

Technical Summary

March 2009

Pit Name: Crescent Spur

Provincial Pit #: 1811

Location: The pit is located at the end of Prospect Road, approximately 5km down Crescent Spur Road (off Hwy 16), approximately 50km Northwest of McBride (Figure 1).

Legal Land Description: The site is currently a section 16 Map Reserve held by the Ministry of Transportation and Infrastructure. The legal land description of the reserve is the “Crown Land covering that Part of D.L. 8043, Cariboo District, as shown on the attached map and containing 13.2 hectares, more or less” (Figure 2).

2009 Investigation: The 2009 investigation consisted of 13 test pits with depths ranging from 3.1 to 5.1m. Based on the results of this investigation, Area A has been delineated as an area containing usable granular materials (Figure 3).

Material Gradation

Table 1 displays the gradation as percent by weight of the fines (silts and clays), sand and gravel component as well as the Unified Soil Classification (USC) for the samples from Area A.

Table 1: Deposit Gradation

Test Pit	Depth (m)	Fines (%)	Sand (%)	Gravel (%)	USC
TP 09-02	0.05-1.2	1.2	54.5	44.3	SW
TP 09-03	1-4.5	3.8	39.3	56.9	GW
TP 09-04	0.3-5.1	5.1	32.8	62.1	GW-GM
TP 09-07	0.7-2.8	2.7	24.2	73.1	GP
TP 09-08	2.3-4.1	2.9	36.2	60.9	GW
TP 09-12	0-1.9	4.1	42.4	53.5	GW
Average		3.3	38.2	58.5	GW

Table 2 includes the percent by weight of oversized rocks as well as the corrected percentages of fines, sand and gravel. The gravel is also divided into fine and coarse portions.

Table 2: Pit Run Gradation with Oversized Estimates

Test Pit	% Fines <0.075mm	% Sand 0.075- 4.75mm	% Gravel		% Small Boulders 75-300 mm	% Large Boulders >300mm
			Fine 4.75- 25 mm	Coarse 25- 75 mm		
09-02	1.1	50.1	13.4	27.4	8	0
09-03	3.0	31.4	18.5	27.1	20	0
09-04	4.4	28.5	22.4	31.7	13	0
09-07	2.4	21.3	20.7	43.6	10	2
09-08	2.3	28.2	19.3	28.2	22	0
09-12	3.9	40.7	31.9	19.5	4	0
Average	2.9	33.4	21.0	29.6	12.8	0.3

Material Durability

Durability tests were performed on the samples to verify that the aggregate is of sufficient quality to meet the specifications needed for various highway construction and maintenance products. They were tested for loss from abrasion (micro-deval), presence of plastic fines (sand equivalent), as well as absorption and relative density.

Table 3: Durability Test Results

Area A	Sand Equivalent	Microdeval (% loss)	Absorption		Relative Density	
			Coarse	Fine	Coarse	Fine
TP 09-02	87.6	11.52				
TP 09-03			1.39	1.31	2.600	2.617
TP 09-04	65.8	19.34				
TP 09-07			1.09	1.21	2.600	2.636
TRAN Standard Specs	≥ 20 Sub- base aggregate ≥40 base course & asphalt mix aggregates	≤ 30 sub-base aggregate ≤ 25 base course aggregate ≤ 17 asphalt mix aggregates	< 2.0 for paving aggregate <1.0 for graded aggregate seal	<1.5 for graded aggregate seal	~2.65	~2.65

Material Suitability

Table 4 summarizes the potential aggregate products that can be produced from Area A .

Table 4: Suitability

	Pit Run	Crush
Suitability	Bridge end fill SGSB	Base course aggregate Asphalt mix aggregate Graded aggregate seal

For pit run, Bridge End Fill and SGSB, the material will need to be screened to remove the larger oversize rocks. The absorption test results on the fine portion meets the requirements for Graded Aggregate Seal aggregates but are slightly higher on the coarse portion. However, it is anticipated that crushing of the oversized rocks with the gravel

will improve the durability characteristics and that the crushed material should be suitable for a variety of aggregate products .

Volume Estimates

Based on depths encountered during the subsurface investigation, Table 5 consists of estimates of the volumes that can be expected for the top soil, overburden and aggregate from Area A that measures approximately 4.45 ha.

Table 5: Volume Estimates

	Top Soil	Overburden	Aggregate
Average Layer Thickness (m)	0.1	0.4	4.0
Volume of material in development area (m³)	4,450	17,800	178,000

There is a potential for granular materials in the east/northeast portion of the reserve. Test Pit 09-13 excavated in this area encountered approximately 3.6m thick gravel layer and bottomed out in gravel. It is recommended that further exploration be carried out in this area to assess the potential.

Pit Development Notes

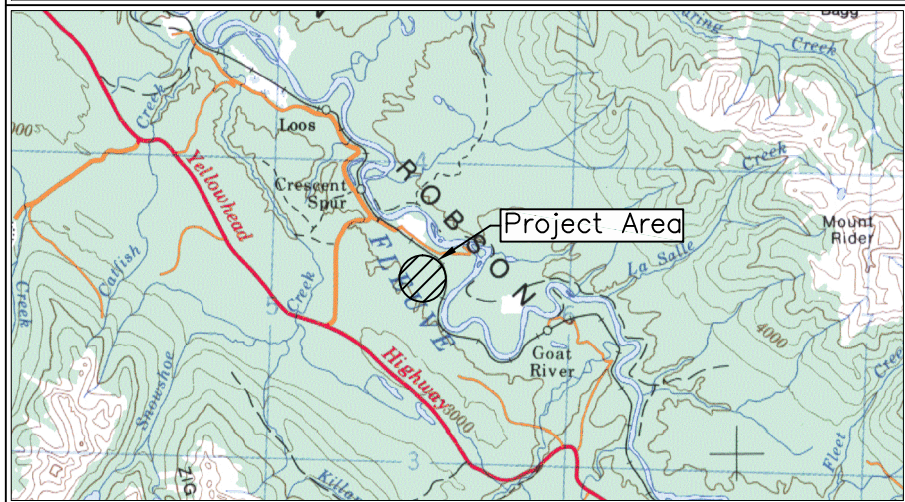
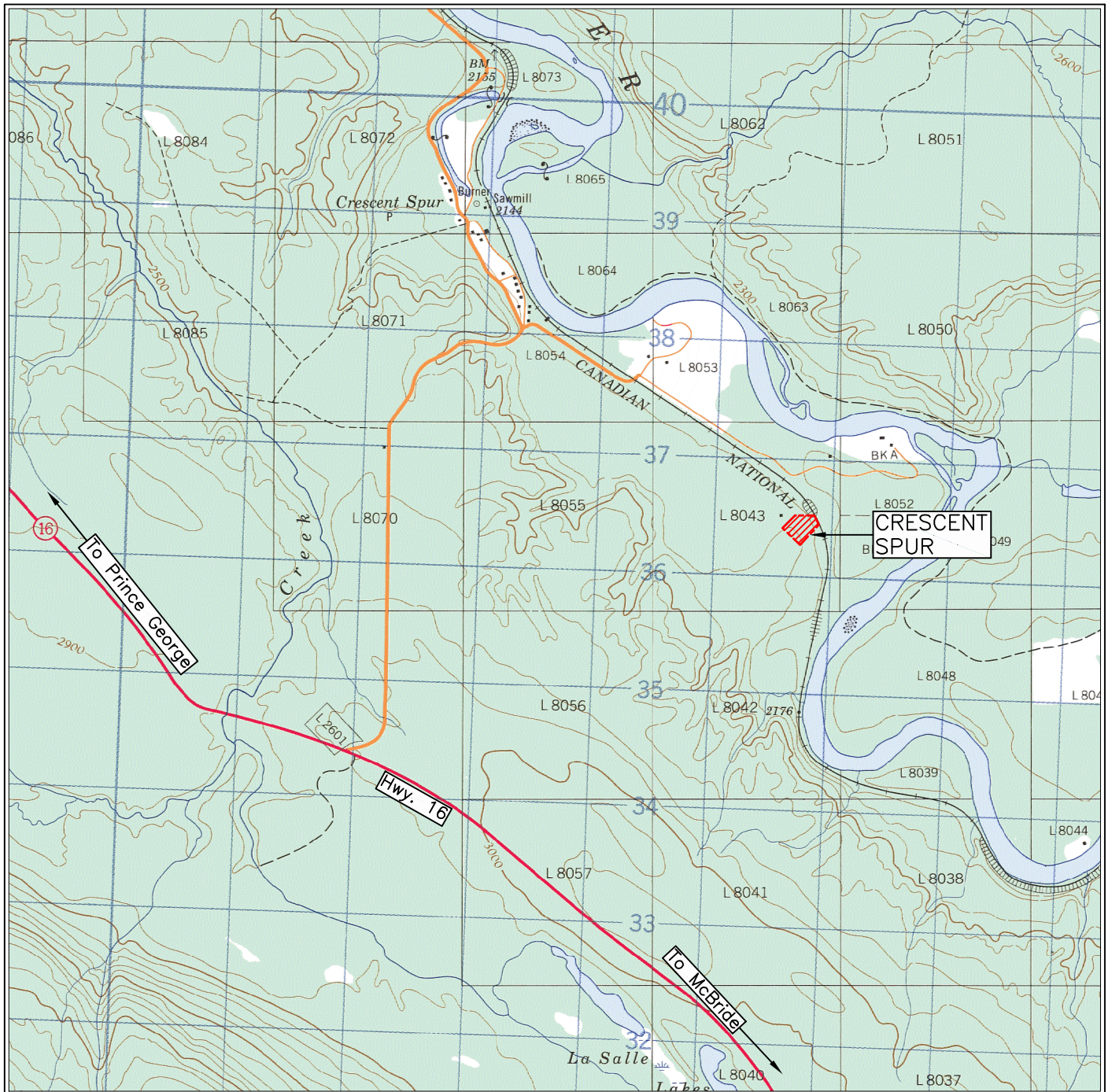
- All development must be carried out in accordance with the Health, Safety, and reclamation Code for Mines in British Columbia, BC Ministry of Energy and Mines, as well as the Standard Specifications for Highway Construction, BC Ministry of Transportation and Infrastructure.
- Development of the pit should continue from the existing pit face towards the south, as shown on the development plan. Area A can be accessed through the existing access road.
- There are two areas marked out in both Figure 2 and Figure 3 that are areas of high archaeological potential according to an Archaeological Overview Assessment (AOA). These areas are not to be entered unless an Archaeological Impact Assessment (AIA) is carried out and finds no archaeological artefacts.
- Groundwater was not encountered in any of the test pits.
- Vegetation consists of mature, but not large, coniferous and deciduous trees. For the most part they are spread out. The pit area has been previously logged so there is a tree line of mature trees that is the pit boundary. Area A will need to be cleared, but the timber may not be merchantable.

- The top soil and overburden must be stripped and stockpiled at the locations shown on the development plan. The top soil and overburden are to be used for pit reclamation activities.

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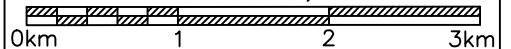
Figure 1: Location Plan



KEY MAP

NTS Map: 93 H/10

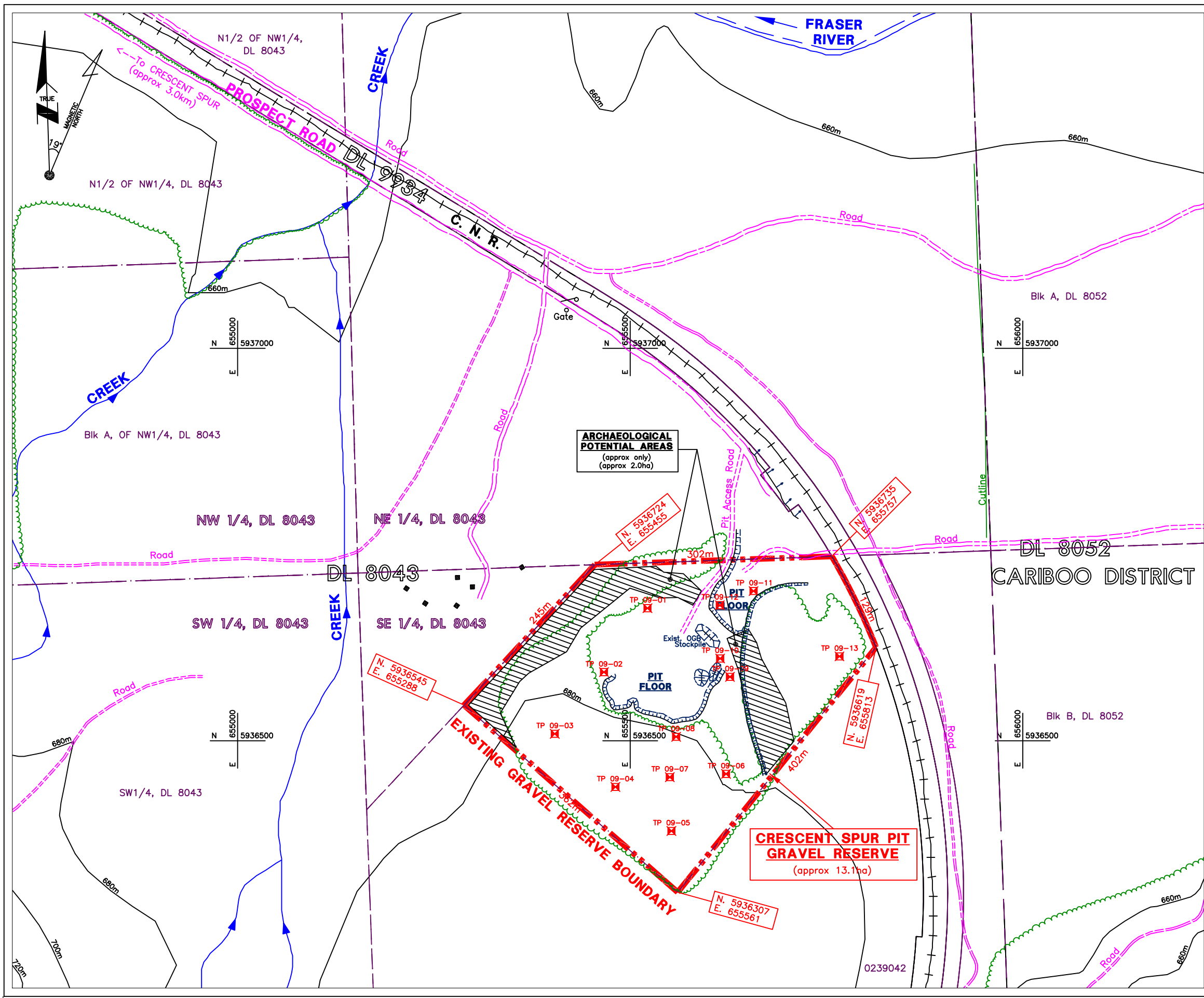
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Figure 1
 LOCATION MAP (2009)
 CRESCENT SPUR
 FORT GEORGE HIGHWAY DISTRICT

Figure 2: Pit Plan



PIT LEGEND			
	NATURAL EMBANKMENT		SWAMP
	PIT FACE		CREEK
	TEST PIT		BUILDING (symbolic)
	TEST HOLE		FENCE
	PAVED ROAD		SIGN POST
	GRAVEL ROAD		UTILITY POLE
	TRAIL		GRAVEL RESERVE BOUNDARY
	TREELINE		Contour Line (100m interval)
	DISTRICT LOT LINE		Contour Line (20m interval)
	MONUMENT		Area of Archaeological Potential (ARCHER)
	IRON PIN		

T.R.I.M. NOTE :

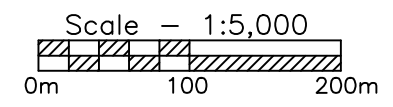
- 1) Contour Interval @ 20 metres
- 2) Base Map derived from T.R.I.M. Digital Map Data:
 - Map No.: 93H.057
 - Flown: TRIM2(~1996)
 - Datum/Zone: UTM NAD83(10)

LEGAL NOTE :

- 1) District Lot lines are derived from digital Crown Cadastral reference mapping supplied by CROWN LAND REGISTRY, Victoria

DRAWING NOTES:

- 1) Updated pit topography derived from MoT Geotech DGPS (crescent_4dec08.cor), surveyed Dec 2008.
- 2) Area of Archaeological Potential derived from Archer (pages from 8257_Cres...AoA report.pdf), dated 18-Dec-08. Areas are approx. location only.



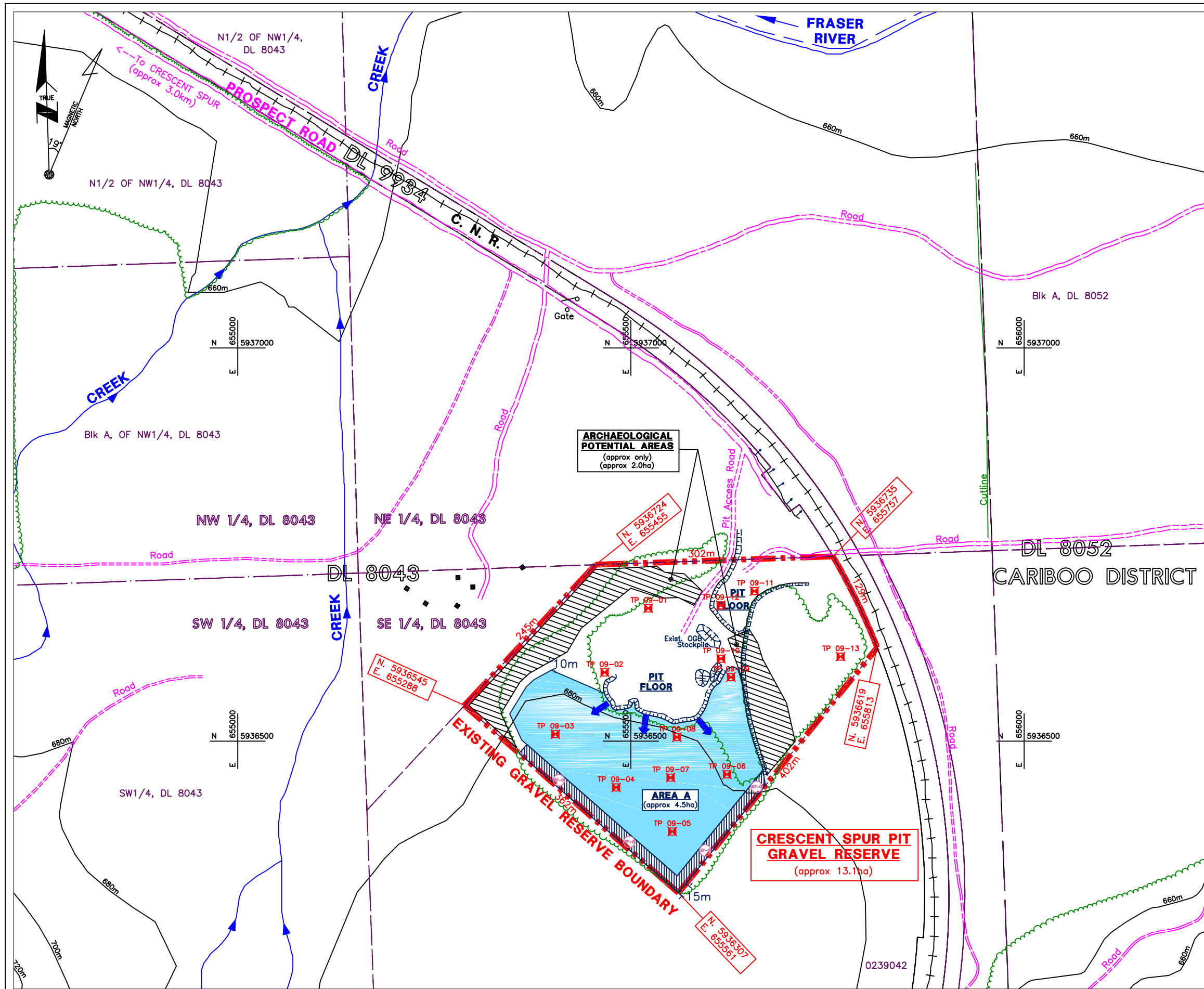
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Figure 2
PIT PLAN (2009)
CRESCENT SPUR PIT
 FORT GEORGE HIGHWAY DISTRICT

Drawn: drb/SP/TW	Date: Jan/09	Scale: As Shown
File No.: 93H/10-011	ACAD File: Fort George\Pits_cresspur 01-09.dwg	

Figure 3: Development Plan



PIT LEGEND			
	NATURAL EMBANKMENT		SWAMP
	PIT FACE		CREEK
	TEST PIT		BUILDING (symbolic)
	TEST HOLE		FENCE
	PAVED ROAD		SIGN POST
	GRAVEL ROAD		UTILITY POLE
	TRAIL		GRAVEL RESERVE BOUNDARY
	TREELINE		800m Contour Line (100m interval)
	DISTRICT LOT LINE		Contour Line (20m interval)
	MONUMENT		Area of Archaeological Potential (ARCHER)
	IRON PIN		Development Area
	Overburden Stockpile		
	Development Direction		

T.R.I.M. NOTE :

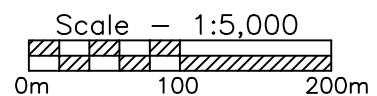
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Figure 2
DEVELOPMENT PLAN (2009)
CRESCENT SPUR PIT
FORT GEORGE HIGHWAY DISTRICT

Drawn: drb/SP/TW	Date: Jan /09	Scale: As Shown
File No.: 93H/10-011	ACAD File:	Fort George\Pits cres dev 02-09

Test Pit Summary

Photos



TP09-02



TP09-03



TP09-04



TP09-05



TP09-06



TP09-07



TP09-08



TP09-09



TP09-13