Appendix 13. Portage Mountain Quarry Western Toad Management Summary

Memo

To: Alex Brissard, Plan B Technical Services

From: Jonathan St Jean

Date: Dec 12th, 2017

Re: Portage Quarry – Western Toad Management Summary

Alces Environmental Ltd. was retained by Plan B Technical Services to provide professional services to the Portage Mountain Quarry Site, pertaining to assessment and management of Western Toads and their habitats. Jonathan St. Jean, R.P.Bio of Alces arrived onsite on July 24, 2017, and remained engaged on the project until September 12, 2017. Mr. St Jean is considered a Qualified Professional (QP), with extensive background in amphibian surveys and management measures, and is registered with the College of Applied Biology of BC.

As requested, here is the list of mitigation measures conducted:

Pre-Construction Assessment

Pre-construction habitat assessments were conducted from July 24 to July 29, 2017. Survey methodology is summarized in Appendix A (Alces Memo - Amphibian Surveys for Portage Quarry Site and Access Road, August 9, 2017).

- Two areas were identified as relevant habitat features: the wetland area at the top of the quarry site and water crossing #2 (see Map, Appendix B).
    - The wetland at the top was identified as a breeding site, and
    - The water crossing #2 was identified as a possible migration route for western toads (as it was the only significant watercourse within the project area and would potentially contain breeding habitat upstream or downstream of the access road crossing).

Mitigation Measures

Wetland at top of quarry

- No works were performed

Water crossing #2

- Amphibian exclusion fencing was installed on both sides of the access road to allow for travel through the location to get to the quarry site (installed per BC Hydro Western Toad Management Procedure, Appendix C).
- The upstream fence was installed in its permanent location on August 11-13, 2017.
- The downstream fence was first installed in a temporary location along the edge of the access road on August 11-13, 2017, then reinstalled further downstream along the edge of the work limits in its permanent location on August 27,28, 2017.
- Following relocation of the lower fence, work proceeded on the stream and amphibian culvert locations.

Initial design sizing of the poly 1000mm amphibian crossing culverts was provided during the road design review process by BC Hydro. Alces' Environmental compared the design with the '*Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia Guidebook'.* The 1000mm poly crossing structures satisfied all best management practices recommended in the guidebook and were therefor ordered for installation.

Monitoring and Translocation

- Daily dawn road surveys were completed prior to the crew arriving onsite between August 1, 2017 and Sept 3, 2017.
    - An increased frequency of monitoring during the 'caution period' (weekly monitoring recommended per BC Hydro Management Procedures, Appendix C) was considered necessary due to the persistent presence of toads.
    - Toads observed during the dawn road surveys were captured and translocated >50 m from the roadway.
    - Translocation occurred consistent with the Site C Western Toad Management Procedure and *'Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia Guidebook'.*
    - A table was generated and updated daily with the permit required information regarding the translocation of amphibians (Appendix D).
    - Daily surveys continued until toads were no longer present for three mornings in a row (September 3, 2017).
- Weekly inspections occurred in all active work areas from Sept 3, 2017 until September 12, 2017.

Closure

Alces has prepared this summary report for reference of BC Hydro when evaluating relevant permit and approval requirements. Please feel free to contact the undersigned with any questions.

Yours truly,

Alces Environmental Ltd.

Jonathan St Jean, R.P.Bio., BC-CESCL

Principal/Senior Biologist

Appendix A – Amphibian Survey Summary
Alces Memo (August 9, 2017)

Memo

To: Plan B Technical Services Inc

From: Jonathan St Jean, R.P.Bio

Date: August 9, 2017

Re: Amphibian Surveys for Portage Quarry Site and Access Road.

Alces Environmental Ltd. (Alces) was retained by Plan B Technical Services (Plan B) to conduct pre-construction amphibian surveys for the Portage Quarry Site and Access Road Upgrade Project (the Project) in the Portage Mountain area west Hudson's Hope, BC.

Pre-construction amphibian habitat surveys were conducted from July 24th-29th, 2017 prior to site mobilization by the contractor. A systematic survey approach was utilized in order to identify habitat features which may require the installation of temporary or permanent mitigation measures during construction activities.

Access Road Survey (Canyon Drive to Site Gate)

The field surveys consisted of walking the road right-of-way (ROW) in a zig zag pattern from the road edge out to approximately 30m away from the road. The survey's purpose was to identify any moist areas such as streams, wetlands or ponded water which could provide breeding habitat or areas in which mass migrations routes may occur.

Most of the access road habitat is characterized as dry mixed wood forests (Photo 1) or previously logged forest plantations. The access road crosses two TRIM mapped streams (Appendix II) prior to the site gate; however, the first one of these is a dry gently sloping swale with no aquatic vegetation and very little evidence of seasonal flow. The second stream crossing is identified on the design drawings as Watercourse Crossing 2, this location may be a migration route as it provides habitat for multiple amphibian age classes; it has some flowing and ponded water below the road with moist soil for 5-10m on either side of the watercourse including above the road where an adult Western Toad was observed.

Watercourse Crossing 2 Mitigation Measures

This watercourse crossing and immediate surrounding moist habitat may provide a potential migration route for amphibians such as western toads, wood frogs and boreal chorus frogs. As this may be a potential migration route it is recommended this area be isolated from traffic with amphibian guidance fencing and have an amphibian friendly crossing structure installed following the standards outline in the Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia guidebook. A site sketch of the recommended measures has been provided in Appendix III. The structures will be field fit under the direction of an appropriately qualified professional with amphibian experience.

Portage Quarry Survey

The footprint for the quarry has been previously logged, mulched and is mostly covered in grasses, forbs and small shrubs. There are a number of seepages and moist areas (Photo 2) throughout the lower gently sloped portion of the site where the stock pile areas will be located. A number of adult frogs and toads were observed during the systematic habitat survey of this area. The steep face portion of the site may provide some rock crevasse habitat for Western Toads but generally provides low quality habitat in its current condition.

The very top of the quarry has a number of small ponds (Photo 3) and a Non-Classified Wetland (NCW) (Photo 4) which are currently inundated with thousands of juvenile frogs and toads (Photo 5); with all age classes being observed (Photo 6). BC Hydro will have to develop a directive on how they want to proceed with this area in the short and long terms.

Closure

Further amphibian surveys will continue as required and to the exact timing and measures outlined in Site C's Western Toad Management Procedure document. Translocations and handling of amphibians will also strictly follow the Management Procedures document.

Please do no hesitate to contact the undersigned should you have any questions or require any further information.

Yours truly,

Alces Environmental Ltd.

Jonathan St Jean, R.P.Bio., P.Biol., BC-CESCL

Principal/Senior Biologist

Appendix I
Site Photographs

Photo 1 – Typical mixed wood forest located along much of the access road into the Portage Quarry site.

Photo 2 – Example of a small wet area located within the Portage stockpile location.

Photo 3 – The largest pond at the top of the Portage Quarry site.

Photo 4 – Small wetland at the top north corner of the Portage Quarry site.

Photo 5 – One of the larger congregations of juvenile toads and frogs.

Photo 6 – Tadpoles located in a pool within the wetland.

Appendix II
Overview Map of Portage Quarry and Access Road

Portage Quarry - Amphibian Habitat Assessment

N

Legend

- Access Road
- SiteBoundary

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP swisstopo, and the GIS User Community

0 0.5 1 2 3 4 Kilometers

Appendix III
Watercourse Crossing 2
Amphibian Mitigation Site Sketch

Portage Quarry - Amphibian Habitat Assessment

Appendix B – Map

N

Water Crossing 2

Water Crossing 5

Water Crossing 4

Map Notes:
1. Datum: NAD 83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.
4. Imagery: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,
5. Wetland areas identified visually from imagery.

Legend

- Water Crossing
- Wetland Areas
- Amphibian Area of Concern
- Licence of Occupation
- River or Stream

FOR DISCUSSION PURPOSES ONLY - CONFIDENTIAL

0 200 m

1:3,500

BC Hydro

Amphibian Wetland Areas
Portage Mountain Quarry

Date	SEP 01, 2017	DWG NO	1016-C14-10061	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

Path: X:\ArcGIS\Projects\Environment\Wildlife\Prgat\Mn_AmphAssmt_1016_C14_10061.mxd

Appendix C - Site C Western Toad Management Procedure (BC Hydro, July 21, 2017)

Site C Western Toad Management Procedure

This management procedure is applicable only during construction on access roads, the transmission line right-of-way, and areas within 250 m of wetlands. However, in all construction areas impacts to amphibians must be mitigated as described in §4.17 of the Site C CEMP, including through the implementation of barriers, setback buffers, and salvage and relocation, as appropriate and at the direction of a Qualified Environmental Professional.

Core Period: June 01 to August 15 – At this time juvenile western toads (**Figures 1, 3, and 4**) disperse from breeding sites (shallow margins of lakes, ponds, or wetlands) into foraging sites (other wetlands, riparian areas along streams, or upland sites). Large numbers of toads might be encountered on roads and at work sites. Juvenile western toad observations ≥10 individuals have occurred within the Project area from June 1 until August 15; the anticipated duration for western toad dispersal is approximately 11 weeks – the "core dispersal period".

During the core dispersal period, a Qualified Environmental Professional (QEP) must survey:

- **all Project Access Roads prior to crews driving to site,**
- **all Project Access Roads prior to the first daily site delivery; and**
- **all daily Work Sites before work commences.**

Caution Periods: April 01 – May 31; August 16 – September 30 – Adult western toads (**Figure 2**) and juveniles (**Figure 1**) may occur on Access Roads and at Work Sites during their "breeding period" or "foraging period."

The breeding window is when adults start to move from hibernation areas to breeding sites (shallow margins of lakes, ponds, or other wetlands). Toads often move at night, when temperatures are cooler, and especially after a rainfall. The breeding window coincides with days where the minimum temperature doesn't drop below 0°C AND the maximum temperature is above 10°C. In the Project area, the breeding period is April 01 – May 31.

The foraging window is when adults and juveniles move from breeding sites to foraging areas to prepare for hibernation. As with the breeding window, toads tend to be more active at night, especially following a rainfall. Toads can be found foraging year-round, but the key foraging period is August 16 – September 30.

During the caution period, before any work starts, the contractor must contact the QEP to provide the work location and start date. The contractor's QEP must conduct an Access Road / Work Site sweep to determine if toads are likely to be present, before work starts. The contractor's QEP can give an "all clear" window for up to one week after this sweep during the caution period. The contractor's QEP must be notified to re-assess the area if one week or more has passed since the previous "all clear."

Hibernation Period: October 01 – March 31 - Western toads are not anticipated to be on work sites or roads.

Figure 1. Juvenile western toads are small and can be difficult to detect if dispersal is limited to a few individuals.

Figure 2. Adult western toad traveling to breeding site.

Figure 3. Sub-adult western toad.

Figure 4. Mass dispersal event of juvenile western toads.

Site C Western Toad Management Procedure

This management procedure outlines how BC Hydro and its contractors will remain compliant with EAC conditions 16 and 19 pertaining to western toads, a federally and provincially listed species at risk. It applies only during construction on access roads, transmission line rights-of-way, and off-site areas within 250 m of wetlands. However, all construction activities must mitigate for amphibians as described in §4.17 of the Site C CEMP.

A QEP with western toad survey experience, employed by the contractor, must survey for toads:

- before any work along project access roads during the core dispersal period (June 01 to August 15).
- at work sites within the transmission line right-of-way (towers, roads, laydown, pull-sites, offices, staging areas) and any project-related off-site areas within 250 metres of wetlands.
- along existing project access roads adjacent to wetlands during the caution period (breeding and foraging windows, April 01 – May 31 and August 16 – September 30, respectively).

On the direction of the contractor's QEP, contractors may be required to alter their schedule.

Access Road and Work Site Sweep Methods

During the core dispersal period, and during the caution periods (April 01 - May 31 and August 16 - September 30), the contractor's QEP must conduct a road and work site sweep prior to heavy traffic use on access roads, and construction activities at transmission towers and transmission access routes. Once the road and work site sweeps have finished, the contractor's QEP will determine if western toads are at risk of direct mortality. If there is determined to be no risk to dispersing toads, work will be allowed to commence.

Road sweeps must be conducted by vehicle travelling at 35-55 km/h (as appropriate given QEP experience and road/weather conditions) with the contractor's QEP in the passenger seat looking for dispersing western toads on the road and road verges. Road sweeps can commence at dawn using headlights on low beam for illumination (see *RISC Standard for Pond Breeding Amphibians*).

Work site and adjacent wetland area sweeps / searches must be conducted on foot by the contractor's QEP using a search pattern (zig-zag, grid or transect) that considers observability, terrain, searcher safety and search area coverage. Maximum survey effort is 1 ha/hour time constrained searches, as per the *RISC Standard for Pond Breeding Amphibians*.

The contractor' QEP will maintain awareness of best management practices for western toads, including the BC *Guidelines for Amphibians during Development* and *BMP - Amphibian and Reptile Salvages* and revisions.

Toad Sweep Crew Tool Kit

2 x 30km/h road signs, 20 x 0.5 m stakes, 3 x hammer/mallet, 200 m landscaping fabric (minimum 0.5 m width), 1 x box cutter, 2 x shovel, 5 x pit trap buckets (2 gal, ~9" diameter, ~9" depth), 2 x bucket lids with holes (for translocation), 100 x nitrile gloves (various sizes), 5 x work gloves, 1 L unscented bleach, 4 gallon water.

Stop Work Procedure

All road and work site sweeps must be conducted by the contractor's QEP. If dispersing western toads are confirmed within 20 m of access roads or construction, the contractor's QEP must halt traffic and construction activities at the dispersal site and initiate the steps described before work recommences. Qualified personnel under the direction of the contractor's QEP will install temporary barrier fences along the road or around construction at the dispersal site. Barrier fences will be of UV stabilized material, woven or solid to prevent small toads passage, and 0.5 m high and curved or L-shaped at the top (with the fence lip facing away from the road) to prevent toads from climbing over the fence. Barrier fences must be arranged in a wedge or zig-zag pattern to funnel amphibians into traps and must extend 50 to 100 m beyond the last trap at either end of the fence. Trapped toads will be translocated away from the road or work site in buckets to continue dispersal (see "Translocation"). Personnel requirements depend on the size and spatial extent of the dispersal. Speed restrictions of 30 km/h in the area 50 m either side of the dispersal site must be applied and maintained for the duration of the dispersal event. A sweep must confirm dispersing western toads have vacated the area before the contractor's QEP can approve the commencement / re-commencement of construction at the dispersal site, and lift the speed restriction.

Translocation

If dispersing western toads are observed on any roads, or at tower construction sites, the contractor's QEP will determine the direction of dispersal. All toads potentially affected by traffic or construction must be captured, translocated, and released by the contractor's QEP; in the direction of dispersal and to a safe area within 200 m (and at least 50 m from) the capture site. Translocated individuals will not be placed in any specific habitat type, but sub-optimal habitats (e.g., drill pads, rock outcrops) will be avoided. During translocations the contractor's QEP must maintain hygiene when handling amphibians, including following established procedures to prevent the spread of amphibian chytrid fungus, as described below. If individuals are translocated >200 m from point of capture, survival monitoring must be completed by the contractor's QEP as per *Wildlife Act* permit FJ16-226024.

If a mass dispersal (>100 individuals during a 24-hour period) requiring relocation of toads (as above) is identified over three consecutive years in the same location, consideration will be given to installing a permanent crossing structure to separate dispersing toads from traffic. Crossings will be appropriately designed culverts or structures achieving separation, and including well-maintained guidance fencing to direct toads into the structure, see *Guidelines for Amphibians during Development* (pg. 23). Such mitigation will be directed by the QEP and BC Hydro's Representative and will be an extra to the contract, to be managed via the contract change process.

Disinfectant and Hygiene

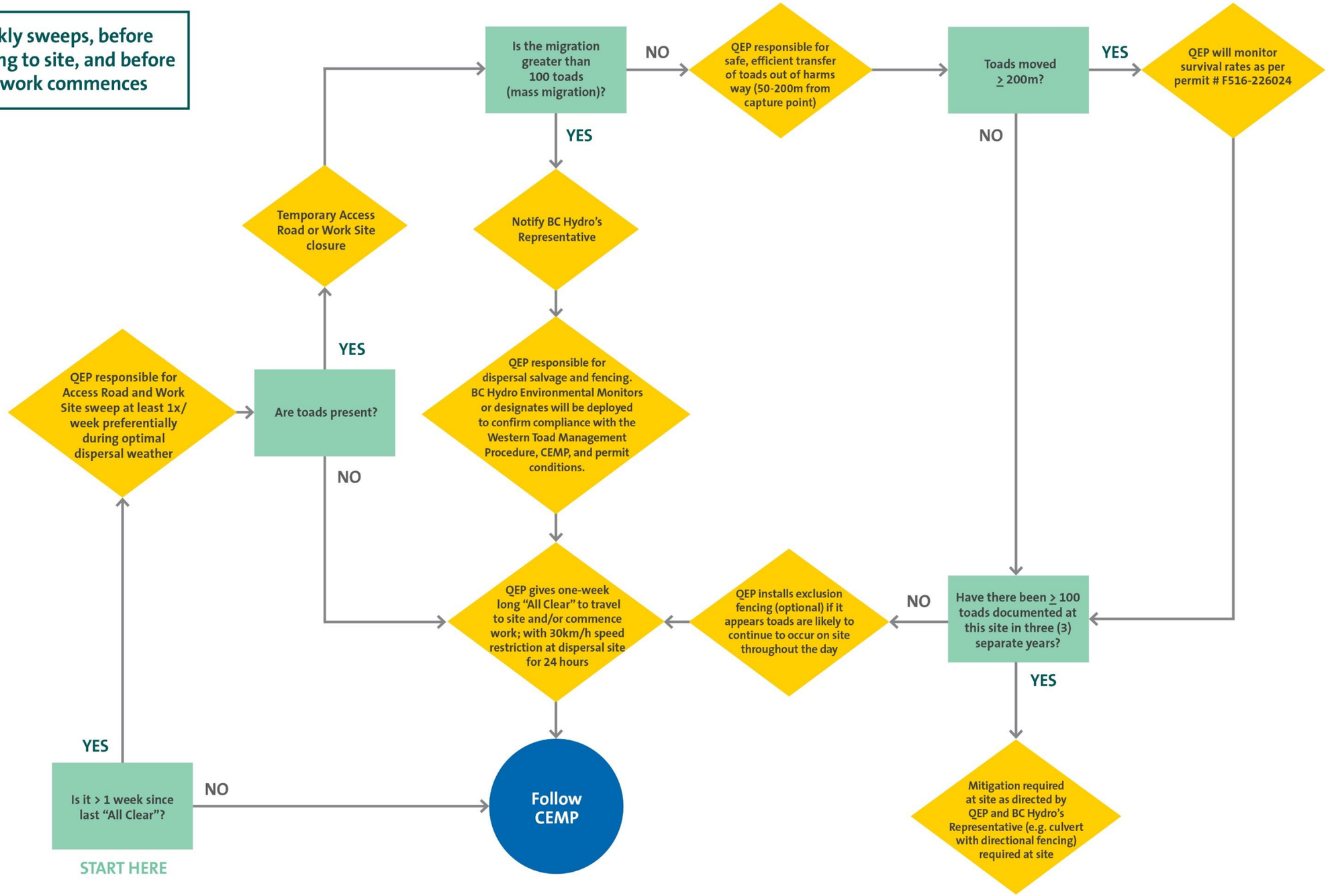
Handlers must wear clean, new vinyl or nitrile gloves during salvages, as per BC's *Standard Operating Procedures: Hygiene Protocols for Amphibian Fieldwork*. Gloves must be changed when moving to another translocation site. Buckets used for transferring individuals must be disinfected using a household bleach and water mixture at 32 ml / 1 litre of water (or 3.5 cups bleach to one tall bucket / 25 litre of water).

July 21, 2017

Western Toad Caution Period
(April 1 – May 31, August 16 – September 30)

BC Hydro
Power smart

Weekly sweeps, before travelling to site, and before any work commences

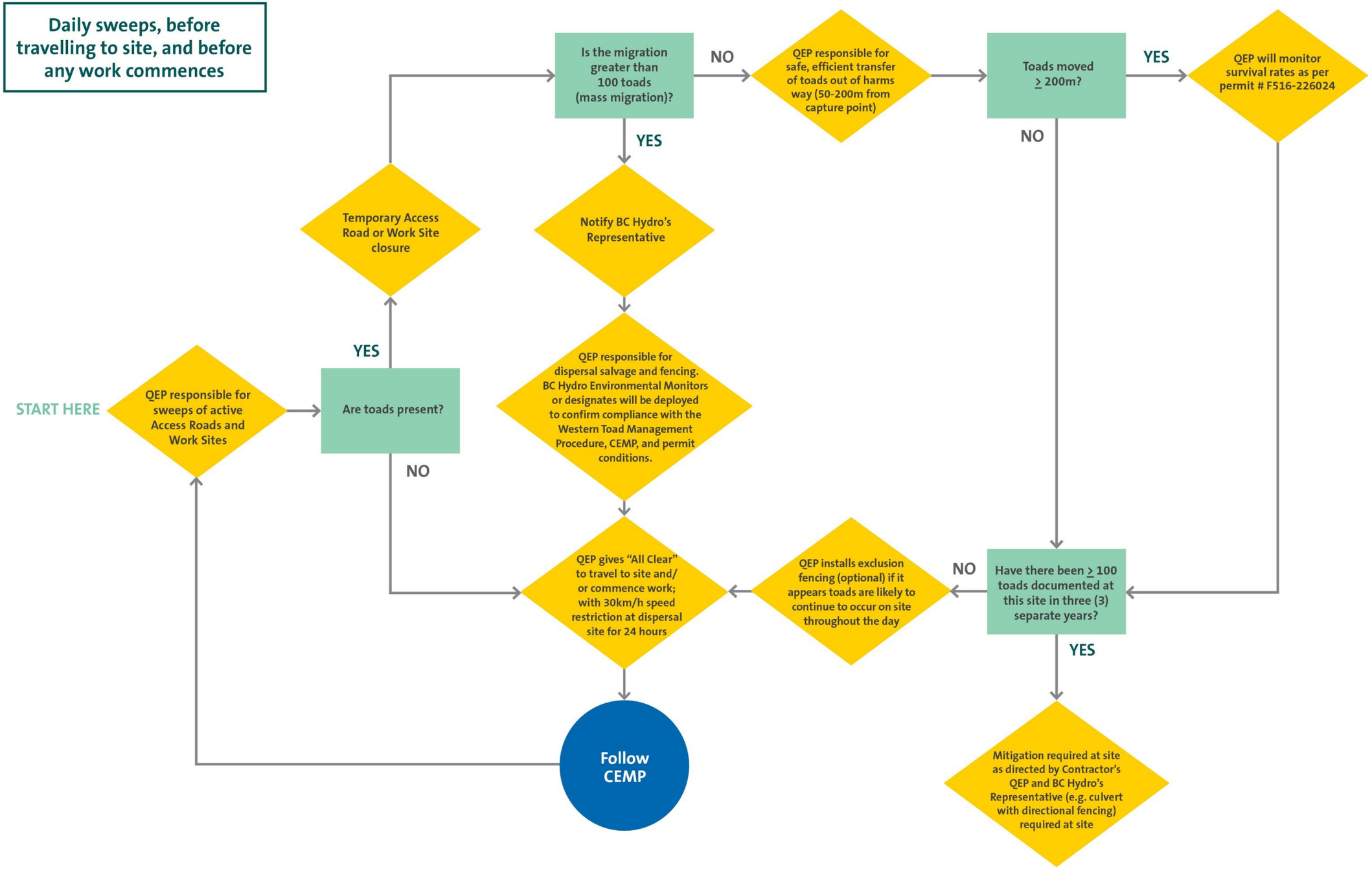


July 21, 2017

Western Toad Core Dispersal Period
(June 1 – August 15)

BC Hydro
Power smart

Daily sweeps, before travelling to site, and before any work commences



July 21, 2017

Appendix D - Amphibian Translocation Record

Portage Quarry Amphibian Translocations				
Date Captured	Common Name	Location Captured	Age Class	Capture Notes
01-Aug-17	Western Toad	10v 557974 6205745	Adult	Dawn Road Survey - Moved >50m away from Rd
01-Aug-17	Western Toad	10v 557874 6205449	Adult	Dawn Road Survey - Moved >50m away from Rd
01-Aug-17	Western Toad	10v 555775 6204054	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10v 559420 6209746	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10v 559138 6209364	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10v 558901 6208924	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10v 558909 6208646	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10v 558867 6208546	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10v 558689 6207790	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10v 556327 6206781	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10u 556813 6204665	Adult	Dawn Road Survey - Moved >50m away from Rd
09-Aug-17	Western Toad	10u 555773 6204074	Adult	Translocated from the upstream ditchline at WC#2 prior to moving in dozer
10-Aug-17	Western Toad	10V 559370 6209677	Adult	Dawn Road Survey - Moved >50m away from Rd
10-Aug-17	Western Toads	10v 559220 6209465	Adults (2)	Dawn Road Survey - Moved >50m away from Rd
10-Aug-17	Western Toad	10v 559131 6209350	Adult	Dawn Road Survey - Moved >50m away from Rd
10-Aug-17	Western Toad	10v 558902 6208939	Adult	Dawn Road Survey - Moved >50m away from Rd
10-Aug-17	Western Toad	10v 558850 6208475	Adult	Dawn Road Survey - Moved >50m away from Rd
10-Aug-17	Western Toad	10v 558887 6208393	Adult	Dawn Road Survey - Moved >50m away from Rd
11-Aug-17	Western Toad	10v 558849 6208433	Adult	Dawn Road Survey - Moved >50m away from Rd
11-Aug-17	Western Toad	10v 558897 6208361	Adult	Dawn Road Survey - Moved >50m away from Rd
11-Aug-17	Western Toad	10u 556828 6204673	Adult	Dawn Road Survey - Moved >50m away from Rd
11-Aug-17	Western Toad	10u 555774 6204068	Adult	Dawn Road Survey - Moved >50m away from Rd
11-Aug-17	Western Toad	10u 555778 6204001	Adult	Dawn Road Survey - Moved >50m away from Rd
11-Aug-17	Western Toad	10u 556338 6204414	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10v 559353 6209683	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10v 558848 6208482	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10v 558884 6208642	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10v 558427 6207071	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10v 558320 6206780	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10u 557995 6205821	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10u 557930 6205637	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10u 557898 6205540	Adult	Dawn Road Survey - Moved >50m away from Rd
12-Aug-17	Western Toad	10u 556679 6204573	Adult	Dawn Road Survey - Moved >50m away from Rd
13-Aug-17	Western Toad	10u 558132 6206221	Adult	Dawn Road Survey - Moved >50m away from Rd
13-Aug-17	Western Toad	10u 557905 6205557	Sub Adult	Dawn Road Survey - Moved >50m away from Rd
13-Aug-17	Western Toad	10u 557713 6205296	Adult	Dawn Road Survey - Moved >50m away from Rd
13-Aug-17	Western Toad	10u 555310 6203667	Sub Adult	Dawn Road Survey - Moved >50m away from Rd
13-Aug-17	Western Toad	10u 555799 6204162	Adult	Dawn Road Survey - Moved >50m away from Rd
14-Aug-17	Western Toad	10v 558849 6208167	Adult	Dawn Road Survey - Moved >50m away from Rd
14-Aug-17	Western Toad	10u 557885 6205503	Adult	Dawn Road Survey - Moved >50m away from Rd
14-Aug-17	Western Toad	10u 556828 6204676	Adult	Dawn Road Survey - Moved >50m away from Rd
14-Aug-17	Western Toad	10u 555602 6203828	Adult	Dawn Road Survey - Moved >50m away from Rd
14-Aug-17	Western Toad	10u 555306 62036111	Adult	Dawn Road Survey - Moved >50m away from Rd
14-Aug-17	Wood Frog	10u 555367 6203627	Adult	Moved approximately 100m from capture site about 60m outside of quarry site
14-Aug-17	Wood Frog	10u 555317 6203623	Adult	Moved approximately 100m from capture site about 60m outside of quarry site
15-Aug-17	Wood Frog	10u 555327 6203654	Adult	Moved approximately 100m from capture site about 60m outside of quarry site
16-Aug-17	Western Toad	10v 558912 6208862	Adult	Dawn Road Survey - Moved >50m away from Rd
16-Aug-17	Western Toad	10v 559879 6205490	Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10v 559364 6209675	Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10v 558897 6208615	Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10v 558854 6208437	Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10v 558583 6207592	Sub Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10v 558334 6206827	Sub Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10v 558334 6206827	Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10V 558317 6206767	Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10u 557893 6205520	Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10u 557676 6205264	Adult	Dawn Road Survey - Moved >50m away from Rd
23-Aug-17	Western Toad	10u 557899 6205528	Adult	Dawn Road Survey - Moved >50m away from Rd
24-Aug-17	Western Toad	10 v 558356 6206849	Adult	Dawn Road Survey - Moved >50m away from Rd
24-Aug-17	Western Toad	10u 557974 6205747	Adult	Dawn Road Survey - Moved >50m away from Rd
24-Aug-17	Western Toad	10u 557896 6205525	Adult	Dawn Road Survey - Moved >50m away from Rd
24-Aug-17	Western Toad	10v 558905 6208627	Adult	Dawn Road Survey - Moved >50m away from Rd
26-Aug-17	Western Toad	10v 558330 6206797	Adult	Dawn Road Survey - Moved >50m away from Rd
26-Aug-17	Western Toad	10v 558065 6206011	Adult	Dawn Road Survey - Moved >50m away from Rd
27-Aug-17	Western Toad	10v 558879 6208402	Adult	Dawn Road Survey - Moved >50m away from Rd
27-Aug-17	Western Toad	10u 558192 6206401	Adult	Dawn Road Survey - Moved >50m away from Rd
28-Aug-17	Western Toad	10v 559877 6205492	Adult	Dawn Road Survey - Moved >50m away from Rd
28-Aug-17	Western Toad	10v 559877 6205492	Adult	Dawn Road Survey - Moved >50m away from Rd

28-Aug-17	Western Toad	10V 555302 6203652	Juvenile	Moved approximately 100m from capture site about 60m outside of quarry site
29-Aug-17	Western Toad	10v 559880 6205492	Adult	Dawn Road Survey - Moved >50m away from Rd
29-Aug-17	Western Toad	10u 555312 6203615	Adult	Dawn Road Survey - Moved >50m away from Rd
31-Aug-17	Western Toad	10V 558446 6207129	Adult	Dawn Road Survey - Moved >50m away from Rd

Appendix 14. Bald Eagle Nest Monitoring 2017 Annual Report

MEMORANDUM

Date:	January 19, 2018
To:	Brock Simons, R.P.Bio., Site C Wildlife Lead
From:	Ashleigh Ballevona, R.P.Bio. and Charlie Palmer, P.Biol., R.P.Bio. Hemmera
File:	398-0173.05
Re:	**Bald Eagle Nest Surveys –Summary for 2017: Site C Wildlife Monitoring BCO 95055**

1.0 INTRODUCTION

This memo summarizes the findings of the bald eagle (*Haliaeetus leucocephalus*) nest surveys on the Peace River conducted in May and June 2017. The purpose of the surveys was to document the status of known bald eagle nests along the Peace River, the status of known nests at wetlands near the Site C transmission line, and to determine if new bald eagle nests had been constructed in either area.

The primary objectives of the bald eagle nest surveys were to:

1. Determine the activity status (active/not active) and productivity of bald eagle nests in the study area (footprint plus disturbance buffer between the Alberta border and Hudson's Hope).
2. Provide the data to BC Hydro for use in guiding mitigation during ongoing and upcoming construction activities.

Data collected during this survey provides information on nest status (i.e., if it is still present), activity (i.e., birds observed on the nest), and productivity (i.e., presence of eggs or chicks). This work continues to build on the data collected during baseline studies.

2.0 METHODS

Known bald eagle nest locations along the Peace River and at natural wetlands adjacent to the Site C transmission line right-of-way were surveyed over three days in May and June 2017, following the methods outlined by the Resources Inventory Committee (2001). The survey was conducted from a helicopter with a two-person crew consisting of a crew lead and a technician. The flights took place between two hours after sunrise and two hours before sunset to avoid contrasting shadows. The helicopter maintained a minimum 50-metre height above nests. Previously identified nest locations from past aerial surveys and incidental observations from the existing dataset were visited. New nests observed during the survey were added to the database, and nest status and activity data were collected.

After each survey, the results were provided to BC Hydro in Excel (.csv) format, including applicable comments and coordinates for each nest. Hemmera has also provided BC Hydro with an Access database that contains the combined 2017 data.

3.0 SURVEY RESULTS

Observations at each known nest site were recorded, with statuses of “active”, “inactive”, “tree gone”, or “unknown”, assigned to each nest (**Table 1**). The classification of “unknown” was applied to nests that were not observed because they were difficult to see (i.e., obscured by foliage).

Sixty-six (66) previously recorded stick nests were re-visited during the 2017 surveys, and 13 new nests were recorded. New nests were assigned a nest ID number starting at 600 (**Table 1**). Of the new nests recorded, nine were identified as bald eagle nests, and the remaining nests were identified as belonging to common raven (*Corvus corax*) (1), red-tailed hawk (*Buteo jamaicensis*) (1), Canada goose (*Branta canadensis*) (1), and an unknown species (1). Incidental observations of nests being used by species other than bald eagles are included in **Appendix A**. All the of newly identified nests were recorded as active except one older-looking ‘inactive’ bald eagle nest that had vegetation growing inside of it.

During the 2017 surveys, 16 of the re-visited nests were not present (i.e., ‘tree gone’). Of these, one bald eagle nest (#116) and one Canada goose nest (#306) were lost as a result of tree clearing within the Lower Reservoir Clearing area. The other 14 nests are presumed to have been lost as a result of natural causes (i.e., age, decay, weather events), as these trees were located outside of project-clearing areas. Three additional nests were observed to be in an obvious state of decay and could not be used for nesting (‘inactive’). These 19 nests will not be re-surveyed in future years, and are shown in grey in **Table 1** below.

Ten of the 66 nest locations that were re-visited in 2017[1] were previously reported as ‘not present.’ This status was confirmed during 2017, and they are not included in the summary table below. Only one of those nests (#215) no longer present was lost due to project-related tree clearing, which occurred because the tree was located within the Dam Site clearing area (completed during Summer 2015 – Spring 2016).

The nest located at Charlie Lake (nest #304) was not re-visited in 2017 and is recorded as having an unknown status (**Table 1**). This nest is not in a clearing area for Site C and is greater than 10 km from active Site C construction at the Wuthrich Quarry. The separation from active construction exceeds the best management practice distances (MOE 2013); therefore the Charlie Lake nest was not surveyed in 2017 and will not be surveyed in the future.

[1] Nests re-visited in 2017 but recorded as ‘not present’ during the 2016 surveys: 12c, 17, 39, 92, 105, 166, 192, 215, 217, and 223.

Table 1 2017 bald eagle nest survey summary results, May and June 2017

Nest ID	Year nest first observed*	2017 Status			Nest comment
		May 1	May 16	June 17	
6	Pre-2014	Active	Active	Active	Adult and chicks.
8	Pre-2014	Active	Active	Active	Adult and chicks.
13	Pre-2014	Active	Active	Active	Adult and chicks.
14	Pre-2014	Tree gone – natural cause	Tree gone – natural cause	Tree gone – natural cause	Nest located outside of areas cleared in 2016 and 2017; tree is presumed to have fallen due to natural causes.
19	Pre-2014	Inactive	Inactive	-	Nest destroyed. Very small remnant remains.
22	Pre-2014	Active	Active	Inactive	Adult present May 1 and 16.
23	Pre-2014	Active	Tree gone – natural cause	Tree gone – natural cause	Adult present May 1; nest/tree could not be found during subsequent surveys. Nest located downstream from dam site, outside of Project clearing areas.
25	Pre-2014	Inactive	Inactive	Inactive	No birds observed. Nest in good condition.
29	Pre-2014	Active	Active	Unknown	Jun 17 - two adults nearby but cannot find nest.
38	Pre-2014	Active	Active	Active	Adult and chicks.
62c	Pre-2014	Active	Active	Active	Adult and chicks.
100	Pre-2014	Inactive	Inactive	-	Nest in good condition but not in use.
101	Pre-2014	Active	Inactive	-	Nest present but not in use.
103	Pre-2014	Inactive	Tree gone – natural cause	Tree gone – natural cause	No birds present May 1. Nest located downstream from dam site, outside of Project clearing areas.
104	Pre-2014	Active	Active	Active	BAEA confirmed on last survey.
105	Pre-2014	-	Tree gone – natural cause	Tree gone – natural cause	Nest located downstream from dam site, outside of Project clearing areas.
116	Pre-2014	Tree gone – cleared for construction	Tree gone – cleared for construction	Tree gone – cleared for construction	Nest was located in the Lower Reservoir Clearing area.
121	Pre-2014	Active	Active	Active	Adult and chicks.
122	Pre-2014	Active	Active	Active	Adult and chicks.
127	Pre-2014	Active	Active	Active	Adult and chicks.
128	Pre-2014	Inactive	Inactive	Inactive	Nest in decent conditions. No birds.

Nest ID	Year nest first observed*	2017 Status			Nest comment
		May 1	May 16	June 17	
132	Pre-2014	Active	Active	Active	Adult and chicks.
133	Pre-2014	Active	Active	Unknown	Adult May 1 and 16; could not find nest June 17 but saw adult.
137	Pre-2014	Active	Active	Active	Adult and chicks.
138	Pre-2014	Active	Active	Active	Adult and chicks.
144	Pre-2014	Active	Active	Active	Adults nearby, chicks in nest.
146	Pre-2014	Active	Active	Unknown	Adult and chicks; difficult to see June 17.
152	Pre-2014	Tree gone – natural cause	Tree gone – natural cause	Tree gone – natural cause	Nest located outside of areas cleared in 2016 and 2017; tree is presumed to have fallen due to natural causes.
155	Pre-2014	Active	Active	Active	Adult and chicks.
159	Pre-2014	-	Tree gone – natural cause	Tree gone – natural cause	Nest located outside of areas cleared in 2016 and 2017; tree is presumed to have fallen due to natural causes.
203	Pre-2014	Active	Active	Inactive	Adult on nest May 1 and 16; nest empty June 17.
212	Pre-2014	Inactive	Tree gone – natural cause	Tree gone – natural cause	Difficult to see May 1; not present on subsequent surveys. Nest located downstream from dam site, outside of Project clearing areas.
213	Pre-2014	-	Tree gone – natural cause	Tree gone – natural cause	Nest located outside of areas cleared in 2016 and 2017; tree is presumed to have fallen due to natural causes.
214	Pre-2014	Inactive	Inactive	Tree gone – natural cause	Low, smaller stick nest present. Unlikely being used by bald eagle. Nest located downstream from dam site, outside of Project clearing areas.
216	Pre-2014	Inactive	Inactive	Inactive	Poor condition, not much nest remains.
218	Pre-2014	Inactive	Inactive	Active	Adult on June 17 only.
219	Pre-2014	Active	Active	Inactive	Adult on nest May 1 and 16; nest empty June 17.
220	Pre-2014	Tree gone – natural cause	Tree gone – natural cause	Tree gone – natural cause	Nest located downstream from dam site, outside of Project clearing areas.
222	Pre-2014	Active	Active	Active	Adult and chicks.
223	Pre-2014	Unknown	Inactive	Inactive	Not detected May 1; nest found on subsequent surveys but no birds present.
224	Pre-2014	Active	Inactive	Inactive	Two adults May 1; not birds on subsequent surveys.
225	Pre-2014	Inactive	Inactive	Unknown	Adult bald eagle nearby May 1; osprey nearby May 16; cannot find nest June 17 due to foliage.

Nest ID	Year nest first observed*	2017 Status			Nest comment
		May 1	May 16	June 17	
301	2014	Tree gone – natural cause	Tree gone – natural cause	Tree gone – natural cause	Nest located outside of areas cleared in 2016 and 2017; tree is presumed to have fallen due to natural causes.
303	2014	Active	Active	Inactive	Adult on nest, no chicks. No birds observed June 17.
304	2014	-	-	-	Charlie Lake nest; not checked in 2017.
305	2014	Tree gone – natural cause	Tree gone – natural cause	Tree gone – natural cause	Nest located downstream from dam site, outside of Project clearing areas.
400	2016	Active	Active	Active	Adult and chick.
401	2016	Tree gone – natural cause	Tree gone – natural cause	-	Nest located downstream from dam site, outside of Project clearing areas.
402	2016	Inactive	Inactive	-	Dilapidated, nest destroyed.
500	2016	Active	Active	Active	Adult and chicks.
600	2017	Active	Active	Active	Adult and chicks.
601	2017	Inactive	Inactive	Inactive	Old nest, forbs growing in nest.
602	2017	Active	Active	Active	Adult and chick.
603	2017	Active	Active	Unknown	Adult and chicks May 1 and 16; could not located nest June 17.
604	2017	Inactive	Inactive	Active	Not previously documented but a bit old looking, nest appeared repair May 16; adult perched on nest June 17.
607	2017	Active	Active	Active	Adult and chick.
610	2017	-	Inactive	Inactive	Nest appears new but no birds present.
611	2017	-	Active	Unknown	3 dark chicks. No adult present but osprey nearby. Could not find nest on June 17.
612	2017	-	Active	Unknown	Adult on nest May 16; could not find nest due to foliage June 17.

Notes:
'*' - Year first observed for nests recorded before 2014 is not known as the Site C EIS does not provide this detail, but rather only that that BAEA nest surveys were conducted and the nests found in 2006, 2008, and 2011. Surveys were conducted in 2012, but no nests were detected.
'-' denotes that a nest was not surveyed.
Grey rows show nests that do not need to be re-surveyed in future years.

Of the bald eagle nests in **Table 1**, 34 were observed to be active at least once during the 2017 surveys, and 24 of the 34 active nests had chicks in the nest (**Table 2**).

Table 2 Active bald eagle nests, May and June 2017.

Nest ID	May 1, 2017	May 16, 2017	June 17, 2017	Assumed Productivity (~no. fledged)
6	Adult	Adult, Chicks (2)	Adult, Chick (1)	1
8	Adult	Adult, Chicks (2)	Chicks (2)	2
13	Adult, Chicks (1-2)	Chicks (2)	Chicks (2)	2
22	Adult	Adult	-	0
29	Adult, Chicks (2)	Adult, Chick (1)	*	1
38	Adult	Adult, Chicks (2)	Chicks (3)	2
62c	Adult	Adult, Chick (1)	Chicks (2)	2
101	Adult	-	n/a	0
104	Adult	Adult	Chicks (2)	2
121	Adult	Adult, Chicks (2)	Chicks (2)	2
122	Chicks (3)	Adult, Chicks (2)	Chicks (2)	2
127	Adult	Adult, Chicks (2)	Adult, Chicks (2)	2
132	Adult	Adult, Chicks (2)	Adult, Chick (1)	1
133	Adult	Adult	*	0
137	Adult	Adult, Chick (1)	Chicks (2)	2
138	Adult	Adult, Chick (1)	Chick (1)	1
144	Chicks (2-3)	Chicks (2)	Chicks (3)	2
146	Adult	Adult, Chicks (2)	Chick (1)	1
155	Adult	Chick (1)	Chicks (2)	2
203	Adult	Adult	-	0
218	-	-	Adult	0
219	Adult	Adult	-	0
222	Adult	Adult	Chicks (2)	2
224	Adults (2)	-	-	0
303	Adult	Adult	-	0
400	Adult	Adult, Chicks (2)	Chicks (3)	2
500	Adult	Chicks (2)	Chick (1)	1
600	Adult	Chicks (2)	Adult, Chick (1)	1
602	Adult	Chick (1), Eggs (2)	Chick (1)	1
603	Adult, Chicks (2-3)	Adult, Chicks (2)	*	2
604	-	-	Adult	0
607	n/a	Adult, Chick (1)	Chick (1)	1
611	n/a	Chicks (3)	*	2
612	n/a	Adult	*	0

Notes: n/a – nest not surveyed; '*' - nest not found due to foliage; '-' inactive nest (i.e., no birds observed).

The number of chicks in active nests ranged from zero (adult or adults present, but no chicks) to three (Table 2). However, fledging success for bald eagles raised in nests with multiple chicks is much-reduced and chicks from the third-laid eggs are unlikely to survive (Gerrard and Bortolotti 1988, as cited in Buehler 2000). In two chick broods, both chicks generally survive (e.g., only two chicks from 37 two-chick broods in Saskatchewan died [Bortolotti 1986]).

Second clutches in natural populations of bald eagle are not observed (Buehler 2000), likely due to the long duration of breeding, as speculated by Newton (1977). Exceptions are known when eggs or nestlings are artificially removed as part of captive breeding programs (Morrison and Walton 1980, Wood and Collopy 1993), or eggs are lost early in the season (Steenhof and Newton 2007). No second clutches were observed, or are expected in the study area.

Productivity in the study area is estimated to be 1.15 young per occupied nest. Productivity was calculated as the sum of assumed productivity from active nests (**Table 2**) divided by the number of active nests (n=34). Calculations of productivity assumed the following:

- The number of chicks in a nest at the last observation reflects the number fledged, except nests with three chicks which were only assumed to fledge two chicks.
- Occupied nests included those with evidence of adults present at any one of the three field surveys.
- No second clutches.

Productivity on the Peace River is comparable with metrics from other areas where pesticides have not affected productivity in bald eagles (Elliot and Norstrom 1997). Examples from other studies include 0.88 to 1.24 young produced per occupied site in the Aleutian archipelago, Alaska (Anthony et al 1999), 0.72-1.18 young fledged per occupied site in Oregon (Isaacs et al 1983), 1.56 eggs or downy young per nest from between 19 and 43 active nests in Alaska (Hodges 1982), and 1.14 young/nest from 109 active nests in north central Florida (McEwan and Hirth 1979). The aerial survey methods used in this study on the Peace River are similar to those used in some of the other studies reported (Hodges 1982, Elliot and Norstrom 1998).

4.0 DISCUSSION AND RECOMMENDATIONS

One of the broad mitigation objectives of the Bald Eagle Mitigation and Monitoring Program (BC Hydro 2016) is to determine the number of birds that fledge[2] from nests in trees (i.e., nest productivity). The 2017 surveys represent the first year of productivity monitoring of bald eagle nests in the study area. From these results it is apparent that obtaining precise productivity metrics is difficult in the study area.

[2] A fledgling is defined as young of the year that survive to leave the nest.

Bald eagle nesting phenology in the Peace is asynchronous; some bald eagles were observed incubating on nests at the same time as other bald eagles were brood-rearing or had chicks that had already fledged. Some bald eagles were observed establishing nests very late in the recognised "nesting season" from February 5 – June 25 (MOE 2013), such that two nests that were inactive in the early and mid-May surveys were classified as 'active' in mid-June due to the presence of an adult in each (**Table 2**). This asynchronous nesting makes surveying for productivity difficult, particularly late in the season when leaves obscure nests and the precise number of fledged chicks are difficult to discern. Therefore, all chicks observed in nests during the June survey were assumed to survive to fledging, except for nests with three chicks, because chicks from the third-laid eggs are unlikely to survive (Gerrard and Bortolotti 1988, as cited in Buehler 2000). Visual surveys by helicopter later in the season to confirm fledging would have limited utility because leaves would obscure the nests.

Other challenges with obtaining precise productivity metrics include (i) the large size of the study area (~200 km long), which to survey in one day requires stable weather conditions that sometimes don't coincide with desirable survey timing, and (ii) limiting visitations to limit disturbance of bald eagles.

Results from the surveys in 2017 indicate that the data obtained from the mid-May and mid-June surveys have much more information for deriving productivity than the early May survey data (**Table 2**). The early May survey found only two active nests that were not determined to be active in later surveys (out of 34 total active nests; **Table 2**). Based on the results of surveys in 2017, two surveys are likely sufficient to determine activity status and obtain reasonable productivity estimates for most nests in the study area; one in mid-May and one in mid-June (before 15 June). However, due to uncertainty regarding inter-annual variability, three surveys should be conducted again in 2018 to investigate whether this pattern appears to be consistent over time.

Observability during mid-June surveys was diminished due to leaf development obscuring nests and occupants of nests. In 2017 data could not be obtained from six nests in mid-June because leaves obscured the nests, and more nests would be obscured later in the season as leaf-out advances. Future surveys should therefore occur in early June rather than mid-June to increase visibility for surveyors.

It is possible that some birds observed in nests in early or mid-June may not survive to fledging. At that stage of development though, up to two surviving chicks observed in each nest during the mid-June survey are likely to survive to fledging, and are assumed to for estimating productivity. Obtaining more-precise productivity metrics over the prolonged bald eagle nesting season in the Peace District would require more surveys later in the nesting season (i.e., after mid-June), when leaf development would further obscure visibility. Late-season surveys are discouraged in the RISC standards for this reason (RIC 2001). Alternative approaches could be used, such as surveying a subset of nests using drones. However, it seems likely that little additional information would be gained from further surveys later in June. As long as survey methods remain consistent, estimates of productivity gained by helicopter

observations in early June should form a useful basis for comparison of relative productivity between nests (including artificial platform nests) and years. Those productivity estimates will then be used to adjust mitigation for bald eagles within an adaptive management framework, as appropriate.

Report prepared by:
Hemmera Envirochem Inc.

Ashleigh Ballevona, B.Sc., R.P.Bio.
Environmental Specialist
604.669.0424
aballevona@hemmera.com

Report Peer reviewed by:
Hemmera Envirochem Inc.

Charlie Palmer, M.Sc., P.Biol., R.P.Bio.
Practice Leader
604.669.0424
cpalmer@hemmera.com

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APPENDIX A
Incidental Observations

Table 1 Incidental observations, May and June 2017.

Species	Nest ID	2017 Status			Nest comment
		May 1	May 16	June 17	
Canada goose	1	Active	Active	Inactive	Canada goose with eggs.
Canada goose	2	Active	Inactive	Inactive	Canada goose was using nest; nest appeared lopsided during subsequent surveys.
Canada goose	24	Active	Inactive	Inactive	CAGO present May 1; did not appear to be used on subsequent surveys.
Unknown spp	147	Inactive	Inactive	Inactive	Adult bald eagle nearby May 16 and June 17, but not on nest.
Canada goose	163	Active	Active	Inactive	Adult present May 1 and 16; no birds June 17.
Canada goose	186	Active	Inactive	Inactive	Adult May 1; no birds on subsequent surveys.
Canada goose	221	Active	Tree gone – natural cause	Tree gone – natural cause	Adult on nest May 1; nest in water May 16. Nest located downstream from dam site, outside of Project clearing areas.
Canada goose	302	Active	Inactive	Inactive	Adult May 1; shell fragments in nest May 16; no birds June 17.
Canada goose	306	Tree gone – cleared for construction	Tree gone – cleared for construction	Tree gone – cleared for construction	Nest was located in the Lower Reservoir Clearing area.
Common raven	605	Active	Active	-	Raven on nest May 1 and 16.
Red-tailed hawk	606	Inactive	Active	-	Red-tailed hawk on nest May 16.
Unknown spp	608	Active	Active	Active	No adults observed to confirm species ID. Only chicks present.
Canada goose	614	n/a	Active	Inactive	Canada goose on nest, two bald eagles nearby.

Notes:
'-' denotes that a nest was not surveyed.

Appendix 15. Ground Nesting Raptor Monitoring 2017 Annual Report

Site C Clean Energy Project
Ground Nesting Raptor Monitoring
2017 Annual Report

PRESENTED TO

BC Hydro and Power Authority

JANUARY 12, 2018
ISSUED FOR USE
FILE: 704-ENV.VENV03095-01.GNRM 2017

Saulteau EBA Environmental Services Joint Venture.
14940 – 123 Avenue
Edmonton, AB T5V 1B4 CANADA
Tel 780.451.2121 Fax 780.454.5688

Site C Clean Energy Project Ground Nesting Raptor Monitoring – 2017 Annual Report

FILE: 704-ENV.VENV03095-01.GNRM 2017
January 12, 2018

PRESENTED TO

Site C Clean Energy Project
BC Hydro and Power Authority
P.O. Box 49260
Vancouver, BC V7X 1V5

PRESENTED BY

Tetra Tech Canada Inc.
1000-885 Dunsmuir St.
Vancouver, BC V6E 3X2
P +1-604-685-0275
tetratech.com

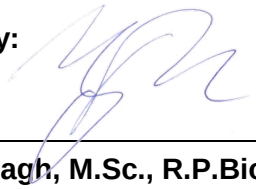
Prepared by:

Kayla Hatzel, B.Sc. BIT **2018-01-12**
Wildlife Biologist

Reviewed by:

Jeff Matheson, M.Sc., R.P.Bio. **2018-01-12**
Senior Biologist

Reviewed by:



Nigel Cavanagh, M.Sc., R.P.Bio. **2018-01-12**
Operations Manager, SEES JV

EXECUTIVE SUMMARY

Saulteau EBA Environmental Services Joint Venture (SEES JV) completed surveys of ground nesting raptors (Short-eared Owl [*Asio flammeu]* and Northern Harrier [*Circus cyaneus*]) in the area of BC Hydro and Power Authority's (BC Hydro) Site C Clean Energy Project ("Site C") in spring and summer 2017. The surveys were part of BC Hydro's Ground Nesting Raptor Follow-up Monitoring Program. This report describes the methods used to conduct the surveys and provides a summary of the results.

The ground nesting surveys were completed in three BC Hydro mitigation properties (Marl Fen, Rutledge Property and Wilder Creek). Surveys were also completed in cleared portions of the Site C reservoir.

Ground nesting raptor surveys were completed three times between May and July 2017. The surveys were conducted using a combination of encounter transects walked on foot and by boat and stationary standwatches. Ground nesting raptors were observed at two of the three mitigation properties and in an area north of Highway 29. All observations were Northern Harriers: four at Marl Fen, one at Wilder Creek, and one near the Highway 29 cleared area. The Highway 29 observation was within the reservoir footprint but hunting over a fallow field and not in a recently cleared area. No ground nesting raptors were observed within the cleared portions of the footprint along the Peace River. No nests or possible nests were observed at any of the areas surveyed. At the present time, there is no evidence of ground nesting raptors nesting within cleared portions of the reservoir. Surveys in 2018 will continue in all cleared areas within the reservoir and in the mitigation properties.

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APPENDICES

1.0 INTRODUCTION

Saulteau EBA Environmental Services Joint Venture (SEES JV) completed surveys of ground nesting raptors in the area of BC Hydro and Power Authority's (BC Hydro) Site C Clean Energy Project ("Site C") in spring and summer 2017. The surveys were part of BC Hydro's Ground Nesting Raptor Follow-up Monitoring Program (BC Hydro 2016). This report describes the methods used to conduct the surveys and provides a summary of the results.

The Ground Nesting Raptor Follow-up Monitoring Program is specifically focussed on two ground nesting raptor species: Short-eared Owl (*Asio flammeus)* and Northern Harrier (*Circus cyaneus)* (Table 1). Other species were recorded during surveys and are reported in Appendix A.

Table 1. Species covered in the Ground Nesting Raptor Follow-up Monitoring program.

Common Name	Scientific Name	BC List	COSEWIC [1] Status	SARA [2] Status
Short-eared Owl	*Asio flammeus*	Blue	Special Concern	Schedule 1 – Special Concern
Northern Harrier	*Circus cyaneus*	Yellow	-	-

[1] COSEWIC – Committee on the Status of Endangered Wildlife in Canada.
[2] SARA – *Species at Risk Act*.

The objectives of the ground nesting raptor monitoring program are to determine:

- The number of Northern Harrier and Short-eared Owl nesting in areas cleared during reservoir preparation;
- The effects of seasonal headpond flooding on Northern Harrier and Short-eared Owl nests; and
- Use of open fields within mitigation properties being managed to provide nesting habitat for Northern Harrier and Short-eared Owl.

This document reports on the ground nesting raptor surveys that were conducted in 2017.

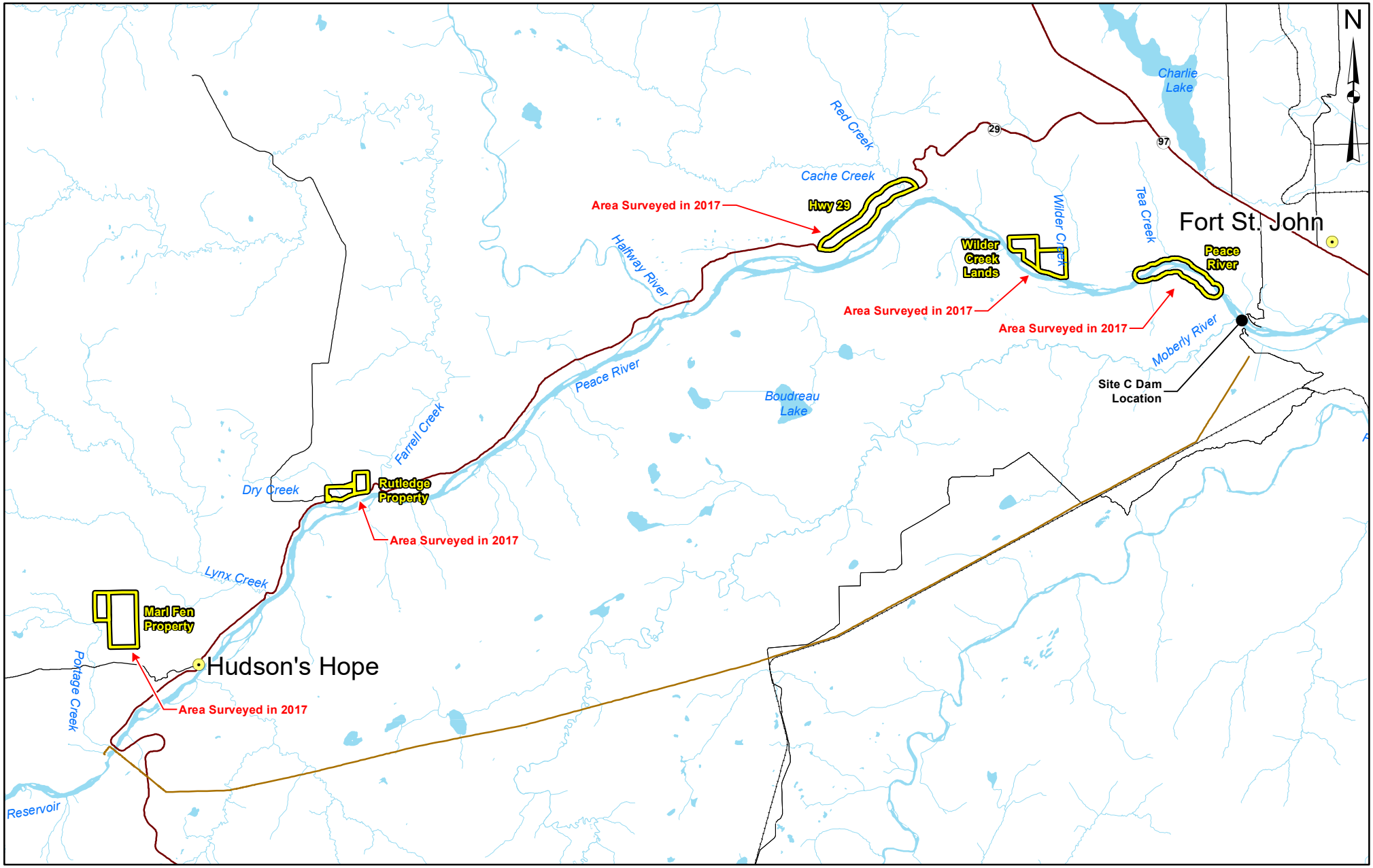
2.0 METHODS

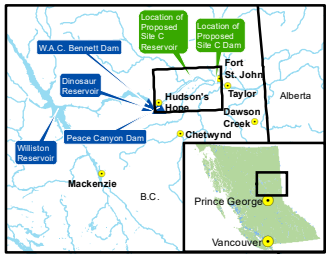
2.1 Survey Areas

Surveys in 2017 were conducted in:

- The BC Hydro mitigation properties (Marl Fen, Rutledge and Wilder Creek);
- North of Highway 29 from Bear Flats to approximately six kilometers east, that had been cleared in fall/winter 2016/2017; and
- Along a portion of the Peace River near Tea Creek that had been cleared in fall/winter 2016/2017 (approximately four kilometers upstream from the construction bridge and continuing approximately eight kilometers further upstream).

These areas are shown in Figure 1.





Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.
4. Prepared by: Tetra Tech.
5. Property boundary locations are best available but should be considered approximate. Property information provided by BC Hydro on March 10, 2016.

Legend

- Survey Area
- Proposed Transmission Corridor
- Railway
- Highway
- Other Road
- Watercourse
- Waterbody

1:300,000

0 8 km

BC Hydro

Figure 1:
Ground Nesting Raptor
Follow-up Monitoring
Survey Locations in 2017

DATE	November 21, 2017	1016-C14-08888-1	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

W:\Projects\VAN11494201\ENV\03095-01\GIS\Maps\Raptor\2017\BB_1016_C14_08888-1_Overview.mxd

2.2 Ground-Nesting Raptor Surveys

Ground nesting raptors were surveyed three times between May and July 2017, to capture early, middle, and late stages of their breeding season (Table 2). The first survey was originally planned to occur in late April[1] but was delayed due to snow cover. The surveys were conducted using a combination of encounter transects walked on foot and boat and stationary standwatches. Methods followed *Inventory Methods for Raptors* (Resources Inventory Committee 2001). Surveys were completed by two teams of two observers. Each team was composed of a biologist with raptor survey experience and an assistant (Appendix B).

Table 2. Survey dates for ground-nesting raptors.

Survey Location	First Visit	Second Visit	Third Visit
Marl Fen	3-May-17	10-Jun-17	4-Jul-17
Rutledge Property	5-May-17	10-Jun-17	4-Jul-17
Wilder Creek	2-May-17	11-Jun-17	7-Jul-17
Highway 29 (Cleared)	5-May-17	Not surveyed	10-Jul-17
Peace River (Cleared)	5-May-17	12-Jun-17	7-Jul-17

The surveys along transects were conducted by walking at a speed of 0.5 – 2 km/hr and while floating downstream in a boat on the Peace River at a speed of 2-10 km/hr, looking and listening for birds. Surveyors stopped whenever required in order to confirm identification and to record data. Transects were located only in potentially suitable habitat (old pastures, old field, hayfields, grasslands, bogs and marsh and in cleared portions of the reservoir). Surveyors walked in such a way to ensure visual coverage of the entire portion of suitable habitat in each area. Surveyors were not required to walk the precise transect as walked in previous visits.

The standwatch stations were located along the walking transects. The standwatches served three purposes:

- Allowed surveyors to observe areas for longer periods to increase the potential to observe bird activity;
- Allowed surveyors to carefully observe areas that cannot be visited by foot due to impassable terrain using binoculars and spotting scope; and
- To monitor potential nesting behaviour for the purpose of locating nests of Short-eared Owl and Northern Harrier.

Standwatches were conducted by remaining stationary for 20 minutes. All surveys were conducted during daylight hours. Surveys were not completed during periods of high wind (greater than Beaufort 3, 12 – 19 km/hr), rain or fog. The standwatch stations were surveyed in a different order for each visit in order to minimize the effect of time of day on raptor activity and detectability. While walking the survey transects, potential hunting perches (e.g., fence posts and short trees) were searched opportunistically for evidence of use by raptors (i.e., pellets).

Short-eared Owl are a crepuscular species and optimal survey timing is in the evening just prior to civil twilight. There are however logistical and safety considerations of when surveys can be completed. Surveys in cleared portions of the reservoir require boat access and evening surveys would require boating in very low light or dark conditions after surveys are complete. Boat use at night on the Peace River would not be considered an acceptable

[1] Siddle (2010) reported early dates of arrival of Short-eared Owl in the Peace Region in April.

safe work practice by BC Hydro. Detections of Short-eared Owl in the reservoir therefore need to rely on flushing owls when walking transects or boating close to shore in addition to any individuals that may be active during daytime.

The location of standwatch stations are shown in Figures 2 to 6. Not all standwatch stations were surveyed three times. Some stations were inaccessible due to standing water or cattle, and the cleared areas north of Highway 29 were only surveyed twice due to inclement weather on the second visit. The standwatch stations and their visit dates are provided below (Table 3).

Table 3. Standwatch stations visited in each survey area.

Standwatch Station	Visit 1	Visit 2	Visit 3	Comments
Marl Fen				
MFSW01	-	X	X	Visit 1:Could not access due to standing water
MFSW02	-	X	X	Visit 1:Could not access due to standing water
MFSW03	X	X	X	
MFSW04	X	X	X	
MFSW05	X	X	X	
MFSW06	X	X	X	
MFSW07	X	X	X	
MFSW08	-	-	-	Visit 1 and 2: Could not access due to standing water Visit 3: Could not access due to presence of cattle
MFSW09	-	X	-	Visit 1:Could not access due to standing water Visit 3: Could not access due to presence of cattle
MFSW10	X			Visit 2 and 3: Could not access due to presence of cattle
Rutledge				
RUSW01	X	X	X	
RUSW02	X	X	X	
RUSW03	X	X	X	
RUSW04	X	X	X	
RUSW05	X	X	X	
RUSW06	X	X	X	
RUSW07	X	X	X	
RUSW08	-	X	X	New station was added after first visit to improve survey coverage.
Wilder Creek				
WCSW01	X	X	X	
WCSW02	X	X	X	

Standwatch Station	Visit 1	Visit 2	Visit 3	Comments
WCSW03	X	-	X	Visit 2: Did not survey due to poor weather conditions.
WCSW04	X	X	X	
WCSW05	X	X	X	
WCSW06	X	X	X	
WCSW07	X	X	X	
WCSW08	X	X	X	
Highway 29				
H29SW01	X	-	X	
H29SW02	X	-	X	
H29SW03	X	-	X	
Peace River				
PRSW01	X	X	X	
PRSW02	X	X	X	
PRSW03	X	X	X	
PRSW04	X	X	X	
PRSW05	X	X	X	
PRSW06	X	X	X	
PRSW07	X	X	X	
PRSW08	X	X	X	
PRSW09	X	X	X	

For all raptor observations, species, sex, age, activity, distance and compass direction were recorded. Other species were recorded as incidental observations. For Northern Harrier or Short-eared Owl observations, if a pair was observed or there was evidence of nesting behaviour, a nest search was to be conducted to attempt to locate any nest that might be present in the area. Since ground nesting raptors are sensitive to disturbance and ground nests can easily be destroyed by human traffic, surveyors were instructed to observe rather than conduct intensive foot searches to locate a nest.

3.0 RESULTS AND DISCUSSION

Ground nesting raptors were observed at two of the three mitigation properties and in an area north of Highway 29 (Table 4 and Figures 2, 4 and 5). All observations were Northern Harriers: four at Marl Fen, one at Wilder Creek, and one near the Highway 29 cleared area. The Highway 29 observation was within the reservoir footprint but hunting over a fallow field and not in a recently cleared area. No ground nesting raptors were observed within the cleared portions of the footprint along the Peace River. One of the Northern Harriers at Marl Fen (May 2, 2017) was a male displaying courtship behaviour. No nests or possible nests were observed at any of the areas surveyed.

At the present time, there is no evidence of ground nesting raptors nesting within cleared portions of the reservoir. Areas surveyed in 2016 and 2017 will be surveyed again in 2018 in addition to newly cleared areas within the reservoir. Surveys in the reservoir will continue until the reservoir has filled.

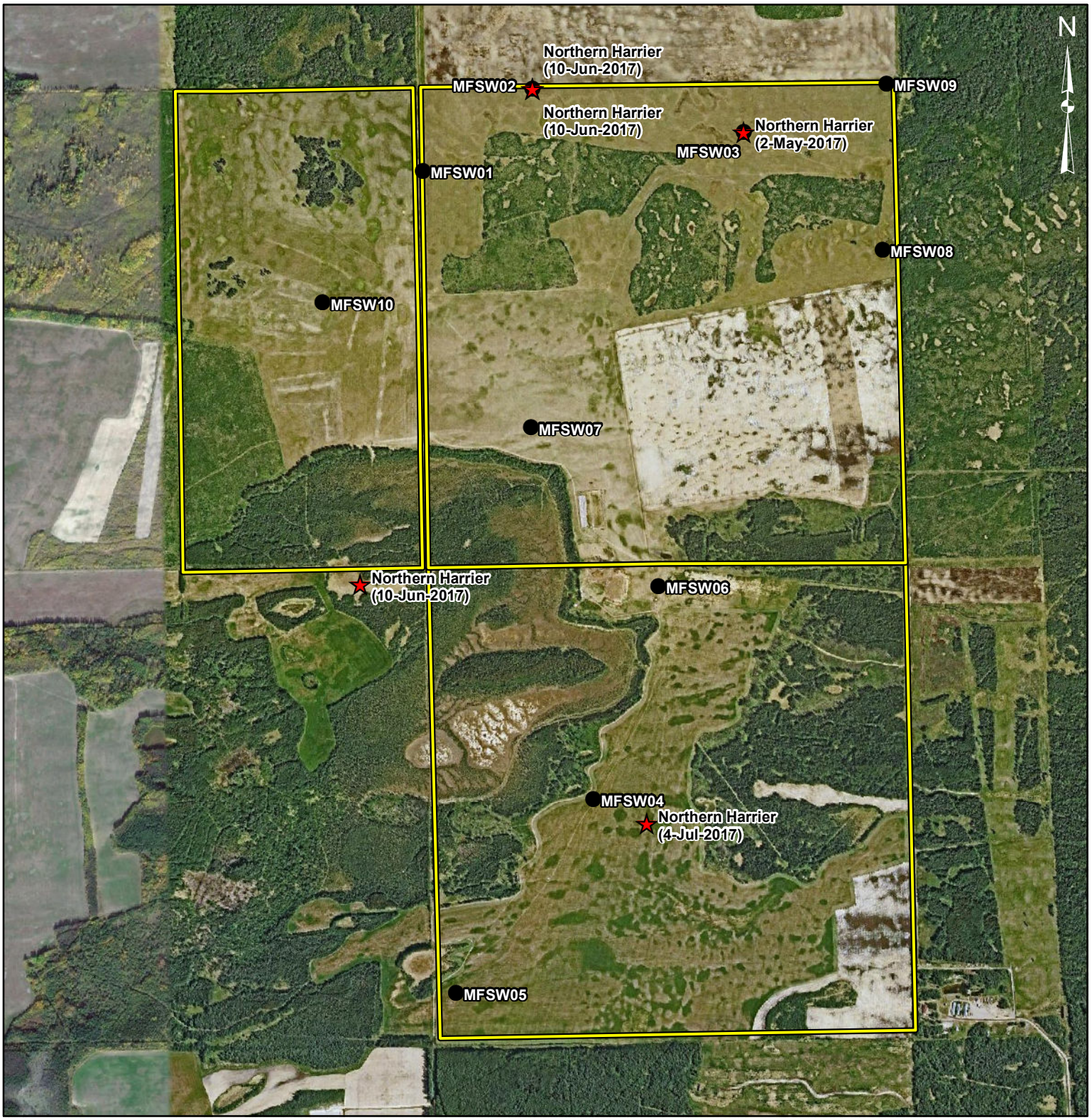
In 2018 and 2019, Common Nighthawk surveys will be completed in the mitigation properties and portions of the reservoir that can be accessed by road. Surveys will be in similar habitat to that of Short-eared Owl and conducted between sunset and nautical twilight, overlapping with the optimal survey timing for Short-eared Owl. Surveyors will record Short-eared Owls while walking to/from survey stations and during Common Nighthawk point counts, providing an opportunity for detections of Short-eared Owl in addition to the daytime surveys. Observations of Short-eared Owl during the Common Nighthawk point counts will be included in the annual reports.

The ground-nesting raptor monitoring data collected in 2017 will be submitted to the BC Ministry of Environment Wildlife Species Inventory (WSI) database[2].

[2] http://www.env.gov.bc.ca/wildlife/wsi/index.htm

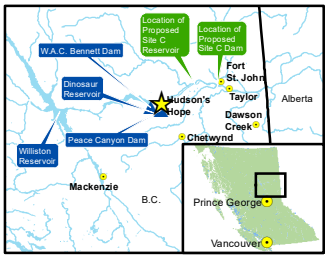
Table 4. Ground nesting raptor observations.

Location	Species	Date	Activity	Sex	Age Class	Comments
Highway 29 (cleared)	Northern Harrier	5-May-2017	Hunting	Female	Adult	Hunting over fallow field adjacent to cleared area within footprint.
Marl Fen	Northern Harrier	2-May-2017	Flying/ Displaying	Male	Adult	Mating display by male; continued flying north
Marl Fen	Northern Harrier	10-June-2017	Foraging	Female	Adult	Observed hunting over field ~350m SW of MFSW02
Marl Fen	Northern Harrier	10-June-2017	Flying/ Hunting	Female	Adult	Non-directional flight/hunting
Marl Fen	Northern Harrier	10-June-2017	Non-directional Flight	Female	Adult	Landed in field then flew west of Marl Fen
Wilder Creek	Northern Harrier	7 July 2017	Flying	Male	Adult	Observed flying across field



Legend

- Observation Point
- Standwatch Station
- Mitigation Property



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.
4. Prepared by: Tetra Tech.
5. Imagery from Google; DigitalGlobe.
6. Property boundary locations are best available but should be considered approximate. Property information provided by BC Hydro on March 10, 2016.

1:18,000 0 400 m

BC Hydro

Figure 2:
Marl Fen Property
Ground Nesting Raptor
Follow-up Monitoring Surveys

DATE	November 23, 2017	1016-C14-08888-2	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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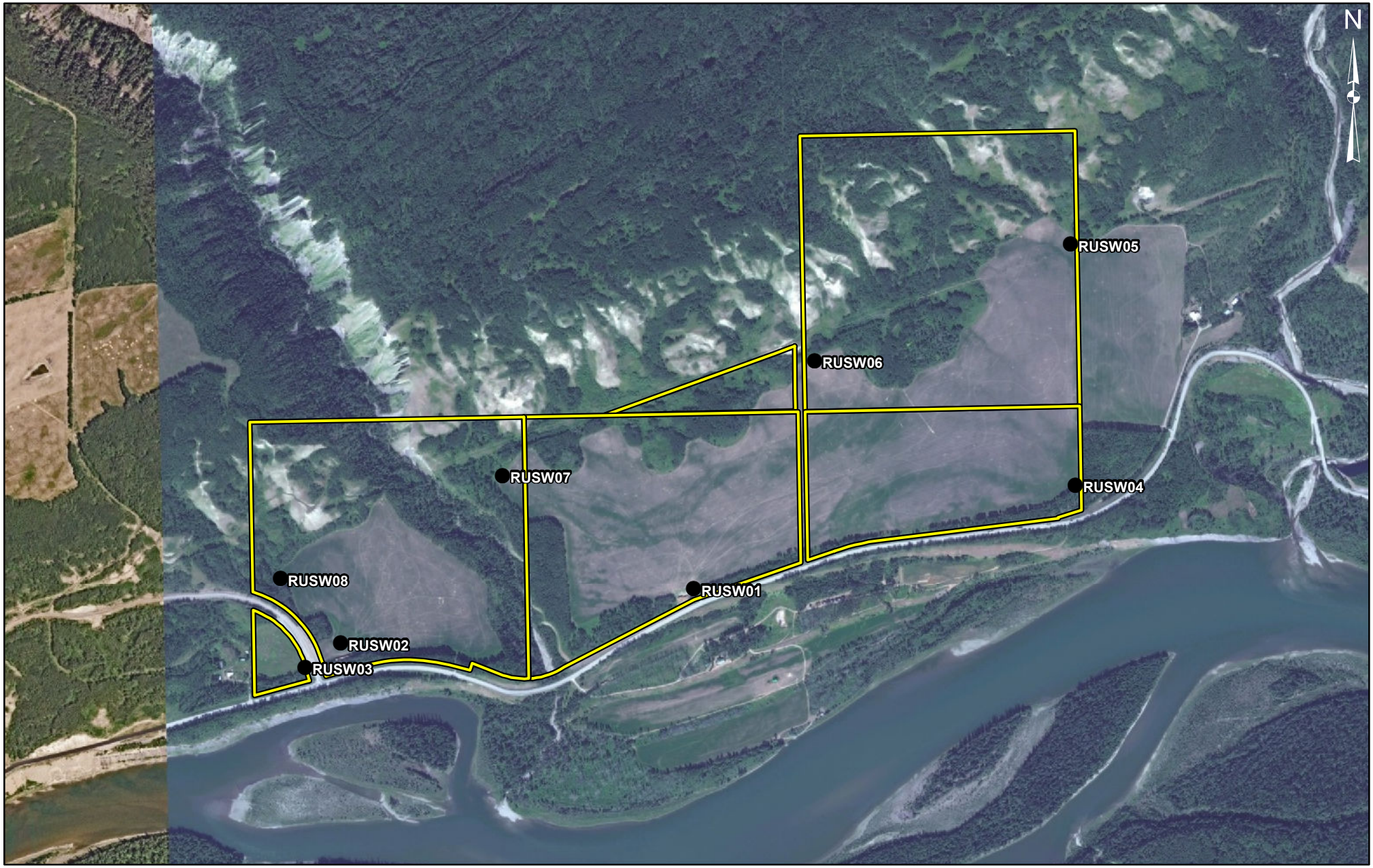

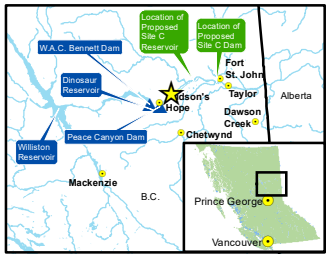

Map Notes:
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2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.
4. Prepared by: Tetra Tech.
5. Imagery from Microsoft Bing Imagery Service.
6. Property boundary locations are best available but should be considered approximate. Property information provided by BC Hydro on March 10, 2016.

Legend

- Standwatch Station
- Mitigation Property

1:15,000

0 400 m

BC Hydro

Figure 3:
Rutledge Property
Ground Nesting Raptor
Follow-up Monitoring Surveys

DATE	November 23, 2017	1016-C14-08888-3	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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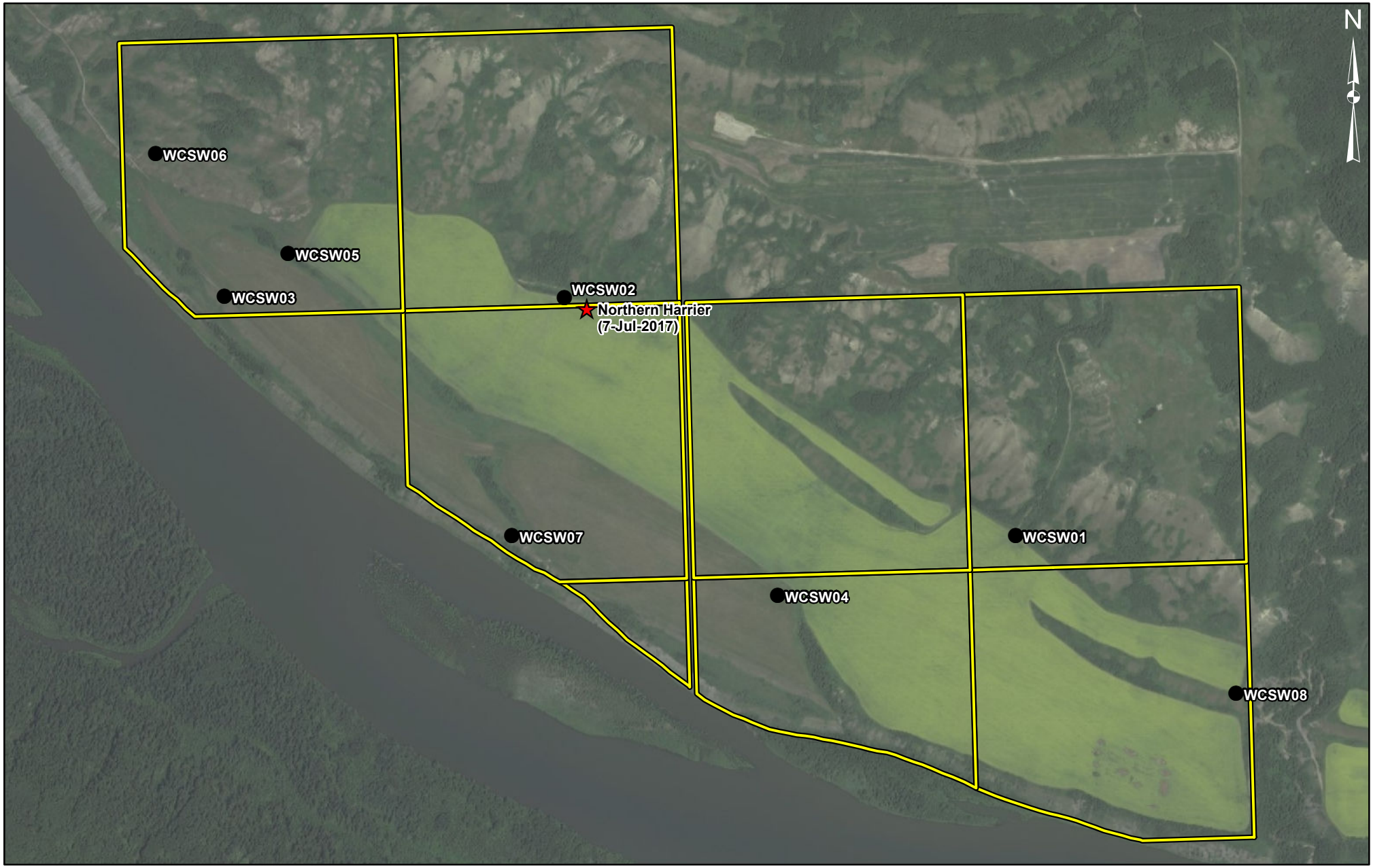

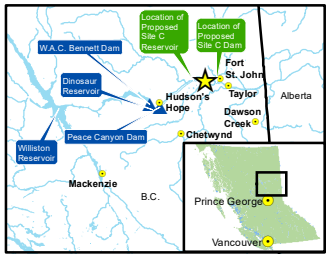

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4. Prepared by: Tetra Tech.
5. Imagery from Microsoft Bing Imagery Service.
6. Property boundary locations are best available but should be considered approximate. Property information provided by BC Hydro on March 10, 2016.

Legend

- Observation Point
- Standwatch Station
- Mitigation Property

1:15,000

0 400 m

BC Hydro

Figure 4:
Wilder Creek Lands
Ground Nesting Raptor
Follow-up Monitoring Surveys

DATE	November 23, 2017	1016-C14-08888-4	R 0

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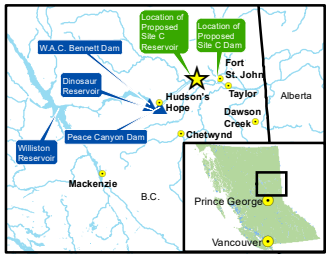

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4. Prepared by: Tetra Tech.
5. Imagery from ESRI; DigitalGlobe.
6. Property boundary locations are best available but should be considered approximate. Property information provided by BC Hydro on March 10, 2016.

Legend

- Observation Point
- Standwatch Station

1:30,000

0 400 m

BC Hydro

Figure 5:
Hwy 29
Ground Nesting Raptor
Follow-up Monitoring Surveys

DATE	November 23, 2017	1016-C14-08888-5	R 0

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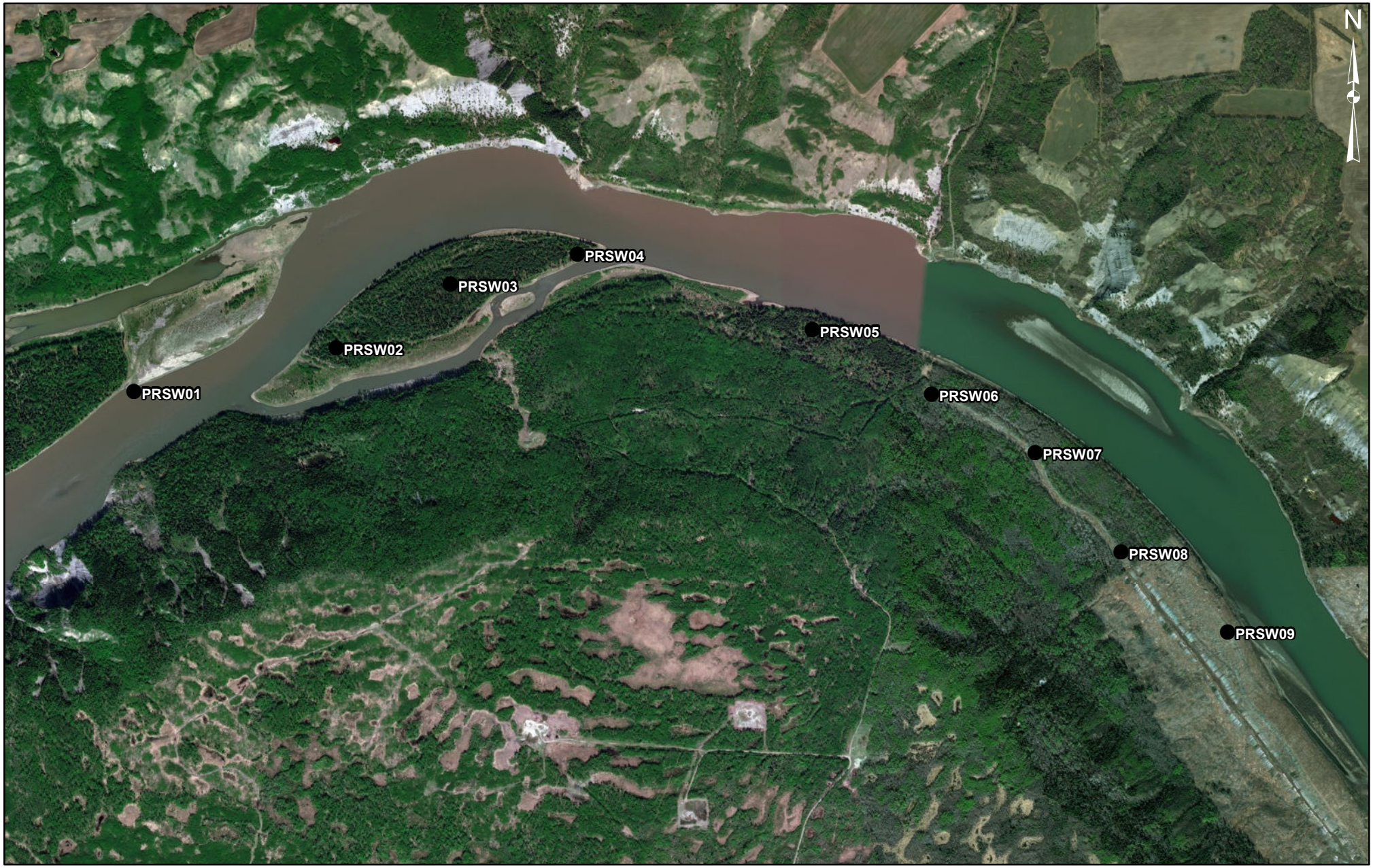
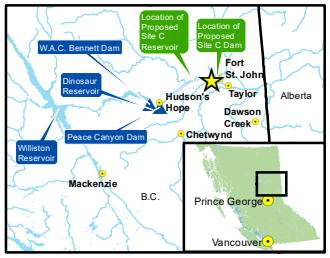
Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.





Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.
4. Prepared by: Tetra Tech.
5. Imagery from ESRI; DigitalGlobe.
6. Property boundary locations are best available but should be considered approximate. Property information provided by BC Hydro on March 10, 2016.

Legend

● Standwatch Station

1:20,000

0 400 m

BC Hydro

Figure 6:
Peace River
Ground Nesting Raptor
Follow-up Monitoring Surveys

DATE	November 23, 2017	1016-C14-08888-6	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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BC Hydro. 2016. Ground Nesting Raptor Follow-up Monitoring Program Plan. Prepared for BC Hydro's Site C Clean Energy Project.

Resources Inventory Committee. 2001. Inventory Methods for Raptors. Standards for Components of British Columbia's Biodiversity No. 11. BC Ministry of Sustainable Resource Management, Environment Inventory Branch, Victoria, BC.

Siddle, C. 2010. Birds of North Peace River (Fort St. John and Vicinity), British Columbia, 1975-1999: Part 1 (Introduction and Nonpasserines: waterfowl through woodpeckers). Wildlife Afield 7(1):12–123.

APPENDIX A
INCIDENTAL WILDLIFE OBSERVATIONS

Table A.1: List Of All Wildlife Observed During Ground Nesting Raptor Surveys

Common Name	Scientific Name	BC List	COSEWIC/ SARA [1]	Highway 29	Marl Fen	Peace River	Rutledge Property	Wilder Creek
Amphibians								
Boreal Chorus Frog	*Pseudacris maculata*	Yellow	-	-	28	-	-	3
Birds								
Spotted Sandpiper	*Actitis macularius*	Yellow	-	2	-	2	-	-
Red-winged Blackbird	*Agelaius phoeniceus*	Yellow	-	4	-	-	-	-
Northern Pintail	*Anas acuta*	Yellow	-	-	-	-	-	19
American Wigeon	*Anas americana*	Yellow	-	-	12	-	-	-
Green-winged Teal	*Anas crecca*	Yellow	-	1		-	-	-
Mallard	*Anas platyrhynchos*	Yellow	-	-	11	5	-	-
Gadwall	*Anas strepera*	Yellow	-	-	-	2	-	-
American Pipit	*Anthus rubescens*	Yellow	-	-	-	-	-	30
Sandhill Crane	*Antigone canadensis*	Yellow	-	-	3	-	-	-
Upland Sandpiper	*Bartramia longicauda*	Red	-	-	6	-	-	-
Cedar Waxwing	*Bombycilla cedrorum*	Yellow	-	-	-	3	1	-
Ruffed Grouse	*Bonasa umbellus*	Yellow	-	-	-	-	2	1
Canada Goose	*Branta canadensis*	Yellow	-	-	-	7	30	2
Red-tailed Hawk	*Buteo jamaicensis*	Yellow	-	-	-	-	-	1
Wilson's Warbler	*Cardellina pusilla*	Yellow	-	-	-	1	-	-
Hermit Thrush	*Catharus guttatus*	Yellow	-	-	-	1	4	2
Swainson's Thrush	*Catharus ustulatus*	Yellow	-	-	4	5	-	2
Killdeer	*Charadrius vociferus*	Yellow	-	1	-	-	-	-

Common Name	Scientific Name	BC List	COSEWIC/ SARA [1]	Highway 29	Marl Fen	Peace River	Rutledge Property	Wilder Creek
Northern Flicker	*Colaptes auratus*	Yellow	-	1	1	6	8	2
Olive-sided Flycatcher	*Contopus cooperi*	Blue	Threatened/ Sched 1 Threatened	-	-	2	-	-
American Crow	*Corvus brachyrhynchos*	Yellow	-	-	1	1	5	14
Common Raven	*Corvus corax*	Yellow	-	1	20	33	19	27
Blue Jay	*Cyanocitta cristata*	Yellow	-	-	-	1	-	-
Trumpeter Swan	*Cygnus buccinator*	Yellow	-	-	-	-	13	-
Gray Catbird	*Dumetella carolinensis*	Yellow	-	-	-	-	2	-
Alder Flycatcher	*Empidonax alnorum*	Yellow	-	-	2	3	2	1
Least Flycatcher	*Empidonax minimus*	Yellow	-	-	-	1	2	1
Merlin	*Falco columbarius*	Yellow	-	-	-	1	-	-
American Kestrel	*Falco sparverius*	Yellow	-	-	1	-	-	-
Wilson's Snipe	*Gallinago delicata*	Yellow	-	4	4	-	-	1
Common Yellowthroat	*Geothlypis trichas*	Yellow	-	-	2	4	-	-
Purple Finch	*Haemorhous purpureus*	Yellow	-	-	-	-	2	-
Bald Eagle	*Haliaeetus leucocephalus*	Yellow	-	-	-	1	-	-
Barn Swallow	*Hirundo rustica*	Blue	Threatened/ Sched 1 Threatened	1	3	-	-	-
Dark-eyed Junco	*Junco hyemalis*	Yellow	-	5	3	20	2	1
Belted Kingfisher	*Megaceryle alcyon*	Yellow	-	-	-	1	-	-
Lincoln's Sparrow	*Melospiza lincolnii*	Yellow	-	2	2	3	7	3
Song Sparrow	*Melospiza melodia*	Yellow	-	2	-	8	-	4
Black-and-white Warbler	*Mniotilta varia*	Yellow	-	-	1	-	1	-

Common Name	Scientific Name	BC List	COSEWIC/ SARA [1]	Highway 29	Marl Fen	Peace River	Rutledge Property	Wilder Creek
Brown-headed Cowbird	*Molothrus ater*	Yellow	-	-	14	-	-	-
Orange-crowned Warbler	*Oreothlypis celata*	Yellow	-	-	-	1	1	-
Tennessee Warbler	*Oreothlypis peregrina*	Yellow	-	-	6	1	-	-
Northern Waterthrush	*Parkesia noveboracensis*	Yellow	-	-	-	1	-	-
Savannah Sparrow	*Passerculus sandwichensis*	Yellow	-	1	11	3	5	3
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Yellow	-	-	-	-	1	1
Black-billed Magpie	*Pica hudsonia*	Yellow	-	-	6	5	17	7
Hairy Woodpecker	*Picoides villosus*	Yellow	-	-	-	-	-	1
Western Tanager	*Piranga ludoviciana*	Yellow	-	-	-	6	-	1
Black-capped Chickadee	*Poecile atricapillus*	Yellow	-	-	-	2	5	-
Vesper Sparrow	*Pooecetes gramineus*	Yellow	-	2	-	-	5	11
Sora	*Porzana carolina*	Yellow	-	-	3	-	-	-
Ruby-crowned Kinglet	*Regulus calendula*	Yellow	-	1	-	-	0	-
Bank Swallow	*Riparia riparia*	Yellow	Threatened/ not listed	2	-	-	-	-
Ovenbird	*Seiurus aurocapilla*	Yellow	-	-	2	1	2	-
Yellow-rumped Warbler	*Setophaga coronata*	Yellow	-	3	-	2	-	1
Yellow Warbler	*Setophaga petechia*	Yellow	-	1	1	5	3	4
American Redstart	*Setophaga ruticilla*	Yellow	-	-	-	4	2	-
Mountain Bluebird	*Sialia currucoides*	Yellow	-	-	3	-	-	-
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Yellow	-	-	-	4	-	-
Pine Siskin	*Spinus pinus*	Yellow	-	1	-	-	-	-
Clay-colored Sparrow	*Spizella pallida*	Yellow	-	-	2	1	5	4

Common Name	Scientific Name	BC List	COSEWIC/ SARA [1]	Highway 29	Marl Fen	Peace River	Rutledge Property	Wilder Creek
Chipping Sparrow	*Spizella passerina*	Yellow	-	-	1	2	-	1
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Yellow	-	1	-	-	-	-
European Starling	*Sturnus vulgaris*	-	-	-	-	-	8	-
Tree Swallow	*Tachycineta bicolor*	Yellow	-	-	2	1	-	1
House Wren	*Troglodytes aedon*	Yellow	-	1	-	-	6	1
American Robin	*Turdus migratorius*	Yellow	-	11	10	7	8	5
Eastern Kingbird	*Tyrannus tyrannus*	Yellow	-	-	1	-	-	1
Warbling Vireo	*Vireo gilvus*	Yellow	-	-	3	-	1	2
Red-eyed Vireo	*Vireo olivaceus*	Yellow	-	2	4	8	8	8
Blue-headed Vireo	*Vireo solitarius*	Yellow	-	-	-	2	-	-
White-throated Sparrow	*Zonotrichia albicollis*	Yellow	-	4	1	12	7	4
White-crowned Sparrow	*Zonotrichia leucophrys*	Yellow	-	-	-	1	-	-
Unknown Duck	-	-	-	-	1	-	-	-
Unknown Sparrow	-	-	-	-	-	-	1	-
Unknown Warbler	-	-	-	1	-	-	-	-
Unknown Woodpecker	-	-	-	-	-	-	-	1
Unknown Shorebird	-	-	-	-	1	-	-	-
Unknown Sparrow	-	-	-	1	11	-	-	-
Unknown Swallow	-	-	-	1	-	-	-	-
Mammals								
Black Bear	*Ursus americanus*	Yellow	-	-	-	1	-	-

Common Name	Scientific Name	BC List	COSEWIC/ SARA [1]	Highway 29	Marl Fen	Peace River	Rutledge Property	Wilder Creek
Richardson's Ground Squirrel	*Urocitellus richardsonii*	Yellow	-	-	1	-	-	-
Coyote	*Canis latrans*	Yellow	-	-	3	-	-	-
Mule Deer	*Odocoileus hemionus*	Yellow	-	2	4	-	14	3
Red Squirrel	*Tamiasciurus hudsonicus*	Yellow	-	1	-	1	-	-
White-tailed Deer	*Odocoileus virginianus*	Yellow	-	2	4	-	-	-

[1] COSEWIC – Committee on the Status of Endangered Wildlife in Canada. SARA – Species at Risk Act

APPENDIX B
PROJECT QUALIFIED ENVIRONMENTAL PROFESSIONALS

Name and Affiliation	Project Role
Jeff Matheson, M.Sc., R.P.Bio. Tetra Tech Canada Inc.	Project manager, report reviewer
Kayla Hatzel, B.Sc., B.I.T. Tetra Tech Canada Inc.	Field data collection, data entry, report author
Claudio Bianchini, R.P.Bio. Bianchini Biological Services	Field data collection

APPENDIX C
GENERAL CONDITIONS

GENERAL CONDITIONS

Natural Sciences

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORTS AND OWNERSHIP

This report pertains to a specific site, a specific development or activity, and/or a specific scope of work. The report may include plans, drawings, profiles and other supporting documents that collectively constitute the report (the "Report").

The Report is intended for the sole use of Saulteau EBA Environmental Services Joint Venture's (SEES JV) Client (the "Client") as specifically identified in the SEES JV Services Agreement or other Contract entered into with the Client (either of which is termed the "Services Agreement" herein). SEES JV does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Report when it is used or relied upon by any party other than the Client, unless authorized in writing by SEES JV.

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2.0 ALTERNATIVE REPORT FORMAT

Where SEES JV submits both electronic file and hard copy versions of the Report or any drawings or other project-related documents and deliverables (collectively termed SEES JV's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed version archived by SEES JV shall be deemed to be the original. SEES JV will archive the original signed and/or sealed version for a maximum period of 10 years.

Both electronic file and hard copy versions of SEES JV's Instruments of Professional Service shall not, under any circumstances, be altered by any party except SEES JV. SEES JV's Instruments of Professional Service will be used only and exactly as submitted by SEES JV.

Electronic files submitted by SEES JV have been prepared and submitted using specific software and hardware systems. SEES JV makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 STANDARD OF CARE

Services performed by SEES JV for the Report have been conducted in accordance with the Services Agreement, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Report.

SEES JV professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by SEES JV of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to such bodies or persons as required may be done by SEES JV in its reasonably exercised discretion.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of SEES JV.

4.0 ENVIRONMENTAL ISSUES

The ability to rely upon and generalize from environmental baseline data is dependent on data collection activities occurring within biologically relevant survey windows.

5.0 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with SEES JV with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for SEES JV to properly provide the services contracted for in the Services Agreement, SEES JV has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

6.0 INFORMATION PROVIDED TO SEES JV BY OTHERS

During the performance of the work and the preparation of this Report, SEES JV may have relied on information provided by persons other than the Client.

While SEES JV endeavours to verify the accuracy of such information, SEES JV accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

7.0 GENERAL LIMITATIONS OF REPORT

This Report is based solely on the conditions present and the data available to SEES JV at the time the data were collected in the field or gathered from publically available databases.

The Client, and any Authorized Party, acknowledges that the Report is based on limited data and that the conclusions, opinions, and recommendations contained in the Report are the result of the application of professional judgment to such limited data.

The Report is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present at or the development proposed as of the date of the Report requires a supplementary investigation and assessment.

It is incumbent upon the Client and any Authorized Party, to be knowledgeable of the level of risk that has been incorporated into the project design or scope, in consideration of the level of the environmental baseline information that was reasonably acquired to facilitate completion of the scope.

The Client acknowledges that SEES JV is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of property, the decisions on which are the sole responsibility of the Client.

8.0 JOB SITE SAFETY

SEES JV is only responsible for the activities of its employees on the job site and was not and will not be responsible for the supervision of any other persons whatsoever. The presence of SEES JV personnel on site shall not be construed in any way to relieve the Client or any other persons on site from their responsibility for job site safety.