[redacted]

26 July 2016

[redacted]
Water Management Officer
Ministry of Forests, Lands and Natural Resource Operations
PO Box 9340 Stn. Prov Govt
Victoria, BC, V8W 9M1

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Leave to Construct LTC #3A – Right Bank Stage 1 Cofferdam

1.0 INTRODUCTION

As Independent Engineer (IE) for the Site C Clean Energy Project (Site C), I have received a submission from BC Hydro requesting permission to start construction of the right bank Stage 1 cofferdam, which is one of the works authorized under LCC #3. The proposed works would be constructed by BC Hydro's contractor for the Site C Main Civil Works, [redacted] in conjunction with their subcontractor, [redacted] For reference, these works are to be authorized under *Leave to Construct LTC #3A*.

2.0 DESCRIPTION OF THE WORKS

Many components of the Site C project works authorized under CWLs 132990 and 132991 will be constructed in dewatered work areas behind cofferdams, which will be constructed in two stages. In Stage 1, cofferdams will be constructed on the left and right bank of the dam site to confine the Peace River to its main channel. In Stage 2, upstream and downstream cofferdams will be constructed across the river channel and the river will be diverted through two tunnels to be constructed in the left abutment.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

3.0 LTC #3A SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #3A:

1. BC Hydro - *Site C Clean Energy Project Request for Leave to Construct – Stage 1 Right Bank Cofferdam (LTC 3A)*, letter from [redacted] to [redacted] 17 July 2016.

[redacted]

[redacted]

The above documents were reviewed by the IE and the IEM as applicable to the roles of each party. [redacted]

4.0 REVIEW OF SUBMISSIONS

4.1 Construction Drawings

The construction drawings show the information that would typically be expected for works of this nature, including plans, sections and details of the right bank Stage 1 cofferdam and the instrumentation that is to be installed. Some of the drawings were included in the design report that was previously submitted with the request for LCC #3.

The drawings provided have been sealed by Professional Engineers registered in British Columbia and are Issued for Construction status. It is the IE's opinion that the drawings are consistent with the Site C project general arrangement drawings, the design basis and the conditions of Conditional Water Licences 132990 and 132991.

4.2 Construction Implementation Plan and Schedule

[redacted]

[redacted]

[redacted]

4.3 Quality Management

Details of [redacted] were previously submitted and reviewed with the request for LCC #1. As part of that program, [redacted] has developed standard Inspection and Test Plans (ITPs) for specific types of work. The ITPs submitted for construction of the right bank Stage 1 cofferdam are comprehensive and consistent with the Main Civil Works Construction Quality Plan, and cover the types of work included in the cofferdam construction.

4.4 Management & Care of Water and Environmental Protection

[redacted]

[redacted]

[redacted]

[redacted]

The IE has discussed the work with the IEM and both parties are familiar with the area where the right bank Stage 1 cofferdam is to be constructed.

The IEM has provided the IE with comments and recommendations on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] *– Site C Clean Energy Project – Conditional Water Licence 132990 IEM review of the Right Bank Cofferdam EPP and relevant component plans in consideration of LTC#3A,* letter to [redacted] dated 25 July 2016.

As summarized in the above letter, the IEM has noted several details that have not yet been fully addressed by the EPP.

4.5 Dam Safety

The FLNRO Dam Safety Officer has reviewed the submissions for the right bank Stage 1 cofferdam and has discussed the proposed construction works with the IE, as documented in the following:

1. [redacted] Senior Dam Safety Officer - *Site C Clean Energy Project, Conditional Water Licences 132990 and 132991 on Peace River, Request for Leave to Construct – Stage 1 Right Bank Cofferdam (LTC 3A)*, letter to [redacted] dated 25 July 2016.

The Dam Safety Officer accepts the submitted information and agrees with the work proceeding as long as the cut-off wall is constructed with a similar approach to that described in [redacted]

The IE notes that the draft Operations Maintenance and Surveillance Plan and Emergency Response and Preparedness Plan for the cofferdam were previously reviewed as part of the submission for LCC #3. These documents will need to be finalized before the right bank Stage 1 cofferdam is placed into service as a water-retaining structure.

4.6 Safety

[redacted]

5.0 LEAVE TO CONSTRUCT

By copy of this letter, the Independent Engineer hereby confirms that BC Hydro can proceed with construction of the Right Bank Stage 1 Cofferdam. For reference, this permission is referred to as *Leave to Construct LTC #3A*.

Leave to Construct for the Right Bank Stage 1 Cofferdam is subject to the following conditions:

1. BC Hydro and/or its contractor [redacted] must comply with the terms listed in the *IEM Requirements* section of the attached IEM letter dated 25 July 2016;
2. BC Hydro must submit a copy of the subcontractor's activity plan for the slurry cut-off wall construction to the IE and IEM when it is received from [redacted] with adequate time for review.
3. BC Hydro and/or its contractors must obtain and comply with any necessary permits from other provincial and/or federal regulatory agencies.

Yours truly,

[redacted]

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
[redacted]
July 26 2016

[redacted]
Independent Engineer, Site C Clean Energy Project

Attachment: IEM letter dated 25 July 2016

c: [redacted]

TABLE 1

LTC #3A – RIGHT BANK STAGE 1 COFFERDAM
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

July 25, 2016

[redacted] Project No: 14P0693

[redacted]
13541 – 15A Avenue
Surrey, BC V4A 9A1

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water Licence 132990 IEM review of the Right Bank Cofferdam EPP and relevant component plans in consideration of LTC#3A

Leave to Commence Construction (LCC#3) was issued by the Engineer as identified in the Conditional Water Licence 132990[1] for the construction of four key components consisting of the following:

- Right bank Stage 1 cofferdam and cut-off wall;
- Overburden excavations for the approach channel and structures to be constructed inside the right bank Stage 1 cofferdam;
- Bedrock excavations inside the right bank Stage 1 cofferdam and structures to be constructed inside the right bank Stage 1 cofferdam; and,
- Left bank Stage 1 diversion inlet and outlet cofferdams and cut-off walls.

Each of these components requires individual Leaves to Construct (LTCs). While it is the role of the Independent Engineer (IE) to issue the LTCs, the Independent Environmental Monitor's (IEM's) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction. This letter has been prepared specifically for the works associated with construction of the Right Bank Stage 1 Cofferdam, identified as LTC#3A.

As the issuance of each LTC requires the IEM's review and recommendation for acceptance to the IE, it is the IEM's understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

[1] Conditional Water Licence 132990. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

The IEM has reviewed the EPP provided by [redacted] and relevant component plans. The review included cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The following is a summary of plans, permits, authorizations and drawings received and reviewed by the IEM, which are related to LTC#3A.

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

BC Hydro Plans/Documents

- *CEMP* (Revision 3), dated July 8, 2016.
- *Construction Safety Management Plan* (CSMP), dated June 5, 2015.

Provincial Permits/Approvals

- Conditional Water Licence 132990.
- Conditional Water Licences 132990 and 132991 on Peace River Leave to Commence Construction No. 3, dated July 20, 2016.
- Approval A703710 – Short Term Use issued under the *Water Act*.
- Licence No.: 815646 issued under the *Land Act*.

Review Summary

Safety plans were not reviewed in detail; the review was only to confirm that the plans were provided as required.

It is our understanding that works under this LTC are to include the following:

- Backfilling of the south bank side channel;
- Exploratory geotechnical drilling along the cofferdam alignment;
- Pre-construction grouting of bedrock fractures at the western end of the cofferdam alignment;
- Construction of an earthen cofferdam (Stage 1) adjacent to the right bank of the Peace River;

- Keying in and placement of a rip rap protected section toward the upstream end of the cofferdam.
- Construction of a slurry trench cut off wall; and,
- Dewatering of the final enclosed area within the completed cofferdam.

The contractor has proposed the use of the Severity of Ill-Effects (SEV) approach for monitoring turbidity in the Peace River during instream work elements. This procedure was described in the DFO Application of Authorization, prepared by BC Hydro (February 23, 2015) and formed the basis of previously authorized works under *Fisheries Act* Approval 2015-HPAC-00170 and *Water Act* Approval A703715. The instream work element of the cofferdam is not a component of either of these approvals; however, is regulated under Conditional Water Licence 132990. It is expected that the SEV approach would be implemented as described in the DFO Application for Authorization.

IEM Requirements

Upon review of the submitted documents for LTC#3A, and based on communications and information provided by BC Hydro and the contractor, the IEM conducted a preliminary review of the draft EPP with BC Hydro and PRHP. A number of items requiring revision within the EPP and/or COW plans were identified. The majority of these comments have been addressed in the EPP (Revision 3) provided to the IEM on July 22, 2016. The IEM requires the following as conditions of this LTC:

- Confirmation must be provided in writing to the IEM in advance of any instream works that a DFO self-assessment has been conducted for the activities described within the scope of this LTC and a *Fisheries Act* Authorization or Navigation Protection Program approval is not required. The EPP should be revised to accurately describe the permitting process and requirements.
- The IEM accepts the use of the SEV approach to turbidity monitoring for this specific work element, based on the information provided, scope of work, and perceived level of risk. In advance of any instream works, the IEM must be provided confirmation that SEV model monitoring for in situ data collection is in place and operational.
- Confirmation must be provided in writing to the IEM in advance of any instream works that all fish and amphibian salvages have been completed.
- The slurry cutoff wall construction work plan must be provided to the IEM for review prior to commencement of those works with adequate time (i.e., at least five days) for review.
    - The work plan must include a summary of worker qualifications.
- The IEM must be provided with a revised EPP prior to any drilling works and/or works within the riparian area. The revisions must include the following:
    - Include ESA maps in the appropriate appendix and ensure all appendices are attached.
    - Revise the EPP to state that LCC #3 has now been issued (section 4.4).
    - Include specific sampling locations, distance intervals and additional details on sampling methods for water quality monitoring immediately upstream and downstream of the

cofferdam work site and for and at the two or more sites adjacent to the work area, identified in figure 7 (section 7.2.2).

- Include the IEM contact information table 3 in the section on environmental incidents and stop work procedures (section 9).
- As per the EMP, appendix G, section 6, provide more details on refueling procedures for any equipment within 30 m of the Peace River high water mark (section 6.4).
- Provide more details on the construction and management of the temporary slurry sedimentation pond (section 6.6.1), including discharge location. Note: These temporary ponds are not described in the Care of Water Plan.
- Provide more details on the hydroacoustic monitoring during sheet pile works, such as location(s), methods, and frequency of monitoring (section 6.8).
- Discharge of water from the main RSEM area R5b pond will be to the Peace River, not the Moberly River (section 6.11).

Additionally, contact water management must comply with the CEMP Appendix E, currently under revision. Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, appropriate regulations, and the CEMP.

Based on our understanding of the works proposed, and provided the preceding items are acceptable to the Independent Engineer, we have no objections to issuing LTC#3A for the works associated with the right bank cofferdam, as described.

Yours truly,

[redacted]

[redacted]

[redacted]

Independent Environmental Monitor - Delegate

cc. [redacted]

[redacted]

28 July 2016

[redacted], P.Geo.
Water Management Officer
Ministry of Forests, Lands and Natural Resource Operations
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Leave to Construct LTC #3B – Right Bank Overburden Excavations

1.0 INTRODUCTION

As Independent Engineer (IE) for the Site C Clean Energy Project (Site C), I have received a submission from BC Hydro requesting permission to commence excavation of overburden in the approach channel and the area inside the right bank Stage 1 cofferdam. These excavations are one of the works authorized under LCC #3, dated 20 July 2016. The proposed excavations would be performed by [redacted] BC Hydro's contractor for the Site C Main Civil Works. For reference, these works are to be authorized under *Leave to Construct LTC #3B*.

Overburden excavations authorized by LTC #3B include the installation of any necessary soil support measures required to provide worker safety and/or stability of excavated slopes.

Bedrock excavations in the approach channel and the area inside the right bank Stage 1 cofferdam will be authorized by a future LTC under LCC #3.

All approach channel linings and all RCC and concrete linings for project components to be constructed inside the right bank Stage 1 cofferdam will be authorized by a future LCC(s).

2.0 DESCRIPTION OF THE WORKS

Note that in the Main Civil Works contract and the submissions for LTC #3B, excavations in overburden and bedrock are referred to as Class 1 excavation and Class 2 excavation, respectively.

The right bank Stage 1 cofferdam authorized under LTC #3A will enclose the area where the roller-compacted concrete (RCC) buttress, the spillway, most of the tailrace and the right side of the earthfill dam are to be constructed. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

3.0 LTC #3B SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #3B:

1. BC Hydro - *Site C Clean Energy Project Request for Leave to Construct – Overburden excavations for the Approach Channel and Structures to be Constructed inside the Right Bank Stage 1 Cofferdam (LTC3B)*, letter from [redacted] to [redacted] 22 July 2016.
2. BC Hydro – *Issued for Construction Drawings*- see Table 1.
3. [redacted]
4. [redacted]
5. [redacted]
6. [redacted]
7. [redacted]

Item 1 above notes that these documents are a first submission which focuses on the overburden excavation for the approach channel. A second submission focusing on the overburden excavation for the area inside the right bank Stage 1 cofferdam will be provided prior to the Fall of 2016. The IE considers this submission schedule to be acceptable, considering the time that will be required to construct that cofferdam. The information provided in the first submission, together with the previous submission for LCC #3 provides sufficient details to understand the overall scope of right bank excavation works.

The IE notes that, in addition to overburden excavations, some of the submitted documents include information related to bedrock excavations and approach channel linings. This information is useful for

understanding how the overburden excavations relate to subsequent project activities and components, but the IE has not reviewed those aspects in detail at this time.

4.0 REVIEW OF SUBMISSIONS

4.1 Construction Drawings

The construction drawings show the information that would typically be expected for works of this nature, including plans, sections and details of the approach channel excavation. Most of the drawings include details of excavations in both overburden and bedrock, as well as details of the channel liners that will be installed at a later date.

The drawings provided have been sealed by a Professional Engineer registered in British Columbia and are Issued for Construction status. It is the IE's opinion that the drawings are consistent with the Site C project general arrangement drawings, the design basis and the conditions of Conditional Water Licences 132990 and 132991.

4.2 Construction Implementation Plan and Schedule

[redacted]

4.3 Quality Management

Details of [redacted] were previously submitted and reviewed with the request for LCC #1. As part of that program, [redacted] has developed standard Inspection and Test Plans (ITPs) for specific types of work, which can be incorporated into the overall ITP for a larger work component. Other ITPs for unique work activities are developed as required.

[redacted]

4.4 Management & Care of Water and Environmental Protection

[redacted]

The IE has discussed the work with the IEM and both parties are familiar with the area where the right bank overburden excavations will occur. The IEM has provided the IE with comments and recommendations on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] *Site C Clean Energy Project – Conditional Water Licence 132990 IEM review of the Approach Channel Excavation (Phase 1 Overburden) EPP and relevant component plans in consideration of LTC#3B,* letter to [redacted] dated 28 July 2016.

As summarized in the above letter, the IEM has noted that the submitted EPP only applies to approach channel Phase 1 overburden excavation and will require revision or separate addenda for Phase 2 and for overburden excavation inside the right bank Stage 1 cofferdam.

4.5 Dam Safety

There are no dam safety requirements for the overburden excavation for the approach channel.

The draft Operations Maintenance and Surveillance Plan and Emergency Response and Preparedness Plan for the right bank Stage 1 cofferdam were previously reviewed as part of the submission for LCC #3. These documents will need to be finalized and the appropriate procedures implemented before overburden excavation inside the cofferdam commences.

4.6 Safety

[redacted]

5.0 LEAVE TO CONSTRUCT

By copy of this letter, the Independent Engineer hereby confirms that BC Hydro can proceed with Right Bank Overburden Excavations for the approach channel and area inside the right bank Stage 1 cofferdam. For reference, this permission is referred to as *Leave to Construct LTC #3B*.

Leave to Construct for the Right Bank Overburden Excavations is subject to the following conditions:

1. BC Hydro and/or its contractor [redacted] must comply with the terms listed in the *IEM Requirements* section of the attached IEM letter dated 28 July 2016;
2. Prior to initiating Phases 2.1 and 2.2 overburden excavations in the approach channel or overburden excavations inside the right bank Stage 1 cofferdam, BC Hydro must submit to the IE and IEM an updated EPP and an updated Care of Water Plan, or separate addenda, as applicable to those works.
3. Prior to initiating overburden excavations inside the right bank Stage 1 cofferdam, BC Hydro must confirm to the IE that the draft Operations Maintenance and Surveillance Plan and Emergency Response and Preparedness Plan have been finalized and the appropriate procedures

implemented, and must provide copies of those documents to the IE and the FLNRO Dam Safety Officer.

4. BC Hydro and/or its contractors must obtain and comply with any necessary permits from provincial and/or federal regulatory agencies.

Yours truly,

[redacted] P.Eng.
Independent Engineer, Site C Clean Energy Project

[redacted] 2016

Attachment: IEM letter dated 28 July 2016

c:
- [redacted] BCH VP & Project Director (Site C Licensee Representative)
- [redacted] SNC Lavalin (Site C Design Engineer)
- [redacted] BCH (Site C Construction Engineer)
- [redacted] BCH (Environment, Aboriginal Relations and Public Affairs Director)
- [redacted] BCH (Acting Regulatory Manager)
- [redacted] Independent Environmental Monitor

TABLE 1

LTC #3B – RIGHT BANK OVERBURDEN EXCAVATIONS
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

* - Not sealed by P.Eng.; not specifically related to overburden excavation, and included only as reference drawings showing related future works.

[redacted]

July 28, 2016

[redacted]

[redacted]

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water Licence 132990 IEM review of the Approach Channel Excavation (Phase 1 Overburden) EPP and relevant component plans in consideration of LTC#3B

Leave to Commence Construction (LCC#3) was issued by the Engineer as identified in the Conditional Water Licence 132990[1] for the construction of four key components consisting of the following:

- Right bank Stage 1 cofferdam and cut-off wall;
- Overburden excavations for the approach channel and structures inside the right bank Stage 1 cofferdam;
- Bedrock excavations for the approach channel and structures to be constructed inside the right bank Stage 1 cofferdam; and
- Left bank Stage 1 diversion inlet and outlet cofferdams and cut-off walls.

Each of these components requires individual Leaves to Construct (LTCs). While it is the role of the Independent Engineer (IE) to issue the LTCs, the Independent Environmental Monitor's (IEM's) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction. This letter has been prepared specifically for the works associated with excavation of overburden materials within the Approach Channel and within the right bank Stage 1 cofferdam, herein referred to as LTC#3B.

As the issuance of each LTC requires the IEM's review and recommendation for acceptance to the IE, it is the IEM's understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

[1] Conditional Water Licence 132990. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

The IEM has reviewed the EPP for the approach channel excavation (Phase 1), provided by [redacted] and relevant component plans. The review included cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM, which are related to LTC#3B.

[redacted]

- [redacted]

BC Hydro Plans/Documents

- *CEMP* (Revision 3), dated July 8, 2016.
- Construction Safety Management Plan (CSMP), dated June 5, 2015.
- Approach Channel Class 1 Excavations Permits Table, dated July 22, 2016.

Provincial Permits/Approvals

- Conditional Water Licence 132990.
- Conditional Water Licences 132990 and 132991 on Peace River Leave to Commence Construction No. 3. Letter from [redacted] to [redacted] dated July 20, 2016.
- Approval A703710 – Short Term Use issued under the *Water Act*.
- Licence No.: 815646 issued under the *Land Act*.

Review Summary

Safety plans were not reviewed in detail; the review was only to confirm that the plans were provided as required.

It is our understanding that works under this LTC are to include the following:

- Overburden excavations for the approach channel and structures to be constructed inside the right bank Stage 1 cofferdam.

Additionally, the IEM understands that Metal Mining Effluent Regulations (MMER) parameters and program described in the COW plan are no longer applicable. The IEM accepts the water quality approach described in sections 6.10 and 7 of the Approach Channel Excavation (Phase 1 Overburden) EPP, dated July 23, 2016 as the COW plan (Revision 0), dated July 13, 2016, is not current with respect to water quality management.

Furthermore, the scope of work identified in the EPP is only for Phase 1 excavation and does not include any excavations within the Phase 2 area of the approach channel or the behind the Right Bank Stage 1 Cofferdam.

IEM Requirements

Upon review of the submitted documents for LTC#3B, and based on communications and information provided by BC Hydro and the contractor, the IEM identified a number of items requiring clarification within the EPP and/or COW plans. The majority of these comments have been addressed in the EPP (Revision 1) provided to the IEM on July 24, 2016.

The IEM requires the following:

- Separate addenda to the Phase 1 excavation EPP and Care of Water Plan must be provided to the IEM for review and acceptance prior to starting overburden excavation and related works within Phase 2 of the approach channel.
- An EPP (or addendum) and Care of Water Plan be provided for review and acceptance by the IEM prior to starting overburden excavation and related works within the right bank Stage 1 cofferdam.
- BC Hydro and the contractor must confirm to the IEM that the MMER parameters and program referenced in the COW plan will not be used. Additionally, contact water management must comply with the CEMP revised Appendix E, currently under revision.

Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, appropriate regulations, and the CEMP.

Based on our understanding of the works proposed, and provided the preceding items are acceptable to the Independent Engineer, we have no objections to issuing LTC#3B for the works associated with approach channel overburden excavation as described.

Yours truly,

[redacted]

[redacted] A.Ag., CPESC
Independent Environmental Monitor - Delegate

cc. [redacted] Water Management Branch, Engineer
[redacted] BC Hydro, Manager, Project Environmental Risk Management
[redacted] BC Hydro Regulatory Manager (Acting)

[redacted]

26 September 2016

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
PO Box 9340 Stn. Prov Govt
Victoria, BC, V8W 9M1

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Leave to Construct LTC #3C – Stage 1 Diversion Inlet Cofferdam

1.0 INTRODUCTION

As Independent Engineer (IE) for the Site C Clean Energy Project (Site C), I have received a submission from BC Hydro requesting permission to start construction of the Stage 1 diversion inlet cofferdam, which is one of the works authorized under LCC #3. The proposed works would be constructed by BC Hydro's contractor for the Site C Main Civil Works, [redacted] in conjunction with their subcontractor, [redacted]. For reference, these works are to be authorized under *Leave to Construct LTC #3C.*

2.0 DESCRIPTION OF THE WORKS

Many components of the Site C project works authorized under CWLs 132990 and 132991 will be constructed in dewatered work areas behind cofferdams, which will be constructed in two stages. In Stage 1, cofferdams will be constructed on the left and right bank of the dam site to confine the Peace River to its main channel. In Stage 2, upstream and downstream cofferdams will be constructed across the river channel and the river will be diverted through two tunnels to be constructed in the left abutment.

The Stage 1 diversion inlet cofferdam, the subject of this LTC, will enclose the north bank area where the inlet portal works and upstream headings of the diversion tunnels are to be constructed in the dry. The inlet portal will comprise a large excavation through alluvium and colluvium and into bedrock, extending from below river level up to the toe of the overlying left bank excavation. Once the inlet portal is established, excavation of the two diversion tunnels will commence, entirely in bedrock.

A similar Stage 1 cofferdam is to be constructed at the diversion tunnel outlet, and will be authorized under another future LTC. Later, the Stage 1 left bank cofferdam will be constructed parallel to the river, connecting to the Stage 1 diversion inlet and outlet cofferdams to enclose the area where the left side and abutment of the earthfill dam will be constructed. The Stage 1 left bank cofferdam will be authorized under a future LCC.

[redacted]

[redacted]

[redacted]

3.0 LTC #3C SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #3C:

1. BC Hydro - *Site C Clean Energy Project Request for Leave to Construct – Diversion Inlet Cofferdam (LTC 3C)*, letter from [redacted] 01 September 2016.

[redacted]

[redacted]

The IE has also received the following document as part of LTC#3A submissions for the Stage 1 Right Bank Cofferdam, which is also relevant to this LTC:

[redacted]

The following Dam Safety documents previously received with the request for LCC3 also apply to the diversion inlet cofferdam:

[redacted]

4.0 REVIEW OF SUBMISSIONS

4.1 Construction Drawings

The construction drawings show the information that would typically be expected for works of this nature, including plans, sections and details of the Stage 1 diversion inlet cofferdam and the instrumentation that is to be installed. Some of the drawings were included in the design report that was previously submitted with the request for LCC #3.

The drawings provided have been sealed by a Professional Engineer registered in British Columbia and are Issued for Construction status. It is the IE's opinion that the drawings are consistent with the Site C project general arrangement drawings, the design basis and the conditions of Conditional Water Licences 132990 and 132991.

4.2 Construction Implementation Plan and Schedule

[redacted]

[redacted]

4.3 Quality Management

[redacted]

4.4 Management & Care of Water and Environmental Protection

[redacted]

The IE has discussed the work with the IEM and both parties are familiar with the area where the Stage 1 diversion inlet cofferdam is to be constructed.

The IEM has provided the IE with comments and recommendations on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] – *Site C Clean Energy Project – Conditional Water Licence 132990 IEM review of the Diversion Inlet Cofferdam EPP and relevant component plans in consideration of LTC#3C,* letter to [redacted] dated 25 September 2016.

As summarized in the above letter, the IEM requires confirmations related to fish and amphibian salvages and water quality monitoring in advance of any instream works.

4.5 Dam Safety

The FLNRO Dam Safety Officer has reviewed the submissions for the Stage 1 diversion inlet cofferdam and has discussed the proposed construction works with the IE, as documented in the following:

1. [redacted] Senior Dam Safety Officer - *Site C Clean Energy Project, Conditional Water Licences 132990 and 132991 on Peace River, Request for Leave to Construct – Diversion Inlet Cofferdam (LTC 3C)*, letter to [redacted] dated 13 September 2016.

The Dam Safety Officer accepts the submitted information.

The IE notes that the draft Operations Maintenance and Surveillance Plan and Emergency Response and Preparedness Plan for the cofferdam were previously reviewed as part of the submission for LCC #3. These documents will need to be finalized before the Stage 1 diversion inlet cofferdam is placed into service as a water-retaining structure.

4.6 Public Safety

The IE has not reviewed [redacted] in detail except to note that the plan is aligned with [redacted] and references many of the *HSMP* appendices that apply to [redacted] entire scope of work. [redacted]

5.0 LEAVE TO CONSTRUCT

By copy of this letter, the Independent Engineer hereby confirms that BC Hydro can proceed with construction of the Stage 1 Diversion Inlet Cofferdam. For reference, this permission is referred to as *Leave to Construct LTC #3C.*

Leave to Construct for the Stage 1 Diversion Inlet Cofferdam is subject to the following conditions:

1. Prior to commencing any instream works for this cofferdam, BC Hydro and/or its contractor [redacted] must provide the IEM with confirmations related to fish and amphibian salvages and water quality monitoring as described in the *IEM Requirements* section of the attached IEM letter dated 25 September 2016;
2. Prior to initiating overburden excavations inside the Stage 1 diversion inlet cofferdam, BC Hydro must confirm to the IE that the Operations Maintenance and Surveillance Plan and Emergency Response and Preparedness Plan for Stage 1 cofferdams have been finalized and the appropriate procedures implemented, and must provide copies of those documents to the IE and the FLNRO Dam Safety Officer.
3. BC Hydro and/or its contractors must obtain and comply with any necessary permits from other provincial and/or federal regulatory agencies.

Yours truly,

[redacted]

PROFESSIONAL ENGINEER
PROVINCE OF [redacted] BRITISH COLUMBIA
26 Sept 2016

[redacted]
Independent Engineer, Site C Clean Energy Project

Attachment: IEM letter dated 25 September 2016

c: [redacted]

TABLE 1

LTC #3C – DIVERSION INLET COFFERDAM
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]		

[redacted]

[redacted]

September 25, 2016

[redacted]

[redacted]

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water Licence 132990 IEM review of the Diversion Inlet Cofferdam EPP and relevant component plans in consideration of LTC#3C

Leave to Commence Construction (LCC#3) was issued by the Engineer as identified in the Conditional Water Licence 132990[1] for the construction of four key components consisting of the following:

- Right bank Stage 1 cofferdam and cut-off wall;
- Overburden excavations for the approach channel and structures inside the right bank Stage 1 cofferdam;
- Bedrock excavations for the approach channel and structures to be constructed inside the right bank Stage 1 cofferdam; and
- Left bank Stage 1 diversion inlet and outlet cofferdams and cut-off walls.

Each of the components requires individual Leaves to Construct (LTCs). While it is the role of the Independent Engineer (IE) to issue the LTCs, the Independent Environmental Monitor's (IEM's) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction. This letter has been prepared specifically for the works associated with construction of the Diversion Inlet Cofferdam, identified as LTC#3C.

As the issuance of each LTC requires the IEM's review and recommendation for acceptance to the IE, it is the IEM's understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

The IEM has reviewed the EPP provided by [redacted] and relevant component plans. The review included cross-referencing with the various applicable project requirements found within

[1] Conditional Water Licence 132990. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

the Construction Environmental Management Plan (CEMP), PRHP's Environmental Management Plan (EMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project. Safety plans were not reviewed in detail; the review was only to confirm that the plans were provided as required.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM, which are related to LTC#3C.

[redacted]

BC Hydro Plans/Documents

- *CEMP* (Revision 3), dated July 8, 2016.
- Construction Safety Management Plan (CSMP), dated June 5, 2015.

Provincial Permits/Approvals

- Conditional Water Licence 132990.
- Conditional Water Licences 132990 and 132991 on Peace River Leave to Commence Construction No. 3. Letter from [redacted] to [redacted], dated July 20, 2016.
- *Navigation Protection Act* Authorization 20008-500822.
- *Fisheries Act* Authorization 15-HPAC-01160.
- *Wildlife Act* Amphibian Salvage Permit FJ16-226024.
- *Wildlife Act* Fish Salvage Permit FJ16-225327.
- *Wildlife Act* Beaver and Muskrat Permit FJ14-154005.
- *Wildlife Act* Beaver Dam Removal Notification 176588.
- Approval A703710 – Short Term Use issued under the Water Act.
- Licence No.: 815646 issued under the *Land Act*.

Review Summary

It is our understanding that works under this LTC are to include the following:

- Foundation preparation;
- Fill placement on land and under water;
- Riprap placement on river-facing slopes of the embankment;
- Exploratory geotechnical drilling along the cofferdam alignment;
- Grouting of bedrock fractures at the western end of the cofferdam alignment;
- Construction of a slurry trench cut off wall; and,
- Dewatering of the final enclosed area within the completed cofferdam.

IEM Requirements

The IEM has the expectation that the portion of the left bank side channel downstream of the diversion inlet cofferdam will be monitored for fish stranding during water level fluctuations until the side channel is completely isolated.

Upon review of the submitted documents for LTC#3C, the IEM requires the following as conditions of this LTC:

- In advance of any instream works, the IEM must be provided confirmation that SEV model monitoring for in situ data collection is in place and operational.
- Confirmation must be provided in writing to the IEM in advance of any instream works that all fish and amphibian salvages have been completed.

Additionally, contact water management must comply with the CEMP Appendix E, and in the event PAG materials are excavated, that they be placed in the appropriate RSEM area. Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, appropriate regulations, and the CEMP.

Based on our understanding of the works proposed, and provided the preceding items are acceptable to the Independent Engineer, we have no objections to issuing LTC#3C for the works associated with the Diversion Inlet Cofferdam, as described.

Yours truly,

[redacted]
Independent Environmental Monitor - Delegate

cc. [redacted]

09 March 2017

[redacted]
Deputy Comptroller of Water Rights / Manager, Water Allocation and Utility Regulation
Ministry of Forests, Lands and Natural Resource Operations
PO Box 9340 Stn. Prov Govt
Victoria, BC, V8W 9M1
Via email: [redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Left Bank Global Instability Initial Remediation Measures

- **Leave to Construct LTC #1G – Left Bank Excavation Phase 2 – Amendment #2**
- **Leave to Construct LTC #2B – RSEM Area L5 – Amendment #1**
- **Leave to Construct LTC #3C – Stage 1 Diversion Inlet Cofferdam - Amendment #1**

As described below, this letter is intended to serve as amendments to the following three Leaves to Construct, as construction of the works authorized by these LTCs has been impacted by a common event:

- LTC #1G – Left Bank Excavation Phase 2, issued 10 August 2016
- LTC #2B – RSEM Area L5, issued 18 August 2016
- LTC #3C – Stage 1 Diversion Inlet Cofferdam, issued 26 September 2016

In mid-February 2017 a tension crack about 400 m long developed in fill and colluvium materials along the lower left bank of the dam site. The crack is located above the eastern end of RSEM L5 (under construction) and the future diversion tunnels inlet portal, and below the haul road being constructed from the left bank excavation to RSEM L5. Construction activities in those areas were promptly suspended for safety reasons and monitoring and site investigations were initiated by BC Hydro and [redacted] Survey monuments indicated slope movements that accelerated for about a week, peaking in the order of 2 m/day in some locations, then slowed substantially.

It is interpreted by BC Hydro and [redacted] that all the material within the unstable area was intended to be excavated during construction of the project. However, temporary stability improvements are required to allow the suspended construction activities to safely continue.

Site investigations have determined that the toe of the unstable area is located near the edge of the Peace River. Two toe buttresses approximately 170 m long and 10 m high have been designed as an interim remedial measure to improve stability of the slope so that construction can continue in the above-noted areas. The Independent Engineer (IE)and the Independent Environmental Monitor (IEM) have received the following plan, including drawings, describing the proposed works:

- [redacted]

[redacted]

One buttress will be constructed within the eastern footprint of RSEM L5 and the other inside the future diversion inlet cofferdam. The area between the buttresses is the location of the length of common embankment that will be shared by the RSEM L5 starter dike and the diversion inlet cofferdam.

[redacted]

By copy of this letter, the Independent Engineer hereby confirms that BC Hydro can proceed with construction of the initial remedial works described above, in accordance with the Construction and Environmental Mitigation Plan, including all measures and actions described in the above-noted contract submittal.

The IE and IEM recommend that the Construction and Environmental Mitigation Plan should be revised as soon as possible. Until then, we recommend that the contract submittal document be appended to that Plan to ensure the information required by onsite staff or others is appropriately contained in a single document. Copies of any Plan updates should be provided to the IE and IEM for information.

The IEM also requests that BC Hydro provide confirmation that the appropriate notification is provided to the Ministry of Forests, Lands and Natural Resource Operations as required under the fish salvage permit and as committed to in the contract submittal document, by 10 March 2017.

The IE and IEM request to be kept informed of the progress of construction of the remedial works and any material changes in the construction approach, any significant changes in behaviour of the slope instability, or any potential impacts on the design of permanent project components.

Yours truly,

[redacted]

[redacted]

[redacted] P.Eng.
Independent Engineer, Site C Clean Energy Project

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted] BCH (Site C Construction Engineer)
[redacted] BCH (Environment, Aboriginal Relations and Public Affairs Director)
[redacted] BCH (Regulatory Manager)
[redacted] Independent Environmental Monitor

[redacted]

31 March 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
PO Box 9340 Stn. Prov Govt
Victoria, BC, V8W 9M1
Via email: [redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Left Bank Global Instability Remediation Measures – Side Channel Infilling

- **Leave to Construct LTC #01G – Left Bank Excavation Phase 2 – Amendment #3**
- **Leave to Construct LTC #02B – RSEM Area L5 – Amendment #2**
- **Leave to Construct LTC #03C – Stage 1 Diversion Inlet Cofferdam - Amendment #2**

As described below, this letter is intended to serve as amendments to the following three Leaves to Construct:

- LTC #01G – Left Bank Excavation Phase 2, issued 10 August 2016
- LTC #02B – RSEM Area L5, issued 18 August 2016
- LTC #03C – Stage 1 Diversion Inlet Cofferdam, issued 26 September 2016

Construction of the works authorized by these LTCs was impacted by slope instability that developed in fill and colluvium materials along the lower left bank of the dam site in February 2017. Previous amendments to these LTCs, issued on 09 March 2017, authorized construction of two toe buttresses as an initial measure to improve stability of the affected slope. To complete those works, construction access improvements were also required, consisting of widening a 440 m length of the existing temporary access road immediately upstream of the Peace River construction bridge north abutment.

During a monthly site visit on 29 March 2017, the Independent Engineer (IE) and the Independent Environmental Monitor (IEM) noted that the road widening was largely completed and construction of the toe buttresses was in progress by BC Hydro's contractor [redacted] As planned, the road widening has partially infilled a previously-isolated river side channel.

During the site visit, [redacted] informed BC Hydro, the IE and the IEM that it proposes to infill the remainder of the river side channel area to provide additional construction work area, which is limited along the river. The IE and the IEM have since received the following plan describing the proposed works:

- [redacted]

[redacted]

[redacted]

[redacted]

Although it is physically separated from the Peace River, the side channel pond may still be hydraulically connected to the river through alluvial deposits. The Plan also states that amphibian salvage and relocation will be implemented if necessary. Based on those factors, the IEM recommends that to ensure compliance with Section 4.5 of the CEMP, readily biodegradable hydraulic fluids should be used in equipment working above or within the wetted area.

In the previous LTC Amendment dated 09 March 2017, it was requested that copies of updates to the Construction and Environmental Mitigation Plan be provided to the IE and IEM for information. The IE and IEM have received Revision R1 of the Plan, dated 10 March 2017, including BC Hydro's comments on the Plan.

The IEM also requested that BC Hydro provide confirmation that the appropriate notification was provided to the Ministry of Forests, Lands and Natural Resource Operations as required under the fish salvage permit, by 10 March 2017. Confirmation was received by the IEM on the requested date.

By copy of this letter, the Independent Engineer hereby confirms that BC Hydro can proceed with backfilling the remainder of the river side channel as described above, in accordance with the submitted Construction and Environmental Mitigation Plan. The IE notes that most of the side channel area is located within the footprint of the future RSEM L6 and recommends that BC Hydro should confirm that the infilling will not affect the construction of the RSEM.

Yours truly,

[redacted]

[redacted]

[redacted]

Independent Engineer, Site C Clean Energy Project

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted] BCH (Site C Construction Engineer)
[redacted] BCH (Environment, Aboriginal Relations and Public Affairs Director)
[redacted] BCH (Regulatory Manager)
[redacted] Independent Environmental Monitor
[redacted] FLNRO Water Management Officer

[redacted]

[redacted]

07 October 2016

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]
Via email: [redacted]

Dear [redacted]:

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Leave to Construct LTC #3D – Right Bank Bedrock Excavations

1.0 INTRODUCTION

As Independent Engineer (IE) for the Site C Clean Energy Project (Site C), I have received a submission from BC Hydro requesting permission to commence excavation of bedrock in the approach channel and the area inside the Stage 1 right bank cofferdam. These excavations are one of the works authorized under LCC #3, dated 20 July 2016. [redacted]

Overburden excavations in the approach channel and the area inside the Stage 1 right bank cofferdam were previously authorized by LTC #3B dated 28 July 2016.

Bedrock excavations authorized by LTC #3D include the installation of any necessary rock support measures required to provide worker safety and/or stability of excavated slopes, and also include the installation of any rock surface preparation and protection measures required under the Main Civil Works contract. Any measures required to maintain dewatered conditions within the excavations are also included in this LTC.

All approach channel linings and all roller-compacted concrete (RCC) and cast-in-place concrete for project components to be constructed inside the Stage 1 right bank cofferdam will be authorized by future LCCs.

2.0 DESCRIPTION OF THE WORKS

Note that in the Main Civil Works contract and the submissions for LTC #3D, excavations in overburden and bedrock are referred to as Class 1 excavation and Class 2 excavation, respectively.

The Stage 1 right bank cofferdam, authorized under LTC #3A and currently under construction, encloses the area where the RCC buttress, the spillway, most of the tailrace and the right side of the earthfill dam are to be constructed. Construction of all of these structures will require large excavations in both overburden and bedrock, which will extend below river level. Only limited shallow excavation of the overburden can be started in this area before the surrounding cofferdam, including its cutoff wall, is completed and put into service.

[redacted]

The excavation for the RCC buttress will extend southerly into the footprint of the approach channel, which will be constructed at a higher elevation on an existing terrace above the river level. Therefore, at least a portion of the approach channel area must be excavated to allow the full RCC buttress excavation to be completed. Due to the difference in elevation, [redacted] has been able to start overburden excavation in the approach channel ahead of the excavations inside the cofferdam. All overburden excavation is being carried out with standard excavating and earthmoving equipment.

[redacted] All excavated bedrock is considered to be potentially acid-generating (PAG) and will be disposed of in RSEM areas R5a and R5b.

The IE understands that the in-progress overburden excavation in the approach channel is now close to the bedrock surface in some areas and that [redacted]. Bedrock excavation will of course require that a suitable RSEM area is available to receive the excavated material.

3.0 LTC #3D SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #3D:

1. BC Hydro - *Site C Clean Energy Project Request for Leave to Construct – Right Bank Bedrock Excavation (LTC 3D)*, letter from [redacted] 20 September 2016.
2. BC Hydro – *Issued for Construction Drawings*- see Table 1.
3. [redacted]
4. [redacted]
5. [redacted]
6. [redacted]
7. [redacted]
8. [redacted]
9. [redacted]
10. [redacted]
11. [redacted]
12. [redacted]

[redacted]

Some of these documents and drawings were previously submitted with the request for LTC #3B, as they include information on both overburden and bedrock excavations. The IE notes that some of the documents also include information about RCC structures and approach channel linings. This information is useful for understanding how the excavations relate to subsequent project activities and components, but the IE has not reviewed those aspects in detail at this time.

4.0 REVIEW OF SUBMISSIONS

4.1 Construction Drawings

The construction drawings show the information that would typically be expected for works of this nature, including plans, sections and details of the approach channel and RCC buttress excavations. Many of the drawings include details of excavations in both overburden and bedrock, as well as details of the approach channel liners that will be installed at a later date.

The drawings provided have been sealed by Professional Engineers registered in British Columbia and are Issued for Construction status. It is the IE's opinion that the drawings are consistent with the Site C project general arrangement drawings, the design basis and the conditions of Conditional Water Licences 132990 and 132991.

4.2 Construction Implementation Plan and Schedule

The approach channel excavation will be in the order of 1200 m long, 300 m wide and up to about 35 m deep, with about two thirds of the excavation being in bedrock. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

The hydraulic conductivity of the bedrock is low and seepage through the rock mass is expected to mostly comprise small flows along features such as discontinuities, bedding planes and shears. Dewatering wells are not expected to be required in the bedrock and depressurization wells will be installed as required, likely based on data obtained from piezometers to be installed in the foundation.

[redacted]

Several bedrock foundation protection measures are defined in the Main Civil Works contract, including installation of shotcrete or a temporary geotextile cover, or terminating the bulk removal of rock about 600 mm above the final minimum line of excavation. The method to be adopted depends on whether the excavated surface is horizontal, vertical or inclined, and the type of material to be placed on it. The IE understands that [redacted] will conduct a field trial of various foundation protection methods as part of an upcoming RCC trial placement, and that the methods shown on the drawings could be revised based on the results of that trial.

The IE notes that the above foundation preparation and protection measures may not fully preclude the potential need for additional final rock surface cleaning and preparation prior to placing roller compacted concrete (RCC), impervious fill or other final linings on the excavated rock surfaces.

[redacted]

[redacted]

[redacted] The IE notes that the actual percentages of bedrock excavated by each method could vary from the estimates depending on experience gained during construction, but that would not be considered a material change to this LTC.

[redacted]

4.3 Quality Management

Details of [redacted]'s quality management program were previously submitted and reviewed with the request for LCC #1. As part of that program, [redacted]

[redacted] Other ITPs for rock support and shotcrete were received with the submission for this LTC. All of the ITPs are comprehensive and consistent with the [redacted] and cover the types of work included with the bedrock excavations.

4.4 Management & Care of Water and Environmental Protection

[redacted] describe water management measures for the proposed excavations. The IE notes that the proposed water management infrastructure for the right bank bedrock excavations is consistent with [redacted], which was previously submitted with the request for LCC #2. With respect to the approach channel, the submitted plans [redacted]

[redacted]

Contact water within the excavations will be collected and managed by temporary ditches, containment berms and sumps. The IE notes that these facilities will likely be modified and field fitted on an ongoing basis to suit field conditions as the excavation progresses. [redacted]

Since the bedrock excavations are mostly scheduled for winter months, the effects of freezing temperatures will be an important seasonal consideration for water management. [redacted]

The IE has discussed the work with the IEM and both parties are familiar with the area where the right bank bedrock excavations will occur. The IEM has provided the IE with comments and recommendations on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] – *Site C Clean Energy Project – Conditional Water Licence 132990 IEM review of the Right Bank Bedrock Excavation EPP and relevant component plans in consideration of LTC#3D,* letter to [redacted] dated 07 October 2016.

As described in the above letter, the IEM requires that, prior to starting bedrock excavation and related works within Phase 2 of the approach channel, the *Right Bank Bedrock Excavation EPP* and *Phase 1 Approach Channel Excavation Care of Water Plan* must be revised to include Phase 2 works and provided to the IEM for review.

4.5 Dam Safety

There are no dam safety requirements for the bedrock excavation for the approach channel.

As per the prior conditions of LTC #3B, the *Operations Maintenance and Surveillance Plan* and *Emergency Response and Preparedness Plan* for the right bank Stage 1 cofferdam must be finalized and the appropriate procedures implemented before overburden excavation inside the cofferdam commences. The IE therefore expects that those plans and procedures will be in place prior to the start of bedrock excavations in that area.

4.6 Public Safety

The IE has not reviewed [redacted] in detail except to note that the plan is aligned with [redacted] and has been accepted by BC Hydro. In particular, the *HSMP* includes a *Public Safety Management Plan* that applies to construction of the entire Main Civil Works.

The IE notes that [redacted] also accepted by BC Hydro, provides information on proposed blasting methods including explosive products and control, fly rock control, blast monitoring and safety and security. BC Hydro has also accepted PRHP's submitted qualifications and BC Ministry of Mines blasting certificates for several blasting specialists.

5.0 LEAVE TO CONSTRUCT

By copy of this letter, the Independent Engineer hereby confirms that BC Hydro can proceed with Right Bank Bedrock Excavations for the approach channel and the area inside the Stage 1 right bank cofferdam. [redacted] For reference, this permission is referred to as *Leave to Construct LTC #3D*.

Leave to Construct for the Right Bank Bedrock Excavations is subject to the following conditions:

1. Prior to starting bedrock excavation and related works within Phase 2 of the approach channel, the *Right Bank Bedrock Excavation EPP* and *Phase 1 Approach Channel Excavation Care of Water Plan* must be revised to include Phase 2 works and provided to the IEM for review.
2. BC Hydro and/or its contractors must obtain and comply with any necessary permits from provincial and/or federal regulatory agencies.

Yours truly,

[redacted]

[redacted]

[redacted], P.Eng.
Independent Engineer, Site C Clean Energy Project

Attachment: IEM letter dated 07 October 2016

c: [redacted] FLNRO Water Management Officer
[redacted], BCH VP & Project Director (Site C Licensee Representative)
[redacted], SNC Lavalin (Site C Design Engineer)
[redacted] BCH (Site C Construction Engineer)
[redacted] BCH (Environment, Aboriginal Relations and Public Affairs Director)
[redacted], BCH (Regulatory Manager)
[redacted] Independent Environmental Monitor

TABLE 1

LTC #3D – RIGHT BANK BEDROCK EXCAVATIONS
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

* - Not sealed by P.Eng.; included only as reference drawings showing related future works.

[redacted]

October 07, 2016

[redacted]

[redacted]

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water Licence 132990 IEM review of the Right Bank Bedrock Excavation EPP and relevant component plans in consideration of LTC#3D

Leave to Commence Construction (LCC#3) was issued by the Engineer as identified in the Conditional Water Licence 132990[1] for the construction of four key components consisting of the following:

- Right bank Stage 1 cofferdam and cut-off wall;
- Overburden excavations for the approach channel and structures inside the right bank Stage 1 cofferdam;
- Bedrock excavations for the approach channel and structures to be constructed inside the right bank Stage 1 cofferdam; and
- Left bank Stage 1 diversion inlet and outlet cofferdams and cut-off walls.

Each of these components requires individual Leaves to Construct (LTCs). While it is the role of the Independent Engineer (IE) to issue the LTCs, the Independent Environmental Monitor's (IEM's) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction. This letter has been prepared specifically for the works associated with bedrock (Class 2) excavation within the Approach Channel and Roller Compacted Concrete (RCC) Buttress work areas, identified as LTC#3D.

As the issuance of each LTC requires the IEM's review and recommendation for acceptance to the IE, it is the IEM's understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

[1] Conditional Water Licence 132990. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

The IEM has reviewed the EPP for the bedrock excavation in the Approach Channel (Phase 1) and RCC Buttress (Phases 1 – 4), provided by [redacted], and relevant component plans. The review included cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), [redacted], components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project. Safety plans were not reviewed in detail; the review was only to confirm that the plans were provided as required.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM, which are related to LTC#3D.

[redacted]

- [redacted]

BC Hydro Plans/Documents

- *CEMP* (Revision 3), dated July 8, 2016.
- Construction Safety Management Plan (CSMP), dated June 5, 2015.

Provincial Permits/Approvals

- Conditional Water Licence 132990.
- Conditional Water Licences 132990 and 132991 on Peace River Leave to Commence Construction No. 3. Letter from [redacted], dated July 20, 2016.
- *Wildlife Act* Amphibian Salvage Permit FJ16-226024.
- Approval A703710 – Short Term Use issued under the *Water Act*.
- Licence No.: 815646 issued under the *Land Act*.

Review Summary

It is our understanding that works under this LTC are to include the following:

- Bedrock excavations of the approach channel (Phases 1 and 2);
- Bedrock excavations of the RCC Buttress (Phases 1 – 4).

It is our understanding that the construction of the approach channel Phase 3 slurry cut-off wall and excavation in the RCC Buttress Phases 5 and 6 will be covered under separate LTCs yet to be issued.

IEM Requirements

Upon review of the submitted documents for LTC#3D the IEM requires the following:

- Prior to starting bedrock excavation and related works within Phase 2 of the approach channel, the Right Bank Bedrock Excavation EPP and Phase 1 Approach Channel Excavation Care of Water Plan must be revised to include Phase 2 works and provided to the IEM for review.

Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, appropriate regulations, and the CEMP.

Based on our understanding of the works proposed, and provided the preceding items are acceptable to the Independent Engineer, we have no objections to issuing LTC#3D for the works associated with right bank bedrock excavation as described.

Yours truly,

[redacted]
[redacted] A.Ag., CPESC
Independent Environmental Monitor - Delegate

cc. [redacted] Deputy Comptroller of Water Rights
[redacted] Water Management Branch, Engineer
[redacted] BC Hydro, Manager, Project Environmental Risk Management
[redacted] BC Hydro Regulatory Manager

[redacted]

30 November 2016

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
PO Box 9340 Stn. Prov Govt
Victoria, BC, V8W 9M1
Via email: [redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Leave to Construct LTC #3D – Right Bank Bedrock Excavations
Amendment #1 – Temporary PAG Stockpile

Right bank bedrock excavations in the approach channel and the area inside the Stage 1 right bank cofferdam were authorized by Leave to Construct LTC #3D dated 07 October 2016. Bedrock excavation in the approach channel is currently in progress by [redacted] with only mechanical excavation methods required so far. Most of the bedrock excavated to date has been placed in RSEM R5b.

All of the excavated bedrock is considered potentially acid-generating (PAG) and the construction plans submitted with the request for LTC #3D indicated that the rock would be disposed of in RSEM areas R5a and R5b. RSEM R5b is already filled to capacity and [redacted] has just recently gained access across the Moberly River where RSEM R5a will be constructed. In the interim until RSEM R5a is ready to accept PAG materials, [redacted] proposes to temporarily stockpile excavated bedrock in an area referred to as Area 23 Laydown Area, on the south side of the future approach channel.

Recognizing the sensitivity of PAG material management, the Independent Engineer (IE) considers the temporary stockpile to be a material change from the construction plans originally submitted for LTC #3D. The IE also notes that project activities within Area 23 are subject to the terms of Temporary Licence of Occupation (LOO) L815646, which is valid until 07 July2017. The LOO makes reference to the Management Plan (Development Plan) for the Site C project, which describes typical construction activities including stockpiling of materials. The Development Plan further references the Construction Environmental Management Plan (CEMP) which includes requirements for management of PAG materials.

The IE and the Independent Environmental Monitor (IEM) have received the following information from BC Hydro regarding the temporary PAG stockpile:

1. [redacted]
2. [redacted]

[redacted]

3. [redacted]

The Issued for Construction drawings provided have been sealed by Professional Engineers registered in British Columbia.

[redacted]

By copy of this letter, the Independent Engineer hereby confirms that BC Hydro can proceed with construction of the temporary PAG stockpile in Area 23 in accordance with the submitted [redacted] plans, including transfer of the stockpiled PAG materials to RSEM R5a in early 2017. The IE requests that copies

of the revised EPP and Care of Water Plan which address BC Hydro's comments should be provided to the IE and the IEM in a timely manner.

For reference, this permission is referred to as *Leave to Construct LTC #3D, Amendment #1.*

Yours truly,

[redacted] 2016

[redacted] P.Eng.
Independent Engineer, Site C Clean Energy Project

c: [redacted], FLNRO Water Management Officer
[redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted] BCH (Site C Construction Engineer)
[redacted] BCH (Environment, Aboriginal Relations and Public Affairs Director)
[redacted] BCH (Regulatory Manager)
[redacted], Independent Environmental Monitor

[redacted]

30 June 2017

[redacted] P.Eng.
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991

- **Recommendation for Leave to Construct LTC #05B - Diversion Outlet Works**
- **Recommendation for Leave to Construct LTC #02F – RSEM L6**
- **Recommendation for Leave to Construct LTC #03F – Stage 1 Diversion Outlet Cofferdam**

1.0 INTRODUCTION

Conditional Water Licences (CWLs) 132990 and 132991 dated 26 February 2016 authorize construction of works for the storage, diversion and use of water from the Peace River for power purposes at the Site C Clean Energy Project (Site C). Leave to Commence Construction of the works comprising LCC #01 under CWLs 132990 and 132991 was granted to BC Hydro and Power Authority (BC Hydro) on 01 April 2016.

Leave to Commence Construction LCC #05 was granted to BC Hydro, with conditions, on 25 April 2017. The project components included in LCC #05 are located on the left bank and in the river channel of the dam site and comprise:

- Diversion inlet & outlet portal and channel excavations
- Diversion tunnel inlet & outlet portal structures
- Diversion tunnels
- Stage 1 left bank cofferdam
- Left bank earthfill dam core trench excavation
- Left bank drainage adit
- In-river excavations for tailrace and downstream river channel

As Independent Engineer (IE) for the Site C project, I have received a submission from BC Hydro requesting permission to commence construction of the diversion tunnel outlet works consisting of:

- Excavation of the diversion outlet portal, including rock support, and
- In-river excavation, including mid-river island, tailrace and downstream river channel, and the portion of the bar island within the Dam Site Area Boundary.

The submission also requests permission to commence construction of:

- RSEM L6, authorized under LCC #02 dated 29 June 2016, and
- Stage 1 diversion outlet cofferdam, authorized under LCC #03 dated 20 July 2016.

These works are to be constructed by BC Hydro's Main Civil Works contractor, [redacted]

Recognizing the inter-related construction aspects of these works, this letter provides recommendations for the following Leaves to Construct:

- *Leave to Construct LTC #05B* - Diversion outlet works, including in-river excavations
- *Leave to Construct LTC #02F* – RSEM L6
- *Leave to Construct LTC #03F* – Stage 1 diversion outlet cofferdam

The scope of LTC #05B includes the portions of the diversion outlet channel located inside and outside of the Stage 1 diversion outlet cofferdam. [redacted]

The portion of the bar island downstream of the Dam Site Area Boundary is excluded from the scope of LTC #05B. This area is not authorized by CWL 132990 and the IE understands that BC Hydro will apply for the necessary provincial permit to allow that excavation. [redacted]

2.0 DESCRIPTION OF THE WORKS

Diversion of the Peace River, which is required to construct the Site C project, occurs in two stages. In Stage 1, the Peace River is confined to its main channel by three cofferdams on the left bank of the river and one cofferdam on the right bank.

On the right bank, the Stage 1 cofferdam is completed and in service and construction of the RCC buttress works has commenced inside the dewatered interior area. On the left bank, construction of the diversion inlet and outlet portal works and diversion tunnel works will be carried out inside the Stage 1 diversion inlet and outlet cofferdams. Construction of the inlet cofferdam was authorized by LTC #03C dated 26 September 2017; the embankment has been completed and construction of the slurry cutoff wall is now in progress. Construction of the Stage 1 left bank cofferdam was authorized by LTC #05C dated 16 June 2017 and foundation stripping and preparation have started. The upstream and downstream legs of this cofferdam will connect to the Stage 1 diversion inlet and outlet cofferdams to enclose the area where the left side of the earthfill dam will be constructed.

In Stage 2, portions of the Stage 1 cofferdams will be removed, the river will be diverted through two tunnels in the north bank, and the river channel will be closed off with upstream and downstream Stage 2 cofferdams. The central portion of the earthfill dam will be constructed inside the area enclosed by those cofferdams.

2.1 Stage 1 Diversion Outlet Cofferdam

[redacted]

2.2 Outlet Portal & Channel and In-River Excavations

[redacted]

[redacted]

[redacted]

2.3 RSEM L6

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

3.0 SUBMISSION FOR LTC #05B, LTC #02F & LTC #03F

The following documents have been received from BC Hydro in support of the request for LTCs #05B, #02F and #03F:

1. BC Hydro - *Site C Clean Energy Project Request for LCC5 Component Authorization, Leave to Construct 5B (LTC5B) – Diversion Outlet Works, including In-River Excavation*, letter from [redacted] to [redacted] 12 May 2017.
2. BC Hydro – *Issued for Construction Drawings for Diversion Outlet Works and In-River Excavations* (see Table 1).

[redacted]

4.0 REVIEW OF SUBMISSIONS

4.1 Design Details and Construction Drawings

BC Hydro provided reference designs for the project cofferdams in the Main Civil Works contract, but the contractor is responsible for the final design, construction and maintenance of all project cofferdams during construction of the project works. [redacted]

The outlet channel and portal excavations have been designed by BC Hydro, except for the overburden slopes which are to be designed by the contractor. The construction drawings by BC Hydro show the information that would typically be expected for works of this nature, including plans, sections and details of the diversion outlet portal and outlet channel. The design of the outlet portal excavation is very similar to that for the inlet portal excavation, which was authorized under LTC #05A. [redacted]

[redacted]

[redacted]

Drawings for the contractor-designed overburden slopes have not yet been received because the final design of those slopes will be influenced by the design of the construction access road to the top of the outlet portal excavation. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

The drawings provided for these works have been sealed by Professional Engineers registered in British Columbia and are Issued for Construction status. BC Hydro has accepted the contractor's drawings, except for minor revisions and clarifications. It is the IE's opinion that the drawings are consistent with the Site C project general arrangement drawings, the design basis and the conditions of Conditional Water Licences 132990 and 132991.

4.2 Construction Implementation Plan and Schedule

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

The IE considers the work plan to be appropriate to the work, and that the proposed schedule is reasonable.

[redacted]

4.3 Quality Management

Details of [redacted] were previously submitted and reviewed with the request for LCC #01. As part of that program, [redacted] has developed standard Inspection and Test Plans (ITPs) for specific types of work, which are reviewed by BC Hydro in accordance with the Main Civil Works contract.

The application for LTCs #05B, #02F and #03F lists ITPs for the types of work included in construction of the outlet cofferdam and portal works, RSEM L6, and the in-river excavations.

4.4 Environmental Protection

The Environmental Protection Plan (EPP) is included in the application document for LTCs #05B, #02F and #03F, and includes descriptions of anticipated work activities and applicable mitigation measures to reduce potential environmental impacts. BC Hydro has accepted the EPP.

Most of the portal excavations will occur above or inside the diversion outlet cofferdam, which should allow PAG contact water to be readily collected and managed.

The work includes substantial in-river excavations and construction that will require fish salvage to be carried out in a staged manner as construction progresses. [redacted]

The IE has discussed the work with the IEM and both parties are familiar with the area where the diversion outlet portal and cofferdam works, RSEM L6 and in-river excavations will be constructed.

The IEM has provided the IE with comments on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] *– Site C Clean Energy Project – Conditional Water License 132990 IEM review of the Diversion Outlet Works, including In-River Excavation and relevant component plans,* letter to [redacted] dated 30 June 2017.

As noted by the IEM, future modifications to the in-river excavation methodology described in the LTC submission could require revisions to the EPP and could also require additional regulatory permits, which in turn could result in additional permit conditions.

The IEM has no objections to issuing LTCs #05B, #02F and #03F.

4.5 Dam Safety

The FLNRO Dam Safety Officer has reviewed the submissions for the Stage 1 diversion outlet cofferdam, as documented in the following:

1. [redacted] Senior Dam Safety Officer - *Site C Clean Energy Project, Conditional Water Licences 132990 and 132991 on Peace River, Request for Leave to Construct – Diversion Outlet Works, Including In-River Excavation, (LTC 5B)*, letter to [redacted] dated 30 June 2017.

The Dam Safety Officer accepts the submitted information.

The lower portion of the outlet portal works and the upstream end of the outlet channel will be constructed inside the Stage 1 diversion outlet cofferdam. The *Operations Maintenance and Surveillance Plan* and *Emergency Response Plan* for the Stage 1 cofferdams are in place and have been accepted by the FLNRO Dam Safety Officer.

As required by LCC #02, the RSEM L6 sediment pond must comply with the BC Dam Safety Regulation (2016). [redacted]

The Dam Safety Officer has accepted the submitted information.

4.6 Public Safety

The works to be constructed on land will be located within areas with no public access, however there will likely be public boat traffic along the river during the in-river excavation and construction activities.

BC Hydro has received Navigation Protection Act (NPA) approvals that define requirements for warning signs, lights and high visibility markers for construction equipment and activities in the river. Navigation warning signs are already in place upstream and downstream of the site, and PRHP will install other lights and markers at the work site as required during the work.

The NPA approvals also require that a safe passage way must be maintained for pubic navigation through the work area, although the required width and depth of passage are not specified. [redacted]

[redacted]

5.0 RECOMMENDATION FOR LEAVES TO CONSTRUCT LTC #05B, LTC #02F & LTC #03F

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with construction of the works as described above, and referred to as:

- *Leave to Construct LTC #05B* - Diversion outlet works, including in-river excavations
- *Leave to Construct LTC #02F* – RSEM L6
- *Leave to Construct LTC #03F* – Stage 1 diversion outlet cofferdam

As per LCC #05 dated 25 April 2017, this recommendation is copied to BC Hydro and is sufficient for construction of these works to proceed.

Leaves to Construct LTC# 05B, LTC #02F and LTC #03F are subject to the conditions of LCC #05, LCC #02 and LCC #03 which are attached to this letter as Appendices A, B and C for reference. In addition:

1. The Issued for Construction drawings and any supporting information for the contractor-designed overburden excavation at the diversion outlet portal must be submitted to the IE, and the IE must issue an LTC Amendment before construction of the final overburden excavation can proceed.
2. If a temporary PAG stockpile is required, the Issued for Construction drawing(s) and details of related PAG contact water management must be submitted to the IE and the IEM, and the IE must issue an LTC Amendment before construction of the stockpile can proceed.
3. As noted in the attached letter from the IEM, the IEM requests that:
    a. Notice be provided to the IE/IEM in advance of any modified construction approaches for in-river excavation, and
    b. Requirement for such notice should be added as an environmental hold point in EPP Table 9-1.
4. The IE requests that a copy of the designer-of-record certification for the Stage 1 outlet cofferdam be provided to the IE for information before excavation inside the cofferdam advances below river level.

Yours truly,

[redacted]

[redacted] *P.Eng.*
Independent Engineer, Site C Clean Energy Project

[redacted]

Attachments:

1. Table 1 – LTC #05B – Diversion Outlet Works Including In-River Excavations - IFC Drawings
2. Table 2 – LTC #02F – RSEM L6 - IFC Drawings
3. Table 3 – LTC #03F – Stage 1 Diversion Outlet Cofferdam - IFC Drawings
4. Appendix A – LCC #02 Conditions (Applicable to RSEM L6)
5. Appendix B – LCC #03 Conditions (Applicable to Stage 1 Diversion Outlet Cofferdam)
6. Appendix C – LCC #05 Conditions (Applicable to Diversion Outlet Works)
7. IEM letter dated 30 June 2017

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] BCH (Regulatory Manager)
SNC Lavalin (Site C Design Engineer)
[redacted] BCH (Site C Construction Engineer)
Independent Environmental Monitor
FLNRO Water Management Officer
FLNRO Water Management Officer
FLNRO Dam Safety Officer

TABLE 1
LTC #05B – DIVERSION OUTLET WORKS INCLUDING IN-RIVER EXCAVATIONS
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

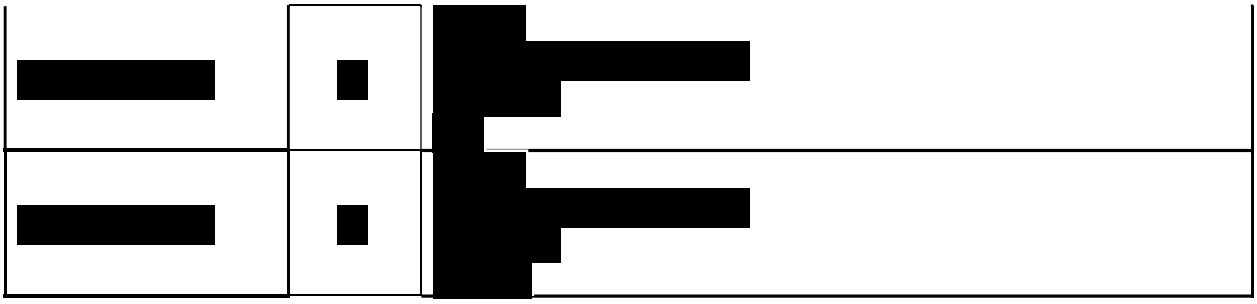

TABLE 2
LTC #02F – RSEM L6
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

TABLE 3
LTC #03F – STAGE 1 DIVERSION OUTLET COFFERDAM
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

APPENDIX A
LCC #02 CONDITIONS (APPLICABLE TO RSEM L6)

No.	Condition	Status for LTC #02F
1	The Contractor can begin construction of any component of the works only after the relevant design drawings signed and sealed by the Design Engineer, have been submitted to [redacted] in his capacity as IE, for review, and permission to begin construction is received from the IE. The permission will be in the form of a letter from the IE to the Engineer under the Water Sustainability Act, with copies to the Licensee, Design Engineer and the Construction Engineer.	Completed.
2	Construction of works shall be supervised by the Construction Engineer and the Design Engineer.	Ongoing.
3	Any revisions to CEMP sections that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed and accepted by the IEM and the Engineer.	If and as required.
4	The assessment approach for evaluating juvenile Rainbow Trout and Arctic Grayling in tributaries, including the design of their respective monitoring programs, must be completed and submitted by January 31, 2017;	Compliance assessed by CWR office.
5	The licensee shall adhere to and implement the Site C Water Quality Management Programme as ordered by my letter of June 24, 2016;	Ongoing.
6	All sediment ponds must be designed and operated in accordance with Technical Guidance 7 Environmental Management Act – Assessing the Design, Size, and Operation of Sediment Ponds Used in Mining – Version 1.0, dated December 2015, and Technical Guidance 3 Environmental Management Act – Developing a Mining Erosion and Sediment Control Plan – Version 1.10, dated February 2015, both prepared by Ministry of Environment;	L6 pond design complies.
7	All sediment ponds that discharge to the aquatic environment must be designed to include any water routed to the ponds from other Project construction areas;	L6 pond design complies.
8	All sediment pond discharge structures must be designed to be impassable to fish at all times;	L6 pond design complies.
9	A low permeability layer must be achieved, as described in section 3.5.7 of [redacted], for the base layer of each of the RSEM areas that will contain PAG material, including the associated sediment ponds as well as the pond walls and/or starter dikes.	To be completed.

	Furthermore, the same low permeability layer must be installed beneath any other temporary or permanent area on top of which PAG material will be placed	
10	All sediment ponds must comply with the BC Dam Safety Regulation (2016);	L6 pond design complies.
11	Weekly progress reports on contract construction shall be submitted by the licensee to the IE and the Engineer;	Ongoing.
12	Permits, licences, and approvals under enactments other than the Water Act or Water Sustainability Act for the construction of works may be required in addition to the leave to commence construction, and you should ensure the appropriate authorizations are in place.	If and as required.

APPENDIX B
LCC #03 CONDITIONS (APPLICABLE TO STAGE 1 DIVERSION OUTLET COFFERDAM)

No.	Condition	Status for LTC #05B
1	The Contractor can begin construction of any component of the LCC3 works only after the relevant design drawings signed and sealed by the Design Engineer, have been submitted to [redacted] in his capacity as IE, for review, and permission to begin construction is received from the IE. The permission will be in the form of a letter from the IE to the Engineer under the Water Sustainability Act, with copies to the Licensee, Design Engineer and the Construction Engineer.	Completed.
2	Construction of works shall be supervised by the Construction Engineer and the Design Engineer, as per Water Licences clause (k) 1) and 2).	Ongoing.
3	Any revisions to CEMP sections that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed by the IEM and accepted by the Engineer.	If and as required.
4	Revisions to the Acid Rock Drainage and Metal Leachate Plan, Section 4.14 of the CEMP, incorporating the Site C Water Quality Management Programme, are to be completed and submitted to the satisfaction of the IEM and the acceptance of the Engineer by September 30, 2016.	Completed; further revisions pending.
5	Revisions to the schedule of LCCs and LTCs must be completed to the satisfaction of the IE and submitted to the Engineer by September 30, 2016.	Completed.
6	All cofferdams must comply with the BC Dam Safety Regulation (2016).	Design complies.
7	The Operations, Maintenance and Surveillance Plan as well as the Emergency Response and Preparedness Plan must be finalized prior to excavation activities within the cofferdams that will result in the dams holding back water.	Completed.
8 to 13	CWL Schedule A milestones.	Compliance assessed by CWR office.
14	Weekly progress reports on contract construction shall be submitted by the licensee to the IE and the Engineer.	Ongoing.
15	Permits,licences, and approvals under enactments other than the Water Act or Water Sustainability Act for the construction of works may be required in addition to the leave to commence construction, and you should ensure the appropriate authorizations are in place.	If and as required.

APPENDIX C
LCC #05 CONDITIONS (APPLICABLE TO DIVERSION OUTLET WORKS)

No.	Condition	Status for LTC #05A
a)	Before the construction of any component of LCC #5 may proceed, the Licensee must: • submit relevant design drawings signed and sealed by a professional engineer registered in the province of British Columbia to [redacted] P. Eng. to review in his capacity as IE, and • receive a copy of a report (the "Recommendation Report") submitted by the IE to the DCWR under the Water Sustainability Act, which recommends that construction of that component of LCC #5 may proceed. The Recommendation Report is in the form of a letter and is sufficient for construction of that component to proceed.	Completed, except for drawings for contractor-designed overburden slopes.
b)	In-river works for the tailrace and downstream river channel that are outside the area shaded grey on DWG NO 1016-C14-B6158-22 dated November 8, 2012 (attached in Appendix D of LCC #5) are not authorized for construction under LCC #5.	Not applicable.
c)	The Licensee may request the DCWR to review any of the IE's Recommendation Reports and make alterations to the Leave to Construct.	If and as required.
d)	If during construction material changes to the works of LCC #5 are proposed, the changes must be authorized through the process described in No. a) above.	If and as required.
e)	Any revisions to sections of the CEMP that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed by the IEM and accepted by the Deputy Comptroller of Water Rights	If and as required.

[redacted]

June 30, 2017

[redacted]

[redacted]

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water License 132990 IEM review of the Diversion Outlet Works, including In-River Excavation and relevant component plans

Leave to Commence Construction (LCC#5) was issued by the Deputy Comptroller of Water Rights as identified in the Conditional Water Licence (CWL) 132990[1] for the Left Bank Cofferdams and Diversion Tunnel Works involving the following key components:

- Inlet Works Portal and Channel Including in-River Portion of Channel.
- Outlet Works Portal and Channel Including In-River Works for the Tailrace and Downstream River Channel.
- Stage 1 Left Bank Cofferdam Including Slurry Cut-off Wall and Grouting and Left Bank Earthfill Dam Core Trench Excavation
- Left Bank Drainage Adit including Portal Works.
- Diversion Tunnels Excavation and Rock Support.
- Diversion Tunnels Lining and Inlet & Outlet Concrete Structures.
- Diversion Tunnel Gates and Electro-Mechanics Installation and Testing.

While it is the role of the Independent Engineer (IE) to issue the LTCs, the IEMs role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction.

This letter has been prepared specifically for three inter-related LTC work elements associated with the diversion outlet, including in-river excavation activities. It is our understanding that works under this LTC are to include the following:

- Excavation of the diversion outlet portal (LTC#5B), including:

[1] Conditional Water Licence 132990. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

  - rock stabilization.
  - in-river excavation, including mid-river island, bar island (portion within the dam site area boundary), and in-river tailrace.

- Construction of the outlet cofferdam (LTC#3F); and
- Construction of RSEM area L6 (LTC#2F).

It is the Independent Environmental Monitor's (IEMs) understanding that the scope of this request does not include:

- Forest clearing – completed previously by other contractors; and
- Diversion outlet cofferdam removal at the start of Stage 2 flow diversion.

Furthermore, BC Hydro will be seeking approval for in-river excavation of the portion of bar island outside the dam site area boundary under a *Land Act* Licence of Occupation and *Water Sustainability Act* Section 11 application, with works expected to take place in 2018.

As the issuance of each LTC requires the IEMs review and recommendation for acceptance to the IE, it is the IEMs understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

The IEM has reviewed the EPP provided by BC Hydro including cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM team, which are related to LTC#5B.

BC Hydro Plans/Documents

- *Construction Environmental Management Plan* (Revision 4), dated July 26, 2016.
- *Site C Clean Energy Project Request for LCC5 Component Authorization, Leave to Construct 5B (LTC5B) – Diversion Outlet Works, including In-River Excavation*, letter from [redacted] to [redacted] 12 May 2017.

[redacted]

- [redacted]

Relevant Design and Conceptual Drawings

- *Clean Energy Project – Site C – Diversion Tunnels Outlet Portal Excavation and Rock Support Sections and Details – 1020-C17-00465_HS_ES_RO-20170517*
- *Clean Energy Project – Site C – Diversion Tunnels Outlet Erosion Protection Sections Sheet 1 – 1020-C17-00472-HS-ES-RO-20170517*
- *Clean Energy Project – Site C – Diversion Tunnels Outlet Erosion Protection Sections Sheet 2 – 1020-C17-00475-HS-ES-RO-20170517*
- *Clean Energy Project – Site C – Cofferdams Outlet Cofferdam – Stage 1 – 1020-C17-00762_R5 Sealed*
- *Clean Energy Project – Site C – Diversion – Cofferdams Outlet Cofferdam – Stage 1 – Sections, Profile and Details – 1020-C17-00763_R6 Sealed*

Provincial Permits/Approvals

- Conditional Water Licence 132990.

Federal Permits/Approvals

- *Fisheries Act* Authorization 15-HPAC-00170 and 15-HPAC-01160
- *Navigation Protection Act* Approval 2008-500822 and 2016-500328

IEM Requirements

- Based on our understanding of the information provided and communications to date, it is the IEM's understanding that [redacted] may still modify their in-stream excavation methods beyond those presently described. [redacted] It is the IEMs expectation that this information would be provided in advance of implementing any modified construction approaches, ensuring all appropriate permits/approvals are in place for the works, along with any relevant EPP revisions.
- The IEM would also recommend that the previous requirement as committed to by [redacted] be clearly reflected in Table 9-1 of the LTC Application package, Environmental Hold Points.

Conclusions and Recommendations

Upon review of the submitted documents for LTC#5B, LTC#2F and LTC#3F, and based on our understanding of the works proposed in addition to communications and information provided by BC Hydro, we have no objections to issuing these LTCs for the works associated with the diversion outlet works, including in-river excavation, as described. Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, regulations, and the CEMP.

Yours truly,

[redacted]

Original signed and sealed version maintained on file.

[redacted] R.P.Bio., P.Biol., P.Ag.
Independent Environmental Monitor, Delegate

cc. [redacted] Water Management Branch, Manager of Water Allocation and Utilities Section
[redacted] FLNRO Water Management Officer
[redacted] FLNRO Water Management Officer
[redacted] BC Hydro, Manager, Project Environmental Risk Management
[redacted] BC Hydro Regulatory Manager

[redacted]

04 July 2017

[redacted], P.Eng.
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Recommendation for Leave to Construct LTC #03E – Stage 1 Diversion Outlet Cofferdam
Erratum

Please refer to letter dated 30 June 2017 with recommendations for:

- *Leave to Construct LTC #05B* - Diversion outlet works, including in-river excavations
- *Leave to Construct LTC #02F* – RSEM L6
- *Leave to Construct **LTC #03E*** – Stage 1 diversion outlet cofferdam

Please note that the LTC for the Stage 1 diversion outlet cofferdam should be numbered **LTC #03E**, not LTC #03F as shown in the recommendation. There are no changes to the recommendation.

It is suggested that a copy of this letter be filed with the original recommendation letter for reference.

Yours truly,

[redacted]

[redacted], *P.Eng.*
Independent Engineer, Site C Clean Energy Project

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] BCH (Regulatory Manager)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted], BCH (Site C Construction Engineer)
[redacted], Independent Environmental Monitor
[redacted], FLNRO Water Management Officer
[redacted], FLNRO Water Management Officer
[redacted], FLNRO Dam Safety Officer

[redacted]

[redacted]

19 December 2016

[redacted]
Manager, Water Allocation and Utility Regulation, Water Management Branch
Ministry of Forests, Lands and Natural Resource Operations
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licence 132991
Leave to Construct LTC #4A – Eastern Reservoir Clearing – North and South Bank Areas

1.0 INTRODUCTION

Leave to Commence Construction LCC #4 for clearing of the Eastern area and a limited portion of the Central area of the proposed Site C reservoir was issued 06 December 2016 by the Deputy Comptroller of Water Rights. As proposed by BC Hydro, it is anticipated that the LCC #4 reservoir clearing will be carried out under five Leaves to Construct (LTCs) during the 2016-17 and 2017-18 cold weather seasons.

As Independent Engineer (IE) for the Site C Clean Energy Project (Site C), I have received a submission from BC Hydro requesting permission to commence clearing portions of the Eastern Reservoir comprising North Bank (Dam Site to Tea Creek, Wilder Creek to Cache Creek) and South Bank (South of Tea Island). The proposed North and South Bank clearing would be by BC Hydro's contractors, [redacted], and [redacted] respectively. For reference, these works are to be authorized under *Leave to Construct LTC #4A*.

BC Hydro has received a Site Specific Tenure Temporary Licence over Crown land (File No. 8015830) within the Eastern reservoir area. The tenure commences 12 December 2016 and is valid for two years.

BC Hydro has also received the following Occupant Licences to Cut and Remove Timber (OLTCs) for the Eastern Reservoir:

OLTC	OLTC Management Plan	Description
L50571	OLTC 6	South Bank
L50572	OLTC7	North Bank
L50573	OLTC8	Access to South Bank

The clearing areas to be included in LTC #4A are located within OLTCs L50571 and L50572. The area covered by OLTC L50573 is above normal reservoir level and no work is required in that area for the clearing included in this LTC.

Each of these OLTCs require that the clearing adhere to the applicable Management Plan and that the maintenance of Environmental Certificate No. E14-02 must be in good standing. For each of the OLTCs, the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) has approved BC Hydro's

requests for exemptions under several sections of the Forest and Range Practices Act, Forest Planning and Practices Regulation Section 91.

The OLTC Management Plans identify various existing land tenures that will be impacted by the clearing works, including range tenures, guide outfitter areas and trap line tenures. The Site Specific Tenure received by BC Hydro requires it to "*...resolve overlapping conflict through correspondence regarding compatible use*…"

2.0 DESCRIPTION OF THE WORKS

The clearing works in this LTC comprise two areas on the north bank of the Peace River and one area on the south bank.

One of the north bank areas extends approximately 3.5 km from the dam site upstream to Tea Creek. The east end of this area abuts RSEM area L5, which was cleared under OLTC L50182 as part of the Site C project Early Works. The second north bank area extends approximately 10 km from Wilder Creek upstream to Highway 29 near Cache Creek. BC Hydro has contracted [redacted] to clear both areas. The intermediate area between Tea Creek and Wilder Creek requires further geotechnical evaluation and will be cleared under a separate future LTC.

The south bank area is about 1.25 km long and located south of Tea Island. The east end of this area abuts the south bank clearing area previously authorized by OLTC L50183 as part of the Site C project Early Works. During the Early Works, clearing was completed to the upstream end of RSEM area R5a, leaving approximately 3 km further upstream to and including Tea Island to be cleared during the 2016-17 season. BC Hydro has contracted [redacted] to clear both that remaining area (under OLTC L50183; no LTC required), and the area south of Tea Island (under OLTC L50571 & this LTC).

Approximately 1.5 km downstream of Tea Creek, a natural gas pipeline crosses the Peace River and a municipal wastewater effluent pipeline from Charlie Lake discharges from the north bank into river. Both pipelines cross the proposed north bank clearing area between Tea Creek and the dam site. BC Hydro expects to receive a crossing permit from the gas pipeline owner in December and is working with the Peace River Regional District to determine the design and timing of mitigation works, including a clearing prescription for the local area at the wastewater outfall.

The minimum and maximum normal operating levels of the Site C reservoir will be Els. 460.0 m and 461.8 m, respectively. The maximum flood level will be El. 466.3 m, which is the highest elevation of authorized Crown land occupation under Permit 28283. In areas where no reservoir shoreline erosion is predicted, clearing will be up to the normal maximum level of El 461.8 m. Elsewhere, clearing will extend up to the elevation where erosion is predicted to occur over the first five years of reservoir operation. In local areas, the 5-year beach line may be at a higher elevation than the maximum flood level of El. 466.3 m. In all cases, clearing could extend to higher elevations if necessitated by access and/or safety considerations. Any clearing of Crown lands above El. 466.3 m is authorized by the applicable OLTC.

The reservoir clearing strategy outlined in BC Hydro's *Vegetation Clearing and Debris Management Plan* includes consideration of multiple factors such as restricted clearing requirements for existing riparian areas, retention of some vegetation for future fish habitat, ground stability and predicted future shoreline erosion, future recreation interests and navigational safety, and worker safety in steep or unstable terrain.

Construction of new access roads is to be minimized, and where possible, existing roads or trails will be upgraded and later de-activated as required. The Environmental Protection Plan (EPP) indicates that approximately 3,479 linear metres of new access road will be constructed.

The north and south river bank areas to be cleared include varied terrain ranging from low lying riparian areas to steep slopes. There are slopes with both exposed bedrock and overburden cover. Clearing prescriptions for these varied conditions are based on the strategy noted above. There are several islands in the Peace River within the Eastern reservoir. Those islands within the area covered by this LTC do not have merchantable timber and will not be cleared. Tea Island will be cleared as previously authorized under OLTC L50183.

The south bank area near Tea Island includes a portion of an Old Growth Management area. OLTC L50571 requires that BC Hydro provide the surveyed shape of this area impacted by clearing activities to FLNRO Resource Management.

3.0 LTC #4A SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #4A:

1. BC Hydro - *Site C Clean Energy Project Request for LCC4 Component Authorization, Leave to Construct 4A (LTC4A) -- Eastern Reservoir Clearing North Bank (Dam Site to Tea Creek, Wilder Creek to Cache Creek) and South Bank (South of Tea Island)*, letter from [redacted] to [redacted], 01 December 2016.
2. BC Hydro – *Clearing Prescription Maps* – see Table 1.
3. BC Hydro – *Reservoir Clearing 2016/17 Temporary Access Roads and PAG Rock Excavations*, letter from [redacted] to [redacted], 29 November 2016.
4. BC Hydro - *Site C Clean Energy Project, North and South Bank Eastern Reservoir Clearing Environmental Protection Plan, including Appendices, R0*, 28 November 2016.
5. [redacted]

BC Hydro also provided copies of the following licences and authorizations:

7. MFLNRO – *Notice of Final Review re. Your Application for a Tenure Over Crown Land*, File 8015830, 12 December 2016.
8. MFLNRO – *Site Specific Tenure*, Appendix E to BC Hydro Master Agreement, File 8015830, 12 December 2016.
9. MFLNRO – *Letter re: Information to Avoid/Minimize Impacts to Environmental Values*, FCBC File # 8015830, 09 December 2016.
10. MFLNRO - *Occupant License to Cut and Remove Timber L50571*, 12 December 2016.
11. MFLNRO - *Occupant License to Cut and Remove Timber L50572*, 12 December 2016.
12. MFLNRO - *Occupant License to Cut and Remove Timber L50573*, 12 December 2016.
13. MFLNRO -*Letter re. Forest and Range Practices Act, Forest Planning and Practices Regulation Section 91 Exemptions*, File 19545-60/L50571, 09 December 2016.

14. MFLNRO -*Letter re. Forest and Range Practices Act, Forest Planning and Practices Regulation Section 91 Exemptions*, File 19545-60/L50572, 09 December 2016.
15. MFLNRO -*Letter re. Forest and Range Practices Act, Forest Planning and Practices Regulation Section 91 Exemptions*, File 19545-60/L50573, 09 December 2016.

4.0 REVIEW OF SUBMISSIONS

4.1 Design Details and Construction Drawings

The clearing prescription maps listed in Table 1 outline the site-specific clearing treatments to be applied. A table of specifications for falling of timber, management of waste wood and ground disturbance is included with each map.

The specifications include waste wood tolerances in terms of the number of pieces of wood of various diameters and lengths that can remain in different categories of cleared areas. The IE notes that the intent is to minimize the amount of waste wood left on the ground and that only a small percentage of those pieces can be longer than 2 m, which is a sound debris management/dam safety consideration. The Site C project design includes temporary and permanent debris booms that are intended to collect future floating debris before it can reach the dam site either during or after construction. In the event that residual waste wood from clearing operations is not fully captured by the booms, short pieces of timber are less likely to get caught or jammed in gate or tunnel openings.

Falling will be by mechanical or hand methods; clearing will include merchantable timber only or all timber; and waste wood will be mulched, piled and burned or left where felled, all depending on site-specific factors such as type of terrain, access and slope gradient. In many locations, the ground surface will be minimally disturbed with low stumps left in place to preserve slope stability. On slopes of less than 35% in an upstream north bank area that must be fully cleared for future boater safety, subsurface mulching is planned to discourage regrowth of the felled trees.

Clearing map no. 1016-C14-B7134-2 covers the area where the gas pipeline and the municipal wastewater effluent pipeline cross the proposed north bank clearing area downstream of Tea Creek. This map shows a “no-go” zone that includes these crossings, where no clearing is to be carried out until authorized in writing by the BC Hydro Representative. The IE understands that the clearing prescriptions for this area will be defined after BC Hydro has consulted with the pipeline owners, and that the clearing in this area will likely not be completed during the 2016-17 winter season.

The clearing prescription maps provided for these works have been sealed by a Professional Forester registered in British Columbia. It is the IE’s opinion that the clearing prescriptions are consistent with the Site C project general arrangement drawings, BC Hydro’s *Vegetation Clearing and Debris Management Plan*, the conditions of Conditional Water Licence 132991 and the requirements of the CEMP.

4.2 Construction Implementation Plan and Schedule

The OLTC Management Plans include summaries of Special Resource Features and general strategies for riparian management, access and stream crossings and waste wood management. Typical work methods expected to be employed by contractors are described in the EPP.

The clearing works are scheduled for the winter months to minimize impacts on soils and water quality, and to avoid sensitive bird and fish seasons. It is intended that construction of new access roads will be minimized, and where possible, existing roads or trails will be upgraded and later de-activated as required. Work carried out when the ground surface is frozen will minimize the need for road-building and ground disturbance.

On the north bank of the Peace River, ground access to the area between the dam site and Tea Creek will be through the Site C project site and RSEM L5, which is currently under construction. Ground access to the area between Wilder Creek and Highway 29 will be from the highway. BC Hydro has advised the IE that the contractor will likely use helicopters to transport clearing crews into areas not accessible by land. Access by boat and on foot into those areas in winter conditions is generally considered to be too hazardous.

On the south bank, ground access for clearing will be through the Site C project site and RSEM R5a, which is currently under construction.

Prior to commencing the clearing, BC Hydro will survey, lay out, ribbon and mark the boundaries for the different types of treatment shown on the clearing prescription maps. BC Hydro has advised the IE that it will have a supervisor on site during the clearing operations.

The IE understands that the clearing contractors will be granted the merchantable timber as part of their contracts and are responsible for removing such timber from site. Merchantable timber not removed will be classified as waste wood. Residual waste wood is to be minimized and much of the waste will likely be piled and burned. Piling will be done by machine or hand methods depending on the type of terrain, and helicopters will be used to assist in moving and piling waste wood in some areas.

In the opinion of the IE, the proposed clearing methods and timing are appropriate and intended to minimize impacts on the environment and to safely accommodate future public uses of the reservoir.

4.3 Quality Management

There is no specific quality management program defined for these clearing works. In general terms, quality clearing outcomes will be achieved if the contractor carries out the work in accordance with the clearing prescriptions, the OLTC management plans and the EPP, with BC Hydro oversight and verification of the completed work.

The IE and the IEM also intend to periodically inspect the progress of the work.

4.4 Environmental Protection

BC Hydro has prepared the EPP, which is intended to be adopted by both contractors carrying out these reservoir clearing works. The EPP includes descriptions of anticipated work activities and applicable mitigation measures related to work planning and execution that will reduce potential environmental impacts.

BC Hydro has also reviewed the construction details for proposed temporary access roads and has determined that it is unlikely that potentially acid-generating (PAG) materials will be encountered. It was concluded that most of the roads will be constructed on flat grades that do not require road cut excavations. Only one road cut will be required, and it will be constructed in an alluvial terrace.

The IE has discussed the proposed clearing works with the IEM. The IEM has provided comments on environmental aspects of the proposed clearing works in the following letter, a copy of which is attached for reference:

> [redacted] – *Site C Clean Energy Project – Conditional Water License 132991 IEM review of the North and South Bank Eastern Reservoir Clearing EPP and relevant component plans in consideration of LTC#4A*, letter to [redacted] dated 19 December 2016.

As summarized in the above letter, the IEM has requested that additional information be provided by BC Hydro prior to the start of any clearing activities, and that a revised version of the EPP be provided for review within 5 days of commencement of clearing activities. The IEM has also requested that BC Hydro review the subsurface mulching activities proposed in the clearing prescriptions and confirm with the IEM in advance of any subsurface mulching activities that this approach is consistent with EAC Condition No. 2, *Fluvial Geomorphology and Sediment Transport*.

4.5 Public Safety

The IE has not reviewed the contractor safety plans in detail except to note that both plans include a Public Safety Management Plan component. The primary potential public safety hazards associated with the clearing works are related to equipment and vehicle traffic on public roads outside the work areas, or due to public entry into active work areas. The IE notes that these hazards, along with mitigation measures, are identified in the contractors' safety plans.

BC Hydro has advised the IE that it has reviewed and accepted both contractor safety plans. The IE notes that if helicopters are to be used in the north bank work, potential public hazards related to that activity should be assessed and added to the safety plan if necessary.

5.0 LEAVE TO CONSTRUCT

By copy of this letter, the Independent Engineer hereby confirms that BC Hydro can proceed with clearing the portions of the Eastern Reservoir comprising North Bank (Dam Site to Tea Creek, Wilder Creek to Cache Creek) and South Bank (South of Tea Island). For reference, this permission is referred to as *Leave to Construct LTC #4A*.

Leave to Construct for these clearing works is subject to the following conditions:

1. BC Hydro and/or its contractors must obtain and comply with any other necessary permits from provincial and/or federal regulatory agencies and affected pipeline owners.
2. If contractor public safety plans need to be revised to address potential public safety hazards related to helicopter use, copies of the revised plans must be provided to the IE for information.

3. BC Hydro must provide the IEM with additional information as requested in the attached IEM letter dated 19 December 2016.

Yours truly,

[redacted]

[redacted]
Independent Engineer, Site C Clean Energy Project

Attachment: IEM letter dated 19 December 2016

c: [redacted], BCH VP & Project Director (Site C Licensee Representative)
[redacted], SNC Lavalin (Site C Design Engineer)
[redacted], BCH (Site C Construction Engineer)
[redacted] BCH (Environment, Aboriginal Relations and Public Affairs Director)
[redacted], BCH (Regulatory Manager)
[redacted], Independent Environmental Monitor

TABLE 1

LTC #4A – EASTERN RESERVOIR CLEARING –NORTH AND SOUTH BANK AREAS
CLEARING PRESCRIPTION MAPS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

December 19, 2016

[redacted]

[redacted]

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water License 132991 IEM review of the North and South Bank Eastern Reservoir Clearing EPP and relevant component plans in consideration of LTC#4A

Leave to Commence Construction (LCC#4) was issued by the Deputy Comptroller of Water Rights as identified in the Conditional Water Licence (CWL) 132991[1] for the eastern reservoir clearing from the dam site upstream to and including Cache Creek valley.

It is the IEM's understanding that BC Hydro will be requesting approval of five separate Leaves to Construct (LTC's) (LTC#4A, LTC#4B, LTC#4C, LTC#4D, LTC#4E) applicable to LCC#4 reservoir clearing works.

While it is the role of the Independent Engineer (IE) to issue the LTCs, the Independent Environmental Monitor's (IEM's) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction. This letter has been prepared specifically for the clearing works associated with LTC#4A. It is our understanding that works under this LTC are to include the following:

- North Bank - dam site to Tea Creek,
- North Bank - Wilder Creek to Cache Creek, and
- South Bank - area south of Tea Island.

As the issuance of each LTC requires the IEM's review and recommendation for acceptance to the IE, it is the IEM's understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

[1] Conditional Water Licence 132991. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

The IEM has reviewed the EPP provided by BC Hydro and relevant component plans. The review included cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM, which are related to LTC#4A.

BC Hydro Plans/Documents

- *CEMP* (Revision 4), dated July 26, 2016.
- *Construction Safety Management Plan* (CSMP), dated June 5, 2015.
- BC Hydro - *Site C Clean Energy Project, North and South Bank Eastern Reservoir Clearing Environmental Protection Plan,* dated November 28, 2016.

[redacted]

- [redacted]
- [redacted]

Relevant Design and Conceptual Drawings – Signed and Sealed by Registered Professional Forester (RPF)

- Contract Map OLTC 7 Year 2 Harvesting, Drawing 1 of 12.
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 2 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 3 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 4 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 5 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 6 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 7 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 8 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 9 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 10 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 11 of 12
- Contract Map OLTC 7 Year 2 Harvesting, Drawing 12 of 12

Provincial Permits/Approvals

- MFLNRO – *Notice of Final Review re. Your Application for a Tenure Over Crown Land*, File 8015830, December 12, 2016.
- MFLNRO – *Site Specific Tenure*, Appendix E to BC Hydro Master Agreement, File 8015830, dated December 12, 2016.
- MFLNRO – *Letter re: Information to Avoid/Minimize Impacts to Environmental Values*, FCBC File # 8015830, dated December 9, 2016.
- MFLNRO - *Occupant License to Cut and Remove Timber L50571*, dated December 12, 2016.
- MFLNRO - *Occupant License to Cut and Remove Timber L50572*, dated December 12, 2016.
- MFLNRO - *Occupant License to Cut and Remove Timber L50573*, dated December 12, 2016.
- MFLNRO - Letter re. *Forest and Range Practices Act, Forest Planning and Practices Regulation* Section 91 Exemptions, File 19545-60/L50571, dated December 9, 2016.
- MFLNRO - Letter re. *Forest and Range Practices Act, Forest Planning and Practices Regulation* Section 91 Exemptions, File 19545-60/L50572, dated December 9, 2016.
- MFLNRO - Letter re. *Forest and Range Practices Act, Forest Planning and Practices Regulation* Section 91 Exemptions, File 19545-60/L50573, dated December 9, 2016.
- *Conditional Water Licence 132991.*

Review Summary

It is our understanding that the scope of work includes:

- Tree and merchantable timber removal;
- Waste wood collection and treatment; and
- New access road (approximately 3,479 linear metres) and/or trail development and deactivation.

As per communications forwarded to the IEM by the IE (as provided by BC Hydro on December 16, 2016), islands identified within LTC#4A clearing areas do not have merchantable timber, and as such do not require clearing. Subsequent LTCs may include clearing of islands.

Vegetation clearing along the south bank was previously completed under the Site C project Early Works, authorized by OLTC L50183. BC Hydro has contracted 4Evergreen Resources to clear an additional 3 km of vegetation commencing from the upstream end of RSEM area R5a to and including Tea Island (under OLTC L50183) and an additional 1.25 km beyond the area south of Tea Island (under OLTC L50571).

Safety plans were not reviewed in detail; the review was only to confirm that the plans are in place as required.

IEM Requirements

Upon review of the submitted documents for LTC#4A, and based on communications and information provided by BC Hydro, the IEM requests the following information be provided prior to the start of any clearing activities:

- Contact information for the contractors along with environmental staff and respective qualifications.
- A list of erosion and sediment contingency supplies to be readily available on site as identified by the contractors Qualified Professional.
- Additional details with regards to the potential impacts and associated mitigation measures, if any, in consideration of ungulate winter range and helicopter use.
- Provide refueling procedures and spill contingency planning for helicopter use.

The IEM will also require that a revised version of the EPP be provided for review within 5 days of commencement of clearing activities that addresses IEM comments as per the responses provided by BC Hydro on December 16, 2016.

The IEM also notes that EAC Condition No. 2, Fluvial Geomorphology and Sediment Transport, requires that the EAC holder "*leave stumps in place to reduce soil disturbance, erosion and sediment transport in the headpond during reservoir clearing to reduce soil disturbance and potential sedimentation issues*". It is the IEMs expectation that BC Hydro will review the subsurface mulching activities as proposed and confirm with the IEM that the approach is consistent with this requirement in advance of any subsurface mulching activities.

Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, regulations, and the CEMP.

Based on our understanding of the works proposed, we have no objections to issuing LTC#4A for the works associated with the North and South Bank Eastern Reservoir Clearing, as described.

Yours truly,

[redacted]

Independent Environmental Monitor, Delegate

cc. [redacted] Water Management Branch, Manager of Water Allocation and Utilities Section
[redacted], BC Hydro, Manager, Project Environmental Risk Management
[redacted], BC Hydro Regulatory Manager

[redacted]

08 February 2017

[redacted]
Manager, Water Allocation and Utility Regulation, Water Management Branch
Ministry of Forests, Lands and Natural Resource Operations
[redacted]
Via email: [redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licence 132991
Leave to Construct LTC #4A – Eastern Reservoir Clearing – North and South Bank Areas
Amendment #1 – Change of Contractor

1.0 INTRODUCTION

Leave to Commence Construction LCC #4 for clearing of the Eastern area and a limited portion of the Central area of the proposed Site C reservoir was issued 06 December 2016. Leave to Construct LTC #4A for the North Bank (Dam Site to Tea Creek, Wilder Creek to Cache Creek) and South Bank (South of Tea Island) was issued 19 December 2016. At that time, BC Hydro had contracted with [redacted] to clear the North Bank areas and with [redacted] to clear the South Bank areas.

[redacted] has started clearing operations on the South Bank. However, BC Hydro has changed contractors for the North Bank clearing work and has now engaged [redacted] to undertake this portion of the work for eastern reservoir clearing under LTC #4A. The Independent Engineer (IE) considers the change of contractor to be a material change from the plans originally submitted for LTC #4A.

The IE and the Independent Environmental Monitor (IEM) have received the following information from BC Hydro in support of the request for an amendment to LTC #4A:

1. [redacted]
2. Extract from BC Hydro Public Safety Plan, *Section 5.3*.

Since LTC #4A was issued, BC Hydro has also issued an update to the Environmental Protection Plan (EPP) for this work:

3. BC Hydro - *Site C Clean Energy Project, North and South Bank Eastern Reservoir Clearing Environmental Protection Plan, including Appendices, R1*, 22 December 2016.

The updated EPP includes revisions to address previous comments by the IEM. [redacted] will adopt this EPP for their clearing works.

[redacted]

Additionally, BC Hydro has advised the IE that:

- While the final version of the Safety Management Plan has not yet been received, BC Hydro views the submission as significantly complete, with only minor improvements to be made prior to acceptance.
- The contractor will access the north bank clearing area through Site C (controlled by the Site C gates), overland along the left bank and by boat. There are no public roads accessing this area at this time. However, BC Hydro is undertaking discussions with MOTI to obtain a temporary use permit to access the western portion of the site through Highway 29.
- [redacted] has chosen not to carry out any helicopter work at this time. If required in the future, BC Hydro Air Operations will review and approve the work.

The Safety Management Plan indicates that [redacted] will follow BC Hydro's Public Safety Management Plan (item 2 noted above). The primary potential public safety hazards associated with the clearing works are related to equipment and vehicle traffic on public roads outside the work areas, or due to public entry into active work areas. The IE notes that these hazards, along with mitigation measures, are identified in the contractor's safety plan.

If access plans change to include Highway 29 or other public roads or use of helicopters, the IE recommends that appropriate safety, security and traffic management details be added to the safety plan.

The IE has discussed the work with the IEM, and both parties viewed a portion of the North Bank area identified for clearing during a site visit on 25 January 2017. The IE and IEM have reviewed the above-noted submissions and consider that the change of contractor as described in the submitted documents is consistent with the conditions of Conditional Water Licence 132991 and with BC Hydro's requirements.

By copy of this letter, the Independent Engineer confirms that BC Hydro can proceed with clearing the portions of the Eastern Reservoir comprising North Bank (Dam Site to Tea Creek, Wilder Creek to Cache Creek), with clearing to be performed by [redacted]. IEM requirements for LTC #4A will still apply to this work. If the contractor's public safety plan needs to be revised to address public safety hazards related to road or helicopter access, a copy of the revised plan must be provided to the IE for information.

For reference, this permission is referred to as *Leave to Construct LTC #4A, Amendment #1.*

[redacted]
Independent Engineer Alternate, Site C Clean Energy Project

[redacted]

Reviewed by

[redacted]

[redacted] Independent Engineer

c:
- [redacted], BCH VP & Project Director (Site C Licensee Representative)
- [redacted], SNC Lavalin (Site C Design Engineer)
- [redacted], BCH (Site C Construction Engineer)
- [redacted], BCH (Environment, Aboriginal Relations and Public Affairs Director)
- [redacted], BCH (Regulatory Manager)
- [redacted], Independent Environmental Monitor

[redacted]

14 June 2017

[redacted] P.Eng.
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]
Via email: [redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licence 132991
Leave to Construct LTC #04B – North Bank Central Reservoir Clearing – Highway 29 at Cache Creek
Recommendation for Amendment #1 - Archaeological Site Stripping

Leave to Commence Construction LCC #04 for clearing of Crown land in the Eastern area and a limited portion of the Central area of the proposed Site C reservoir was issued 06 December 2016 by the Deputy Comptroller of Water Rights. Leave to Construct LTC #04B for clearing of north bank Crown lands in the Central Reservoir area adjacent to proposed Highway 29 realignment works at Cache Creek was issued 23 January 2017.

Clearing of these lands was completed in accordance with the applicable Environmental Protection Plan and Harvest Prescription in March 2017. One of the treatment units in the Harvest Prescription applied to heritage sites identified within the clearing area. Each heritage site was assigned one of five categories of heritage management requirements, ranging from "*no work zone*" to "*no further (heritage management) works required*".

BC Hydro now plans to undertake Archaeological Site Stripping at heritage sites located within the clearing boundaries of LTC#04B. The stripping activities were not included in the original scope of work for LTC #04B and the IE recommends that they be authorized by an amendment to the LTC.

The IE and the IEM have received and reviewed the following submissions describing the proposed works:

1. BC Hydro - *Site C Clean Energy Project, Request for Amendment to undertake Archaeological Stripping - LCC4, Leave to Construct 4B (LTC4B) – North Bank Central Reservoir Clearing - Highway 29 at Cache Creek*, letter from [redacted] to [redacted], 09 June 2017.
2. BC Hydro - *Description and Photos of Archaeology Site Stripping*, internal memo from [redacted] and [redacted], 09 June 2017.
3. [redacted] – *Issued for Construction drawings* – see Table 1.
4. [redacted] – *Environmental Protection Plan, Bear Flat-Cache Creek, Archaeological Site Stripping*, Revision 1, Prepared for: [redacted], 02 June 2017.

The Environmental Protection Plan (EPP) and the Issued for Construction drawings apply to both the Crown land areas cleared under LTC #04B and the adjacent areas cleared for the Highway 29 realignment works. The drawings show the locations and stripping depth, area and volume for each heritage site.

[redacted]

Archaeological site stripping will involve removal of the topsoil to a specified depth, which will be placed in windrows alongside the sites, usually no more than 1 m high. Site-specific stripping depths are based on an archaeological impact assessment and systematic data recovery to identify and target specific depths associated with cultural levels and artifact concentrations. Within the LTC #04B clearing areas, several of the heritage sites are designated as "*no work zones*" and the rest will be stripped to depths ranging from 0.1 m to 0.3 m.

An archaeology crew including heritage field assistants from local First Nations will inspect the stripped surfaces and examine the topsoil in the windrows to collect and map surface artifacts. The soil will then be relocated to designated stockpile areas shown on the drawings.

The EPP includes descriptions of anticipated work activities and applicable mitigation measures related to work planning and execution that are intended to reduce potential environmental impacts. Erosion and sediment control measures will be applied to the stripped areas as the work advances. Site restoration after the stripping is completed will include ground contouring, restoration of drainage patterns and decompaction of disturbed soils, and may include re-vegetation.

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with archaeological site stripping of portions of Crown land areas cleared under LTC #04B as described above and in accordance with the submitted Environmental Protection Plan. This recommendation is copied to BC Hydro and is sufficient for these activities to proceed. For reference, this recommendation is referred to as *Leave to Construct LTC #04B, Amendment #1*.

Leave to Construct LTC #04B, Amendment #1 is subject to the following conditions:

1. Prior to the start of work, BC Hydro must confirm to the IEM that its outstanding comments on the EPP have been addressed to its satisfaction.
2. Prior to application of any seed for erosion and sediment control or for site reclamation purposes, BC Hydro must confirm to the IEM that the proposed seed mix described in EPP Section 15.2 is compliant with Environmental Assessment Certificate Schedule B condition no. 8.
3. It is acknowledged that there is a low likelihood of encountering potentially acid generating (PAG) materials during the archaeological site stripping. If PAG material is encountered, it must be managed in accordance with Appendix E (*Acid Rock Drainage and Metal Leachate Management Plan*) of the CEMP.

Yours truly,

[redacted]

[redacted] *P.Eng.*
Independent Engineer, Site C Clean Energy Projec

[redacted]

Attachment – Table 1 – Issued for Construction Drawings

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted], BCH (Site C Construction Engineer)
[redacted], BCH (Regulatory Manager)
[redacted], Independent Environmental Monitor
[redacted], FLNRO Water Management Officer
[redacted] FLNRO Water Management Officer

TABLE 1
LTC #04B – NORTH BANK CENTRAL RESRVOIR CLEARING – HIGHWAY 29 AT CACHE CREEK
AMENDMENT #1 – ARCHAEOLOGICAL SITE STRIPPING
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

14 June 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licence 132991
Leave to Construct LTC #04B – North Bank Central Reservoir Clearing – Highway 29 at Cache Creek
Recommendation for Amendment #1 - Archaeological Site Stripping

Leave to Commence Construction LCC #04 for clearing of Crown land in the Eastern area and a limited portion of the Central area of the proposed Site C reservoir was issued 06 December 2016 by the Deputy Comptroller of Water Rights. Leave to Construct LTC #04B for clearing of north bank Crown lands in the Central Reservoir area adjacent to proposed Highway 29 realignment works at Cache Creek was issued 23 January 2017.

Clearing of these lands was completed in accordance with the applicable Environmental Protection Plan and Harvest Prescription in March 2017. One of the treatment units in the Harvest Prescription applied to heritage sites identified within the clearing area. Each heritage site was assigned one of five categories of heritage management requirements, ranging from "*no work zone*" to "*no further (heritage management) works required*".

BC Hydro now plans to undertake Archaeological Site Stripping at heritage sites located within the clearing boundaries of LTC#04B. The stripping activities were not included in the original scope of work for LTC #04B and the IE recommends that they be authorized by an amendment to the LTC.

The IE and the IEM have received and reviewed the following submissions describing the proposed works:

1. BC Hydro - *Site C Clean Energy Project, Request for Amendment to undertake Archaeological Stripping - LCC4, Leave to Construct 4B (LTC4B) – North Bank Central Reservoir Clearing - Highway 29 at Cache Creek*, letter from [redacted] to [redacted], 09 June 2017.
2. BC Hydro - *Description and Photos of Archaeology Site Stripping*, internal memo from [redacted] and [redacted] to [redacted], 09 June 2017.
3. [redacted]
4. [redacted]

The Environmental Protection Plan (EPP) and the Issued for Construction drawings apply to both the Crown land areas cleared under LTC #04B and the adjacent areas cleared for the Highway 29 realignment works. The drawings show the locations and stripping depth, area and volume for each heritage site.

[redacted]

Archaeological site stripping will involve removal of the topsoil to a specified depth, which will be placed in windrows alongside the sites, usually no more than 1 m high. Site-specific stripping depths are based on an archaeological impact assessment and systematic data recovery to identify and target specific depths associated with cultural levels and artifact concentrations. Within the LTC #04B clearing areas, several of the heritage sites are designated as *"no work zones"* and the rest will be stripped to depths ranging from 0.1 m to 0.3 m.

An archaeology crew including heritage field assistants from local First Nations will inspect the stripped surfaces and examine the topsoil in the windrows to collect and map surface artifacts. The soil will then be relocated to designated stockpile areas shown on the drawings.

The EPP includes descriptions of anticipated work activities and applicable mitigation measures related to work planning and execution that are intended to reduce potential environmental impacts. Erosion and sediment control measures will be applied to the stripped areas as the work advances. Site restoration after the stripping is completed will include ground contouring, restoration of drainage patterns and decompaction of disturbed soils, and may include re-vegetation.

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with archaeological site stripping of portions of Crown land areas cleared under LTC #04B as described above and in accordance with the submitted Environmental Protection Plan. This recommendation is copied to BC Hydro and is sufficient for these activities to proceed. For reference, this recommendation is referred to as *Leave to Construct LTC #04B, Amendment #1*.

Leave to Construct LTC #04B, Amendment #1 is subject to the following conditions:

1. Prior to the start of work, BC Hydro must confirm to the IEM that its outstanding comments on the EPP have been addressed to its satisfaction.
2. Prior to application of any seed for erosion and sediment control or for site reclamation purposes, BC Hydro must confirm to the IEM that the proposed seed mix described in EPP Section 15.2 is compliant with Environmental Assessment Certificate Schedule B condition no. 8.
3. It is acknowledged that there is a low likelihood of encountering potentially acid generating (PAG) materials during the archaeological site stripping. If PAG material is encountered, it must be managed in accordance with Appendix E (*Acid Rock Drainage and Metal Leachate Management Plan*) of the CEMP.

Yours truly,

[redacted]

[redacted]

Independent Engineer, Site C Clean Energy Project

Attachment – Table 1 – Issued for Construction Drawings

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted], BCH (Site C Construction Engineer)
[redacted], BCH (Regulatory Manager)
[redacted], Independent Environmental Monitor
[redacted], FLNRO Water Management Officer
[redacted], FLNRO Water Management Officer

TABLE 1
LTC #04B – NORTH BANK CENTRAL RESRVOIR CLEARING – HIGHWAY 29 AT CACHE CREEK
AMENDMENT #1 – ARCHAEOLOGICAL SITE STRIPPING
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

16 June 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Recommendation for Leave to Construct LTC #05C - Stage 1 Left Bank Cofferdam

1.0 INTRODUCTION

Conditional Water Licences (CWLs) 132990 and 132991 dated 26 February 2016 authorize construction of works for the storage, diversion and use of water from the Peace River for power purposes at the Site C Clean Energy Project (Site C). Leave to Commence Construction of the works comprising LCC #01 under CWLs 132990 and 132991 was granted to BC Hydro and Power Authority (BC Hydro) on 01 April 2016.

Leave to Commence Construction LCC #05 was granted to BC Hydro, with conditions, on 25 April 2017. The project components included in LCC #05 are located on the left bank and in the river channel of the dam site and comprise:

- Diversion inlet & outlet portal and channel excavations
- Diversion tunnel inlet & outlet portal structures
- Diversion tunnels
- Stage 1 left bank cofferdam
- Left bank earthfill dam core trench excavation
- Left bank drainage adit
- In-river excavations for tailrace and downstream river channel

Leave to Construct LTC #05A for construction of the diversion inlet works portal and channel including the in-river portion of the channel was issued on 12 May 2017. Limited construction of those works has commenced.

As Independent Engineer (IE) for the Site C project, I have received a submission from BC Hydro requesting permission to commence construction of the Stage 1 left bank cofferdam, including the left bank earthfill dam core trench excavation inside the cofferdam. The proposed works would be constructed by BC Hydro's contractor for the Site C Main Civil Works, [redacted] in conjunction with their subcontractor, [redacted] For reference, these works are to be authorized under *Leave to Construct LTC #05C*.

Most of the alignment for the left bank cofferdam is along an existing mid-stream island in the Peace River. To minimize potential construction constraints due to nesting birds, clearing, grubbing and stripping of portions of the mid-stream island were authorized under *Initial Portion of Leave to Construct LTC #05C*

dated 26 May 2017. Those activities have already been completed except for buffer zones left around bird nests that were established prior to the start of work.

2.0 DESCRIPTION OF THE WORKS

[redacted]

3.0 LTC #05C SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #05C:

1. BC Hydro - *Site C Clean Energy Project Request for LCC5 Component Authorization, Leave to Construct 5C (LTC5C) – Left Bank Cofferdam*, letter from [redacted] to [redacted] 23 May 2017.
2. [redacted]
5. BC Hydro - *Issued for Construction Drawings for Earthfill Dam Foundation Excavation* (see Table 1).

4.0 REVIEW OF SUBMISSIONS

4.1 Design Details and Construction Drawings

The construction drawings show the information that would typically be expected for works of this nature, including plans, sections and details of the Stage 1 left bank cofferdam and the instrumentation that is to be installed. Some of the drawings were included in the Stage 1 cofferdam design report that was previously submitted with the request for LCC #03.

[redacted]

The drawings provided have been sealed by Professional Engineers registered in British Columbia and are Issued for Construction status. It is the IE's opinion that the drawings are consistent with the Site C project general arrangement drawings, the design basis and the conditions of Conditional Water Licences 132990 and 132991.

4.2 Construction Implementation Plan and Schedule

[redacted]

[redacted]

[redacted]

The IE considers the work plan to be appropriate to the work, and that the proposed schedule is reasonable.

4.3 Quality Management

[redacted]

The application for LTC #05C lists ITPs for Left Bank Cofferdam and Earthfill Dam Foundation, which will cover the types of work included in the left bank cofferdam construction.

4.4 Environmental Protection

The EPP is included in the application document for LTC #05C, and includes descriptions of anticipated work activities and applicable mitigation measures to reduce potential environmental impacts. BC Hydro has accepted the EPP, subject to its review comments being addressed.

Construction of the downstream leg of the cofferdam across the Peace River side channel between the mid-stream island and the north bank will require fish salvage to be carried out ahead of in-water works.

[redacted]

The IE has discussed the work with the IEM and both parties are familiar with the area where the inlet channel and portal works will be constructed.

The IEM has provided the IE with comments on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] – *Site C Clean Energy Project – Conditional Water License 132990 IEM review of the Left Bank Cofferdam (Stage 1) and relevant component plans in consideration of LTC#5C,* letter to [redacted] dated 16 June 2017.

The IEM has no objections to issuing LTC #05C, but has requested confirmations regarding the use of collected water and the capacity of the temporary left bank sediment pond, and has requested that the IEM team receive a copy of an anticipated revision of the EPP.

4.5 Dam Safety

The FLNRO Dam Safety Officer has reviewed the submissions for the Stage 1 left bank cofferdam, as documented in the following:

1. [redacted] Senior Dam Safety Officer - *Site C Clean Energy Project, Conditional Water Licences 132990 and 132991 on Peace River, Request for Leave to Construct – Left Bank Cofferdam (LTC 5C)*, letter to [redacted] dated 15 June 2017.

The Dam Safety Officer accepts the submitted information.

[redacted] The *Operations Maintenance and Surveillance Plan* and *Emergency Response Plan* for the Stage 1 cofferdams are in place and have been accepted by the FLNRO Dam Safety Officer. The IE notes that these plans may require the addition of details specific to each of the left bank cofferdams prior to work proceeding inside the dewatered areas.

4.6 Public Safety

The application document for LTC #05C notes that except for the limited in-river activities, the work will take place entirely on land within the project area, with no public access. The in-river construction work will be in the side channel which is already closed off at the upstream end by the inlet cofferdam embankment. [redacted]

5.0 RECOMMENDATION FOR LEAVE TO CONSTRUCT LTC#05C

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with construction of the Stage 1 left bank cofferdam works as described above. As per LCC #05 dated 25 April 2017, this recommendation is copied to BC Hydro and is sufficient for construction of these works to proceed. For reference, this recommendation is referred to as *Leave to Construct LTC #05C*.

Leave to Construct LTC# 05C for construction of the Stage 1 left bank cofferdam works is subject to the conditions of LCC #05 which are attached to this letter as Appendix A for reference.

In addition, as requested by the IEM:

1. Water collected in ponds and sumps must not be used for dust suppression or other purposes until such time as approval is obtained from the Comptroller of Water Rights, with confirmation provided to the IEM.
2. Confirmation must be provided that the temporary left bank sediment pond has the capacity to manage the potential additional waters as proposed in the EPP and Care of Water Plan prior to any use of the pond, recognizing that it was designed to manage water from other potential sources in the left bank area.
3. All other BC Hydro comments provided on the LTC#05C Left Bank Cofferdam Application (R0) must be completed to BC Hydro's satisfaction and copied to the IEM team in a subsequent revision of the EPP for the proposed works.

Yours truly,

[redacted]

[redacted] *P.Eng.*
Independent Engineer, Site C Clean Energy Project

Attachments:
1. Table 1 – Issued for Construction Drawings
2. Appendix A – LCC #05 Conditions
3. IEM letter dated 16 June 2017

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted], BCH (Regulatory Manager)
[redacted], SNC Lavalin (Site C Design Engineer)
[redacted], BCH (Site C Construction Engineer)
[redacted], Independent Environmental Monitor
[redacted], FLNRO Water Management Officer
[redacted], FLNRO Water Management Officer
[redacted], FLNRO Dam Safety Officer

TABLE 1
LTC #05C – STAGE 1 LEFT BANK COFFERDAM
ISSUED FOR CONSTRUCTION DRAWINGS

Left Bank Stage 1 Cofferdam (by [redacted]

Drawing No.	Revision	Title
[redacted]		

Earthfill Dam Core Trench & Foundation Excavation (by BC Hydro)

Drawing No.	Revision	Title
[redacted]		

APPENDIX A
LCC #05 – CONDITIONS

No.	Condition	Status for LTC #05C
a)	Before the construction of any component of LCC #5 may proceed, the Licensee must: • submit relevant design drawings signed and sealed by a professional engineer registered in the province of British Columbia to [redacted] to review in his capacity as IE, and • receive a copy of a report (the "Recommendation Report") submitted by the IE to the DCWR under the Water Sustainability Act, which recommends that construction of that component of LCC #5 may proceed. The Recommendation Report is in the form of a letter and is sufficient for construction of that component to proceed.	Completed.
b)	In-river works for the tailrace and downstream river channel that are outside the area shaded grey on DWG NO 1016-C14-B6158-22 dated November 8, 2012 (attached in Appendix D of LCC #5) are not authorized for construction under LCC #5.	Not applicable.
c)	The Licensee may request the DCWR to review any of the IE's Recommendation Reports and make alterations to the Leave to Construct.	If and as required.
d)	If during construction material changes to the works of LCC #5 are proposed, the changes must be authorized through the process described in No. a) above.	If and as required.
e)	Any revisions to sections of the CEMP that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed by the IEM and accepted by the Deputy Comptroller of Water Rights	If and as required.

[redacted]

[redacted]

June 16, 2017

[redacted]

[redacted]

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water License 132990 IEM review of the Left Bank Cofferdam (Stage 1) and relevant component plans in consideration of LTC#5C

Leave to Commence Construction (LCC#5) was issued by the Deputy Comptroller of Water Rights as identified in the Conditional Water Licence (CWL) 132990[1] for the construction of the following key components:

Inlet Works Portal and Channel Including In-River Portion of Channel.

Outlet Works Portal and Channel Including In-River Works for the Tailrace and Downstream River Channel.

Stage 1 Left Bank Cofferdam Including Slurry Cut-off Wall and Grouting and Left Bank Earthfill Dam Core Trench Excavation.

Left Bank Drainage Adit including Portal Works.

Diversion Tunnels Excavation and Rock Support.

Diversion Tunnels Lining and Inlet & Outlet Concrete Structures.

Diversion Tunnel Gates and Electro-Mechanics Installation and Testing.

While it is the role of the Independent Engineer (IE) to make a recommendation to the Deputy Comptroller of Water Rights for the issuance of LTCs, the Independent Environmental Monitor's (IEMs) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction.

[1] Conditional Water Licence 132990. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

This letter has been prepared specifically for works associated with the construction of the left bank stage 1 cofferdam, herein referred to as LTC#5C. Based on the letter provided from BC Hydro to the Independent Engineer (dated May 23, 2017), it is our understanding that works under this LTC are to include the following:

> Construction of the left bank cofferdam, including foundation, fill placement and slurry cutoff wall.
>
> Excavation of the main earthfill dam core trench inside the left bank cofferdam.

Based on the description of associated construction activities within this letter, we further understand that foundation treatment, consolidation, curtain grouting, and other elements of the main earthfill dam will be components of a separate LTC. The IEM has reviewed the EPP provided by BC Hydro including cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM team, which are related to LTC#5C.

BC Hydro Plans/Documents

> *Construction Environmental Management Plan* (Revision 4), dated July 26, 2016.
>
> *Site C Clean Energy Project Request for LCC5 Component Authorization, Leave to Construct 5C (LTC5C) – Left Bank Cofferdam*, letter from [redacted] to [redacted] dated May 23, 2017.

[redacted]

Provincial and Federal Permits/Approvals

> *Conditional Water Licence 132990.*
>
> *Fisheries Act* Authorization 15-HPAC-01160.
>
> *Navigation Protection Act* Approval File Number 2008-500822 and 2015-500399.
>
> *Wildlife Act* Amphibian Salvage Permit FJ16-226024.
>
> *Wildlife Act* Fish Salvage Permit FJ16-225327 (amended October 17, 2016).
>
> Licence No.: 815646 issued under the *Land Act.*

Conclusions and Recommendations

As the issuance of each LTC requires the IEMs review and recommendation for acceptance to the IE, it is the IEMs understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

Based on our review of the information provided in both the submission documents and subsequent communications, the IEM requests the following:

EPP table 7.5.1 includes a line time that states "other ponds or sumps, with no outlet to a watercourse, if used for dust suppression." This potential source of water must not be used for this or any other purpose until such time as approval is obtained from the Comptroller of Water Rights, with confirmation provided to the IEM.

Confirmation be provided that the temporary left bank sediment pond has the capacity to manage the potential addition waters as proposed in the EPP/CoWP prior to any use of the pond, recognizing that it was designed to manage water from other potential sources in the left bank area.

All other BC Hydro comments provided on the LTC#5C Left Bank Cofferdam Application (Revision 0) are completed to their satisfaction and copied to the IEM team in a subsequent revision of the EPP for the proposed works.

The IEM also notes that:

Comments provided by BC Hydro regarding the LTC#5C Left Bank Cofferdam Application and public safety requirements should be addressed prior to construction.

[redacted]

[redacted]

BC Hydro comments regarding the approach to erosion and sediment control as described in the EPP have been address to their satisfaction [redacted] pers. comm., June 16, 2017).

BC Hydro has reviewed and accepted the [redacted] with several comments to be updated in a subsequent version of the plan [redacted] June 16, 2017).

Upon review of the submitted documents for LTC#5C, and based on our understanding of the works proposed in addition to communications and information provided by BC Hydro, we have no objections to issuing LTC#5C for the works as described. Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, regulations, and the CEMP.

Yours truly,

[redacted]

[redacted]
Independent Environmental Monitor

cc. [redacted] Water Management Branch, Manager of Water Allocation and Utilities Section
[redacted] FLNRO Water Management Office
[redacted] FLNRO Water Management Officer
[redacted] BC Hydro, Manager, Project Environmental Risk Management
[redacted] BC Hydro Regulatory Manager

[redacted]

12 May 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Recommendation for Leave to Construct LTC #05A
Diversion Inlet Works Portal and Channel Including In-River Portion of Channel

1.0 INTRODUCTION

Conditional Water Licences (CWLs) 132990 and 132991 dated 26 February 2016 authorize construction of works for the storage, diversion and use of water from the Peace River for power purposes at the Site C Clean Energy Project (Site C). Leave to Commence Construction of the works comprising LCC #01 under CWLs 132990 and 132991 was granted to BC Hydro and Power Authority (BC Hydro) on 01 April 2016.

Leave to Commence Construction LCC #05 was granted to BC Hydro, with conditions, on 25 April 2017. The project components to be included in LCC #05 are located on the left bank and in the river channel of the dam site and comprise:

- Diversion inlet & outlet portal and channel excavations
- Diversion tunnel inlet & outlet portal structures
- Diversion tunnels
- Stage 1 left bank cofferdam
- Left bank earthfill dam core trench excavation
- Left bank drainage adit
- In-river excavations for tailrace and downstream river channel

As Independent Engineer (IE) for the Site C project, I have received a submission from BC Hydro requesting permission to commence construction of the diversion tunnel inlet works consisting of:

- Excavation of the diversion inlet portal, including rock stabilization, and
- Construction of portions of the diversion inlet channel

The portions of the diversion inlet channel included in the request are the portions located inside and outside of the Stage 1 diversion inlet cofferdam. The remaining length of the inlet channel that will later be formed by removing a portion of the inlet cofferdam as part of Stage 2 diversion works will be authorized under a future LCC.

These works are to be constructed by BC Hydro's Main Civil Works contractor, [redacted] For reference, construction of these works is to be authorized under *Leave to Construct LTC #05A*.

2.0 DESCRIPTION OF THE WORKS

[redacted]

3.0 LTC #05A SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #05A:

1. BC Hydro - *Site C Clean Energy Project Request for LCC5 Component Authorization, Leave to Construct 5A (LTC5A) – Inlet Works (Portal and Channel)*, letter from [redacted] to [redacted] 06 May 2017.

4.0 REVIEW OF SUBMISSIONS

4.1 Design Details and Construction Drawings

[redacted]

The inlet channel and portal excavations have been designed by BC Hydro, except for the overburden slopes which are to be designed by the contractor. The construction drawings by BC Hydro show the information that would typically be expected for works of this nature, including plans, sections and details of the diversion inlet portal and inlet channel. Drawings for the contractor-designed overburden slopes have not yet been received because the final design of those slopes will be impacted by the design of remedial measures for the slope instability. [redacted]

[redacted]

[redacted]

Bedding plane BP25, an important and continuous geological feature, is projected to be exposed near the base of the diversion inlet portal excavation. There are no special design or construction requirements for this feature with respect to the inlet portal excavation.

The drawings provided have been sealed by Professional Engineers registered in British Columbia and are Issued for Construction status. It is the IE's opinion that the drawings are consistent with the Site C project general arrangement drawings, the design basis and the conditions of Conditional Water Licences 132990 and 132991.

4.2 Construction Implementation Plan and Schedule

[redacted]

[redacted]

[redacted]

These works will be authorized under a future LCC.

The IE considers the work plan to be appropriate to the work, and that the proposed schedule is reasonable.

4.3 Quality Management

Details of [redacted] were previously submitted and reviewed with the request for LCC #1. As part of that program, [redacted] has developed standard Inspection and Test Plans (ITPs) for specific types of work, which are reviewed by BC Hydro in accordance with the Main Civil Works contract.

The application for LTC #05A lists ITPs for Left Bank Excavation, Rock Support and Cast-in-Place Concrete, which cover the types of work included in the inlet portal works construction.

4.4 Environmental Protection

The Environmental Protection Plan (EPP) is included in the application document for LTC #05A, and includes descriptions of anticipated work activities and applicable mitigation measures to reduce potential environmental impacts. BC Hydro has accepted the EPP.

Most of the portal excavations will occur above or inside the diversion inlet cofferdam, which should allow PAG contact water to be readily collected and managed.

[redacted]

The IE has discussed the work with the IEM and both parties are familiar with the area where the inlet channel and portal works will be constructed.

The IEM has provided the IE with comments on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] – *Site C Clean Energy Project – Conditional Water License 132990 IEM review of the Inlet Works Portal and Channel Including In-River Portion of Channel and relevant component plans in consideration of LTC#5A,* letter to [redacted] dated 12 May 2017.

The IEM has no objections to issuing LTC #05A.

4.5 Dam Safety

The lower portion of the inlet portal works and the downstream end of the inlet channel will be constructed inside the Stage 1 diversion inlet cofferdam. The *Operations Maintenance and Surveillance Plan* and *Emergency Response Plan* for the Stage 1 cofferdams are in place and have been accepted by the FLNRO Dam Safety Officer.

4.6 Public Safety

The application document for LTC #05A notes that except for the in-river activities, the work will take place entirely on land within the project area, with no public access. [redacted]

5.0 RECOMMENDATION FOR LEAVE TO CONSTRUCT LTC#05A

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with construction of the diversion inlet channel and diversion inlet portal as described above. As per LCC #05 dated 25 April 2017, this recommendation is copied to BC Hydro and is sufficient for construction of these works to proceed. For reference, this recommendation is referred to as *Leave to Construct LTC #05A*.

Leave to Construct LTC# 05A for construction of the diversion inlet channel and diversion inlet portal is subject to the conditions of LCC #05 which are attached to this letter as Appendix A for reference.

In addition:

1. The Issued for Construction drawings and any supporting information for the contractor-designed overburden excavation must be submitted to the IE, and the IE must issue an LTC Amendment before construction of the final overburden excavation can proceed.
2. If a temporary PAG stockpile is required, the Issued for Construction drawing(s) and details of related PAG contact water management must be submitted to the IE and the IEM, and the IE must issue an LTC Amendment before construction of the stockpile can proceed.
3. As noted in the attached letter from the IEM, the IEM requests that:
    a. Confirmation be provided to the IEM once downstream turbidity monitoring dataloggers have been relocated, and
    b. A copy of the ESC work plan be provided to the IEM in advance of initiating the activities described as environmental hold points in Table 9.1 of the EPP.
4. The IE requests that a copy of the designer-of-record certification for the Stage 1 inlet cofferdam be provided to the IE for information before excavation inside the cofferdam advances below river level.

Yours truly,

[redacted]

[redacted]

[redacted]

Independent Engineer, Site C Clean Energy Project

Attachments:

1. Table 1 – Issued for Construction Drawings
2. Appendix A – LCC #05 Conditions
3. IEM letter dated 12 May 2017

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] BCH (Environment, Aboriginal Relations and Public Affairs Director)
[redacted] BCH (Regulatory Manager)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted] BCH (Site C Construction Engineer)
[redacted] Independent Environmental Monitor
[redacted] FLNRO Water Management Officer
[redacted] FLNRO Water Management Officer
[redacted] FLNRO Dam Safety Officer

TABLE 1
LTC #05A – DIVERSION INLET WORKS PORTAL & CHANNEL INCLUDING IN-RIVER PORTION OF CHANNEL
ISSUED FOR CONSTRUCTION DRAWINGS

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

APPENDIX A
LCC #05 – CONDITIONS

No.	Condition	Status for LTC #05A
a)	Before the construction of any component of LCC #5 may proceed, the Licensee must: • submit relevant design drawings signed and sealed by a professional engineer registered in the province of British Columbia to [redacted] P. Eng. to review in his capacity as IE, and • receive a copy of a report (the "Recommendation Report") submitted by the IE to the DCWR under the Water Sustainability Act, which recommends that construction of that component of LCC #5 may proceed. The Recommendation Report is in the form of a letter and is sufficient for construction of that component to proceed.	Completed, except for drawings for contractor-designed overburden slopes.
b)	In-river works for the tailrace and downstream river channel that are outside the area shaded grey on DWG NO 1016-C14-B6158-22 dated November 8, 2012 (attached in Appendix D of LCC #5) are not authorized for construction under LCC #5.	Not applicable.
c)	The Licensee may request the DCWR to review any of the IE's Recommendation Reports and make alterations to the Leave to Construct.	If and as required.
d)	If during construction material changes to the works of LCC #5 are proposed, the changes must be authorized through the process described in No. a) above.	If and as required.
e)	Any revisions to sections of the CEMP that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed by the IEM and accepted by the Deputy Comptroller of Water Rights	If and as required.

[redacted]

May 12, 2017

[redacted]

[redacted]

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water License 132990 IEM review of the Inlet Works Portal and Channel Including In-River Portion of Channel and relevant component plans in consideration of LTC#5A

Leave to Commence Construction (LCC#5) was issued by the Deputy Comptroller of Water Rights as identified in the Conditional Water Licence (CWL) 132990[1] for the construction of the following key components:

Inlet Works Portal and Channel Including In-River Portion of Channel.

Outlet Works Portal and Channel Including In-River Works for the Tailrace and Downstream River Channel.

Stage 1 Left Bank Cofferdam Including Slurry Cut-off Wall and Grouting and Left Bank Earthfill Dam Core Trench Excavation.

Left Bank Drainage Adit including Portal Works.

Diversion Tunnels Excavation and Rock Support.

Diversion Tunnels Lining and Inlet & Outlet Concrete Structures.

Diversion Tunnel Gates and Electro-Mechanics Installation and Testing.

While it is the role of the Independent Engineer (IE) to make a recommendation to the Deputy Comptroller of Water Rights for the issuance of LTCs, the Independent Environmental Monitor's (IEMs) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction.

[1] Conditional Water Licence 132990. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

This letter has been prepared specifically for works associated with the inlet portal and associated channel workss, herein referred to as LTC#5A. It is our understanding that works under this LTC are to include the following:

Excavation of the diversion inlet portal, including rock stabilization.

Construction of portions of the diversion inlet channel.

Based on the description of associated construction activities, diversion channel inlet excavations will be located both within the confines of the inlet cofferdam and portions of the Peace River outside of isolation structures. The IEM has reviewed the EPP provided by BC Hydro including cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM team, which are related to LTC#5A.

BC Hydro Plans/Documents

Construction Environmental Management Plan (Revision 4), dated July 26, 2016.

Site C Clean Energy Project Request for LCC5 Component Authorization, Leave to Construct 5A (LTC5A) – Inlet Works (Portal and Channel), letter from [redacted] to [redacted], dated May 6, 2017.

[redacted]

Additional Relevant Design and Conceptual Drawings

BC Hydro – *Drawing 1020-C11-00555 – Left Bank Area L5 Construction Water Management Temporary Garbage Creek Diversion Discharge Pipe Outlet.*

Provincial and Federal Permits/Approvals

Conditional Water Licence 132990.

Fisheries Act Authorization 15-HPAC-01160.

Navigation Protection Act Approval File Number 2008-500822 and 2015-500399.

Wildlife Act Amphibian Salvage Permit FJ16-226024.

Wildlife Act Fish Salvage Permit FJ16-225327 (amended October 17, 2016).

Licence No.: 815646 issued under the *Land Act*.

Safety plans were not reviewed in detail, the review was only to confirm that the plans are in place as required.

Conclusions and Recommendations

As the issuance of each LTC requires the IEMs review and recommendation for acceptance to the IE, it is the IEMs understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

Based on our review of the information provided in both the submission documents and subsequent communications, the IEM notes the following:

A portion of the works associated with LTC#5A will incorporate the construction of the outlet of the temporary Garbage Creek diversion structure (authorized previously under LTC#2B).

The SEV (Severity of Ill Effects) water quality monitoring locations as referenced on Figure 7.2 of the EPP were established under the direction and acceptance of various subject matter experts as an interim location for the purpose of monitoring turbidity in accordance with the *Fisheries Act* Authorization (15-HPAC-01160) and Application for Authorization Dam Construction, Reservoir Preparation, and Filling (Application), dated December 15, 2015. [redacted] The IEM requests confirmation be provided once the data loggers are relocated.

In the event that a temporary PAG stockpile site is required to during the course of the work, a separate plan will be provided as an addendum to this LTC.

As identified in Table 9.1 of the LTC#5A application submission, the IEM will request a copy of the ESC work plan referenced in advance of initiating the activities described as environmental hold points.

Upon review of the submitted documents for LTC#5A, and based on our understanding of the works proposed in addition to communications and information provided by BC Hydro, we have no objections to issuing LTC#5A for the works as described. Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, regulations, and the CEMP.

Yours truly,

[redacted]

[redacted]
Independent Environmental Monitor

cc. [redacted] Water Management Branch, Manager of Water Allocation and Utilities Section
[redacted] FLNRO Water Management Office
[redacted] FLNRO Water Management Officer
[redacted], BC Hydro, Manager, Project Environmental Risk Management
[redacted] BC Hydro Regulatory Manager

[redacted]

21 July 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
PO Box 9340 Stn. Prov Govt
Victoria, BC, V8W 9M1
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Leave to Construct LTC #05B - Diversion Outlet Works
Recommendation for Amendment #1 – Contractor-Designed Overburden Excavations

Leave to Commence Construction LCC #05 for construction of Left Bank Stage 1 Cofferdam and Diversion and Drainage Works was granted to BC Hydro on 25 April 2017 by the Deputy Comptroller of Water Rights. Leave to Construct LTC #05B for construction of Diversion Outlet Works was issued 30 June 2017. Condition No. 1 of LTC #05B is:

The Issued for Construction drawings and any supporting information for the contractor-designed overburden excavation at the diversion outlet portal must be submitted to the IE, and the IE must issue an LTC Amendment before construction of the final overburden excavation can proceed.

The IE has now received the following drawings by [redacted] for the contractor-designed overburden excavations at the diversion outlet portal:

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

The drawings have been sealed by a Professional Engineer registered in British Columbia and are Issued for Construction status. The drawings are consistent with the outlet works arrangement shown on the drawings previously submitted for LTC #05B.

[redacted]

The IEM has received a copy of the drawings and has no comments.

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with construction of the contractor-designed overburden excavations at the diversion outlet portal. This recommendation is copied to BC Hydro and is sufficient for these activities to proceed. For reference, this recommendation is referred to as *Leave to Construct LTC #05B, Amendment #1.*

Yours truly,

[redacted]

[redacted]

[redacted]

Independent Engineer, Site C Clean Energy Project

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] BCH (Regulatory Manager)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted] BCH (Site C Construction Engineer)
[redacted] Independent Environmental Monitor
[redacted] FLNRO Water Management Officer
[redacted] FLNRO Water Management Officer
[redacted] FLNRO Dam Safety Officer

[redacted]

26 May 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]
Via email: [redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Recommendation for Initial Portion of Leave to Construct LTC #05C
Stage 1 Left Bank Cofferdam – Mid-Stream Island Topsoil Stripping

Conditional Water Licences (CWLs) 132990 and 132991 dated 26 February 2016 authorize construction of works for the storage, diversion and use of water from the Peace River for power purposes at the Site C Clean Energy Project (Site C). Leave to Commence Construction of the works comprising LCC #01 under CWLs 132990 and 132991 was granted to BC Hydro and Power Authority (BC Hydro) on 01 April 2016.

Leave to Commence Construction LCC #05 was granted to BC Hydro, with conditions, on 25 April 2017. The project components included in LCC #05 are located on the left bank and in the river channel of the dam site and comprise:

- Diversion inlet & outlet portal and channel excavations
- Diversion tunnel inlet & outlet portal structures
- Diversion tunnels
- Stage 1 left bank cofferdam
- Left bank earthfill dam core trench excavation
- Left bank drainage adit
- In-river excavations for tailrace and downstream river channel

The Stage 1 left bank cofferdam will enclose an area where the left side of the future earthfill dam will be constructed. In plan, this cofferdam will be approximately 885 m long, with a wide U-shape. The upstream and downstream legs of the cofferdam will connect to the Stage 1 diversion inlet and outlet cofferdams. Except for the downstream leg, most of the alignment for the left bank cofferdam is along an existing mid-stream island in the Peace River.

Construction of the Stage 1 left bank cofferdam is intended to be authorized under Leave to Construct LTC #05C. As Independent Engineer (IE) for the Site C project, I have received a request from BC Hydro to commence final clearing, grubbing and stripping of the topsoil from the mid-stream island in advance of LTC #05C being issued. Timber on the island was previously logged as part of project early works, but remaining low brush and grasses are potential bird nesting locations. BC Hydro's Main Civil Works contractor, [redacted] has requested authorization to clear, grub and strip topsoil from the island as soon as possible to minimize delays due to nesting birds.

[redacted]

[redacted]

During the work, a Certified Professional in Erosion and Sediment Control (CPESC) will prescribe field-fit erosion and sediment control measures following best management practices in accordance with the Construction Environmental Management Plan. These measures will be presented in an ESC work plan. The CPESC will supervise the implementation of ESC measures, document the completion of the ESC work plan and any field fit changes to the original work plan, and conduct ongoing monitoring inspections to verify the effectiveness of the measures and/or the need for additional works.

Based on the information provided and their knowledge of the project site, the IE and the IEM consider that the request to commence the clearing, grubbing and stripping activities in advance of LTC #05C being issued is reasonable. The IE notes that BC Hydro submitted a request for LTC #05C on 23 May 2017, which will be reviewed by the IE and IEM within approximately two weeks.

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with clearing, grubbing and stripping of the mid-stream island area as described above. As per LCC #05 dated 25 April 2017, this recommendation is copied to BC Hydro and is sufficient for construction of these works to proceed. For reference, this recommendation is referred to as *Initial Portion of Leave to Construct LTC #05C.*

The Initial Portion of Leave to Construct LTC# 05A for clearing, grubbing and stripping of the mid-stream island area is subject to the conditions of LCC #05 which are attached to this letter as Appendix A for reference.

In addition, a copy of the ESC work plan must be provided to the IEM in advance of starting the work.

Yours truly,

[redacted]

[redacted]

[redacted]

Independent Engineer, Site C Clean Energy Project

Attachment: Appendix A – LCC #05 Conditions

c: [redacted] BCH VP & Project Director (Site C Licensee Representative)
[redacted] BCH (Environment, Aboriginal Relations and Public Affairs Director)
[redacted] BCH (Regulatory Manager)
[redacted] SNC Lavalin (Site C Design Engineer)
[redacted] BCH (Site C Construction Engineer)
[redacted] Independent Environmental Monitor
[redacted] FLNRO Water Management Officer
[redacted] FLNRO Water Management Officer
[redacted] FLNRO Dam Safety Officer

APPENDIX A
LCC #05 – CONDITIONS

No.	Condition	Status for LTC #05C
a)	Before the construction of any component of LCC #5 may proceed, the Licensee must: • submit relevant design drawings signed and sealed by a professional engineer registered in the province of British Columbia to [redacted] P. Eng. to review in his capacity as IE, and • receive a copy of a report (the "Recommendation Report") submitted by the IE to the DCWR under the Water Sustainability Act, which recommends that construction of that component of LCC #5 may proceed. The Recommendation Report is in the form of a letter and is sufficient for construction of that component to proceed.	Only clearing, grubbing and stripping of topsoil on mid-stream island is authorized.
b)	In-river works for the tailrace and downstream river channel that are outside the area shaded grey on DWG NO 1016-C14-B6158-22 dated November 8, 2012 (attached in Appendix D of LCC #5) are not authorized for construction under LCC #5.	Not applicable.
c)	The Licensee may request the DCWR to review any of the IE's Recommendation Reports and make alterations to the Leave to Construct.	If and as required.
d)	If during construction material changes to the works of LCC #5 are proposed, the changes must be authorized through the process described in No. a) above.	If and as required.
e)	Any revisions to sections of the CEMP that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed by the IEM and accepted by the Deputy Comptroller of Water Rights.	If and as required.

[redacted]

02 June 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
[redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licences 132990 & 132991
Recommendation for Leave to Construct LTC #06A
Powerhouse Roller Compacted Concrete Buttress

1.0 INTRODUCTION

Conditional Water Licences (CWLs) 132990 and 132991 dated 26 February 2016 authorize construction of works for the storage, diversion and use of water from the Peace River for power purposes at the Site C Clean Energy Project (Site C). Leave to Commence Construction of the works comprising LCC #01 under CWLs 132990 and 132991 was granted to BC Hydro and Power Authority (BC Hydro) on 01 April 2016.

Leave to Commence Construction LCC #06 was granted to BC Hydro, with conditions, on 16 May 2017. The project components included in LCC #06 are the following roller compacted concrete (RCC) structures:

- Core buttress – provides the south (right) abutment of the earthfill dam at the core;
- Dam buttress – provides the south abutment of the downstream shell of the earthfill dam;
- Powerhouse buttress – provides the foundation for the generating station;
- Spillway buttress – provides the foundation for the spillways and stilling basin; and
- Tailrace wall – provides a barrier between the tailrace and the toe of the earthfill dam.

As Independent Engineer (IE) for the Site C project, I have received a submission from BC Hydro requesting permission to commence construction of the powerhouse buttress, tailrace wall and downstream spillway stilling basin. These components are the RCC structures scheduled to be constructed in 2017.

These works are to be constructed by BC Hydro's Main Civil Works contractor, [redacted]. For reference, construction of these works is to be authorized under *Leave to Construct LTC #06A*.

The submission received from BC Hydro also includes most of the information that is expected to be required for the remaining RCC structures, but construction of those structures will be authorized under separate LTCs in 2018 and 2019.

2.0 DESCRIPTION OF THE WORKS

The RCC buttress structures will be constructed along the south (right) bank of the Peace River inside the Stage 1 right bank cofferdam, and in total will extend for approximately 747 m from the upstream side of the core of the earthfill dam to the downstream end of the spillways.

In plan, the dam and core buttress sections will have a total width of about 354 m, with a maximum upstream-downstream length of about 62 m. The upper portions of these buttresses will be free-standing sections, extending about 35 m above the approach channel invert to El. 469.4, which is the crest of the future earthfill dam. The south faces of these buttresses will provide containment of the approach channel and the north faces will provide the right abutment for the core and downstream shell of the dam.

In plan, the footprint of the powerhouse buttress will be 162 m wide at its upstream side, with an upstream-downstream length of about 152 m. The powerhouse buttress will support the future power intakes, penstocks and powerhouse, and includes the RCC slab for the service bay, which will be located on its west side.

The tailrace wall, with a maximum width of about 31 m and height ranging from about 15 m to 30 m, will extend about 154 m downstream from the west side of the powerhouse buttress. The wall will provide a barrier between the tailrace and the toe of the earthfill dam to protect against erosion.

The spillway buttress will have a maximum footprint width of about 231 m, with an upstream-downstream length of about 259 m. The spillway buttress will support the future gated spillway headworks, chute, spillway walls, upstream and downstream stilling basins and weir.

Along the toe of the spillway buttress there will be an RCC apron that will protect against foundation scour in the upstream 60 m of the spillway tailrace.

The RCC structures will be entirely founded on excavated bedrock surfaces. The bases of the powerhouse and spillway buttress sections will be at El. 375 m, more than 35 m below existing river level. The dam and core buttress sections will have their bases at El. 398.0 m.

Above its base, the bedrock excavation for the RCC buttresses will slope upwards towards the south at 1.6H:1.0V (powerhouse & spillway buttresses) or 1.45H:1.0V (dam & core buttresses) until it meets the invert of the approach channel excavation. The channel invert will be at El. 432.5 m adjacent to the powerhouse buttress and at El. 434.5 m adjacent to the spillway, dam and core buttresses. The crests of the powerhouse and spillway buttress sections will be at the same elevations as the adjacent approach channel invert.

A drainage gallery will extend longitudinally through all four buttress sections. As the RCC is placed, the gallery will be formed with precast concrete segments, or with removable forms or other acceptable method.

[redacted]

[redacted]

3.0 LTC #06A SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #06A:

1. BC Hydro - *Site C Clean Energy Project Request for LCC6 Component Authorization, Leave to Construct 6A, B and C (LTC6A, LTC6B, and LTC6C) – RCC Buttress Foundation Preparation and RCC Placement*, letter from [redacted] 06 May 2017.
2. [redacted]
3. BC Hydro - *Issued for Construction Drawings* (see Appendix A).
4. [redacted]
5. BC Hydro – *Written Direction for Procurement of Optional Work – Observational Case Materials*, letter from [redacted] File ID 1016.Z.05.003.CMO.00835.LTR, 25 April 2017.
6. [redacted]

4.0 REVIEW OF SUBMISSIONS

4.1 Design Details and Construction Drawings

The RCC buttress, in combination with the future overlying intake and spillway structures, will form part of the Site C reservoir-retaining system. As such, the design and analyses of the RCC buttress sections are in accordance with the guiding principles of the Canadian Dam Association (CDA) and are referenced to internationally-recognized design codes, standards and guidelines for dams. The RCC buttress sections are designed as concrete gravity structures and the design analyses were performed for the range of normal, unusual and extreme load cases that are typically evaluated for major concrete dams and hydraulic structures, including seismic, flood, hydrodynamic and thermal loads, post-earthquake condition, extreme uplift conditions, and conditions with one half of the spillway stilling basin dewatered.

As described in the RCC Buttress DBM, the design of the buttress is strongly influenced by the site geological conditions. The geological features in the shale bedrock that have particular influence on the RCC buttress design are the flat-lying low strength bedding planes, steeply-dipping relaxation joints and cross-cutting shears. Much of the outer and upper bedrock underlying the existing right bank terrace has relaxed toward the valley along bedding planes, due to long-term valley formation and unloading processes. Also, the shale bedrock tends to swell and rebound when unloaded, with both a short-term

elastic response and a longer term swelling response. In addition, there are “locked-in” in situ horizontal stresses in the rock that tend to cause movements when an excavation is opened.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Drawings have been received for all the RCC buttress structures, including plans, sections and typical details, as listed in Appendix A. The drawings have been sealed by Professional Engineers registered in British Columbia and are Issued for Construction status. It is the IE's opinion that the drawings are consistent with the Site C project general arrangement drawings, the design basis and the conditions of Conditional Water Licences 132990 and 132991. [redacted]

4.2 Construction Implementation Plan and Schedule

[redacted] There is a limited seasonal period when outdoor temperatures are warm enough for RCC placement; additionally, the configuration of the structures and access to them impose practical limits on placement rates. [redacted]

Year	Component	Quantity (m^3)	Total (m^3)
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			

[redacted]

[redacted]

The IE considers the work plan to be appropriate to the work, and that the sequential stages of excavation and RCC placement are consistent with the design basis. The IE considers that the proposed schedule is reasonable, provided the contractor is well organized and achieves an early start to each season of RCC placement. The IE notes that going into the first season of RCC placement, there is some uncertainty about the degree of final rock surface preparation that will be required prior to RCC placement, which could impact the rate of progress.

4.3 Quality Management

[redacted] were previously submitted and reviewed with the request for LCC #01. As part of that program, [redacted] has developed standard Inspection and Test Plans (ITPs) for specific types of work, which are reviewed by BC Hydro in accordance with the Main Civil Works contract.

The application for LTC #06A lists ITPs for RCC buttress excavation, foundation protection and preparation, and roller compacted concrete, which cover the types of work included in the RCC construction.

[redacted]

4.4 Environmental Protection

The Environmental Protection Plan (EPP) is included in the application document for LTC #06A, and includes descriptions of anticipated work activities and applicable mitigation measures to reduce potential environmental impacts. BC Hydro has accepted the EPP.

The RCC buttress works will be constructed entirely inside the Stage 1 right bank cofferdam, which should allow PAG contact water to be readily collected and managed.

The IE has discussed the work with the IEM and both parties are familiar with the area where the RCC buttress works will be constructed.

The IEM has provided the IE with comments on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] *– Site C Clean Energy Project – Conditional Water License 132990 & 132991 IEM review of the Powerhouse Roller Compacted Concrete Buttress, and relevant component plans in consideration of LTC#6A,* letter to [redacted]. dated 02 June 2017.

The IEM has no objections to issuing LTC #06A.

4.5 Dam Safety

Construction of the RCC buttress will take place inside the Stage 1 right bank cofferdam. The *Operations, Maintenance and Surveillance (OMS) Plan* and the *Emergency Response and Preparedness (ERP) Plan* for the Stage 1 cofferdams were previously submitted by BC Hydro with the request for LCC #05 and cover the proposed RCC works. The IE and the FLNRO Dam Safety Officer consider the OMS and ERP Plan contents to be consistent with the requirements of BC Dam Safety Regulation 40/2016.

[redacted]

4.6 Public Safety

The request for LTC #06A notes that the work will take place entirely on land within the project area, with no public access. In the event of unauthorized personnel accessing the work site, [redacted] will follow the mitigation measures outlined in its [redacted], which has previously been accepted by BC Hydro.

5.0 RECOMMENDATION FOR LEAVE TO CONSTRUCT LTC#06A

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with construction of the powerhouse RCC buttress as described above. As per LCC #06 dated 16 May 2017, this recommendation is copied to BC Hydro and is sufficient for construction of these works to proceed. For reference, this recommendation is referred to as *Leave to Construct LTC #06A*.

Leave to Construct LTC# 06A for construction of the powerhouse RCC buttress is subject to the conditions of LCC #06 which are attached to this letter as Appendix B for reference.

Recognizing that the RCC works to be constructed in each of the three scheduled years will be similar, the IE expects that the information provided by BC Hydro for LTC #06A will also be largely applicable to the remaining RCC works. With the future requests for LTC #06B and LTC #06C, BC Hydro should provide information on the performance and measured displacements for the relevant RCC excavations and any previously-constructed RCC blocks, with a comparison to design predictions and an assessment regarding the need for RCC movement joints, or any other design or construction considerations.

Yours truly,

[redacted]

[redacted]

Independent Engineer, Site C Clean Energy Project

Attachments:

1. Appendix A – Issued for Construction Drawings
2. Appendix B – LCC #06 Conditions
3. IEM letter dated 02 June 2017

c: [redacted]

APPENDIX A
LTC #06A – POWERHOUSE RCC BUTTRESS – ISSUED FOR CONSTRUCTION DRAWINGS

General Arrangement and General Details

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Foundation Protection & Preparation

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Powerhouse Buttress

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Powerhouse Buttress – Tailrace Wall

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Spillway Buttress

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Dam and Core Buttresses

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Tailrace RCC

Drawing No.	Revision	Title
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

APPENDIX B
LCC #06 – CONDITIONS

No.	Condition	Status for LTC #06A
a)	Before the construction of any component of LCC #6 may proceed, the Licensee must: • submit relevant design drawings signed and sealed by a professional engineer registered in the province of British Columbia to [redacted]. to review in his capacity as IE, and • receive a copy of a report (the "Recommendation Report") submitted by the IE to the DCWR, which recommends that construction of that component of LCC #6 may proceed. The Recommendation Report is in the form of a letter, referred to as a "Leave to Construct" and is sufficient for construction of that component to proceed.	Completed.
b)	The Licensee may request the DCWR to review any of the IE's Recommendation Reports and make alterations that the DCWR deems appropriate.	If and as required.
c)	If during construction material changes to the works of LCC #6 are proposed, the changes must be authorized through the process described in Section 12 a).	If and as required.
d)	Any revisions to sections of the CEMP that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed by the IEM and accepted by the Deputy Comptroller of Water Rights	If and as required.

[redacted]

June 02, 2017

[redacted]

[redacted]

Attention: [redacted], Independent Engineer

RE: Site C Clean Energy Project – Conditional Water License 132990 & 132991 IEM review of the Powerhouse Roller Compacted Concrete Buttress, and relevant component plans in consideration of LTC#6A

Leave to Commence Construction (LCC#6) was issued by the Deputy Comptroller of Water Rights as identified in the Conditional Water Licence (CWL) 132990[1] and 132991[2] for the Powerhouse Roller Compacted Concrete Buttress involving the following key components:

- Core buttress – provides the south (right) abutment of the earthfill dam at the core.
- Dam buttress – provides the south abutment of the downstream shell of the earthfill dam.
- Powerhouse buttress – provides the foundation for the generating station.
- Spillway buttress – provides the foundation for the spillways and stilling basin.
- Tailrace wall – provides a barrier between the tailrace and the toe of the earthfill dam.

While it is the role of the Independent Engineer (IE) to issue the LTCs, the IEMs role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction.

This letter has been prepared specifically the Powerhouse Roller Compacted Concrete Buttress works pertaining to LTC#6A. It is our understanding that works under this LTC are to include the following:

- Foundation protection measures for the roller compacted concrete (RCC) buttress; and
- Construction of the RCC buttress, including the powerhouse, spillway, and dam and core components.

[1] Conditional Water Licence 132990. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[2] Conditional Water Licence 132991. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

As the issuance of each LTC requires the IEMs review and recommendation for acceptance to the IE, it is the IEMs understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

The IEM has reviewed the EPP provided by BC Hydro including cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The IEM team has deferred review of relevant safety plans to the Independent Engineer and the Dam Safety Officer.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM team, which are related to LTC#6A.

BC Hydro Plans/Documents

- *Site C Clean Energy Project Request for LCC6 Component Authorization, Leave to Construct 6A, B and C (LTC6A, LTC6B, and LTC6C) – RCC Buttress Foundation Preparation and RCC Placement*, letter from [redacted] dated May 6, 2017.
- *Construction Environmental Management Plan* (Revision 4), dated July 26, 2016.

Contractor Plans (including relevant design drawings)

- [redacted]

Relevant Design and Conceptual Drawings

- BC Hydro - *Issued for Construction Drawings,* dated May 30, 2017.

Provincial Permits/Approvals

- *Conditional Water Licence 132990.*
- *Conditional Water Licence 132991.*
- Leave to Commence Construction #6 – *Roller Compacted Concrete Buttress Foundation Preparation and Roller Compacted Concrete Placement*, dated May 16, 2017.

Conclusions and Recommendations

Upon review of the submitted documents for LTC#6A, and based on our understanding of the works proposed in addition to communications and information provided by BC Hydro, we have no objections to issuing LTC#6A for the works associated with the Powerhouse Roller Compacted Concrete Buttress, as described. Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, regulations, and the CEMP.

Yours truly,

[redacted]

Independent Environmental Monitor, Delegate

cc. [redacted], Water Management Branch, Manager of Water Allocation and Utilities Section
[redacted] FLNRO Water Management Officer
[redacted], FLNRO Water Management Officer
[redacted], BC Hydro, Manager, Project Environmental Risk Management
[redacted], BC Hydro Regulatory Manager

[redacted]

28 April 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
PO Box 9340 Stn. Prov Govt
Victoria, BC, V8W 9M1
Via email: [redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licence 132991
Recommendation for Leave to Construct LTC #07A
Geotechnical Investigations for Halfway River Debris Boom

1.0 INTRODUCTION

Conditional Water Licences (CWLs) 132990 and 132991 dated 26 February 2016 authorize construction of works for the storage, diversion and use of water from the Peace River for power purposes at the Site C Clean Energy Project (Site C). Leave to Commence Construction of the works comprising LCC #01 under CWLs 132990 and 132991 was granted to BC Hydro and Power Authority (BC Hydro) on 01 April 2016.

CWL 132991 is the storage licence and authorizes the reservoir and other related works. Leave to Commence Construction LCC #07 under CWL 132991 was granted to BC Hydro, with conditions, on 20 April 2016. The scope of works under LCC #07 comprise geotechnical investigations that are required to obtain site-specific information for final design of the proposed Hudson's Hope Shoreline Protection Berm and Halfway River Debris Boom.

As Independent Engineer (IE) for the Site C Clean Energy Project (Site C), I have received a submission from BC Hydro requesting permission to commence geotechnical investigations for the Halfway River debris boom. The proposed investigations would be carried out under a subcontract from [redacted], which has been retained by BC Hydro to complete the design of the debris boom and to prepare tender documents for its construction. For reference, these geotechnical investigations are to be authorized under *Leave to Construct LTC #07A*.

The proposed Halfway River debris boom facility will be located on the Peace River, approximately 4 km downstream of the confluence with the Halfway River. The facility will assist with the overall removal of debris upstream of the dam site construction area by collecting woody debris from the river that is generated both naturally and from clearing activities. The debris boom facility will be temporary, and will be decommissioned prior to reservoir filling and inundation of this area. Based on the current conceptual design, the facility will span the main channel and side channels of the Peace River and will collect and trap debris utilizing a combination of shear booms, diking and a containment boom, with access to facilitate removal of the trapped debris. The anchors for the shear and containment booms would be installed on islands within the river channel. The proposed geotechnical investigations are required to obtain site-specific subsurface information for design of the anchors.

Construction of the debris boom is scheduled for 2017, and would be authorized under a separate LCC.

2.0 DESCRIPTION OF THE WORKS

Anticipated subsurface conditions at the Halfway River debris boom site consist of fluvial sand and gravel deposits overlying shale, siltstone and sandstone bedrock. Exploratory drill holes are to be drilled on the northern sides of several islands in the Peace River to investigate subsurface conditions along the alignment of the proposed debris booms. The investigations will determine the site-specific stratigraphy, as well as the thickness, gradation and relative density of the fluvial deposits, and the quality, compressive strength, joint orientation and spacing, and modulus of the underlying bedrock.

The proposed exploratory drill holes are considered a class of wells under the BC *Groundwater Protection Regulation.* The works described in LCC #07 are "…*geotechnical investigations (including temporary access roads, geotechnical wells and monitoring wells for the purpose of obtaining stratigraphical information, monitoring, observing measuring and assessing the level of groundwater and determination of subsurface conditions) as follows: Halfway River Debris Boom Geotechnical Investigations including up to seven wells on islands in the Peace River about 4 km downstream of the mouth of Halfway River and helicopter launching pads, all of which are located approximately as shown on the plans*…".

The IE notes that the IE recommendation letter for LCC #07 dated 13 April 2017 referred to four exploratory drill holes, based on information provided with BC Hydro's request for the LCC. Prior to LCC #07 being granted, BC Hydro submitted further information showing three additional drill holes, which would be located between the original four. The same equipment and methods would apply to the drilling of all seven holes.

The proposed geotechnical investigations are located on Crown lands.

3.0 LTC #07A SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #07A:

1. BC Hydro - *Site C Clean Energy Project Request for LCC7 Component Authorization, Leave to Construct 7A (LTC7A) – Halfway River Debris Boom Geotechnical Investigations*, letter from [redacted] to [redacted] 17 April 2017.
2. BC Hydro – *Drawing 1016-C14-B7914-3 R 2 - Halfway River Debris Boom Facility*
3. [redacted]

BC Hydro also provided copies of the following permit and licence documents:

1. [redacted] - *BC Hydro - Site C Clean Energy Project, Occupant Licence to Cut #9, Halfway River Containment Booms Management Plan*, V.1.0, February 2016.
2. BC Hydro - *Correction to OLTC #9 – Halfway River Debris Booms Management Plan Section 4: Riparian Management*, memo from [redacted] to Ministry of Forests, Lands and Natural Resource Operations, 17 August 2016.
3. Ministry of Forests, Lands and Natural Resource Operations - *Occupant Licence to Cut and Remove Timber L50574,* 25 August 2016.
4. BC Hydro - *Site C Clean Energy Project, Description of Activities – Halfway River Debris Handling Facility, Application for Land Act Licence of Occupation*, 17 February 2016.
5. Ministry of Forests, Lands and Natural Resource Operations - *Land Act Licence of Occupation, Licence No. 815767, File No. 8015852, Site Specific Tenure*, 25 August 2016.

4.0 REVIEW OF SUBMISSIONS

4.1 Design Details and Construction Drawings

Drill hole locations have been pre-selected as shown in the LTC submissions, at locations with sparse vegetation where practicable. The locations will be adjusted in the field to suit local site conditions, subject to review by the contractor's Environmental Monitor.

BC Hydro has obtained a *Land Act Licence of Occupation* and an *Occupant Licence to Cut and Remove Timber* which include the locations of the proposed drill holes.

At each drill hole location, vegetation will be cut from an area up to a maximum size of 16 m by 16 m. Two temporary timber pads, each about 5 m by 5 m in size and underlain with geotextile fabric, will be constructed to support the drill rig and ancillary equipment.

Drilling will be carried out using a rotary method, with casing installed through the overburden. Standard penetration tests will be carried out at intervals in the fluvial deposits, and continuous samples will be obtained in the bedrock using triple-tube coring. In-situ pressuremeter tests will be performed in the cored sections to determine the strength and modulus of the bedrock. The contractor anticipates that the drill holes will be approximately 20 m to 25 m deep, depending on the depth of overburden.

Overburden and bedrock samples will be retained for laboratory testing. Drilling fluid is to be recirculated and drill cuttings and solids not retained for testing will be removed from the drilling fluid and collected. The collected solids and drilling fluids will be contained in barrels and flown from the site for disposal at a suitable facility. The IE notes that some of the solids and drill fluids may contain small amounts of potentially acid-generating (PAG) shale materials.

Once completed, drill holes will be backfilled with a low strength cement and bentonite grout to meet the backfilling requirements of the BC *Groundwater Protection Regulation*.

The proposed investigation equipment and methods are consistent with typical industry standards for work of this type. In the opinion of the IE, the proposed geotechnical investigations are reasonable and

appropriate for the intended purpose of obtaining information for final design of the debris boom anchors, and are intended to minimize impacts on the environment and the safety of the public.

The engineering work plan provided for these investigations includes a figure showing the proposed drill hole locations and has been sealed by a Professional Engineer registered in British Columbia. It is the IE's opinion that the proposed investigations are consistent with the Site C project general arrangement drawings, the conditions of Conditional Water Licence 132991 and the requirements of the CEMP.

4.2 Construction Implementation Plan and Schedule

Construction materials for the temporary drill pads will be transported to site by helicopter from a nearby staging area. Two potential helicopter staging areas are shown in the work plan. The IE understands that the most likely staging area is at the Peaceview gravel pit, located several kilometres downstream of the debris boom site and about 300 m south of Highway 29.

Drilling will be carried out using a helicopter-portable drill rig. After each drill hole is completed, the drill rig and drill pads will be disassembled and moved to the next drill hole location by helicopter.

Crews performing the work will access the site via boat from a staging area at the downstream end of the Halfway River. The contractor plans to work during daylight hours only.

Mobilization is expected to start shortly after this LTC is issued and the drilling work is scheduled to be completed in about 20 days. All materials used for and related to the drilling investigation will be cleaned up and removed from the site on completion of the work.

The IE considers the work plan to be appropriate to the work, which will be performed without ground access to the work sites, and that the proposed schedule is reasonable.

4.3 Quality Management

The work plan describes methods that are consistent with typical geotechnical drilling industry standards. The plan indicates that engineering personnel will log subsurface conditions as the holes are drilled. This will typically require full-time presence of qualified engineering personnel during drilling operations, which should provide appropriate quality management of those operations.

The IE understands that the in-situ testing and sampling will be carried out in accordance with recognized industry standards, and expects that future laboratory testing on samples collected during the work would also be in accordance with such standards.

4.4 Environmental Protection

The Environmental Protection Plan (EPP) includes descriptions of anticipated work activities and applicable mitigation measures to reduce potential environmental impacts. The EPP indicates that an environmental monitor will be on site full-time to manage environmental concerns and to confirm the work is being carried out as intended under the Permit requirements. The EPP includes a Fisheries and Oceans Canada (DFO) self-assessment which concludes that the works associated with the geotechnical

investigation are not likely to cause any negative effects to fish or fish habitats and not cause any serious harm. BC Hydro has accepted the EPP.

The IE has discussed the work with the IEM and both parties viewed the general location of the proposed debris boom during a boat inspection of the area in September 2016.

The IEM has provided the IE with comments on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] – *Site C Clean Energy Project – Conditional Water License 132991 IEM review of the Geotechnical Investigations for Halfway River Debris Boom and relevant component plans in consideration of LTC#07A,* letter to [redacted] dated 28 April 2017.

The IEM has no objections to issuing LTC #07A but notes that the EPP needs to be revised to incorporate details pertaining to water withdrawal for geotechnical drilling and to water intake fish screens.

4.5 Public Safety

The IE has not reviewed the *Contractor Site Safety Management Plan* in detail except to confirm that the plan includes a *Public Safety Management* component. BC Hydro has accepted the Plan.

The primary potential public interfaces with the geotechnical investigations works would be at the helicopter staging area and the drill sites. The proposed helicopter staging area is open and located well off Highway 29 and can be readily secured against public access. The drill sites could potentially be accessed by the public by boat. The Plan indicates that security signs will be posted and the drill sites will be surrounded with perimeter tape. BC Hydro has informed the IE that the drilling contractor has reviewed the potential for public access during non-working hours and does not plan to hire a night watchman. The keys to start the equipment will be removed from the site at the end of each work day.

5.0 RECOMMENDATION FOR LEAVE TO CONSTRUCT LTC#07A

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with geotechnical investigations for the Halfway River debris boom. As per LCC #07 dated 20 April 2017, this recommendation is copied to BC Hydro and is sufficient for the geotechnical investigations to proceed. For reference, this recommendation is referred to as *Leave to Construct LTC #07A*.

Leave to Construct LTC# 07A for the Halfway River debris boom geotechnical investigations is subject to the conditions of LCC #07, which are attached to this letter as Appendix A for reference.

A copy of the revised EPP incorporating details pertaining to water withdrawal for geotechnical drilling and to water intake fish screens must be provided to the IE and the IEM for information by 05 May 2017.

Yours truly,

[redacted]

[redacted]

[redacted]

Independent Engineer, Site C Clean Energy Project

Attachments:

1. Appendix A – LCC #07 Conditions
2. IEM letter dated 28 April 2017

c: [redacted]

APPENDIX A
LCC #07 – CONDITIONS

No.	Condition	Status for LTC #07A
1	Before commencing the geotechnical investigations, the Licensee must submit to the Deputy Comptroller of Water Rights, with a copy to the Independent Engineer, a document signed by each private landowner affected by the works authorized under LCC #7 that acknowledges there is an agreement for BC Hydro to access the privately owned land.	One agreement pending.
2	Before commencing any of the geotechnical investigations, the Licensee must: • submit relevant plans for the access roads, geotechnical wells, monitoring wells, environmental protection and public safety for each site to [redacted] to review in his capacity as IE, and • receive a copy of a report (the "Recommendation Report") submitted by the IE to the Engineer under the Water Sustainability Act, which report recommends that construction of a component of LCC #7 may proceed. The Recommendation Report is in the form of a letter and is sufficient for construction of that component to proceed.	Completed.
3	Within ten days of the receipt of the Recommendation Report, the Licensee may request the Engineer to make revisions to the Recommendation Report, if it conflicts with the Licensee's plans or site conditions.	If and as required.
4	If during construction material changes are made to the manner in which the geotechnical investigations are to be carried out, the changes must be authorized through the process described in Item 2.	If and as required.
5	Material changes to the number and location of the geotechnical wells, monitoring wells and access roads are to be submitted to the Engineer for amendment of the plans in Appendix C and E (of LCC#7).	If and as required.
6	Any revisions to sections of the CEMP that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed by the IEM and accepted by the Deputy Comptroller of Water Rights	If and as required.
7	Weekly progress reports on construction shall be submitted by the Licensee to the IE, IEM and the Engineer	To be provided as work progresses.
8	The Licensee must comply with the provisions for wells in the Water Sustainability Act and Groundwater Protection Regulation.	Ongoing during completion of the work.

No.	Condition	Status for LTC #07A
9	When the geotechnical investigations are complete, all ground surface disturbances must be restored as nearly as possible to the original condition.	Ongoing during completion of the work.
10	Permits, licences, and approvals under enactments other than the Water Sustainability Act for the construction of works may be required in addition to the leave to commence construction, and the Licensee should ensure the appropriate authorizations are in place.	If and as required.
11	No clearing activities on Crown Land may commence prior to the issuance of relevant Land Act Licence(s) of Occupation, and Forest Act Occupant Licence(s) to Cut, Forest Act Section 52 authorization(s), and Forest and Range Practices Act ungulate winter range exemption(s), where applicable.	Completed.

[redacted]

[redacted]

April 28, 2017

[redacted]

[redacted]
13541 – 15A Avenue
Surrey, BC V4A 9A1

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water License 132991 IEM review of the Geotechnical Investigations for Halfway River Debris Boom and relevant component plans in consideration of LTC#07A

Leave to Commence Construction (LCC#7) was issued by the Deputy Comptroller of Water Rights as identified in the Conditional Water Licence (CWL) 132991[1] for the Geotechnical Investigations for the Halfway River Debris Boom and the Hudson's Hope Shoreline Protection Berm.

It is the IEMs understanding that BC Hydro will be requesting approval of two separate Leaves to Construct (LTCs) (LTC#7A and LTC#7B) applicable to LCC#7 Geotechnical Investigations.

While it is the role of the Independent Engineer (IE) to issue the LTCs, the Independent Environmental Monitor's (IEMs) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction. This letter has been prepared specifically for the geotechnical investigation and associated works pertaining to LTC#7A. It is our understanding that works under this LTC are to include the following:

- Geotechnical Investigations for Halfway River Debris Boom which involves the drilling of seven exploratory drill holes on the northern side of several islands in the Peace River to investigate subsurface conditions in preparation for the installation of debris boom.

As the issuance of each LTC requires the IEMs review and recommendation for acceptance to the IE, it is the IEMs understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

[1] Conditional Water Licence 132991. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

The IEM has reviewed the EPP provided by BC Hydro including cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM team, which are related to LTC#7A.

BC Hydro Plans/Documents

- *Construction Environmental Management Plan* (Revision 4), dated July 26, 2016.
- *Site C Clean Energy Project Request for LCC7 Component Authorization, Leave to Construct 7A (LTC7A) – Halfway River Debris Boom Geotechnical Investigations*, letter from [redacted] to [redacted] 17 April 2017.
- *Site C Clean Energy Project, Description of Activities – Halfway River Debris Handling Facility, Application for Land Act Licence of Occupation*, 17 February 2016.
- Ministry of Forests, Lands and Natural Resource Operations - *Occupant Licence to Cut and Remove Timber L50574*, 25 August 2016.
- Correction to OLTC #9 – *Halfway River Debris Booms Management Plan Section 4: Riparian Management*, memo from [redacted] to Ministry of Forests, Lands and Natural Resource Operations, 17 August 2016.

Contractor Plans/Documents

[redacted]

Relevant Design and Conceptual Drawings

- BC Hydro – *Drawing 1016-C14-B7914-3 R 2 - Halfway River Debris Boom Facility*
- BC Hydro – KMZ file Halfway River Debris Boom Geotechnical Works, 19 April 2017

Provincial Permits/Approvals

- *Conditional Water Licence 132991.*
- [redacted] - *BC Hydro - Site C Clean Energy Project, Occupant Licence to Cut #9, Halfway River Containment Booms Management Plan, V.1.0*, February 2016.
- Ministry of Forests, Lands and Natural Resource Operations - *Land Act Licence of Occupation, Licence No. 815767, File No. 8015852, Site Specific Tenure*, 25 August 2016.

Review Summary

It is our understanding that the scope of work includes:

- Exploratory drill holes are to be drilled on the northern side of several islands in the Peace River to investigate subsurface conditions along the alignment of the proposed debris booms.
- Use of heli-portable rig equipment to drill seven cased bore holes through soil deposits utilizing coring methods through bedrock deposits.
- Access to the site utilizing a boat from staging area at the downstream end of the Halfway River.

Safety plans were not reviewed in detail; the review was only to confirm that the plans are in place as required.

Conclusions and Recommendations

Based on information received from [redacted] BC Hydro Sr. Environmental Coordinator, 28 April 2017, it is the IEMs understanding that water withdrawal for use during geotechnical drilling activities does not require a *Water Sustainability Act*, Short-Term Water Use Permit. Furthermore, the contractor will be required to adhere to Fisheries and Oceans Canada (DFO) Freshwater Intake End-of-Pipe Fish Screen Guidelines. It is our understanding that Revision 3 of the EPP will be updated to incorporate these items in Revision 4 of the EPP during the week of May 1, 2017. It is our expectation that the revised copy will be provided to the IEM team by the end of this week.

Upon review of the submitted documents for LTC#7A, and based on our understanding of the works proposed in addition to communications and information provided by BC Hydro, we have no objections to issuing LTC#7A for the works associated with the Geotechnical Investigations for Halfway River Debris Boom, as described. Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, regulations, and the CEMP.

Yours truly,

[redacted]

Independent Environmental Monitor, Delegate

cc. [redacted]

[redacted]

28 April 2017

[redacted]
Deputy Comptroller of Water Rights
Ministry of Forests, Lands and Natural Resource Operations
PO Box 9340 Stn. Prov Govt
Victoria, BC, V8W 9M1
Via email: [redacted]

Dear [redacted]

Site C Clean Energy Project - Conditional Water Licence 132991
Recommendation for Leave to Construct LTC #07B
Geotechnical Investigations for Hudson's Hope Shoreline Protection Berm

1.0 INTRODUCTION

Conditional Water Licences (CWLs) 132990 and 132991 dated 26 February 2016 authorize construction of works for the storage, diversion and use of water from the Peace River for power purposes at the Site C Clean Energy Project (Site C). Leave to Commence Construction of the works comprising LCC #01 under CWLs 132990 and 132991 was granted to BC Hydro and Power Authority (BC Hydro) on 01 April 2016.

CWL 132991 is the storage licence and authorizes the reservoir and other related works. Leave to Commence Construction LCC #07 under CWL 132991 was granted to BC Hydro, with conditions, on 20 April 2016. The scope of works under LCC #07 comprise geotechnical investigations that are required to obtain site-specific information for final design of the proposed Hudson's Hope Shoreline Protection Berm and Halfway River Debris Boom.

As Independent Engineer (IE) for the Site C Clean Energy Project (Site C), I have received a submission from BC Hydro requesting permission to commence geotechnical investigations for the Hudson's Hope shoreline protection berm. The proposed investigations would be carried out under a subcontract through [redacted], which has been retained by BC Hydro to complete the design of the berm. For reference, these geotechnical investigations are to be authorized under *Leave to Construct LTC #07B*.

Hudson's Hope is situated on the north shore of the Peace River about six kilometres from the upstream end of the proposed Site C Reservoir. The reservoir will inundate the toe of the existing natural slopes along the river in this area and shoreline protection works will be constructed adjacent to the community prior to reservoir filling to protect against erosion and potential slope instability. The current conceptual design for the proposed shoreline protection works includes a berm to be constructed against the riverbank in two zones totalling about 2100 m, and a bench cut along the bank for a length of about 550 m. It is anticipated that the bench excavation would provide much of the berm construction material. D.A. Thomas Road, an existing road which provides access to the shoreline near the middle of the proposed shoreline protection works, would be upgraded to facilitate construction and future access.

The proposed geotechnical investigations are required to obtain site-specific geotechnical design information regarding subsurface conditions, for final design of the shoreline protection works.

Schedule A of CWL 132991 includes two requirements for the Hudson's Hope Shoreline Protection Berm, that:

1. *"Initial design, including habitat features, is provided to FAHTC (Fisheries and Aquatic Habitat Mitigation and Monitoring Technical Committee) and District of Hudson's Hope (DHH) for review at least three years before berm construction is to begin".*
2. *"Final design criteria and preliminary design drawings are agreed to by FAHTC and DHH two years before construction is to begin".*

BC Hydro has provided information indicating that the Comptroller of Water Rights and the District of Hudson's Hope have agreed to reduce the period for providing initial design from 3 years to 2.5 years. The geotechnical investigations for the berm are timed to meet this revised schedule. Construction of the shoreline protection works is scheduled for 2020 and would be authorized under a separate LCC.

2.0 DESCRIPTION OF THE WORKS

Previous site investigations provided information for the conceptual design of the shoreline protection works, including exploratory drill holes and piezometers completed in 1985 and 2011, and terrain stability mapping in 2012. The objective of the currently-proposed geotechnical investigation program is to fill gaps left in previous work, including the site-specific stratigraphy and geotechnical properties of the berm foundation and lower riverbank slopes, and the existing fill and subgrade properties of D.A. Thomas Road.

The proposed exploratory drill holes are considered a class of wells under the BC *Groundwater Protection Regulation.* The works described in LCC #07 are "…*geotechnical investigations (including temporary access roads, geotechnical wells and monitoring wells for the purpose of obtaining stratigraphical information, monitoring, observing measuring and assessing the level of groundwater and determination of subsurface conditions) as follows: Hudson Hope Berm Geotechnical Investigations including nine wells, sixteen test pits and temporary access roads in the vicinity of Hudson's Hope, all of which are located approximately as shown on the plan*…".

The drill holes and test pits are distributed along the length of the proposed shoreline protection works. One drill hole and six test pits would be located on Crown land, and the rest would be on either private land or BC Hydro-owned land.

3.0 LTC #07B SUBMISSION

The following documents have been received from BC Hydro in support of the request for LTC #07B:

1. BC Hydro - *Site C Clean Energy Project Request for LCC7 Component Authorization, Leave to Construct 7B (LTC7B) – Hudson's Hope Berm Geotechnical Investigations*, letter from [redacted] 17 April 2017.

[redacted]

BC Hydro also provided a copy of the following permit:

6. Ministry of Forests, Lands and Natural Resource Operations - *Forest Act Section 52 Authorization, File No. 10550-20/Hudson's Hope Berm FA S.52*, 24 April 2017.

BC Hydro also provided redacted copies of signed agreements with private property owners allowing access for geotechnical investigations as follows:

7. PID-011-262-460, dated 01 April 2017, allowing 4 test pits and 5 drill holes.
8. PID-023-962-861, dated 01 April 2017, allowing 2 test pits and 1 drill hole.

BC Hydro has advised that one additional property access agreement that is required has been negotiated and is expected to be finalized and signed soon.

4.0 REVIEW OF SUBMISSIONS

4.1 Design Details and Construction Drawings

Drill hole and test pit locations have been pre-selected as shown in the LTC submissions, based on design requirements and accessibility. Each work area will be approximately 10 m by 10 m. The locations may be adjusted in the field to suit local site conditions and access and egress will be chosen to limit damage to vegetation and the terrain. BC Hydro has obtained a *Forest Act Section 52 Authorization* which allows timber falling on Crown land along the Peace River shoreline near Hudson's Hope. Incidental clearing of both immature and merchantable spruce and aspen may be required to access drill hole and test pit sites, although BC Hydro intends to avoid trees where possible.

Anticipated subsurface conditions along the proposed Hudson's Hope shoreline protection works include both granular deposits and finer-grained soft soils overlying shale, siltstone and sandstone bedrock. The drill holes will range from about 10 m to 45 m deep. The investigation plan indicates that a sonic drill rig will initially be used to drill the deeper holes. Depending on site conditions, a decision will then be made to either continue with the sonic rig or switch to a smaller auger drill rig to access and complete the remaining shallower holes.

The sonic drill rig uses a rotary vibratory drilling method which obtains a continuous core sample. The auger drill rig obtains a continuous but more disturbed sample, as compared to the sonic rig. The auger rig is also capable of using pneumatic downhole hammer (Odex) and mud rotary methods, and can also perform Cone Penetration Testing (CPT) in soft soils.

The drill holes will be logged by the geotechnical supervisor and overburden samples will be retained for laboratory testing to determine material properties such as moisture content, particle gradations and Atterberg limits. Drill cuttings and recovered overburden materials not required for testing may be incorporated into backfill for the holes. If drilling fluid is used, it will be recirculated and after drilling a

hole, the fluid and any remaining cuttings will be collected and disposed of at an appropriate facility, by a licensed vacuum truck.

If bedrock is encountered, it could contain small amounts of potentially acid-generating (PAG) shale materials. Any bedrock cuttings will be contained and disposed of at an appropriate facility, by a vacuum truck.

Once completed, drill holes will be backfilled to meet the requirements of the BC *Groundwater Protection Regulation*.

An excavator will be used to dig the test pits, which will be about 4 m deep. A geotechnical supervisor will log the test pits and collect samples while the pits are being excavated. Once the required depth is achieved, the excavated material will be bucket-packed back into the excavation.

The proposed investigation equipment and methods are consistent with typical industry standards for work of this type and the proposed drill rigs should be capable of drilling and sampling any subsurface materials likely to be encountered at the project location. In the opinion of the IE, the proposed geotechnical investigations are reasonable and appropriate for the intended purpose of obtaining information for final design of the shoreline protection works, and are intended to minimize impacts on the environment and the safety of the public.

The engineering work plan provided for these investigations includes figures showing the proposed drill hole and test pit locations and has been sealed by a Professional Engineer registered in British Columbia. It is the IE's opinion that the proposed investigations are consistent with the Site C project general arrangement drawings, the conditions of Conditional Water Licence 132991 and the requirements of the CEMP.

4.2 Construction Implementation Plan and Schedule

Access for drilling and test pitting will be via existing roads and across existing ground without constructing new roads.

Two different drill rigs and an excavator are proposed for the geotechnical investigations. Both drill rigs and the excavator will likely be track-mounted and self-propelled, and will not require drill pad structures to be constructed. Both drill rigs require a support vehicle, typically a truck, that will carry drilling supplies such as casing, tools and a water tank.

Crews performing the work will access the sites via road and by foot. The contractor plans to work during daylight hours only.

Mobilization is expected to start shortly after this LTC is issued and the geotechnical investigations are scheduled to be completed in about two weeks. All materials used for and related to the investigations will be cleaned up and removed from the site on completion of the work.

The IE considers the work plan to be appropriate to the work, and that the proposed schedule is reasonable.

4.3 Quality Management

The work plan describes methods that are consistent with typical geotechnical drilling industry standards. The plan indicates that engineering personnel will log subsurface conditions as the holes and test pits are drilled or excavated. This will typically require full-time presence of qualified engineering personnel during drilling and test pitting, which should provide appropriate quality management of those operations.

The IE expects that the field investigations and future laboratory testing on samples collected during the work will be carried out in accordance with recognized industry standards.

4.4 Environmental Protection

The Environmental Protection Plan (EPP) includes descriptions of anticipated work activities and applicable mitigation measures to reduce potential environmental impacts. The EPP indicates that an environmental monitor will be on site full-time to monitor construction activities and ensure compliance with all requirements. BC Hydro has accepted the EPP.

The Fisheries and Oceans Canada (DFO) self-assessment of the proposed the on-land and near-river geotechnical investigations concludes that, provided appropriate environmental planning is undertaken in advance of and during completion of the work, these activities will not result in serious harm to fish and do not require further review by DFO.

The IE has discussed the work with the IEM and both parties have visited the general location of the proposed shoreline protection works in 2016 and 2017.

The IEM has provided the IE with comments on environmental aspects of the proposed construction in the following letter, a copy of which is attached for reference:

1. [redacted] *Site C Clean Energy Project – Conditional Water License 132991 IEM review of the Geotechnical Investigations for Hudson's Hope Shoreline Protection Berm and relevant component plans in consideration of LTC#07B,* letter to [redacted] dated 28 April 2017.

The IEM has no objections to issuing LTC #07B.

4.5 Public Safety

The IE has not reviewed the Contractor *Site Safety Management Plan* in detail except to confirm that the plan includes a *Public Safety Management* component. BC Hydro has accepted the Plan.

The geotechnical investigations will be carried out within the community of Hudson's Hope and interactions with the public are expected. Work sites will be flagged off. Minor temporary traffic impacts may occur when equipment is moved and traffic management signage and flagging personnel will be provided if required.

5.0 RECOMMENDATION FOR LEAVE TO CONSTRUCT LTC#07B

The Independent Engineer hereby recommends to the Deputy Comptroller of Water Rights that BC Hydro can proceed with geotechnical investigations for the Hudson's Hope shoreline protection berm, except as noted below. As per LCC #07 dated 20 April 2017, this recommendation is copied to BC Hydro and is sufficient for the geotechnical investigations to proceed. For reference, this recommendation is referred to as *Leave to Construct LTC #07B*.

Leave to Construct LTC# 07B for the Hudson's Hope shoreline protection berm geotechnical investigations is subject to the conditions of LCC #07 which are attached to this letter as Appendix A for reference.

A finalized and signed copy of the outstanding private property land access agreement must be submitted to the Deputy Comptroller of Water Rights, with a copy to the Independent Engineer, before commencing the geotechnical investigations on that property.

Yours truly,

[redacted]

[redacted] P.Eng.
Independent Engineer, Site C Clean Energy Project

Attachments:

1. Appendix A – LCC #07 Conditions
2. IEM letter dated 28 April 2017

c: [redacted]

APPENDIX A
LCC #07 – CONDITIONS

No.	Condition	Status for LTC #07B
1	Before commencing the geotechnical investigations, the Licensee must submit to the Deputy Comptroller of Water Rights, with a copy to the Independent Engineer, a document signed by each private landowner affected by the works authorized under LCC #7 that acknowledges there is an agreement for BC Hydro to access the privately owned land.	Not applicable.
2	Before commencing any of the geotechnical investigations, the Licensee must: • submit relevant plans for the access roads, geotechnical wells, monitoring wells, environmental protection and public safety for each site to [redacted] to review in his capacity as IE, and • receive a copy of a report (the "Recommendation Report") submitted by the IE to the Engineer under the Water Sustainability Act, which report recommends that construction of a component of LCC #7 may proceed. The Recommendation Report is in the form of a letter and is sufficient for construction of that component to proceed.	Completed.
3	Within ten days of the receipt of the Recommendation Report, the Licensee may request the Engineer to make revisions to the Recommendation Report, if it conflicts with the Licensee's plans or site conditions.	If and as required.
4	If during construction material changes are made to the manner in which the geotechnical investigations are to be carried out, the changes must be authorized through the process described in Item 2.	If and as required.
5	Material changes to the number and location of the geotechnical wells, monitoring wells and access roads are to be submitted to the Engineer for amendment of the plans in Appendix C and E (of LCC#7).	If and as required.
6	Any revisions to sections of the CEMP that are applicable to the construction of works authorized by the Water Licences, including temporary works in support of constructing the named permanent works, must be reviewed by the IEM and accepted by the Deputy Comptroller of Water Rights	If and as required.
7	Weekly progress reports on construction shall be submitted by the Licensee to the IE, IEM and the Engineer	To be provided as work progresses.
8	The Licensee must comply with the provisions for wells in the Water Sustainability Act and Groundwater Protection Regulation.	Ongoing during completion of the work.

No.	Condition	Status for LTC #07B
9	When the geotechnical investigations are complete, all ground surface disturbances must be restored as nearly as possible to the original condition.	Ongoing during completion of the work.
10	Permits, licences, and approvals under enactments other than the Water Sustainability Act for the construction of works may be required in addition to the leave to commence construction, and the Licensee should ensure the appropriate authorizations are in place.	If and as required.
11	No clearing activities on Crown Land may commence prior to the issuance of relevant Land Act Licence(s) of Occupation, and Forest Act Occupant Licence(s) to Cut, Forest Act Section 52 authorization(s), and Forest and Range Practices Act ungulate winter range exemption(s), where applicable.	Completed.

[redacted]

[redacted]

April 28, 2017

[redacted]

[redacted]
13541 – 15A Avenue
Surrey, BC V4A 9A1

Attention: [redacted] Independent Engineer

RE: Site C Clean Energy Project – Conditional Water License 132991 IEM review of the Geotechnical Investigations for Hudson's Hope Shoreline Protection Berm and relevant component plans in consideration of LTC#07B

Leave to Commence Construction (LCC#7) was issued by the Deputy Comptroller of Water Rights as identified in the Conditional Water Licence (CWL) 132991[1] for the Geotechnical Investigations for the Halfway River Debris Boom and the Hudson's Hope Shoreline Protection Berm.

It is the IEMs understanding that BC Hydro will be requesting approval of two separate Leaves to Construct (LTCs) (LTC#7A and LTC#7B) applicable to LCC#7 Geotechnical Investigations.

While it is the role of the Independent Engineer (IE) to issue the LTCs, the Independent Environmental Monitor's (IEMs) role is to review Environmental Protection Plans (EPPs) and associated component plans provided by contractors to verify they adequately address the potential environmental impacts in advance of construction. This letter has been prepared specifically for the geotechnical investigation and associated works pertaining to LTC#7B. It is our understanding that works under this LTC are to include the following:

- Geotechnical Investigations for Hudson's Hope Shoreline Protection Berm which involves the drilling of nine exploratory drill holes and the excavation of 16 test pits along the shoreline of the Peace River at Hudson's Hope.

As the issuance of each LTC requires the IEMs review and recommendation for acceptance to the IE, it is the IEMs understanding that any revisions to the EPP or supporting documents, or changes to scopes of work that could require such revisions, would require review and acceptance by the IEM prior to initiating works, and could be considered a hold point by the IE.

[1] Conditional Water Licence 132991. Prepared by the Ministry of Forests, Lands and Natural Resource Operations, Office of the Comptroller of Water Rights, Water Management Branch. Dated February 26, 2016.

[redacted]

The IEM has reviewed the EPP provided by BC Hydro including cross-referencing with the various applicable project requirements found within the Construction Environmental Management Plan (CEMP), components of BC Hydro supporting documentation/plans, relevant permits/approvals/licences, and related drawings for the works. In addition, the review was conducted in consideration of the Environmental Assessment Certificate (EAC) Schedule B Table of Conditions and Decision Statement issued by the Canadian Environmental Assessment Agency (CEAA) for the Project.

The following is a summary of plans, permits, and authorizations received and reviewed by the IEM team, which are related to LTC#7B.

BC Hydro Plans/Documents

- *Construction Environmental Management Plan* (Revision 4), dated July 26, 2016.
- BC Hydro - *Site C Clean Energy Project Request for LCC7 Component Authorization, Leave to Construct 7B (LTC7B) – Hudson's Hope Berm Geotechnical Investigations,* letter from [redacted] to [redacted] 17 April 2017.

BC Hydro Redacted Agreements Allowing Private Property Access

- PID-011-262-460, dated 01 April 2017, allowing 4 test pits and 5 drill holes.
- PID-023-962-861, dated 01 April 2017, allowing 2 test pits and 1 drill hole.

Contractor Plans/Documents

[redacted]

Provincial Permits/Approvals

- *Conditional Water Licence 132991.*
- Ministry of Forests, Lands and Natural Resource Operations - *Forest Act Section 52 Authorization, File No. 10550-20/Hudson's Hope Berm FA S.52*, 24 April 2017.

Review Summary

It is our understanding that the scope of work includes:

- Exploratory drill holes and the excavation of test pits along the Peace River to investigate subsurface conditions along the alignment of the proposed Hudson's Hope Shoreline Protection Berm.
- Access to sites utilizing existing roads though BC Hydro, Crown, and privately owned property.

Safety plans were not reviewed in detail; the review was only to confirm that the plans are in place as required.

Conclusions and Recommendations

It is the IEMs understanding that BC Hydro is currently negotiating with one additional property owner to allow access to perform geotechnical investigations. The contractor will ensure no entry occurs onto any private land without the appropriate permissions in place.

Upon review of the submitted documents for LTC#7B, and based on our understanding of the works proposed in addition to communications and information provided by BC Hydro, we have no objections to issuing LTC#7B for the works associated with the Geotechnical Investigations for Hudson's Hope Shoreline Protection Berm, as described. Ultimately, all works must be compliant with appropriate permits, approvals, authorizations, and conditions as identified within the EAC and CEAA Decision Statement, regulations, and the CEMP.

Yours truly,

[redacted]

Independent Environmental Monitor, Delegate

cc. [redacted]