SITE C CLEAN ENERGY PROJECT

PIT DEVELOPMENT PLAN

DEL RIO PIT

Doc EIS-1A-014

[Final]

Prepared for BC Hydro by

Tetra Tech

November 2012

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Lead Author: Barry Bergstrom <signatures removed>

Contributors: John Bodnarchuk
(by section)

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1.0 INTRODUCTION AND PURPOSE

If the Site C Clean Energy Project (the Project) proceeds, it would require granular embankment and granular road base materials for the construction of the Project Access Road, Jackfish Lake Road and other south bank roads. A source of this material in close proximity to the road is preferred to minimize transportation requirements. A detailed description of the Project components and activities is provided in the Project Description (Section 4.3).

Del Rio Pit, an existing gravel source operated by the BC Ministry of Transportation and Infrastructure (MOTI), has been identified as the preferred source of granular embankment and granular road base for the Project Access Road, Jackfish Lake Road and other south bank roads. The pit is located 50 kilometres nort5h of Chetwynd, BC as shown in Figure 1.1.

The objective of this plan is to: 1) facilitate environmental assessment approvals; 2) support permitting requirements; and 3) plan for guiding the use of the quarry site during construction and operation.

Location of Proposed Site C Dam

Peace River

Maberly River

Septimus Siding Road

Fort St. John

Taylor

Devon PDR 72

400 Road

CNRL PDR 69

Pine River

Project Access Road

Douglas Road

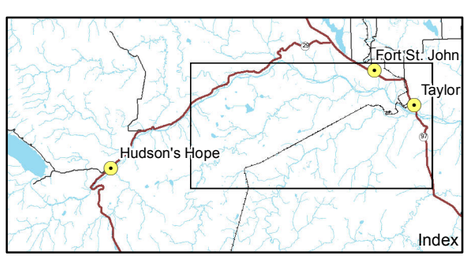
Del Rio Pit Road

Jackfish Lake Road

29

97

N



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Orthophotos created from 1:40,000 photos taken Sept. 10th 2007; TRIM

Legend

- Del Rio Pit Boundary
- New Access Road
- Existing Road
- Highway
- Railway

1:150,000 0 5 km

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Figure 1.1: Key Plan Location of Del Rio Pit

Date	Nov. 29, 2012	DWG NO	1016-C14-B6167-1	R 0

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Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

2.0 BACKGROUND

Del Rio Pit is an existing gravel reserve operated by the MOTI. The License of Occupation on Crown Lands for the gravel reserve spans approximately 142 hectares and is traversed by the BC Hydro Transmission Right of Way as shown in Figure 1.1.

The terrain in this area rises from the east to it's highest point at the Del Rio Pit reserve, at an elevation of approximately 830 metres, then gently slopes west until reaching the Moberly River three kilometres to the west. The lands contained within the reserve and extending southwest and northeast indicate the presence of granular materials of varying quality and composition. Geotechnical field investigation has been completed in Fall 2012 to confirm quantity and quality of materials. Laboratory testing results on material' samples obtained during investigations to verify quality will be available in early 2013.

Del Rio Pit Road enters the reserve from the north, continues southwest within the boundaries of the reserve, crosses the BC Hydro Transmission Line Right of Way, and continues southwest, allowing access to other Crown Land and private parcels to the south. A small area of approximately 2 hectares within the reserve has been utilized for granular materials, while the remaining lands are generally undisturbed. Conifer and deciduous trees and ground vegetation cover most of the remaining reserve.

An agreement in principle has been reached with MOTI that would allow BC Hydro to obtain material from Del Rio Pit. The Project would require approximately 328,000 cubic metres of road fill and borrow which is unprocessed material removed directly from the deposit and 334,000 cubic metres of processed granular aggregates of which approximately 250,000 cubic metres would be required from Del Rio Pit. This volume of granular material could be produced within the existing boundaries of the reserve.

Following completion of the proposed Project work, the pit would remain active under the control of MOTI.

3.0 DEVELOPMENT PLAN BASIS

The development plans for the quarry were based on the following information:

- The area will require logging, clearing and grubbing before any development can commence.
- Approximately 200,000 m^3 of road fill and borrow would be required for Project Access Road construction, upgrades to Jackfish Lake Road and other south bank roads.
- Approximately 50,000 m^3 of processed granular aggregates would be required for the Project from Del Rio Pit.
- The granular embankment materials used for the Project would be hauled from the pit as it is produced.
- The granular aggregates would be produced, stockpiled and hauled when required for the Project.
- A geotechnical field investigation program has been completed in Fall 2012.
- The final pit floor base would be at an approximate elevation of 820 metres, 10 metres below original ground.
- The quarry development design would include a final wall slope of 2H:1V. Temporary slopes and stockpiles to be trimmed to a 1.5H:1V slope.
- Overburden and surplus storage embankments would have a maximum slope of 2H:1V and would be adjacent to the pit face and to the west.
- Overburden depths may range from 0.3 metres to 1.0 metre.

4.0 DEL RIO PIT – OPERATIONS

4.1 PRODUCTION AND SCHEDULING ESTIMATES

In order to produce the amount of granular material that would be necessary for dam construction, areas for storage of overburden would need to be created within the site. Figure 4.1 illustrates the proposed development of Del Rio Pit and the boundaries of the property. As the pit site is developed trees would be cleared. Grubbing and overburden would be removed from areas of extraction and stockpiled for eventual pit site reclamation.

The gravel pit would provide aggregate materials for use in the construction of the Project Access Road and road base upgrades to Jackfish Lake Road and other south bank access roads. It is expected the Project Access Road would commence construction in Year 1 with construction beginning in the fall and continuing through the winter months, with completion in Year 2. Jackfish Lake Road improvements would take place later in the Project schedule, depending on Project requirements.

Pit operations could include activities such as excavating, sorting, crushing, and screening of materials. Heavy equipment and vehicles would be used to transport materials within the pit area and from the pit to road construction locations.

4.2 PIT OPERATIONS DURING CONSTRUCTION

The Pit is an existing source managed by MOTI and would be operated in a consistent manner. The Province's Aggregate Management Principles have been established to ensure that aggregate activities are undertaken in compliance with health and safety standards and environmental protection requirements. The reference documents are:

- Aggregate Operators Best Management Practices Handbook for British Columbia, 2002, Ministry of Energy and Mines (MOEM 2002)
- Health and Safety: A Practical Guide for Aggregate Operations, 2007, Ministry of Energy, Mines and Petroleum Resources, Mining and Minerals Division (MOEM 2007)

Following is a summary of pit operation considerations:

- The main area for excavation would continue southeast from the existing pit face with any stockpiling in the northern half of the site, as shown in Figure 4.1.
- The maximum volumes proposed for extraction would be based on the suitability and quality of the materials as they were processed. The materials unsuitable for use for road embankment construction or gravels would remain within the site.
- The site would contain a trailer office, maintenance and storage area and sediment/erosion control measures.
- Potable water for the office and service area and water for dust control would be brought to the site from an offsite location.

- The material would be delivered to the road construction sections using highway-legal haul trucks.
- Haul trucks or loaders would move material between the areas within the pit, as required.
- The equipment required for operations would be as follows with the number of equipment pieces to be determined at a later stage:
    - Screening and/or crushing plants
    - Loaders (to loosen and remove material and process material at the screening and crushing plants, and stock pile)
    - Bulldozers (to push material for grubbing and stripping of site and stockpiles and loosen in situ materials)
    - Highway legal haul trucks (to transport the material to the road construction sites)
    - Water Trucks (to control dust as required)
    - Grader (for haul road surface maintenance)
    - Personnel Site Pick-ups (for onsite mobility)
    - Service vehicle (mechanic, fuel trucks)

4.3 ACCESS

Access to Del Rio Pit is by Del Rio Pit Road. The road is not currently gated. Access control during pit operations would be achieved by the placement of berms and gated access into the pit extraction area and would be determined prior to development.

Del Rio Pit Road is a public road and would remain open to the public but controlled during extraction operations to allow access to lands beyond. Haul operations on this road would be traffic controlled and haul vehicles would be in radio communication.

4.4 SAFETY AND ENVIRONMENTAL MANAGEMENT DURING OPERATIONS

Management measures to be implemented during pit operation would include:

- Gate access would be installed to control pit operation access.
- Berms would be constructed at the top edges of excavations to control unauthorized access to the pit along the existing Del Rio Pit Road or where access can be achieved along the treed edges.
- Portable toilet facilities would be used within the quarry area and near the project site offices. These facilities would be maintained as required.
- The planning and installation of the lighting system, if required, for the safe operation of the site would follow guidelines in the Aggregate Operators Best Management Practices Handbook (MOEM 2002). Other site management features would include:

- Sediment control, and oil control separation
- Control of noxious weeds through vegetation cover or seeding where required
- Maintenance of road surfaces to reduce vibration
- Control of air emissions and wind generated dust

4.5 SITE RECLAMATION AND FUTURE USE

Del Rio Pit would continue as a gravel pit operationunder the jurisdiction of the MOTI upon completion of the Project. Slopes would be stabilized and drainage features would be established to control drainage. Seeding to control noxious weeds would be done on soil slopes and overburden stockpiles as required.

Gate

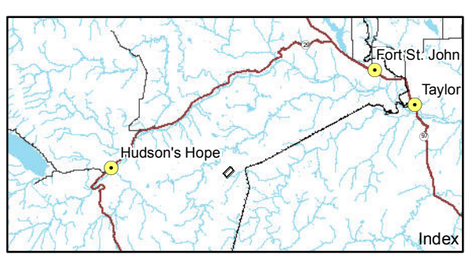
Del Rio Pit Road

Sorting & Stockpile Area

Stockpile

Main Excavation Area

Stockpile



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Orthophotos: TRIM.

Legend

- Del Rio Pit Boundary
- BC MoTI Map Reserve
- Gate
- Sorting and Stockpile Area
- Pit Excavation Area
- Stockpile Locations
- BC Hydro Right-of-Way
- Existing Road

1:6,000 0 250 m

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SITE C CLEAN ENERGY PROJECT

Figure 4.1: Proposed Development Plan of Del Rio Pit

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