

## **Bastin Pit No. 1471**

### December 2023 Technical Information Report

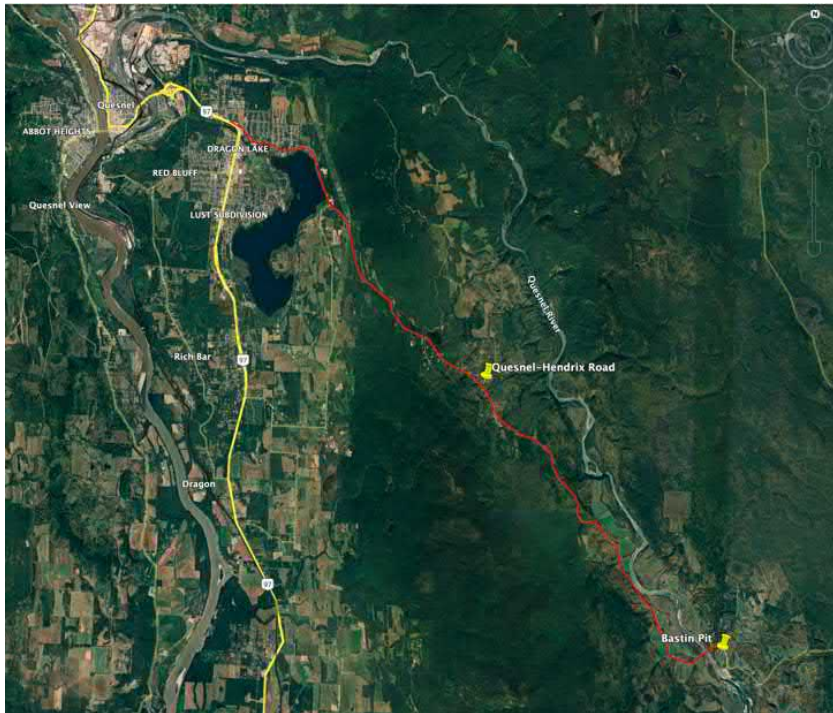
#### **Introduction:**

At the request of Mr. Steven Lee, Senior Aggregate Resource Specialist, MoTI Southern Interior Region, a test pitting program was completed at Bastin Pit No. 1471 on August 14, 15 and 16, 2023. A total of 24 test pits were excavated utilizing a John Deere 200DLC excavator hired from 522828 BC Ltd. (Norm Purmal). Test pits were visually inspected to determine approximate gravel, sand and fines contents as well as the percentage of oversize rock (>75mm) that is present. Sieve Analysis and aggregate quality tests on samples obtained were completed by WSP Engineering of Prince George, BC. Test pit locations, tree lines, slopes, etc. were surveyed by hand held Garmin GPSMAP 64s unit.

The following report documents material encountered within the testing area and provides recommendations on aggregate suitability, available volumes as well as development, mining and final reclamation procedures.

#### **Location:**

The pit is located approximately 23km southeast of the Highway 97/Quesnel -Hendrix Road junction in Quesnel via the Quesnel-Hendrix Road then approximately 1km northeast on the Nyland Lake Road to the pit entrance.



Location Plan

#### **Legal Description:**

Bastin Pit was purchased by the Ministry of Transportation and Infrastructure in 2022 as part of the Nyland Lake Road Slide Remediation Project. The pit site covers approximately 16 hectares with Part of the SW1/4, District Lot 9159, Cariboo Land District, Except Plans BCP28576, EPP21640, EPP21641, EPP21642. The UTM co-ordinates at the gate to the pit entrance is Zone 10, 5855299 Northing, 552583 Easting. The pit is located with the Province of British Columbia Agricultural Land Reserve.

### **Geomorphological Setting:**

Bastin Pit is contained with a glacio-fluvial terrace lying adjacent to the Quesnel River. The deposit consists of a small lower terrace at an approximate elevation of 575 metres and a larger terrace to the southwest lying approximately 7 metres higher at a general elevation of 682 metres. The eastern edge of the glacio-fluvial terrace is covered by high fines colluvium material deposited from slopes to the east. The northern portion of the property has an area that was previously mined for aggregate resources. Rocks observed within the deposit were primarily well rounded and of good quality.

### **Gradation:**

The pit has been divided into two separate development phases referred to as Phase 1 and 2 in order to maximize the material contained within the pit as well as develop and reclaim the site to current Agricultural Land Commission standards. Development Phase 1 is comprised of the lower terrace, Phase 2 consists of the upper terrace lying to the southwest.

The average and range of laboratory sieve analysis as well as oversize rock field estimates for the test pits are as follows:

#### **Phase 1 (Lower Terrace):**

##### **Laboratory Gradations** (Test Pits 23-01, 02, 03, 04, 05, and 24)

<b>Classification:</b>	<b>Average (%)</b>	<b>Range (%)</b>
Gravel (4.75-75mm)	70.2	63.1-77.1
Sand (0.075-4.75mm)	28.3	21.4-35.6
Fines (<0.075mm)	1.5	0.5-2.6

##### **Visual Oversize Rock Estimates** (Test Pits 23-01, 02, 03, 04, 05, and 24)

<b>Classification:</b>	<b>Average (%)</b>	<b>Range (%)</b>
Boulders (>375mm)	<0.1	0-<1
Cobbles (150-375mm)	1.0	0-5
Cobbles (75-150mm)	5.2	0-15

The maximum size rock observed within Phase 1 was 350 mm.

#### **Phase 2 (Upper Terrace):**

##### **Laboratory Gradations** (Test Pits 23-06, 07, 08, 09, 12, 13, 14, 15, 16, 17, 18 and 19)

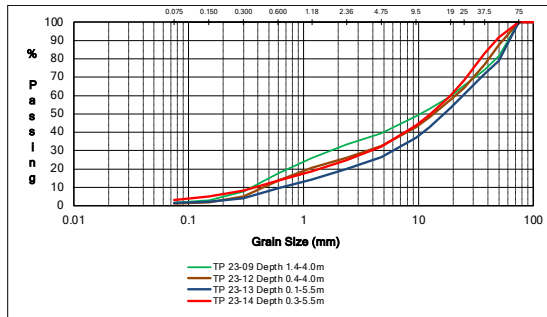
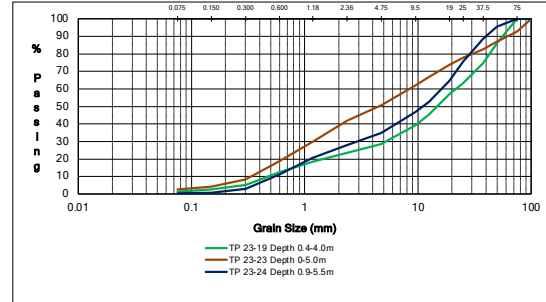
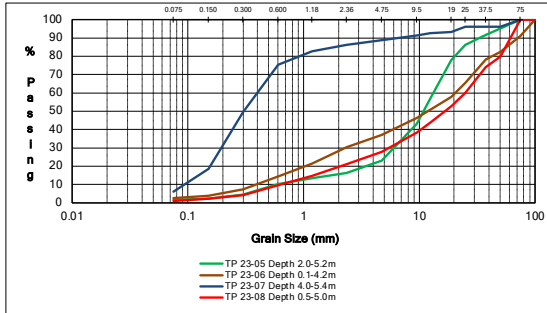
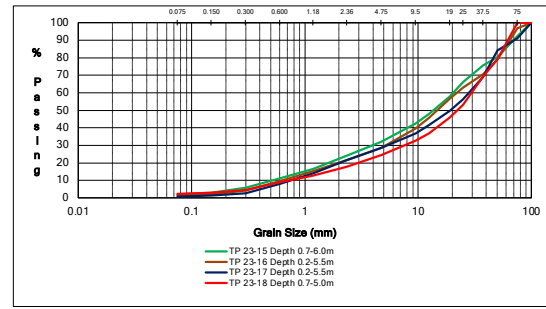
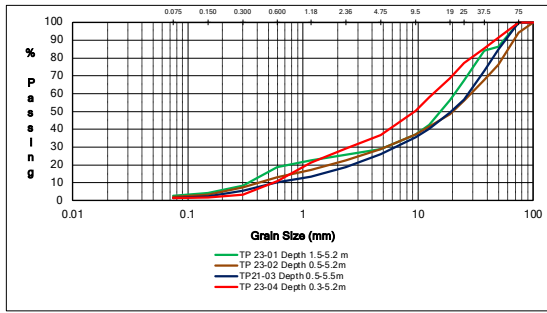
<b>Classification:</b>	<b>Average (%)</b>	<b>Range (%)</b>
Gravel (4.75-75mm)	69.4	60.7-75.7
Sand (0.075-4.75mm)	28.8	22.1-37.6
Fines (<0.075mm)	1.8	1.1-2.6

##### **Visual Oversize Rock Estimates** (Test Pits 23-06, 07, 08, 09, 12, 13, 14, 15, 16, 17, 18 and 19)

<b>Classification:</b>	<b>Average (%)</b>	<b>Range (%)</b>
Boulders (>375mm)	0	0
Cobbles (150-375mm)	2.9	0-10
Cobbles (75-150mm)	11.5	<1-15

The maximum size rock observed within Phase 2 was 250 mm.

**Pit Run Gradation Charts (Not corrected for oversize rock (>75mm)):**



**Gradation Details:**

Sample Information		Percent Passing														
Test Pit	Depth	Pit Run Sieve Sizes (mm)														
		100	75	50	37.5	25	19	12.5	9.5	4.75	2.36	1.18	0.6	0.3	0.15	0.075
TP 23-01	Depth 1.5-5.2 m	100.0	100.0	86.5	84.2	67.3	56.2	42.4	37.2	29.0	25.7	22.5	18.9	8.2	4.2	2.6
TP 23-02	Depth 0.5-5.2m	100.0	94.3	76.1	67.7	55.9	48.5	41.4	37.2	29.0	22.6	17.3	13.2	7.5	3.4	1.9
TP21-03	Depth 0.5-5.5m	100.0	100.0	84.9	72.9	56.6	49.3	40.4	35.4	26.0	18.9	13.4	10.1	5.4	2.3	1.3
TP 23-04	Depth 0.3-5.2m	100.0	100.0	91.4	85.4	77.2	68.7	57.9	50.3	36.9	29.3	21.3	10.9	3.2	1.8	1.3
TP 23-05	Depth 2.0-5.2m	100.0	100.0	95.3	91.8	86.2	77.9	56.9	43.0	22.9	16.4	13.5	10.3	4.5	2.4	1.5
TP 23-06	Depth 0.1-4.2m	100.0	91.1	82.4	78.2	65.5	57.8	50.8	46.4	37.2	30.2	21.3	14.5	7.5	3.9	2.6
TP 23-07	Depth 4.0-5.4m	100.0	100.0	96.0	96.0	96.0	93.4	92.5	91.3	88.7	86.3	82.6	75.3	49.5	18.5	6.2
TP 23-08	Depth 0.5-5.0m	100.0	100.0	79.8	74.0	59.9	52.6	43.7	38.4	27.7	21.1	14.6	9.6	4.2	2.1	1.1
TP 23-09	Depth 1.4-4.0m	100.0	100.0	81.7	73.8	65.7	59.6	52.8	48.6	39.3	33.5	26.0	17.8	7.7	3.1	1.7
TP 23-12	Depth 0.4-4.0m	100.0	100.0	87.5	77.0	64.1	57.7	48.2	42.7	32.6	26.3	20.7	13.8	4.9	1.9	1.1
TP 23-13	Depth 0.1-5.5m	100.0	100.0	78.9	72.0	60.7	53.3	42.8	36.9	26.6	20.1	14.4	9.4	4.2	2.2	1.4
TP 23-14	Depth 0.3-5.5m	100.0	100.0	91.6	83.2	68.2	60.0	49.6	43.6	32.2	24.8	18.7	13.7	8.2	4.9	3.2
TP 23-15	Depth 0.7-6.0m	100.0	92.4	80.5	75.7	66.1	58.0	47.8	42.6	31.9	24.2	16.7	11.2	5.8	3.1	2.1
TP 23-16	Depth 0.21-5.5m	100.0	96.7	79.1	70.7	62.9	56.5	45.6	39.7	28.6	21.7	15.4	9.5	4.1	2.1	1.4
TP 23-17	Depth 0.2-5.5m	100.0	91.2	84.2	69.0	56.4	49.7	41.4	36.7	28.4	21.6	14.1	7.9	2.7	1.3	0.8
TP 23-18	Depth 0.7-5.0m	100.0	100.0	79.0	69.2	53.2	46.0	36.7	32.6	24.3	17.7	12.8	9.1	4.6	2.9	2.2
TP 23-19	Depth 0.4-4.0m	100.0	100.0	85.9	74.8	63.2	57.0	45.3	39.4	28.6	23.5	18.5	12.5	5.3	2.5	1.5
TP 23-23	Depth 0-5.0m	100.0	92.5	87.0	82.6	77.8	73.7	66.6	62.0	50.8	41.8	29.8	18.7	8.4	4.2	2.5
TP 23-24	Depth 0.9-5.5m	100.0	100.0	95.4	88.5	75.5	64.4	52.4	46.8	34.9	27.8	20.7	11.2	2.8	0.9	0.5

**Laboratory Aggregate Quality Test Results:**

Test Pit	Laboratory Test					
	Micro Deval	Sand Equivalent	Magnesium Sulphate	Bulk Relative Density	Absorption	Clay Lumps
TP 23-02						0.2%
TP 23-04	6.8%	68		2.694 Coarse 2.663 Fine	1.21% Coarse 1.49% Fine	
TP 23-08			4.7% Coarse	2.749 Coarse	0.53% Coarse	0.3%
TP 23-11	6.5%	73				
TP 23-15				2.650 Coarse 2.625 Fine	2.0% Coarse. 2.19% Fine	
TP 23-16	6.5%	65				0.2%

Laboratory testing indicates the pit contains good quality material with fines that are non-plastic in nature.

**MoTI Aggregate Quality Specifications:**

Product	Laboratory Test					
	Micro Deval	Sand Equivalent	Magnesium Sulphate	Absorption	Clay Lumps	Plasticity
25mm Well Graded Base	<25%	>40	<20% Coarse, <25% Fine			
50mm Well Graded Base	<25%	>40	<20% Coarse, <25% Fine			
75mm Well Graded Base	<17%	>40	<20% Coarse, <25% Fine			
Select Granular Sub base	<30%	>20	<20% Coarse, <25% Fine			
Bridge End Fill	<30%	>20	<20% Coarse, <25% Fine			
Superpave	<18%	>45		2.0%	1.0%	
Class 1 Asphalt	<18%	>40		2.0%	1.0%	
Class 2 Asphalt	<20%	>40		2.0%	1.5%	
Graded Aggregate Seal	<20%		12%	1.0% Coarse, 1.5% Fine	0.5%	
High Fines Surfacing	<25%	>20				<6

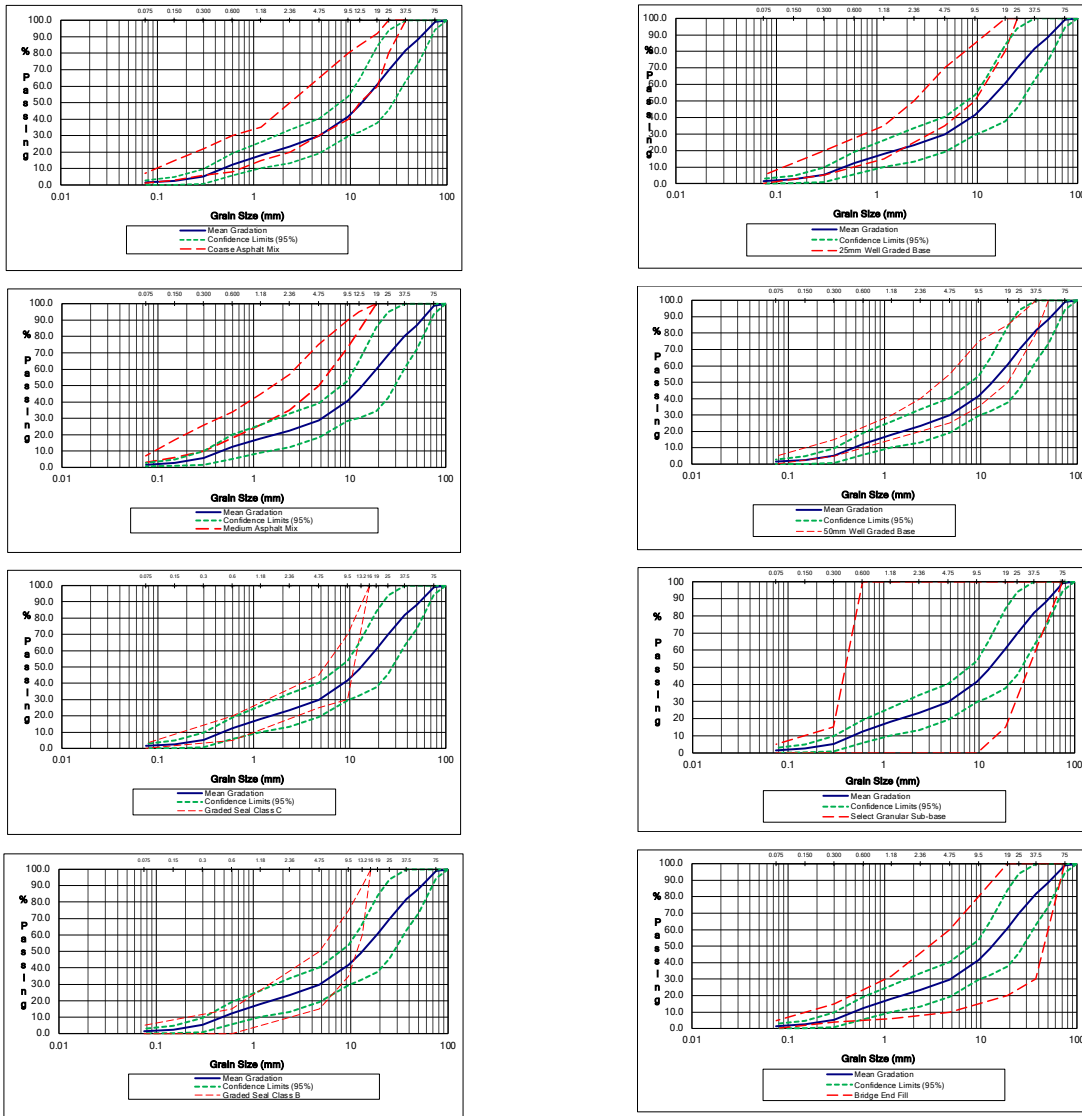
**Phase 1 - Suggested Material Suitability:**

- Coarse Asphalt Mix
- Medium Asphalt Mix
- Class B and C Graded Aggregate Seal
- 25mm Well Graded Base
- 50mm Well Graded Base
- Select Granular Sub base
- Bridge End Fill

**Notes:**

- *It will be necessary to scalp off rock during crushing in order to produce specification 25mm Well Graded Base.*
- *It may be possible to produce High Fines Surfacing Aggregate by adding a suitable mineral filler as well as rejecting rock during production.*
- *Laboratory testing indicates the absorption percentage is variable and should be reviewed when producing Graded Aggregate Seal products.*

**Phase 1 - Mean Gradations vs End Product Gradation Specifications:**



*Note: Mean gradations have not been adjusted to include oversize rock (>75mm)*

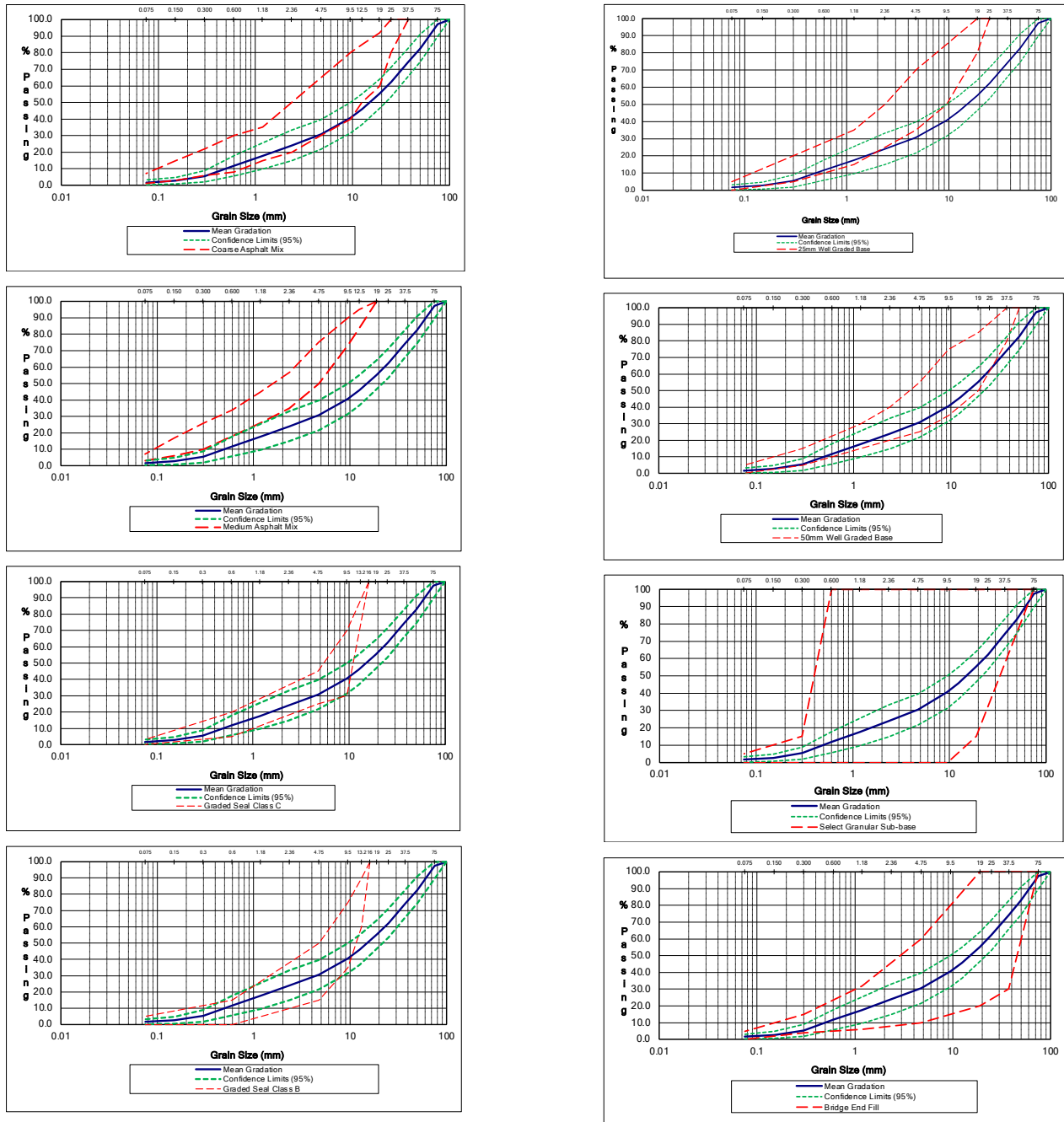
**Phase 2 - Suggested Material Suitability:**

- Coarse Asphalt Mix
- Medium Asphalt Mix
- Class B and C Graded Aggregate Seal
- 25mm Well Graded Base
- 50mm Well Graded Base
- Select Granular Sub base
- Bridge End Fill

Notes:

- *It will be necessary to scalp off rock during crushing in order to produce specification 25mm Well Graded Base.*
- *It may be possible to produce High Fines Surfacing Aggregate by adding a suitable mineral filler as well as rejecting rock during production.*
- *Laboratory testing indicates the absorption percentage is variable and should be reviewed when producing Graded Aggregate Seal products.*

**Phase 2 - Mean Gradations vs End Product Gradation Specifications:**



**Estimated Granular and Overburden Volumes:**

**Phase 1 - Lower Terrace**

- Sand and Gravel: +/-125,000m<sup>3</sup>

*Based on mining the Lower Terrace, covering 2.7 hectares, to an average depth of 5.5 metres after topsoil and overburden has been removed and sloping the pit face to a minimum slope of 2:1.*

- Topsoil and Overburden (combined): +/-17,400m<sup>3</sup>

*Based on stripping the Lower Terrace in the vicinity of TP 23-01, 02, 03 and 04 to an average depth of 0.65 metres and TP 23-05 to a depth of 2.0 metres.*

**Phase 2 - Upper Terrace**

- Sand and Gravel: +/-295,000m<sup>3</sup>

*Based on mining the Upper Terrace, covering 7.3 hectares, to an average depth of 5.0 metres after topsoil and overburden has been removed and sloping the pit face to a minimum slope of 2:1.*

- Topsoil and Overburden (combined): +/-24,800m<sup>3</sup>

*Based on stripping the Upper Terrace to an average combined topsoil and overburden depth of 0.34 metres.*

**Test Pit GPS Co-ordinates:**

Test Pit	GPS Co-ordinates – UTM Zone 10
23-01	5855110 Northing, 552600 Easting
23-02	5855052 Northing, 552528 Easting
23-03	5855002 Northing, 552484 Easting
23-04	5854988 Northing, 5525506 Easting
23-05	5855037 Northing, 552600 Easting
23-06	5854939 Northing, 552551 Easting
23-07	5854888 Northing, 552551 Easting
23-08	5854868 Northing, 552611 Easting
23-09	5854889 Northing, 552678 Easting
23-10	5854909 Northing, 552744 Easting
23-11	5854961 Northing, 552691 Easting
23-12	5855017 Northing, 552657 Easting
23-13	5854835 Northing, 5525556 Easting
23-14	5854787 Northing, 552610 Easting
23-15	5854809 Northing, 552673 Easting
23-16	5854745 Northing, 552660 Easting
23-17	5854685 Northing, 552641 Easting
23-18	5854701 Northing, 552716 Easting
22-19	5854632 Northing, 552688 Easting
23-20	5854767 Northing, 552722 Easting
23-21	5854838 Northing, 552730 Easting
22-22	5855086 Northing, 552473 Easting
22-23	5855166 Northing, 552501 Easting
22-24	5855195 Northing, 552611 Easting

**Pit Development and Recommendations:****Phase 1 – Lower Terrace**

- Phase 1 vegetation consists primarily of grasses with a thin canopy of deciduous and coniferous trees along the northern and western edges. Combined topsoil and overburden depths in the area range from a depth of 0.3 to 2.0 metres. Test pitting indicates that a small area near TP 23-02 has been previously stripped with the topsoil and overburden placed in the vicinity of TP 23-05. Prior to mining the perimeter trees to the north and west need to be removed and placed in piles for burning when the forest fire risk and venting indexes are appropriate. Topsoil and overburden shall be stripped to the depths and general operating procedures as outlined in the Stantec – Bastin Hill Pit Agricultural Soils Assessment September 2023 report.
- Topsoil is recommended to be placed in a neatly trimmed stockpile along the eastern edge of the Phase 1 mining area. After placement, the stockpile should be immediately seeded with a suitable seed mixture in order to prevent erosion and the spread of noxious weeds. Stripping of topsoil and overburden is recommended to be completed with an excavator and a clean-up bucket. Stripping should not be completed when the ground is saturated or when there are very dry, windy conditions.

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- The crusher is recommended to be set up near Test Pit 23-24 with mining proceeding in a southwest direction. Initially, it will be necessary to excavate down to create a suitable mining face of approximately 6 metres in height.
  - Initially, there will be limited aggregate stockpile space adjacent to the crusher site. If a large volume of aggregate is produced it is recommended that the material be placed in stockpile on the northern end of the Upper Terrace. It will be necessary to construct a new haul road to the Upper Terrace for initial aggregate stockpiling.
  - At the completion of intermittent mining the pit face should be trimmed to a slope of 1 1/2:1 with natural sand and gravel. Slopes mined to depletion need to be trimmed to a minimum slope of 3 1/2:1 unless the Agricultural Land Commission approves a 2:1 slope.
  - Reject material from aggregate production should not be used to obtain sloping. Reclamation activities at the pit are recommended to include sloping, loosening compacted areas via ripping or tilling, replacement of overburden and seeding with a suitable grass mixture.

### **Phase 2 – Upper Terrace**

- Phase 2 vegetation consists primarily of grasses with a thin canopy of deciduous and coniferous trees along the western terrace edge. Combined topsoil and overburden depths in the area range from a depth of 0.3 to 2.0 metres. Prior to mining the perimeter trees need to be removed and placed in piles for burning when the forest fire risk and venting indexes are appropriate. Topsoil and overburden shall be stripped to the depths and general operating procedures as outlined in the Stantec – Bastin Hill Pit Agricultural Soils Assessment September 2023 report. Topsoil is recommended to be placed in a neatly trimmed stockpile along the eastern edge of the Phase 2 mining area. After placement, the stockpile should be immediately seeded with a suitable seed mixture in order to prevent erosion and the spread of noxious weeds. Stripping of topsoil and overburden is recommended to be completed with an excavator and a clean-up bucket. Stripping should not be completed when the ground is saturated or when there are very dry, windy conditions.
- There are some out buildings, power poles, fencing, etc. located on the Upper Terrace. These items will need to be removed in order to fully develop and mine the area.
- The crusher is recommended to be located at the base of slope near Test Pit 23-04 and 05 with mining proceeding in a southerly direction. Processed aggregate may be stockpiled near the crusher location where space permits.
- Clean, coarse granular material encountered within Test Pit 23-09 is underlain by high fines sand at a depth of 2.8 metres (prior to topsoil stripping). The lateral extent of the high fines sand is not known, therefore; careful attention to mining depths will be required when excavating near the area.
- The majority of test pits with Phase 2 encountered clay and silt materials near the bottom of the test pit excavations. As a result, mining depths will be limited to approximately 5 metres. Mining near this depth will require close monitoring in order to avoid contamination with clay and silt materials.
- At the completion of intermittent mining the pit face should be trimmed to a slope of 1 1/2:1 with natural sand and gravel. Slopes mined to depletion need to be trimmed to a minimum slope of 3 1/2:1 unless the Agricultural Land Commission approves a 2:1 slope.
- Reject material from aggregate production should not be used to obtain sloping. Reclamation activities at the pit are recommended to include sloping, loosening compacted areas via ripping or tilling, replacement of overburden and seeding with a suitable grass mixture.

**Additional Recommendations:**

- The northern portion of the property has been previously mined for aggregate products. The area has been recommended for the placement of waste material excavated from the nearby Nyland Lake Road slide remediation project. Prior to the placement of waste material, the area will require the removal of some deciduous and coniferous trees and underlying brush. Material should be placed in appropriate lifts and compacted in order to ensure stability of the fill. The top of the fill should be levelled, covered with approximately 0.3 metres of topsoil and seeded with an appropriate seed mixture.

**Test Pit Logs:**

TP	DEPTH		VISUAL MATERIAL DESCRIPTION	ESTIMATED GRADUATION			ESTIMATED ROCK >75mm				SAND TYPE	LABORATORY GRADATIONS and CLASSIFICATION	Comments
	FROM	TO		G	S	F	MAX SIZE	75mm - 150mm	150mm - 375mm	>375mm			
23-01	0.0	1.5	Overburden										
	1.5	5.2	GP	60	38	2	150	5	0	0	FM	GP (71.0%G, 26.4%S, 2.6%F)	
23-02	0.0	0.3	Overburden										
	0.5	5.2	GP	65	33	2	180	15	1	0	FM	GP (71.0%G, 27.1%S, 1.9%F)	
23-03	0.0	0.5	Overburden										
	0.5	5.2	GP	60	38	2	200	10	5	0	FM	GP (74.0%G, 24.7%S, 1.3%F)	
23-04	0.0	0.3	Overburden										
	0.3	5.2	GP	52	46	2	100	1	0	0	MC	GP 63.1%G, 35.6%S, 1.3%F	Test Pit sluffing in
23-05	0.0	2.0	Overburden										Previous stripping disposal area
	2.0	4.5	GP	52	46	2	100	<1	0	0	MC	GP (77.1%G, 21.4%S, 1.5%F)	Test Pit sluffing in
23-06	0.0	0.1	Overburden										
	0.1	4.2	GP	60	38	2	175	15	2	0	FM	GP (62.8%G, 34.6%S, 2.6%F)	
	4.2	5.4	SP	10	86	4	25	0	0	0	FM	SPSM (11.3%G, 82.5%S, 6.2%F)	
23-07	0.0	0.5	Overburden										
	0.5	5.0	GP	60	38	2	150	<1	0	0	FM	GP (72.3%G, 26.3%S, 1.4%F)	
	5.0	6.0	SPSM	20	70	10	25	0	0	0	FM	SPSM (23.1%G, 63.6%S, 13.3%F)	Some silt lumps intermixed
23-08	0.0	0.1	Overburden										
	0.1	4.6	GP	65	32	3	175	15	2	0	FM	GP (72.5%G, 26.23S, 1.2%F)	
	4.6	6.0	SP	35	62	3	100	2	0	0	FM		Test Pit sluffing in
23-09	0.0	0.6	Overburden										
	0.6	2.8	GP	65	32	3	175	10	3	0	FM		
	2.8	6.0	SM3	0	70	30	-	0	0	0	F		
23-10	0.0	0.1	Overburden										
	0.1	3.0	SM3	0	70	30	-	0	0	0	F		
	3.0	5.0	SM2	0	80	20	-	0	0	0	F		Some rocks at bottom of Test Pit
23-11	0.0	0.1	Overburden										
	0.1	0.5	GP	60	38	2	150	5	0	0	FM		
	0.5	0.9	SP	30	67	3	25	0	0	0	FM		
	0.9	1.0	Volcanic Ash										
	1.0	1.2	SP	30	67	3	25	0	0	0	FM		
	1.2	1.4	Volcanic Ash										
	1.4	4.0	GP	60	37	3	175	5	<1	0	FM	GP (60.7%G, 37.6%S, 1.7%F)	
23-12	4.0	5.2	SP	30	67	3	175	<1	0	0	FM		
	0.0	0.4	Overburden										
	0.4	3.0	GP	60	37	3	175	5	<1	0	FM	GP (67.4%G, 31.5%S, 1.1%F)	
	3.0	4.0	GP	60	37	3	250	10	2	0	FM		
	4.0	4.5	GP	60	37	3	175	5	<1	0	FM		Some clay lumps mixed in with granular material
4.5	5.5	SP	30	67	3	50	0	0	0	FM			
23-13	0.0	0.1	Overburden										
	0.1	5.5	GP	65	32	3	175	15	5	0	FM	GP (73.4%G, 25.2%S, 1.4%F)	Test Pit sluffing in
23-14	0.0	0.3	Overburden										
	0.3	5.5	GP	65	32	3	175	10	5	0	FM	GP (67.9%G, 28.9%S, 3.2%F)	Some minor clay lumps at approximately 3.0 m

23-15	0.0	0.7	Overburden											
	0.7	6.0	GP	65	32	3	175	15	2	0	FM	GP (68.1%G, 29.8%S, 2.1%F)	One clay lump observed in Test Pit spoil	
23-16	0.0	0.2	Overburden											
	0.2	5.5	GP	65	33	2	175	15	2	0	MC	GP (71.4%G, 27.2%S, 1.4%F)		
	5.5	5.6	GP	65	33	2	175	15	2	0	MC		Minor clay lumps	
23-17	0.0	0.2	Overburden											
	0.2	5.5	GP	65	33	2	175	10	5	0	MC	GP (71.6%G, 27.5%S, 0.8%F)		
	5.5	6.0	GP	65	33	2	175	10	5	0	MC		Some clay mixed with gravel	
23-18	0.0	0.7	Overburden											
	0.7	5.0	GP	65	32	3	175	10	5	0	FM	GP (75.7%G, 22.1%S, 2.2%F)		
	5.0	6.0	ML/CL											
23-19	0.0	0.4	Overburden											
	0.4	5.0	GP	65	32	3	175	15	10	0	FM	GP 71.4%G, 27.1%S, 1.5%F)		
	5.0	5.5	ML/CL										Mixed with some gravel	
23-20	0.0	1.2	Overburden											
	1.2	5.5	GP/GC										Gravel intermixed with clays	
23-21	0.0	1.8	Overburden											
	1.8	2.8	SM2	0	80	20	F							
	2.8	5.5	GP	63	35	2	FM	250	15	10	0			
	5.5	6.0	SM1	30	58	12	F	25						
23-22	0.0	0.1	Overburden											
	0.1	1.8	GP	50	48	2	FM	50	0	0	0		Pea gravel	
	1.8	6.0	SM2	0	80	20	FM							
23-23	0.0	5.0	SP	40	58	2	FM	150	2	0	0	GP/SP (49.2%G, 48.2%S, 2.5%F)		
23-24	0.0	0.9	Overburden											
	0.9	5.5	GP	60	38	2	FM	350	0	0	<1	GP (65.1%G, 34.4%S, 0.5%F)	One large boulder encountered	

**Site Photographs:**



Test Pit 23-01 Spoil (Clean, coarse sand and gravel 1.5-5.2m)



Test Pit 23-02 Spoil (Clean, coarse sand and gravel 0.5-5.2m)



Test Pit 23-03 Spoil (Clean, coarse sand and gravel 0.5-5.2m)



Test Pit 23-05 Spoil (Clean, coarse sand and gravel 2.0-4.5m)



Test Pit 23-06 Spoil (Clean coarse sand and gravel 0.1-4.2m)



Test Pit 23-06 Spoil (High fines sand 4.2-5.4m)



Test Pit 23-07 Spoil (Clean, coarse sand and gravel 0.5-5.0m)



Test Pit 23-07 Spoil (Silt lumps mixed with gravel 5.0-6.0m)



Test Pit 23-08 Spoil (Clean, coarse sand and gravel 0.1-4.6m)



Test Pit 23-08 Spoil (Clean, gravelly sand 4.6-6.0m)



Test Pit 23-09 Spoil (High fines sand 2.8-6.0m)



Test Pit 23-10 Spoil (High fines sand 0.1-5.0m)



Test Pit 23-11 Spoil (Clean, coarse sand and gravel 1.4-4.0m)



Test Pit 23-12 Spoil (Clean, coarse sand and gravel 0.4-4.0m)



Test Pit 23-12 Spoil (Clay mixed with gravel 4.0-5.5m)



Test Pit 23-13 Spoil (Clean, coarse sand and gravel 0.1-5.5m)



Test Pit 23-14 Spoil (Clean, coarse sand and gravel 0.3-5.6m)



Test Pit 23-14 Spoil (Minor clay lumps at approximately 3.0m)



Test Pit 23-15 Spoil (Clean coarse sand and gravel 0.7-6.0m)



Test Pit 23-16 Spoil (Clean, coarse sand and gravel 0.2-5.5m)



Test Pit 23-17 Spoil (Clean, coarse sand and gravel 0.2-5.5m)



Test Pit 23-17 Spoil (Clay mixed with gravel from 5.5 to 6.0m)



Test Pit 23-18 Spoil (Clean, coarse sand and gravel 0.7-5.0m)



Test Pit 23-19 Spoil (Clean, coarse sand and gravel 0.4-5.0m)



Test Pit 23-19 Spoil (Silt and clay mixed with gravel 5.0-5.5m)



Test Pit 23-20 Spoil (Sand and gravel mixed with large clay lumps 1.2-5.5m)



Test Pit 23-21 Spoil (Clean, coarse sand and gravel 2.8-5.5m)



Test Pit 23-21 Spoil (High fines sand 5.5-6.0m)



Test Pit 23-22 Spoil (High fines sand 1.8-6.0m)



Test Pit 23-23 Spoil (Clean, sandy gravel 0.0-5.0m)



Test Pit 23-24 Spoil (Clean, coarse sand and gravel 0.9-5.5m)



Phase 1 Mining Area (lower terrace looking south)



Phase 2 Mining Area (Upper terrace looking south)

**Closure:**

Discussions and recommendations presented above are based on a field investigation. This report has been prepared for use by the Ministry of Transportation and Infrastructure, which includes the distribution as required for purposes for which the assessment was commissioned. The assessment has been carried out in accordance with generally accepted geotechnical practice. Geotechnical judgment has been applied in developing the recommendations in this report. No other warranty is made, either expressed or implied.

Sitkum Consulting Ltd. trusts that the information presented above meets your current requirements. If you have any questions, or require further information, please do not hesitate to contact the undersigned

Sincerely,

A handwritten signature in black ink, appearing to read "B. James".

Bryan James  
Project Manager  
Sitkum Consulting Ltd.