

Memorandum

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CC	
From	Bruce Larson
Subject	On-shore Sand Loading Using Dredger
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Introduction

BHP's proposed location for a potash storage building at Fraser Surrey Docks (FSD) will require pre-loading of the building footprint prior to construction. One option for pre-loading of the site is to pump dredged sand from the Fraser River onto shore. Fraser River Pile and Dredge (FRPD) is a local BC contractor who is currently engaged in a multi-year Navigation Channel Dredging Contract for the Vancouver Fraser Port Authority. This contract includes maintenance dredging of the lower 34 km of the deep sea navigation channel of the Fraser River and approaches and berths at FSD. They have allowed Ausenco to observe and document their pre-loading procedures at an industrial site near to FSD. This memo presents photographs and descriptions of how pre-loading might be achieved at FSD using the methods employed by FRPD.

Subsequent to the original issue of this memo, FRPD have provided additional information on construction methodology. This is described below.

Description of General Operations

FRPD's method for pre-loading a construction site with dredge material as follows:

- At the outset, a berm will be constructed around the perimeter of the site (Figure 1), with areas allocated for a drainage pond (Figure 2) and collection pond for pumping drained water back to the river (Figure 3).
- Sand for pre-loading will be sourced from the river, and obtained using a hopper dredge (Figure 4), or if material is available adjacent to the site, a cutter/suction dredge.
- Sourced material will be pumped from the dredge ship through carbon steel or HDPE piping (Figure 5 and Figure 6) to the area to be pre-loaded.
- Dozers will work with the material (approximately 80% water, 20% sand), to build up the pre-load pile in sloped 1 meter to 1.5 meter lifts (Figure 7).
- The material will flow from the source pipe to the drainage pond (Figure 8, Figure 9, and Figure 10).

- Water in the drainage pond will flow to a smaller collection pond where it will be pumped back to the river, with sampling as required to comply with regulatory requirements .
- As material is deposited, the dozer operators will continually build up the berm to allow for consecutive lifts of material.

Production for this process is approximately 10,000 m³ to 20,000 m³ per day depending on distance to source material. According to FRPD, this process is only deemed economically viable for locations within 2 km from shore. The FSD site meets this requirement. Dredging operations within the Fraser River are restricted to July through February.

Figure 1 – Built-up Berm Perimeter



Figure 2 – Drainage Pond



Figure 3 – Collection Pond



Figure 4 – Hopper Dredge



Figure 5 – Piping To/From Deposit Area (at ship)



Figure 6 – Piping To/From Deposit Area (at site location)



Figure 7 – Dozers Working with Material



Figure 8 – Water/Material Flow 1 of 3



Figure 9 – Water/Material Flow 2 of 3



Figure 10 – Water/Material Flow 3 of 3



Proposed FSD Construction Methodology

FRPD conducted a site visit to verify their general methodology, and provide site-specific recommendations for placing preload. Key pre-loading placement preparation steps are as follows:

- A perimeter dyke, perimeter swale, and dewatering reservoir will be constructed from soils excavated from below the proposed product storage building. The dyke will be approximately 2.5 m high, and will retain the toe of the pre-load material. The perimeter swale will be less than 0.5 m deep, be located approximately 25 m from the toe of the pre-load material, and will intercept any seepage that escapes the perimeter dyke. These features are shown in plan and section in Figures 11 and 12.
- An 800 mm diameter dredge line will be installed as shown in Figure 11.
- Dewater pump (diesel, 800 hp) and line will be installed as shown in Figure 12. The discharge line will be placed on the bottom of the river to ensure returned water is discharged in the most turbid layer of the river. Sampling will be at the discharge line, and FRPD historically have not experienced any environmental issues with discharge quality.
- Construction of temporary facilities is estimated to require approximately seven working days.
- Once temporary facilities are in place, dredged sand will be placed hydraulically at a rate of approximately 11,000 to 13,000 m³/day. FRPD's experience is that the river sand drains very quickly, and the dewatering reservoir is sized based on their established historical requirements.
- Placement is estimated to take 30 to 40 working days.
- On completion of placement, temporary facilities are maintained for approximately one week to manage seepage, and removal of temporary facilities will take another seven working days.

Figure 11 – Temporary Pre-load infrastructure, Plan

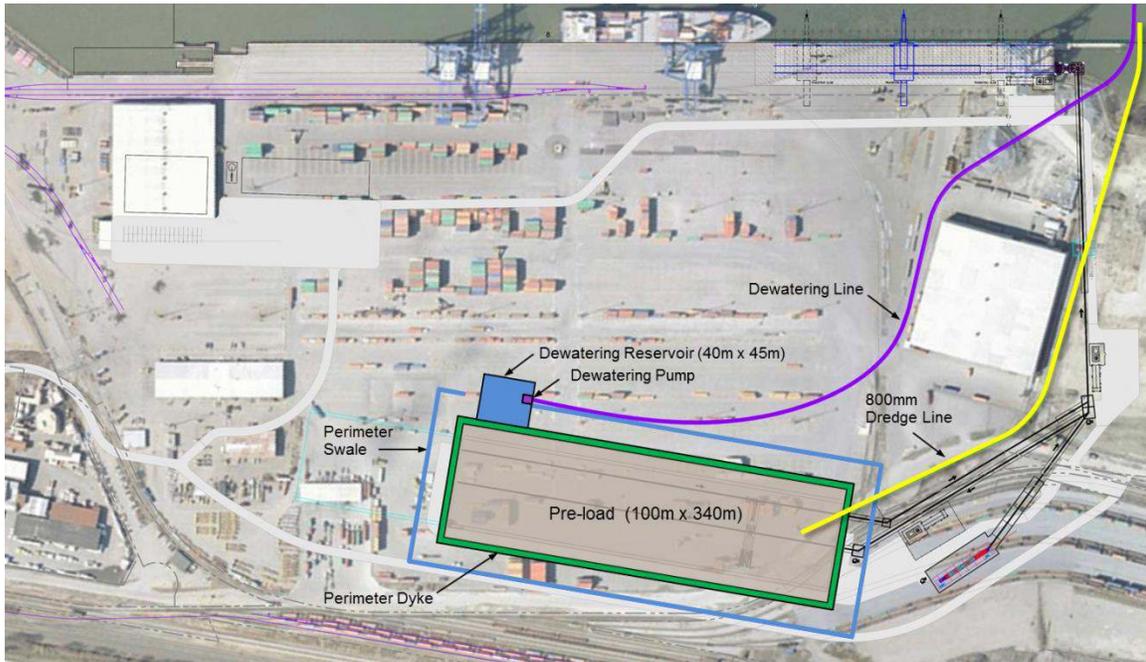


Figure 12 – Temporary Pre-load infrastructure, Section

