is medium grained, yellowish brown in colour with a sugary texture. A strongly developed foliation is present in some locations, trending 020^{o} and dipping 30^{o} North. Minor rusty discolouration is observed along foliation planes.

Grab samples from both rock types were obtained during the visit for further evaluation. Sample locations and general property geology are provided in the following figure.

Figure 2: *Property Geology and Sample Location Map*



WORK SUMMARY

The scope of this assessment work was to visit the property and determine the general geology of the Pioneer claims, with an emphasis on potentially developing the site at a future date. In addition to some mapping four grab samples were obtained, two from each rock type.

The samples were taken to Pioneer Construction Inc.'s CCIL certified laboratory at 2340 Skead Road, Garson, ON across from the Greater Sudbury Airport. The samples were prepared as per current MTO/ ASTM procedures with the intention of evaluating the aggregate as a potential crushed granular source for concrete, asphalt and base granular materials.
Sub-samples of each lithology were combined and crushed in house to provide the fractions required to complete each test. Test samples were prepared at a grading typical of 19.0mm clear stone as provided below:

Table 1: Lab Prepared Coarse Aggregate Percent Passing

Sieve Size	Cumulative Percent Passing
26.5 mm	**100**
19.0 mm	**98**
16.0 mm	**78**
13.2 mm	**61**
9.5 mm	**25**
4.75 mm	**5**

Standard aggregate physical property tests are completed to determine the quality of material used in different construction projects. Tests that are can be affected by the method or crushing processed are not evaluated in this report. Testing that provides an overall evaluation of the potential of each lithology were conducted and include the follow:

In House Testing Performed

LS-604 "Method of Test for Relative Density and Absorption of Coarse Aggregate" Rev 32

LS-609 "Procedure for Petrographic Analysis of Coarse Aggregate" Rev 29

LS-614 "Method of Test for Freezing and Thawing of Coarse Aggregate: Rev 32

LS-618 "Method of Test for The Resistance of Coarse Aggregate To Degradation by Abrasion in a Micro-Deval Apparatus" Rev 32

The results of this testing are provided below.

	LS- 604 Relative Density	LS-604 Absorption	LS-609 Petrographic Analysis	LS-614* Freeze and Thaw	LS-618 Micro-Deval
Meta-Quartzite	***2.629***	***0.651***	***114***	***2.33***	***9.4***
Meta-Gabbro	***2.931***	***0.787***	***107***	***2.17***	***8.1***

LS-614 Freeze-Thaw Results based on weighted average of testing completed on individual fractions

CONCLUSIONS

The site evaluation of the Pioneer Construction Inc. claims indicates that there is an abundant of crushable rock within the property boundaries. Rock types are consistent with the area and are typical of lithologies current being developed at adjacent properties.

Test results from our laboratory work shows that both lithologies meet the physical property requirements for concrete and asphalt coarse aggregate as well as those for granular materials, as per current OPS specifications. Crushing of the gabbroic lithology is of significant interest as the rock tends to be much less brittle than the adjacent quartzite allows a greater variety of applications and have a higher potential to meet more stringent aggregate friction properties as an approved source.

Sudbury, Ontario

May 29, 2019

Respectfully submitted

David Pilkey

David Pilkey BSc

REFERENCES

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Card, K.D., 1968 Geology of the Denison-Waters Area, Ontario Dept. Mines Geology Report 60

Grant, J.A., Pearson W.J., Phemister T.C. and Thomson Jas. E, 1962: Broder, Dill, Neelon and Dryden Townships, Ontario Dept. Mines Report 9

Young G.M. and Church W.R., 1966 The Huronian System in the Sudbury District and Adjoining Areas of Ontario, Proc. Geology Assoc. Canada, Vol. 17 pg. 65-82

District of Kenora, Northwestern Ontario (Assessment File)

Appendix A

Property Photographs and Photo Descriptions from May 8th, 2019 visit

Pioneer Kingsway Claims – ***Visit Photographs***

Photo 4575

Photo 4577

Photo 4578

Photo 4579

Photo 4580

Photo 4582

Photo 4583

Photo 4584

Photo 4591

Photo 4592

Photo 4593

Photo 4600

Photo 4595

Photo 4596

Photo 4599

Pioneer Kingsway Photo Descriptions

Photo #	Description
4575	Transmission line with access trail from Hwy 17 to claim block
4577	Survey Post and Iron Pin located; Just North of transmission lines and South of SE corner Pioneer Claim Block
4578/79	Claim Post location; inscribed 800m W of CP#2, claim 121183 Dominant rock type in area Gabbro/ Diorite, limited vegetation
4580	Claim Post location, east facing, claim 4278187
4582	Photo along lithological transition, Gabbro to SE, metaquartzite to NW Boundary trending 020^{o}
4583/84	Claim Post location, claim 1222509, CP#3
4591	Claim Post location, claim 4278187, CP#1 Lithology observed as metasedimentary rock
4592	Sample location #1; Sample **P10-001-01** Rock described as medium grained, yellow to brownish yellow metaquartzite. Sugary texture, homogeneous with foliation developed 100^{o}/ 30^{o}N, minor rusty discolouration
4593	Claim block photo looking North, outcropping drops off to low swampy area representative of the NW corner of claim block. Metasedimentary rock dominant
4595	Claim block photo looking West, low ground to North with abundant outcropping rising to the South
4596	Claim block photo looking South to transmission line and low area adjacent to quad trail
4599	Sample location #2; Sample **P10-002-01** Rock located along the Gabbro/ Quartzite boundary. Sample medium grained, grey to greenish grey gabbro. Unit massive to slightly foliated near contact. Extrapolated contact to West in low lying area
4600	Area along Southern portion of claim block, slightly south of transmission line. Lithology dominated by Gabbro/ Diorite. Extensive outcropping

Appendix B

Pioneer Construction Inc.

In House Physical Property

Testing

ID#

Absorption and Relative Density of Coarse Aggregate

Source:	Pioneer Kingsway Claims	Contract No.:		Lot:	
Aggregate Type:	In House Crushed 19mm	Conducted By:	David Pilkey		
Date Sampled:	08-May-19				
Remarks:	Gabbroic Rock				
	David Pilkey				

Test is conducted on +4.75mm material

Sample No.	**C** Aggregate Mass In Water 23°C	**B** Surface-dry Aggregate Mass	**A** Oven-dry Aggregate Mass	% Absorption [(B-A)/A]*100	Apparent Relative Density A/(A-C)	Bulk Relative Density A/(B-C)	Bulk Relative Density B/(B-C) S.S.D
1	2001.2	3020.4	2995.8	0.821	3.012	2.939	2.964
2	2025	3066.5	3043.6	0.752	2.988	2.922	2.944
Average				**0.787**	**3.000**	**2.931**	**2.954**
Difference				0.069	0.024	0.017	0.02
Meet Specification				Yes	No	Yes	Yes
Specified allowable tolerance between two samples				maximum 0.2		maximum 0.02	

Test Method		Saturation Period
LS 604	x	15 to 19 hours
AASHTO T 85		15 to 19 hours
ASTM C 127		24 ± 4 hours

Batch Mass (3000g)

19	16	13.2	12.5	9.5	6.7	4.75

ID#

Absorption and Relative Density of Coarse Aggregate

Source:	Pioneer Kingsway Claims	Contract No.:		Lot:	
Aggregate Type:	In House Crushed 19mm	Conducted By:	David Pilkey		
Date Sampled:	08-May-19				
Remarks:	Metasedimentary Rock				

Test is conducted on +4.75mm material

Sample No.	C Aggregate Mass In Water 23°C	B Surface-dry Aggregate Mass	A Oven-dry Aggregate Mass	% Absorption [(B-A)/A]*100	Apparent Relative Density A/(A-C)	Bulk Relative Density A/(B-C)	Bulk Relative Density B/(B-C) S.S.D
1	1875.7	3016.8	2997.2	0.654	2.672	2.627	2.644
2	1877.8	3017.4	2998	0.647	2.676	2.631	2.648
Average				**0.651**	**2.674**	**2.629**	**2.646**
Difference				0.007	0.004	0.004	0.004
Meet Specification				Yes	Yes	Yes	Yes
Specified allowable tolerance between two samples				maximum 0.2		maximum 0.02	

Test Method		Saturation Period
LS 604	x	15 to 19 hours
AASHTO T 85		15 to 19 hours
ASTM C 127		24 ± 4 hours

Batch Mass (3000g)

19	16	13.2	12.5	9.5	6.7	4.75

Unconfined Freeze-Thaw
LS-614-Rev. No. 27

Approximate 8 hours thawing time / 16 hours freezing time ± 2 hour

PIO-002-01
Gabbroic Rock

	Enter the days from start to finish of cycles	5	Enter time samples are put in and removed from freezer	Enter Temperature	- 19C
		prepare sample and start 1st cycle 4:00 p.m.			
A	14-May-19	Put in	3:00 PM	- 20C	1st Cycle
		Remove	6:00 AM	- 19C	
B	15-May-19	Put in	3:00 PM	- 19C	2nd Cycle
		Remove	6:00 AM	- 20C	
C	16-May-19	Put in	3:00 PM	- 19C	3rd Cycle
		Remove	6:00 AM	- 19C	
D	17-May-19	Put in	3:00 PM	- 20C	4th Cycle
		Remove	6:00 AM	- 20C	
E	21-May-19	Put in	3:00 PM	- 20C	5th Cycle
		Remove	6:00 AM	- 19C	
	22-May-19	Rinse (5X) and dry to constant mass			

Sieve Size	Approx. Sample Size	Initial Weight	Weight After Sieving	Individual % Loss	Control Aggregate % Retained	Weighted Average %Loss
-9.5mm +4.75mm	500g	501.9	494.5	1.47	21	30.96
-13.2mm +9.5mm	1000g	1007	982	2.48	24	59.58
-19.0mm +13.2mm	1250g	1255.3	1222.8	2.59	55	142.40
Remarks: Acceptable control range 8.5% to 15.3% for Drain Brothers					Total	**2.33**

Date Approved: March 5, 2013 Revision: 1 F2.2.38
Pioneer Construction Inc.

Unconfined Freeze-Thaw
LS-614-Rev. No. 27

Approximate 8 hours thawing time / 16 hours freezing time ± 2 hour

PIO-001-01
Metasedimentary Rock

	Enter the days from start to finish of cycles	5	Enter time samples are put in and removed from freezer	Enter Temperature	- 19C
		prepare sample and start 1st cycle 4:00 p.m.			
A	14-May-19	Put in	3:00 PM	- 20C	1st Cycle
		Remove	6:00 AM	- 19C	
B	15-May-19	Put in	3:00 PM	- 19C	2nd Cycle
		Remove	6:00 AM	- 20C	
C	16-May-19	Put in	3:00 PM	- 19C	3rd Cycle
		Remove	6:00 AM	- 19C	
D	17-May-19	Put in	3:00 PM	- 20C	4th Cycle
		Remove	6:00 AM	- 20C	
E	21-May-19	Put in	3:00 PM	- 20C	5th Cycle
		Remove	6:00 AM	- 19C	
	22-May-19	Rinse (5X) and dry to constant mass			

Sieve Size	Approx. Sample Size	Initial Weight	Weight After Sieving	Individual % Loss	Control Aggregate % Retained	Weighted Average %Loss
-9.5mm +4.75mm	500g	502.9	499.9	0.60	21	12.53
-13.2mm +9.5mm	1000g	1004.3	981.4	2.28	24	54.72
-19.0mm +13.2mm	1250g	1252.7	1218.5	2.73	55	150.16
Remarks: Acceptable control range 8.5% to 15.3% for Drain Brothers					Total	**2.17**

Date Approved: March 5, 2013 Revision: 1 F2.2.38
Pioneer Construction Inc.

Micro-Deval Abrasion Test

Coarse Aggregate LS-618

Source: Pioneer Kingsway Claims Date: 08-May-19 I.D.: File No.:

LS-618 Select either **A**,**B** or **C** grading (based on nominal maximum size)

Sieve Size (mm)		Grading Masses (g)					
Passing	Retained	A		B		C	
19.0	16.0	375	accumulative				
16.0	13.2	375	750				
13.2	9.5	750	1500±5	750	accumulative		
9.5	6.7			750	1500±5	1500	accumulative
6.7	4.75						1500±5
Circle maximum size of aggregate tested							
Running Time (mins)		120±1		105±1		95±1	

Worksheet

A (1.0g)	B (1.0g)	Abrasion Loss % ((A-B)/A)100 (0.1%)	Reference Sample Data	
			Reference No.	% Loss
1510.6	1368.4	**9.4**	DR-004	12.1

A- Initial mass of test sample

B-Final mass of test sample

Drain Brothers acceptable range 11.4% to 14.8%

Remarks: Sample PIO-002-01

Gabbroic Lithology

Saturate sample in 2.0±0.05L tap water(20±5°C)

5000±5g of steel balls

100±5 rpm

Superimposed sieves 4.75 and 1.18mm for washing test

Dry sample to constant mass

Micro-Deval Abrasion Test
Coarse Aggregate LS-618

Source: Pioneer Kingsway Claims Date: 08-May-19 I.D.: File No.:

LS-618 Select either **A**,**B** or **C** grading (based on nominal maximum size)

Sieve Size (mm)		Grading Masses (g)					
Passing	Retained	A		B		C	
19.0	16.0	375	accumulative				
16.0	13.2	375	750				
13.2	9.5	750	1500±5	750	accumulative		
9.5	6.7			750	1500±5	1500	accumulative
6.7	4.75						1500±5
Circle maximum size of aggregate tested							
Running Time (mins)		120±1		105±1		95±1	

Worksheet

A (1.0g)	B (1.0g)	Abrasion Loss % ((A-B)/A)100 (0.1%)	Reference Sample Data	
			Reference No.	% Loss
1503.8	1381.8	**8.1**	DR-004	12.1

A- Initial mass of test sample

B-Final mass of test sample

Drain Brothers acceptable range 11.4% to 14.8%

Remarks: Sample PIO-001-01

Metasedimentary Lithology

Saturate sample in 2.0±0.05L tap water(20±5°C)

5000±5g of steel balls

100±5 rpm

Superimposed sieves 4.75 and 1.18mm for washing test

Dry sample to constant mass

Coarse Aggregate Petrographic Analysis – MTO LS-609 PC-CC-343

Source Name: Pioneer Coniston Claims Group		Inventory #:
Location:		Test Lab: **Skead Pit**
Date: May 24, 2019	Fraction: 19.0mm to 9.5mm	Analyst: D. Pilkey

Type	Type No.	Mass	%	Granular Correction	
Carbonate (hard; silty hard)	01			-	-
Carbonate (surf. Weathered; silty surf. weath; med. hard; silty med hard)	20			-	-
Carbonate (sandy hard or medium hard)	02			-	-
Carbonate (slightly cherty; <5% chert)	21			-	-
Marble (hard or medium hard)	23			-	-
Conglomerate-Sandstone-Arkose (hard)	03			-	-
Conglomerate-Sandstone-Arkose (medium hard)	22			-	-
Greywacke-Argillite (hard or medium hard)	06			-	-
Gneiss-Amphibolite-Schist (hard)	04			-	-
Quartzite	05			-	-
Granite-Diorite-Gabbro (hard)	08	1231.2	96.5	-	-
Volcanic (hard or medium hard)	07			-	-
Trap (< 20% sulphide)	09			-	-
Quartz (vein or pegmatite)	10				
Total Good Aggregate	-			-	-
Carbonate (soft; silty soft; slightly shaley)	35			X2	
Carbonate (soft; pitted)	41			X2	
Carbonate (deeply weathered; silty, deeply weathered)	42			-	-
Carbonate (sandy; soft)	40			X2	
Marble (brittle)	24			X2	
Chert-Cherty Carbonate (<20% leached chert)	26			X2	
Conglomerate-Sandstone-Arkose (brittle)	30			X2	
Greywacke (brittle)	29			X2	
Encrustation	52			X2	
Gneiss-Amphibolite-Schist (brittle)	25			X2	
Argillite (medium soft)	34	44.7	3.5	X2	
Granite-Diorite-Gabbro (brittle)	27			X2	
Volcanic (soft)	28			X2	
Total Fair Aggregate	-			-	-
Carbonate (shaley, clayey, silty clayey)	43			-	-
Carbonate (ochreous, sandy ochreous)	44			-	-
Marble (friable)	49			X3	
Chert-Cherty Carbonate (>20% leached chert)	45			X3	
Conglomerate-Sandstone-Arkose (friable)	46			X3	
Siltstone	56			X3	
Cementation (partial)	53			X3	
Cementation (total)	54				
Gneiss-Amphibolite (friable)	50			X3	
Schist (soft)	55			X3	
Granite-Diorite-Gabbro (friable)	51			X3	
Volcanic (very soft, porous)	48			X3	
Total Poor Aggregate	-			-	-
Ochre	60			-	-
Shale	61			-	-
Clay	62			-	-
Volcanic-Gneiss-Schist (decomposed)	63			-	-
				-	-
Total Deleterious Aggregate	-			-	-
	Totals	**1275.9**	**100**		

% Good	96.5	X 1	**96.5**
% Fair	3.5	X 3	**10.5**
% Poor		X 6	
% Deleterious		X 10	

Est. Percent Crushed	**100%**
Est. Percent Flat/Elongate	**5%**

Hot Mix, Surface Treatment and Concrete P.N. **107**

David Pilkey

Corrected Granular P.N.

Coarse Aggregate Petrographic Analysis – MTO LS-609 PC-CC-343

Source Name: Pioneer Coniston Claims Group		Inventory #:
Location:		Test Lab: **Skead Pit**
Date: May 24, 2019	Fraction: 19.0mm to 9.5mm	Analyst: D. Pilkey

Type	Type No.	Mass	%	Granular Correction	
Carbonate (hard; silty hard)	01			-	-
Carbonate (surf. Weathered; silty surf. weath; med. hard; silty med hard)	20			-	-
Carbonate (sandy hard or medium hard)	02			-	-
Carbonate (slightly cherty; <5% chert)	21			-	-
Marble (hard or medium hard)	23			-	-
Conglomerate-Sandstone-Arkose (hard)	03			-	-
Conglomerate-Sandstone-Arkose (medium hard)	22			-	-
Greywacke-Argillite (hard or medium hard)	06			-	-
Gneiss-Amphibolite-Schist (hard)	04			-	-
Quartzite	05	1020.9	94.2	-	-
Granite-Diorite-Gabbro (hard)	08			-	-
Volcanic (hard or medium hard)	07			-	-
Trap (< 20% sulphide)	09			-	-
Quartz (vein or pegmatite)	10				
Total Good Aggregate	-			-	-
Carbonate (soft; silty soft; slightly shaley)	35			X2	
Carbonate (soft; pitted)	41			X2	
Carbonate (deeply weathered; silty, deeply weathered)	42			-	-
Carbonate (sandy; soft)	40			X2	
Marble (brittle)	24			X2	
Chert-Cherty Carbonate (<20% leached chert)	26			X2	
Conglomerate-Sandstone-Arkose (brittle)	30			X2	
Greywacke (brittle)	29	55.3	5.1	X2	
Encrustation	52			X2	
Gneiss-Amphibolite-Schist (brittle)	25			X2	
Argillite (medium soft)	34			X2	
Granite-Diorite-Gabbro (brittle)	27			X2	
Volcanic (soft)	28			X2	
Total Fair Aggregate	-			-	-
Carbonate (shaley, clayey, silty clayey)	43			-	-
Carbonate (ochreous, sandy ochreous)	44			-	-
Marble (friable)	49			X3	
Chert-Cherty Carbonate (>20% leached chert)	45			X3	
Conglomerate-Sandstone-Arkose (friable)	46	7.6	0.7	X3	
Siltstone	56			X3	
Cementation (partial)	53			X3	
Cementation (total)	54				
Gneiss-Amphibolite (friable)	50			X3	
Schist (soft)	55			X3	
Granite-Diorite-Gabbro (friable)	51			X3	
Volcanic (very soft, porous)	48			X3	
Total Poor Aggregate	-			-	-
Ochre	60			-	-
Shale	61			-	-
Clay	62			-	-
Volcanic-Gneiss-Schist (decomposed)	63			-	-
				-	-
Total Deleterious Aggregate	-			-	-
	Totals	**1083.8**	**100**		

% Good	94.2	X 1	**94.2**		
% Fair	5.1	X 3	**15.3**	Est. Percent Crushed	**100%**
% Poor	0.7	X 6	**4.2**	Est. Percent Flat/Elongate	**5%**
% Deleterious		X 10		*David Pilkey*	
Hot Mix, Surface Treatment and Concrete P.N.		**114**		**Corrected Granular P.N.**	