SITE C CLEAN ENERGY PROJECT

Component Application Package –
Halfway River Temporary Access Bridges
Revised Design for Crossing 19.7A

Notice of Work
For Canadian Navigable Waters Act

July 8, 2020

Submitted to:
Transport Canada
Navigation Protection Program
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Map of Revised Multi-crossing Bridge Locations at 19.7A

Map of Halfway River Blockage Extent

Attachment B  Design Drawings, Plan and Profile Views of Revised Temporary Access Crossings at 19.7A over Halfway River
1 INTRODUCTION

The Canadian Navigable Waters Act (CNWA) came into force on August 28, 2019. The CNWA includes a Schedule of navigable waters requiring regulatory approval for works that risk a substantial interference with navigation. Works required for construction and operation of the Site C Clean Energy Project (the Project) that occur on, over, under or through navigable waterways, as defined by the CNWA, must be permitted.

The Halfway River is a Peace River tributary near Hudson's Hope, BC and is not named in the CNWA schedule of navigable waters. As such, this application is being submitted as a Notice of Work for the construction of five (5) temporary bridge and causeway crossings over Halfway River. These five crossings replace the design for one bridge crossing at 19.7A that was submitted in a previous Notice of Work (Registry #1493).

2 HALFWAY RIVER TEMPORARY CROSSINGS – RESERVOIR CLEARING

Site C Reservoir clearing in forest areas of the lower Halfway River catchment requires machine access to both banks of the river. The available road networks do not provide access to areas that require clearing ahead of reservoir filling, hence new roads and access routes are proposed. Within this new road network, six (6) mainstem bridge crossings are required, each being accessed using constructed causeway approaches. These mainstem crossings are shown in the overview map in Attachment A.

This Notice of Work application is specifically for the final upstream mainstem crossing which includes a combination of five (5) structures over the Halfway River. This multi-crossing design replaces the one crossing at 19.7A, that was submitted in a previous Notice of Work (Registry #1493) and incorporates the access that was originally planned as a non-obstructive causeway along the northern bank of the river. The previous design at crossing 19.7A was for a causeway and bridge with a causeway length of 105m, and a bridge length of 36.576 m.

A map showing the revised multi-crossing locations at 19.7A is provided in Attachment A. The crossings span portions of the Halfway River that are Crown Land and are within the Occupant Licence to Cut (OLTC 19) area held by BC Hydro. The dimensions and approximate location of each crossing at site 19.7A are provided in Table 1.
Table 1. Location, dimensions and land descriptions for revised Halfway River crossings at 19.7A

<table>
<thead>
<tr>
<th>Halfway River Mainstem Crossing 19.7A Bridge ID</th>
<th>Bridge Length (m)</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Land Description of River Crossing</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>30.480</td>
<td>56.242011</td>
<td>-121.547452</td>
<td>Theoretical Unsurveyed Crown land North 1/2 of Section 34 Township 83 Range 23 West of 6th Meridian Peace River District; and Crown Foreshore, bed of the Halfway River and the Halfway River located within the North 1/2 of Section 34 Township 83 Range 23 West of 6th Meridian Peace River District.</td>
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<tr>
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<td>24.385</td>
<td>56.241527</td>
<td>-121.547467</td>
<td></td>
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<tr>
<td>5</td>
<td>60.960 (2 x 30.480 m bridges)</td>
<td>56.241587</td>
<td>-121.546293</td>
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</table>

The approximate causeways lengths are as follows:

- Northern bank of river to Bridge 1: 11 m
- Bridge 1 to Bridge 2: 47 m
- Bridge 2 to Bridge 3: 42 m
- Bridge 3 to Bridge 4: 290 m
- Bridge 4: No causeway
- Between Bridge 1 and Bridge 5: 52 m

2.1 REVISED DESIGN OF MULTI-CROSSING 19.7A

Two options for this crossing location are provided to address high and low flow river conditions. The general arrangement, dimensions and specifications for each of the five bridges under both conditions, is provided in the drawing package in Attachment B. Each bridge has been designed by an engineering professional. Each crossing would have the capacity to pass the daily average flow estimated for the seasonal (September - April), 1 in 10-year return period (124 m³/s).

Under high flow, non-frozen conditions, the causeways and bridge approaches would be constructed from local river bed materials and supplemented with imported granular material and riprap rock. Five bridge crossings using six spans (two spans combined into a single structure and supported with a lock block pier) are planned for managing higher river flows.

Under low flow and/or frozen conditions, a combination of snow and granular material may be used to develop the access and approaches. Two bridge crossings (Bridges 1 & 5) using three spans (two spans combined into a single structure and supported with a lock block pier) in combination with three sets of 2-800 mm steel culverts (in place of high flow bridges) are planned for low river conditions. Where no flow
exists (western backchannel), under frozen conditions the planned culverts may be reduced in size and number.

A centre pier to support the two-bridge span configuration (Bridge 5), over the widest section of the channel, would be constructed out of concrete lock blocks. During higher flows, a riprap base may be required to provide a platform, outside of the river flow, for the lock blocks. The riprap base will be capped with granular material to ensure the platform is level and can be compacted to provide stability for the structures.

Riprap specifications have been developed using the estimated flows level and associated scour potential. The granular material requirements and riprap specifications for each crossing are summarized in the IFC drawings in Attachment B.

2.2 CONSTRUCTION SEQUENCE AND SCHEDULE

The contractor is expected to begin constructing the Hwy 29 temporary access crossings in early September, starting at the downstream end (Site ID 19.3A) and moving upstream after each crossing is built. Construction of the multi-crossing at 19.7A is planned to begin late November 2020.

Minor changes to location and bridge sizing may be required in order to field fit each crossing to site conditions that exist during construction. These changes may be required due to the dynamic changes in gravel bar and channel locations that occur frequently in this drainage.

Decommission of the crossings will involve bridge deck, abutment and pier removal such that navigation access can be reinstated by May 1, 2021. Causeway materials will remain in place, unless minor openings are required for fish migration. The future Site C reservoir would cover the causeway materials after reservoir filling is completed in 2024, and each causeway would be shown in the future reservoir maps.

3 PUBLIC BOATER ACCESS

Construction of temporary crossings in the Halfway River channel is expected to block boater access to lower portions of the Halfway River between September 1, 2020 and April 30, 2021. A map showing the river blockage extent has been included in Attachment A.

Crossings would be removed in April 2021 and boating access would be reinstated on or before May 1, 2021. The Halfway River boat launch would remain open during this period.

Communication to boaters ahead of river closures would be done in accordance with the Site C Boater Communication Protocol (Site C Construction Safety Management Plan, Section 5.3.4.2). Signs that are visible to boaters would be placed upstream of the crossing location to alert them to the upcoming blockage and potential hazard. Downstream of the crossing, the river would be signed to alert approaching boaters.
Attachment A – Maps

Overview Map of Halfway River Temporary Access Crossings
Map of Revised Multi-crossing Bridge Locations at 19.7A
Map of Halfway River Blockage Extent
Attachment B

Design Drawings, Plan and Profile Views of Revised Temporary Access Crossings at 19.7A over Halfway River
HALFWAY RIVER
OLTC 19 - 7A

PROPOSED SET OF PLANS FOR
LOW-FLOW OPTION

PROPOSED#2 SET OF PLANS FOR
ULTRA LOW-FLOW OPTION
(ALMOST NO FLOW PRESENT IN
CULVERT CHANNELS AT TIME OF
CONSTRUCTION)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>SHEET NUMBER</th>
<th>DESCRIPTION</th>
<th>SHEET NUMBER</th>
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<tr>
<td>EXISTING SITE PHOTOS</td>
<td>01</td>
<td>B1 C1 B2 B5 PROPOSED#2 PLAN VIEW</td>
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<td>C5/C6 PROPOSED#2 PLAN VIEW</td>
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<td>C2 PROPOSED#2 PLAN VIEW</td>
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<td>C7/C8 PROPOSED#2 PLAN VIEW</td>
<td>19</td>
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<td>B1 B5 PROPOSED#2 PROFILES AND SECTIONS</td>
<td>20</td>
</tr>
<tr>
<td>B1 B5 EXISTING PROFILES AND SECTIONS</td>
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<td>C3/C4 C5/C6 PROPOSED#2 PROFILES AND SECTIONS</td>
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<td>C2 C7/C8 PROPOSED#2 PROFILES AND SECTIONS</td>
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<td>C2 B4 EXISTING PROFILES AND SECTIONS</td>
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<td>PROPOSED CUT AND FILL PLAN + DETAILS</td>
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<td>PROPOSED#2 CUT AND FILL PLAN + DETAILS</td>
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<td>LOCKBLOCK/PULLOUT DETAILS</td>
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