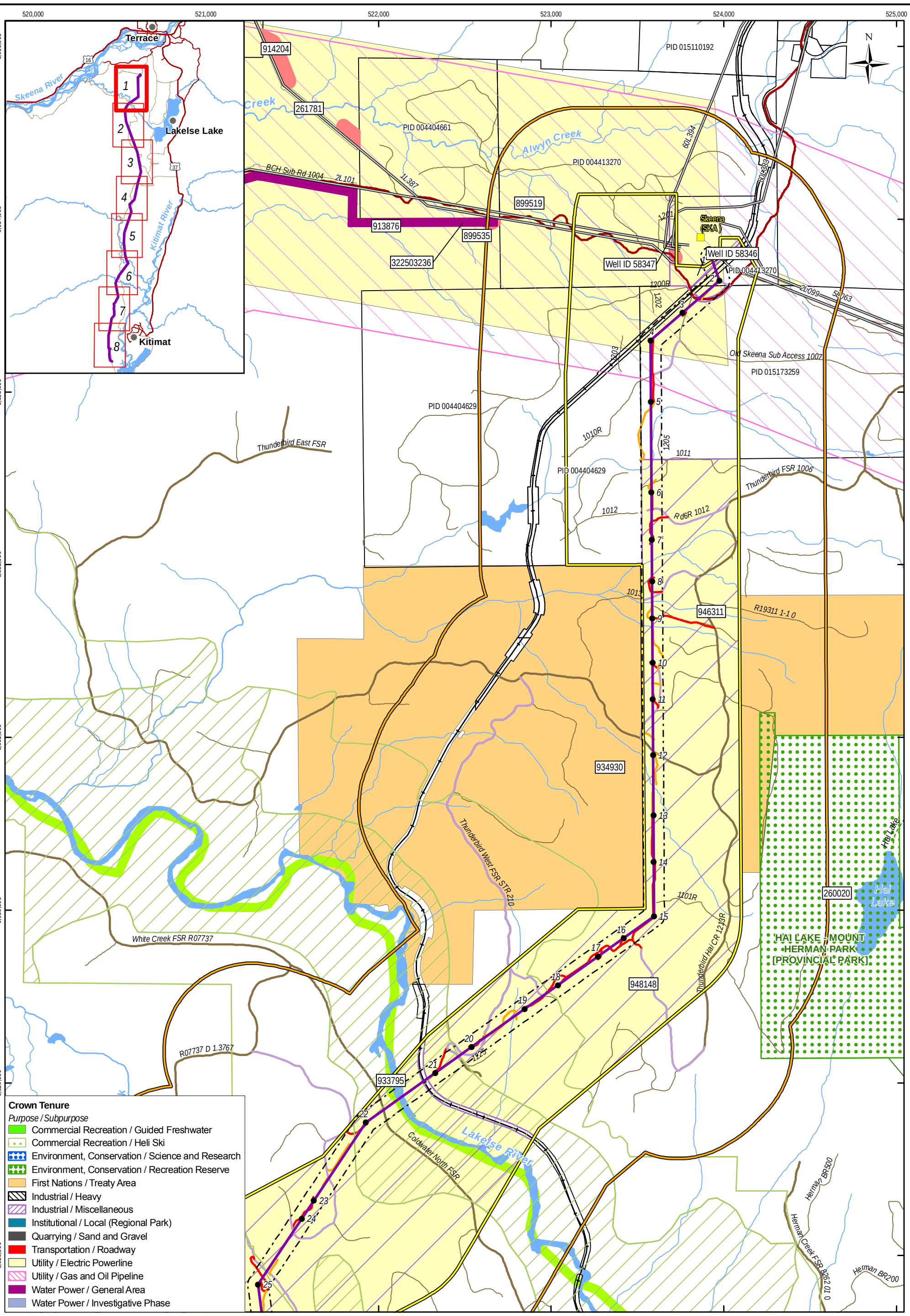
Appendix E

Non-Traditional Land Use

Appendix E.1

Licences and Tenures Intersecting the Non-Traditional Land Use Local Study Area



CLIENT: Prepared for BC Hydro

PROJECT: Terrace to Kitimat Transmission Project (TKTP)

TITLE: Appendix E.1 Licences and Tenures Intersecting the Non-Traditional Land Use Local Study Area

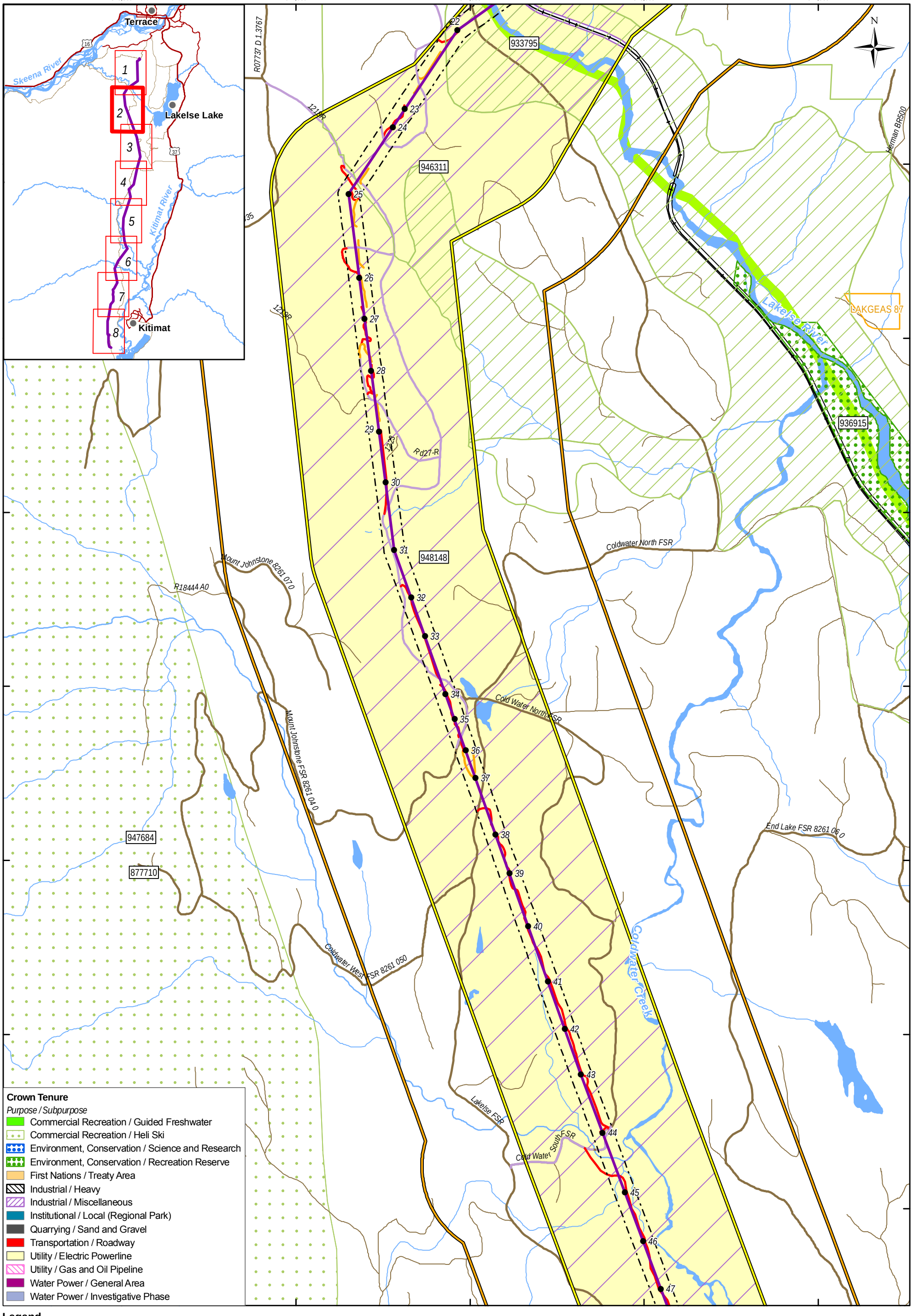
DATE: October, 2016 | ANALYST: WR | QA/QC: NK

GIS FILE: 18-02-013_NTLU_20Kmapb_v4

JOB No: VE52379

COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

amec foster wheeler



Crown Tenure

Purpose / Subpurpose

- Commercial Recreation / Guided Freshwater
- Commercial Recreation / Heli Ski
- Environment, Conservation / Science and Research
- Environment, Conservation / Recreation Reserve
- First Nations / Treaty Area
- Industrial / Heavy
- Industrial / Miscellaneous
- Institutional / Local (Regional Park)
- Quarrying / Sand and Gravel
- Transportation / Roadway
- Utility / Electric Powerline
- Utility / Gas and Oil Pipeline
- Water Power / General Area
- Water Power / Investigative Phase

Legend

- Populated Place
- Existing Substation
- Existing Transmission Line
- Local Road
- Forest Service Road
- Existing Road
- Railway
- Recreation Trail
- First Nation Reserve
- Stream
- Waterbody
- Private Parcel
- Parks
- Recreation Site
- Lakelse Subzone 1
- Lakelse Subzone 2

Proposed Components

- Project Structure
- Provisional Route
- New Permanent Road
- New Temporary Road
- Reconstruction Road
- Transmission Line Right of Way (120m)
- Engineering Boundary
- Non-Traditional Land Use Local Study Area

0 100 200 400
Meters
Scale: 1:20,000

Reference:
DataBC Data Distribution Service
Open Government License (http://www.data.gov.bc.ca/)

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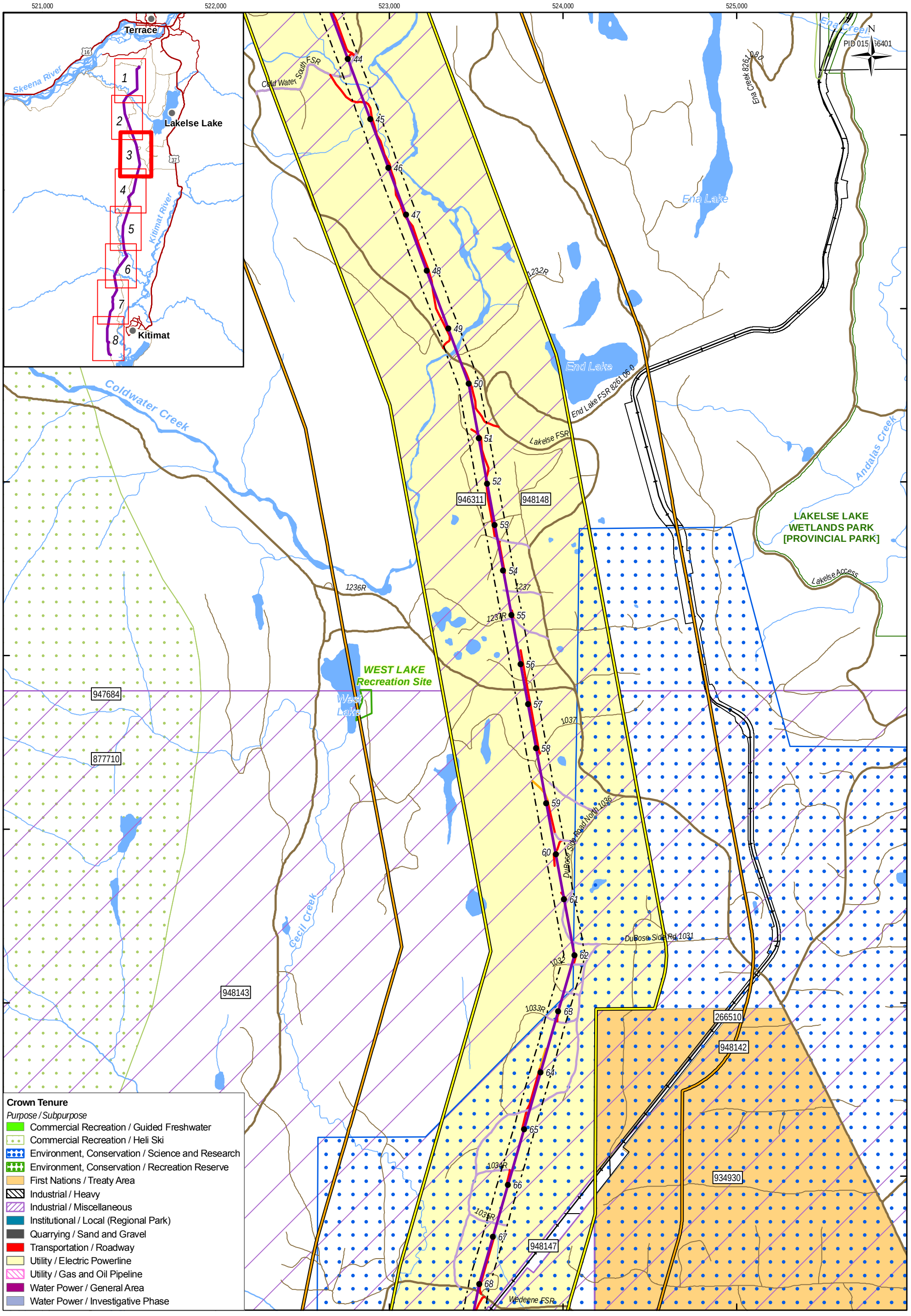

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Meters
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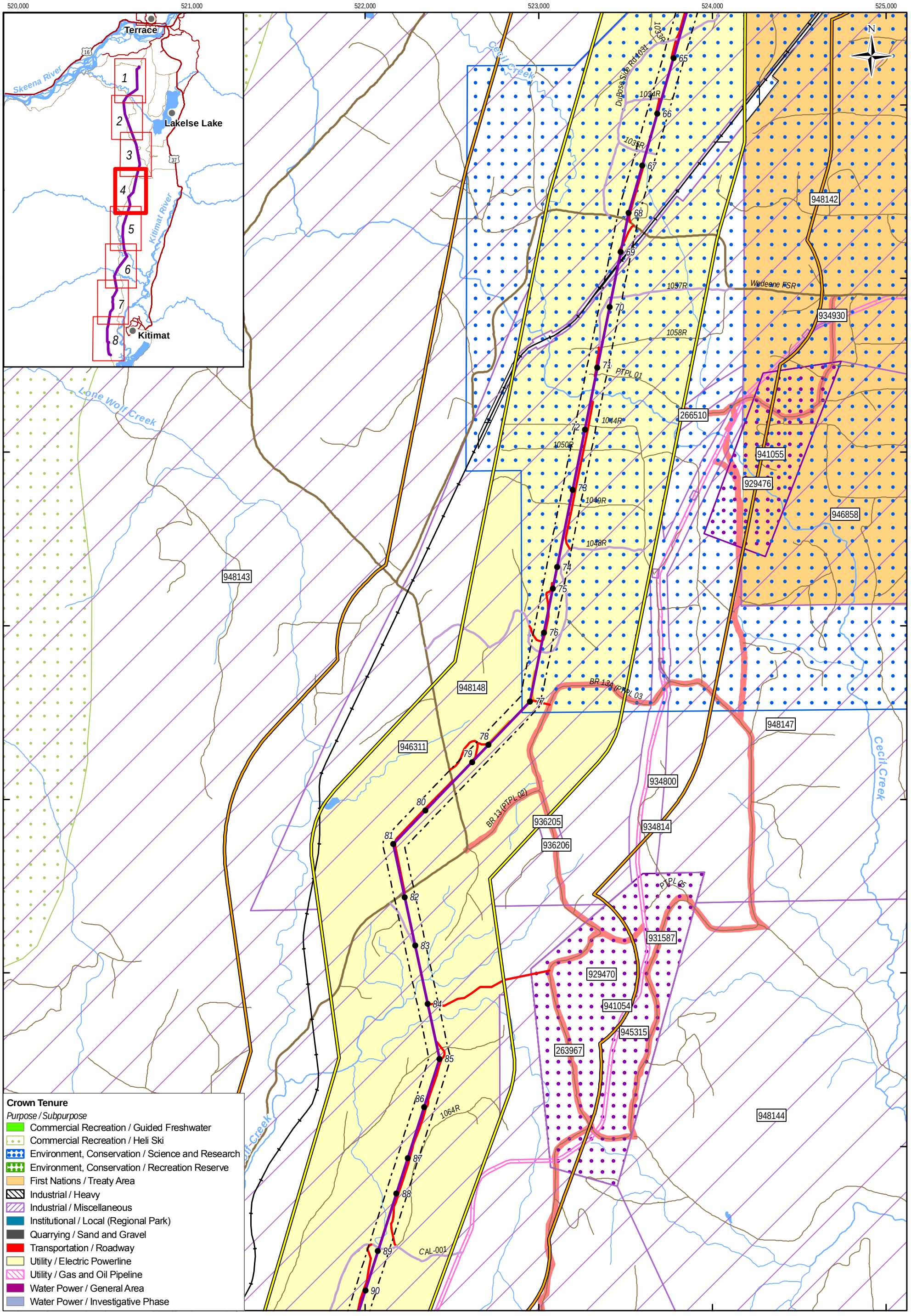
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Terrace
Lakelse Lake
Kitimat
Skeena River
Kitimat River
Lone Wolf Creek
Cecil Creek
DuBose Side Rd 1031
1033R
1034R
1035R
1057R
1058R
1044R
1050R
1049R
1048R
1064R
Wedeene FSR
PTPL 01
BR 13A (PTPL 03
BR 13 (PTPL 02)
PTPL 05
CAL-001
948142
934930
266510
941055
929476
946858
948143
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946311
948147
934800
936205
936206
934814
931587
929470
941054
945315
263967
948144
N
Crown Tenure
Purpose / Subpurpose
Commercial Recreation / Guided Freshwater
Commercial Recreation / Heli Ski
Environment, Conservation / Science and Research
Environment, Conservation / Recreation Reserve
First Nations / Treaty Area
Industrial / Heavy
Industrial / Miscellaneous
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Proposed Components
Project Structure
Provisional Route
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New Temporary Road
Reconstruction Road
Transmission Line Right of Way (120m)
Engineering Boundary
Non-Traditional Land Use Local Study Area
0 100 200 400
Meters
Scale: 1:20,000
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CLIENT: Prepared for BC Hydro
PROJECT: Terrace to Kitimat Transmission Project (TKTP)
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DATE: October, 2016
ANALYST: WR
QA/QC: NK
Page 4 of 8
GIS FILE: 18-02-013_NTLU_20Kmapb_v4
JOB No: VE52379
COORDINATE SYSTEM: NAD 1983 UTM Zone 9N
amec foster wheeler
Last updated by willem.van-riet
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Terrace
Lakelse Lake
Kitimat
Skeena River
Kitimat River
1 2 3 4 5 6 7 8

Lone Wolf Creek
Wedeene FSR
Wedeene River
Raley Creek
Iron Mine Creek
CAL-001
1064R
1062R
1062-R
1052R
Rd96-L
Branch 13C
BR-13 (PTPL 02)
BR-13A (PTPL 03)
879726
875029
934814
948148
946311
948143
945324
879795
931587
948144
263967
934800
941054
929470
929467
941052
1252
86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114

DECEPTION LAKE
Recreation Site
Enso Recreation Site
Iron Mountain

N

Crown Tenure
Purpose / Subpurpose
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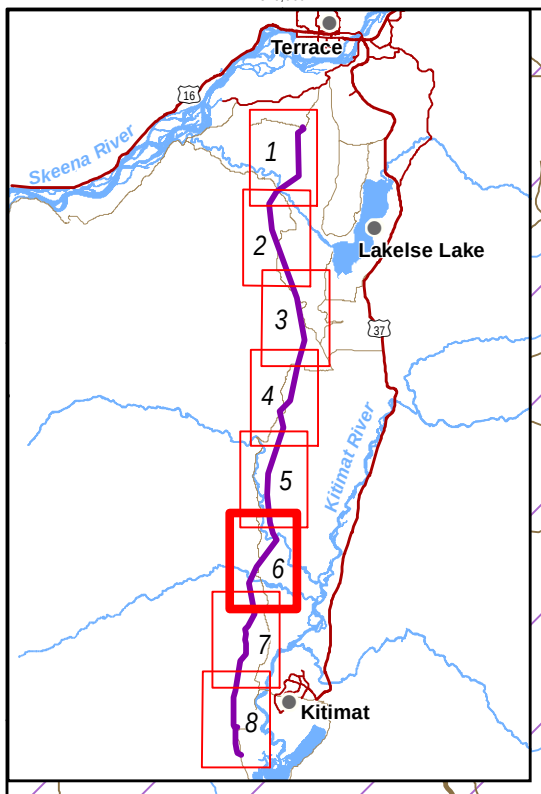

Enso Recreation Site

Wedeene River

Iron Mine Creek

Bowbyes Creek

Little Wedeene River

Wedeene FSR

Branch 13C

RD112R

N

879795 948143 934007 934814 945314 945324 931587 935344 935342 929467 926155 934800 941052 948148 948144 875029 946311 942065 926169 941051 929464 942069 925170 941956 948146

110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137

1252 1254 1253 1255 1053R 1067 1068R 1069R 1070R 1071 1072R 1073 1074R 1075 1076 1077R 1078R 1079R 1080R

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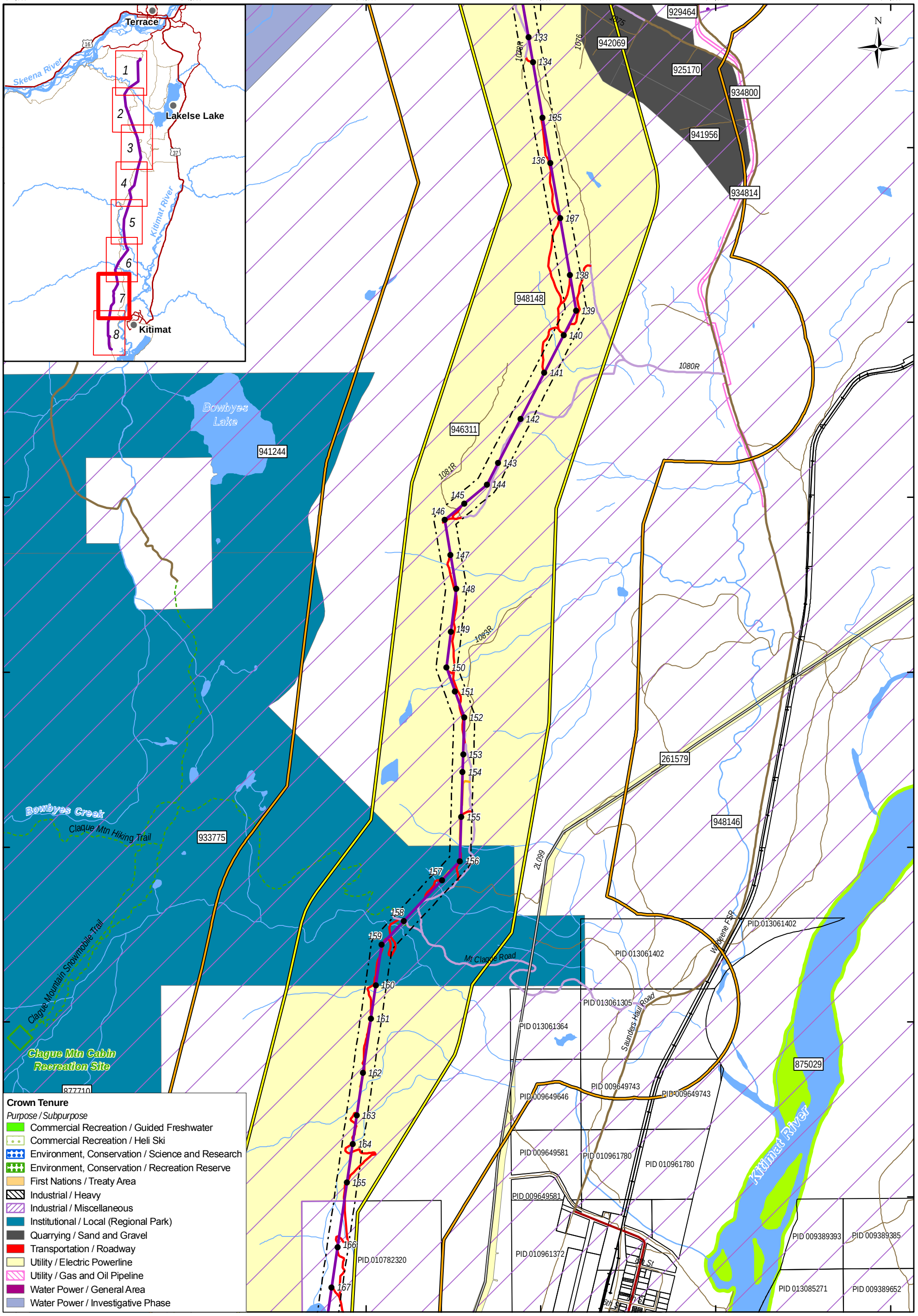

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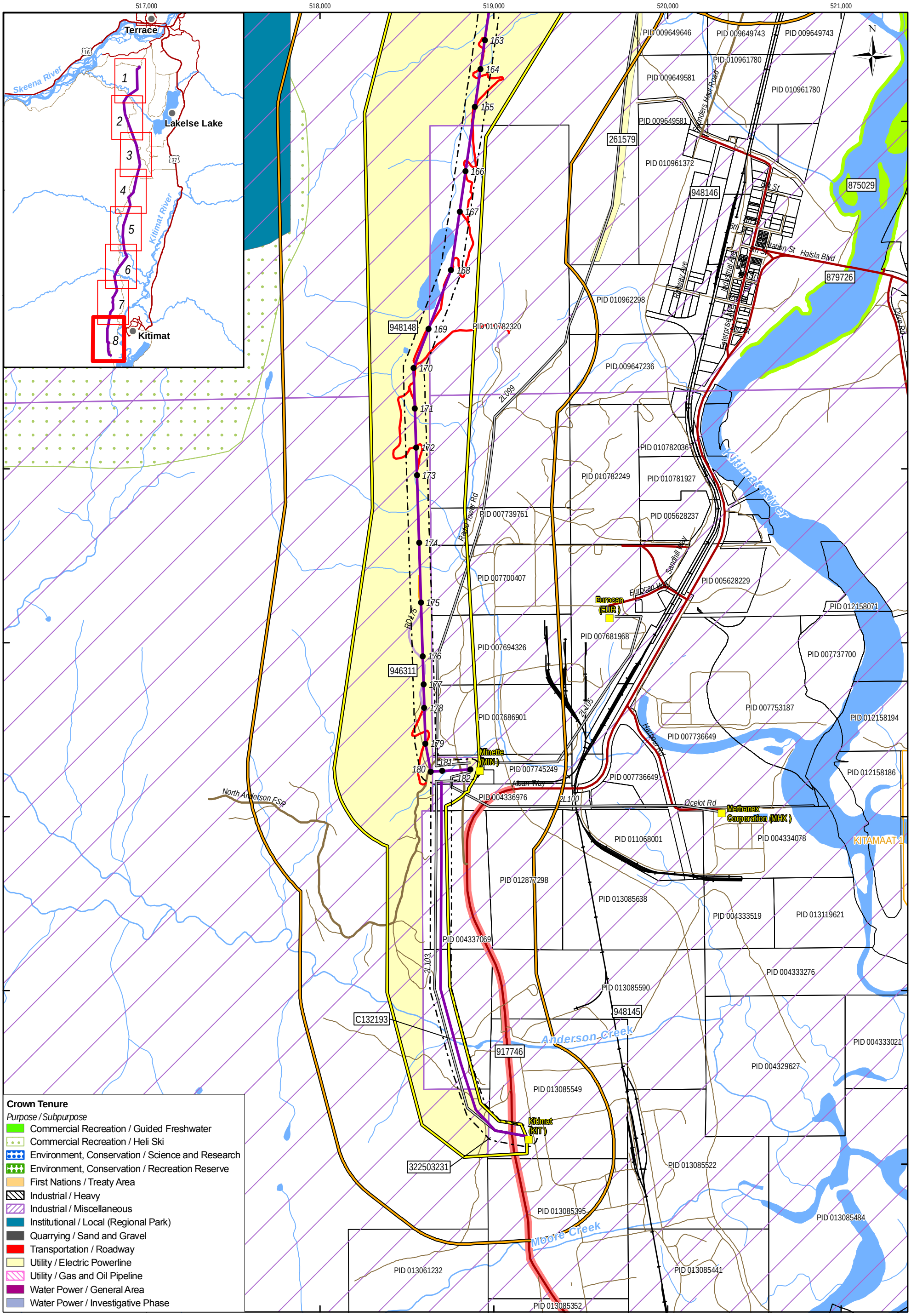

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Appendix E.2

Terrace-Kitimat Transmission Line Timber Assessment
Chartwell Consultants Ltd.
January 22, 2016

CHARTWELL
Consultants Ltd.

Terrace-Kitimat Transmission Line Timber Assessment

Supplement Appendix E.2 to the Environmental and Socio-Economic Effects Report

Terrace to Kitimat, BC

Prepared For:

BC Hydro

6911 Southpoint Dr.
Burnaby, BC
V3N 4X8

Prepared by: Mike Bowering, RPF
Western Rainforest Contracting - Associate
Reviewed by: Warren Hansen, RPF
Project #: 13-737
January 22, 2016

Chartwell Consultants Ltd.
#210 - 275 Fell Avenue, North Vancouver, BC Canada V7P 3R5
Tel: (604) 980-5061 | Fax: (604) 986-0361 | Email: info@chartwell-consultants.com

Terrace-Kitimat Transmission Line Timber Assessment

Chartwell Consultants Ltd. prepared a merchantable timber assessment to evaluate the impacts on timber volume and impact on the timber harvesting land base (THLB) as a result of the Terrace to Kitimat Transmission Line project. Two forest inventories for the area were assessed using GIS and Provincial modeling software to quantify both current and future impacts on timber production in the project components.

Methodology

A GIS file was prepared by combining the two forest inventories with the project components. A November 10, 2015 version of the statutory Right-of-Way clearing boundary, along with the proposed road networks and the overall study area that surrounds the proposed Right-of-Way were linked to the forest inventory files. The Provincial ownership, Forest Tenures, legal OGMAs and the Results inventory were acquired to identify Crown and privately owned land, the area-based Provincial Forest Tenures, legal Old Growth Management Areas and recent harvest depletions, respectively.

The inventory files were intersected with the project components in the November 2015 GIS file to create a resultant dataset. Roads openings were reviewed in January 2016 and amendments were made to the resultant to incorporate the most recent road locations. The resultant database included the following procedures:

- New road lines in GIS were buffered 10m either side to estimate a 20m wide road clearing width, while the proposed transmission line was buffered 21m either side to represent the 42m wide statutory Right-of-Way.
- Inventory files were updated for recent timber harvesting from the Results inventory.
- Provincial Ownership, Forest Tenure and established OGMA inventories were added to the resultant to identify these areas
- The THLB was approximated using the Forest Management Land Base Indicator field where the 2014 VRI was used in the project components. Approximately 10 ha of project component area was identified as Not Sufficiently Restocked (NSR) and had null values for species or site index attributes and were excluded from the THLB.
- Where TFL41 overlaps the project components, the THLB was approximated by the non-productive descriptor in the 2002 Forest Cover rollover inventory. Polygons with null species or site index values were excluded from the THLB, as were those areas with non-productive descriptors (river, gravel, rock, no typing available, swamp)

Inventory volumes and culmination MAI values were projected with VDYP7 using inventory attributes. Basal area and stand density (trees per hectare) attributes were used to project yield curves for treed polygons in the 2014 VRI. Crown closure was used to estimate stand density where no basal area or stand density attributes were provided in the TFL41 inventory. Other than zeroing inventory volumes and resetting ages for recent harvest depletions, no adjustments were made to inventory attributes, or to projected volume or culmination Mean Annual Increment (MAI) as predicted with VDYP7. A table showing the predicted current

stand volume and the culmination MAI was created for each resultant polygon. Summary Inventory attribute tables were compiled from the resultant inventory database and modeling output from VDYP7 and are shown in this report.

Project Components

Inventory polygons were spatially linked to the following Project Components:

1. *Project Footprint*– includes all areas within the November 10, 2015 GIS file. The Project Footprint is predominantly surrounded by the Study Area with exception of a small (0.13ha) portion that extends beyond the Study Area on the North boundary. The Project Footprint is further stratified to include:
    a. A 42m wide *Statutory Right-Of-Way* that surrounds the proposed transmission line (21m each side of centerline). These areas are assumed to be de-forested and not regenerated to commercial tree species. New road openings within the Statutory Right-of-Way clearing area were identified separately but were included in the Statutory Line Right-of-Way clearing area.
    b. *New Road Openings* (or portions) outside the 42m wide Statutory Right-of-Way were identified separately. All new road lines in the GIS file were buffered 10m on either side to represent a 20m wide road opening. All road openings are assumed to be permanently deforested.
    c. *Areas Outside the 42m wide Statutory Right-of-Way Clearing and Outside the New Road Openings* proposed for an one time danger tree clearing. These areas are not assumed to be a permanent loss to the Timber Harvesting Land Base.
2. *New Roads outside the Project Footprint but within Study Area* –proposed new road openings built outside of the Project Footprint in the November 10, 2015 GIS file, but with within the boundaries of the identified Study Area. All new road lines in the GIS file were buffered 10m on either side to represent a 20m wide road opening.
3. *New Roads Outside Study Area* – proposed new road openings built outside the Study Area. New road lines were buffered 10m on either side to represent a 20m wide road opening.
4. *Study Area* – area of interest that includes items 1 & 2 above, plus a buffer area that surrounds them. It is assumed there will be no clearing of timber for project development in the buffer area that surrounds items 1 & 2; therefore, this area was not assessed in this report.

Figure 1 provides a diagram of the project components.

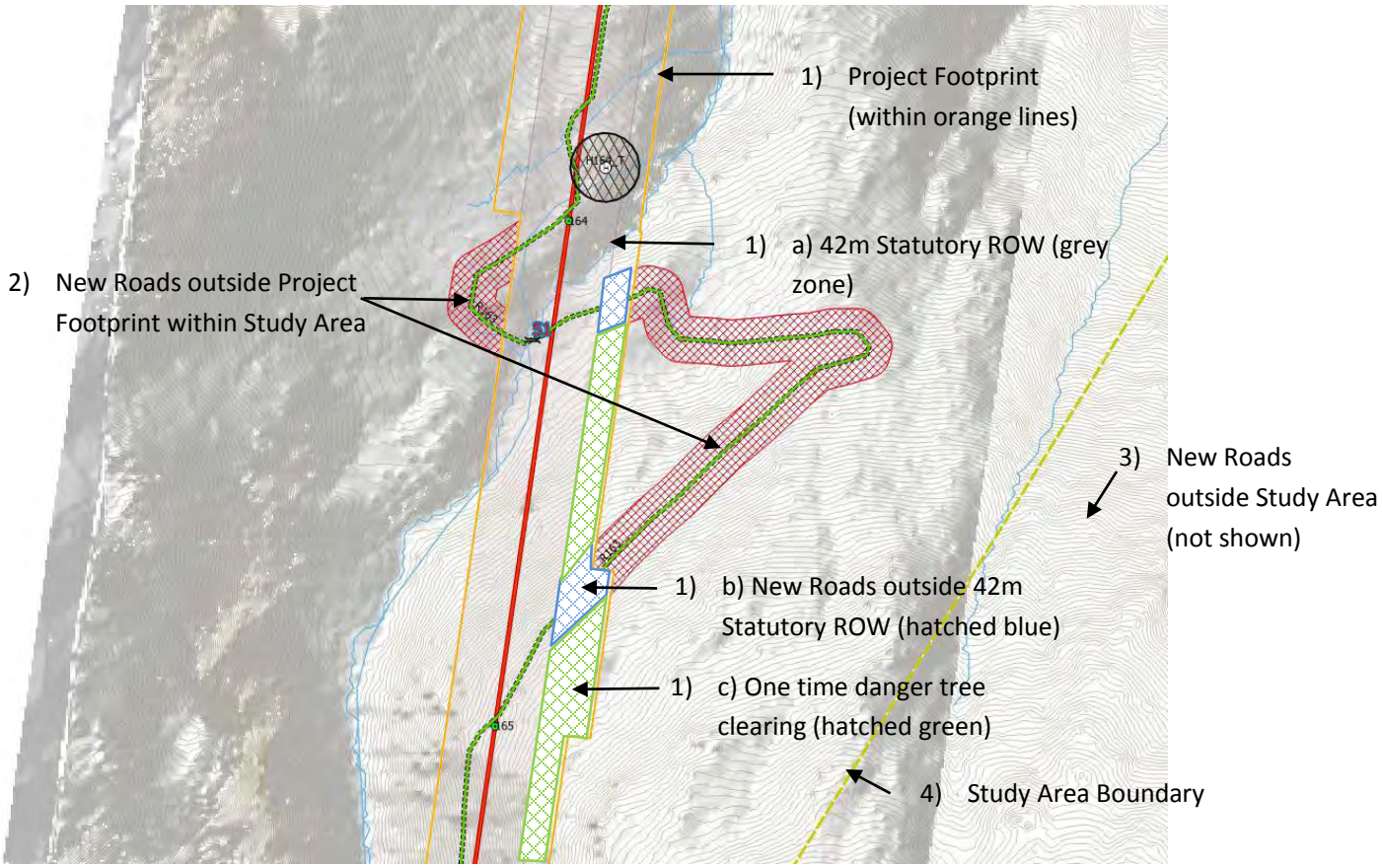

FIGURE 1: PROJECT COMPONENT DIAGRAM

The THLB is an estimate of the forested area available for growing trees for commercial harvest. For this assessment, all timbered inventory polygons were included in the THLB except those areas with obvious deficiencies in timber production. Such polygons include those without site productivity information, non-forested areas like lakes, gravel pits and rock and non-productive areas and areas that were classified as NSR. No allowances were made for non-spatial attributes that may reduce the harvestable land base component in a conventional timber supply analysis such as old seral targets, visual constraints or ungulate winter range.

There are legally established Old Growth Management Areas (OGMA) overlapping the Project Footprint and new road openings to be developed outside the Project Footprint. Unlike a conventional timber supply analysis, the OGMA areas were not excluded from the THLB.

All forested land, both crown and private, was assumed to be in the THLB for this analysis. Table 1 shows the ownership and THLB/Non-timber areas for each project components. Areas proposed for clearing and new road openings comprise nearly 290ha, of which 11ha are non-timbered areas. Approximately 39ha of timbered area is within the Project Footprint and proposed for temporary clearing to address danger trees surrounding the 42m wide transmission line Statutory Right-of-Way.

TABLE 1 – AREA BY PROJECT COMPONENT AND OWNERSHIP FOR THE THLB AND NON-TIMBERED AREA.

		Area (ha)		
Project Component	**Owner**	**THLB**	**Non-Timber**	**Total**
Statutory ROW in Project Footprint	Crown	192.7	6.5	199.2
	Private	9.0	3.3	12.3
New Roads outside Statutory ROW within Project Footprint	Crown	4.1	0.0	4.1
	Private	0.1	0.0	0.1
New Roads outside Project Footprint within Study Area	Crown	25.3	0.6	25.9
	Private	4.7	0.0	4.7
New Roads outside Project Footprint and Study Area	Crown	3.7	0.0	3.8
	Private	0.5	0.0	0.5
Total in the Permanently Cleared Area		**240.0**	**10.6**	**250.6**
Project Footprint outside Statutory ROW and New Roads	Crown	36.3	0.2	36.5
	Private	2.2	0.3	2.5
Total in the Temporarily Cleared Area		**38.5**	**0.5**	**39.0**
Total Area		**278.5**	**11.1**	**289.6**

Inventory Description

The forest inventories for the project components come from two distinct sources: an older Forest Cover to VRI rollover inventory for TFL41 and the Provincial Vegetation Resources Inventory (VRI) for the area outside TFL41. The Province does not provide VRI data for the TFL41 tenure. The inventory attributes for the TFL41 inventory was last projected and updated for depletions in 2002. The current VRI was used for all areas outside of TFL41 including TFL1 and the Terrace Community Forest. The VRI attributes and harvest depletions were projected up to January 01, 2014 in the VRI source file. Inventory adjustments were made in this analysis for recent harvest openings in the Terrace Community Forest as shown in the Provincial Results Opening inventory. No other harvest depletions in the project components were found on Provincial Results-Openings inventory file that were not shown as openings in the two forest inventories.

Inventory attributes for both the TFL41 inventory and the VRI were projected to 2015 using the Province's inventory projection model VDYP7 to predict current year stand volumes. For quality assurance purposes, both inventories were modelled with VDYP7 to their respective inventory projection year to assess the accuracy of the modelled volumes against the inventory file volume. The modelled volume was comparable (slightly less than 6%) to the actual volume found in the inventory file for the 214ha of project component area that was assessed with the VRI. If the 3,147ha portion of Study Area outside of the Project Footprint and new roads is included, the inventory accuracy of modelled versus inventory volumes is less than 3%.

Volumes projected with VDYP7 to the 2002 projection year of the TFL41 inventory were 12.4% less than the TFL41 inventory volumes. This may be due to a number of factors such in an old inventory notwithstanding subsequent changes to Provincial inventory projection models. Yield projections for smaller areas may be

more sensitive to percentage differences and younger stands may also be more variable when using input attributes like crown closure instead of basal area and stems per hectare (not found in the TFL41 inventory). While the projected versus actual inventory difference for the 2002 TFL41 inventory seems significant, the area only comprises approximately 26% (76ha) of the 290ha of project component area under this assessment.

All inventory volumes projected with VDYP7 are merchantable volumes to the 17.5cm diameter at breast height limits. Comparisons were made to the 17.5 diameter limit volumes in the forest inventories. Use of these diameter limits is consistent with the 2010 Data Package for the Kalum Timber Supply Review[1].

Table 2 shows the project components by ownership category and the relevant area-based forest tenure. The area-based tenures are TFL41, TFL1 and the Terrace Community Forest. Volume based tenures are within the Crown owned lands inside the Kalum Timber Supply Area (TSA). The THLB is further distinguished to those areas where the current stand volume is greater than or less than 250m3/ha as a proxy for stand merchantability. Consistent with the 2010 Data Package for the Kalum Timber Supply Review, stands with less than 250m3/ha are assumed to be unsuitable for harvest.

[1] B.C. Ministry of Forests and Range. 2010. *Kalum timber supply area timber supply review - updated data package following completion of the timber supply analysis*. B.C. Min. For. Range., Victoria.

TABLE 2 – AREA BY PROJECT COMPONENT, OWNERSHIP, TENURE AND TIMBER MERCHANTABILITY IN THE THLB AND NON-TIMBERED AREA

Project Component	Owner	Tenure	Area (ha) <250m3/ha	>250m3/ha	Non-Timber	Total
Statutory ROW in Project Footprint	Crown		89.3	26.2	5.8	121.4
	Crown	ComFrst	13.4	5.4	0.1	18.9
	Crown	TFL41	52.4	6.0	0.6	59.0
	Private		8.9	0.2	3.3	12.3
New Roads outside Statutory ROW within Project Footprint	Crown		2.2	0.6	0.0	2.8
	Crown	ComFrst	0.4	0.2	0.0	0.6
	Crown	TFL41	0.5	0.3	0.0	0.7
	Private		0.1	0.0	0.0	0.1
New Roads outside Project Footprint within Study Area	Crown		11.2	3.6	0.5	15.3
	Crown	ComFrst	0.3	0.5	0.0	0.8
	Crown	TFL41	5.7	4.0	0.2	9.9
	Private		4.7	0.0	0.0	4.7
New Roads outside Project Footprint and Study Area	Crown		3.7	0.0	0.0	3.7
	Crown	TFL41	0.0	0.0	0.0	0.0
	Private		0.5	0.0	0.0	0.5
Total in the Permanently Cleared Area			**193.1**	**46.9**	**10.6**	**250.6**
Project Footprint outside Statutory ROW and New Roads	Crown		15.8	9.5	0.0	25.3
	Crown	ComFrst	3.1	1.6	0.0	4.7
	Crown	TFL41	5.1	1.3	0.2	6.5
	Private		2.2	0.0	0.3	2.5
Total in the Temporarily Cleared Area			**26.2**	**12.3**	**0.5**	**39.0**
Total Area			**219.2**	**59.3**	**11.1**	**289.6**

Standing Timber Volume

Standing timber inventory as projected with VDYP7 to the 2015 year is shown in Table 3. The inventory is broken down by ownership, forest tenure and stand merchantability (greater or less than 250m3/ha).

TABLE 3 - TOTAL VOLUME BY PROJECT COMPONENT, OWNERSHIP, TENURE AND TIMBER MERCHANTABILITY IN THE THLB

Project Component	Owner	Tenure	Total Volume (m3) <250m3/ha	>250m3/ha	Non-Timber	TOTAL
Statutory ROW in Project Footprint	Crown		9,288	13,856	0	23,144
	Crown	ComFrst	2,043	1,517	0	3,559
	Crown	TFL41	4,379	3,081	0	7,460
	Private		837	57	0	894
New Roads outside Statutory ROW within Project Footprint	Crown		234	358	0	592
	Crown	ComFrst	45	47	0	92
	Crown	TFL41	37	79	0	116
	Private		14	0	0	14
New Roads outside Project Footprint within Study Area	Crown		1,002	1,731	0	2,732
	Crown	ComFrst	56	119	0	176
	Crown	TFL41	515	1,808	0	2,323
	Private		373	0	0	373
New Roads outside Project Footprint and Study Area	Crown		526	0	0	526
	Crown	TFL41	0	0	0	0
	Private		17	0	0	17
Total in the Permanently Cleared Area			**19,367**	**22,652**	**0**	**42,019**
Project Footprint outside Statutory ROW and New Roads	Crown		1,881	5,062	0	6,943
	Crown	ComFrst	513	433	0	945
	Crown	TFL41	558	707	0	1,265
	Private		347	0	0	347
Total in the Temporarily Cleared Area			**3,299**	**6,201**	**0**	**9,501**
Total Volume			**22,666**	**28,853**	**0**	**51,519**

Clearing the Statutory Right-of-Way and building new roads will result in a harvest of 42,019 m3, while removing timber from the one-time danger tree clearing area will add another 9,501 m3. Although stands considered non-merchantable (less than 250m3/ha) comprise 77% of the THLB area within the proposed clearing areas and roads, these same stands only contribute 46% of the standing volume. Nearly 4,772m3 of inventory volume in the area proposed for Right-of-Way clearing, new roads and the danger tree clearing would come from the Terrace Community Forest while 11,164m3 would be cleared from TFL41. Most of the 28,853m3 of merchantable volume within the proposed clearing areas, new roads and danger tree areas comes from volume based tenure areas in the Kalum TSA (21,006m3).

Table 4 shows the proportion of total timber volume by timber type. Softwood volume makes up nearly 96% of the total timber volume in the project components.

TABLE 4 - TOTAL VOLUME BY TIMBER TYPE, SHOWN BY PROJECT COMPONENT, OWNERSHIP, TENURE AND TIMBER IN THE THLB

Project Component	Owner	Tenure	Total Vol (m3)	Hardwood Vol (m3)	Softwood Vol (m3)
Statutory ROW in Project Footprint	Crown		23,144	704	22,440
	Crown	ComFrst	3,559	410	3,149
	Crown	TFL41	7,460	168	7,292
	Private		894	229	665
New Roads outside Statutory ROW within Project Footprint	Crown		592	6	586
	Crown	ComFrst	92	20	72
	Crown	TFL41	116	0	115
	Private		14	5	9
New Roads outside Project Footprint within Study Area	Crown		2,732	82	2,650
	Crown	ComFrst	176	10	166
	Crown	TFL41	2,323	1	2,322
	Private		373	38	335
New Roads outside Project Footprint and Study Area	Crown		526	1	525
	Crown	TFL41	0	0	0
	Private		17	0	17
Total in Permanently Cleared Area			**42,019**	**1,674**	**40,345**
Project Footprint outside Statutory ROW and New Roads	Crown		6,943	135	6,808
	Crown	ComFrst	945	103	842
	Crown	TFL41	1,265	80	1,185
	Private		347	91	255
Total in Temporarily Cleared Area			**9,501**	**409**	**9,092**
Total Volume			**51,519**	**2,083**	**49,436**

Table 5 shows the softwood timber volume by species type (hemlock (H), balsam (B), cedar (C), pine & larch (P & L) and spruce (S)), differentiated by the merchantability limit of 250m3/ha. Species volume reflects the summation of all stand volume proportioned by the inventory species component within each stand.

TABLE 5 - SOFTWOOD VOLUME BY SPECIES, WHERE STAND VOLUME IS GREATER OR LESS THAN 250M3/HA.

			H (m3)		B (m3)		C (m3)		P & L (m3)		S (m3)	
Project Component	**Own**	**Tenure**	**>250**	**<250**	**>250**	**<250**	**>250**	**<250**	**>250**	**<250**	**>250**	**<250**
Statutory ROW in Project Footprint	C		8,525	6,442	2,011	1,301	1,616	519	48	4	1,452	521
	C	ComFrst	829	1,568	237	349	0	26	0	23	116	2
	C	TFL41	1,191	3,013	1,290	1,056	149	252	0	21	304	15
	P		7	505	0	9	4	82	0	0	11	47
New Roads outside of Statutory ROW within Project Footprint	C		169	161	45	47	63	14	0	0	81	6
	C	ComFrst	23	33	6	8	0	1	0	0	1	0
	C	TFL41	54	27	6	7	18	4	0	0	1	0
	P		0	8	0	0	0	0	0	0	0	0
New Roads outside Project Footprint within Study Area	C		1,455	678	123	130	141	59	0	1	11	52
	C	ComFrst	86	40	23	11	0	2	0	0	6	0
	C	TFL41	1,115	385	512	94	177	35	0	0	4	0
	P		0	309	0	14	0	12	0	0	0	0
New Roads outside Project Footprint and Study Area	C		0	408	0	59	0	0	0	0	0	58
	C	TFL41	0	0	0	0	0	0	0	0	0	0
	P		0	15	0	0	0	2	0	0	0	0
Total in Permanently Cleared Area			**13,454**	**13,591**	**4,252**	**3,083**	**2,169**	**1,008**	**48**	**50**	**1,987**	**702**
Project Footprint outside Statutory ROW and New Roads	C		3,400	1,296	754	276	522	82	7	1	372	99
	C	ComFrst	260	391	71	86	0	7	0	6	22	0
	C	TFL41	131	378	285	146	14	28	0	2	199	2
	P		0	172	0	7	0	45	0	0	0	33
Total in Temporarily Cleared Area			**3,791**	**2,235**	**1,109**	**516**	**536**	**161**	**7**	**8**	**592**	**134**
Total Volume			**17,245**	**15,827**	**5,361**	**3,599**	**2,705**	**1,169**	**56**	**58**	**2,580**	**837**

Table 6 shows the same information as Table 5, but for the hardwood species (aspen & cottonwood (A), red alder (Dr) and birch (Ep)). Most of the hardwood volume is red alder.

TABLE 6: TOTAL HARDWOOD VOLUME BY SPECIES, WHERE STAND VOLUME IS GREATER OR LESS THAN 250M3/HA.

			A (m3)		Dr (m3)		Ep (m3)	
Project Component	**Own**	**Tenure**	**>250**	**<250**	**>250**	**<250**	**>250**	**<250**
Statutory ROW in Project Footprint	C		0	0	203	493	0	9
	C	ComFrst	189	0	146	75	0	0
	C	TFL41	136	0	10	21	0	0
	P		0	0	35	80	0	114
New Roads outside of Statutory ROW within Project Footprint	C		0	0	0	6	0	0
	C	ComFrst	13	0	4	3	0	0
	C	TFL41	0	0	0	0	0	0
	P		0	0	0	3	0	1
New Roads outside Project Footprint within Study Area	C		0	0	0	82	0	0
	C	ComFrst	4	0	1	4	0	0
	C	TFL41	0	0	0	1	0	0
	P		0	0	0	28	0	9
New Roads outside Project Footprint and Study Area	C		0	0	0	1	0	0
	C	TFL41	0	0	0	0	0	0
	P		0	0	0	0	0	0
Total in Permanently Cleared Area			**342**	**0**	**399**	**798**	**0**	**134**
Project Footprint outside Statutory ROW and New Roads	C		0	0	7	125	0	3
	C	ComFrst	56	0	23	23	0	0
	C	TFL41	78	0	1	2	0	0
	P		0	0	0	25	0	66
Total in Temporarily Cleared Area			**134**	**0**	**31**	**175**	**0**	**69**
Total Volume			**476**	**0**	**430**	**974**	**0**	**203**

The area under the project components was distinguished into the Age Class descriptions shown in Table 7. The non-forested areas outside the THLB were classified as Age Class 0.

TABLE 7 - AGE CLASS DESCRIPTIONS

Age Class	Age Range
0	Non-timbered
1	1 to 20
2	21 to 40
3	41 to 60
4	61 to 80
5	81 to 100
6	101 to 120
7	121 to 140
8	141 to 250
9	>250

Table 8 shows the different project component areas by the age class. Nearly 85% of the THLB in the proposed Right-of-Way clearing area and road openings is 60 years of age or less. An age class gap exists across the project component areas for stands between 61 and 140 years of age (age classes 4 to 7). Old seral stands (i.e. Age Class 9 or those >250 years) represent about 13% or 36ha of the project component areas while Age Class 8 stands in the project components only comprise 4.8ha. The project components overlap 5.9 ha of legally established OGMAs, the majority of which are in Age Classes 8 and 9 (2.7ha and 3ha respectively).

TABLE 8 - PROJECT COMPONENT AREA (HA) SHOWN BY AGE CLASS (NON-TIMBERED AREA NOT SHOWN).

			THLB Area (ha) by Age Class								
Project Component	**Owner**	**Tenure**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Statutory ROW in Project Footprint	Crown		2.3	49.9	41.3	0.0	0.0	0.0	0.0	3.1	18.9
	Crown	ComFrst	3.4	1.4	13.1	0.8	0.0	0.1	0.0	0.0	0.0
	Crown	TFL41	0.0	45.2	9.9	0.0	0.3	0.0	0.0	0.7	2.3
	Private		0.0	5.1	3.9	0.0	0.0	0.0	0.0	0.0	0.0
New Roads outside Statutory ROW within Project Footprint	Crown		0.0	1.3	0.9	0.0	0.0	0.0	0.0	0.2	0.4
	Crown	ComFrst	0.2	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	Crown	TFL41	0.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0
	Private		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
New Roads outside Project Footprint within Study Area	Crown		0.3	8.1	2.8	0.0	0.0	0.0	0.0	0.0	3.6
	Crown	ComFrst	0.1	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
	Crown	TFL41	0.0	5.5	1.9	0.0	0.0	0.0	0.0	0.0	2.2
	Private		0.0	3.5	0.6	0.0	0.0	0.0	0.0	0.0	0.6
New Roads outside Project Footprint and Study Area	Crown		0.0	0.5	3.2	0.0	0.0	0.0	0.0	0.0	0.0
	Crown	TFL41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Private		0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total in Permanently Cleared Area			**6.2**	**121.4**	**79.0**	**0.9**	**0.3**	**0.1**	**0.0**	**4.0**	**28.0**
Project Footprint outside Statutory ROW and New Roads	Crown		0.1	8.7	8.5	0.0	0.0	0.0	0.0	0.6	7.5
	Crown	ComFrst	0.7	0.3	3.5	0.3	0.0	0.0	0.0	0.0	0.0
	Crown	TFL41	0.0	3.2	2.3	0.0	0.0	0.0	0.0	0.2	0.6
	Private		0.0	0.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0
Total in Temporarily Cleared Area			**0.7**	**12.3**	**16.3**	**0.3**	**0.0**	**0.0**	**0.0**	**0.8**	**8.0**
Total Area			**7.0**	**133.7**	**95.3**	**1.2**	**0.3**	**0.1**	**0.0**	**4.8**	**36.1**

Future Timber Volume

In order to quantify future stand production, the mean annual increment (MAI) at culmination age was calculated using VDYP7 for each inventory polygon and represents the maximum rate of annual growth of a stand. Multiplying MAI values by the area of stand gives a maximum theoretical sustainable harvest rate for that stand referred to as the long run sustained yield (LRSY). In practice and over long time projections, the maximum sustainable harvest rate of a land base can never exceed the LRSY volumes of all stands in the land base. Short term harvest rates may in fact be greater than LRSY and sustainable over the short term if the inventory volume comes from stands older than their respective age of culmination MAI. Any short term harvest levels that exceed LRSY will not be sustainable over the long term however.

Typically a timber supply forecast will project a sustainable long term harvest level in a given land base is less than the theoretical harvest level of LRSY. This may be due to legacy harvesting or to a number of management constraints that are applied to a land base, like requiring a certain proportion of the inventory to be old seral or requiring harvest areas to be considered greened up before adjacent harvesting is allowed to occur.

The LRSY estimate is considered a theoretical estimate of land base productivity. Stand management practices that increase the overall yield and growth rate of a stand will correspondingly increase LRSY values. Planting with preferred stock to an appropriate density, fertilizing, abating pests and disease are but a few factors that may increase MAI and therefore LRSY.

Table 9 shows the LRSY values and average culmination MAI for each project component category. LRSY values in the table are a summation of individual polygon LRSY values within each project while mean culmination MAI values are simply LRSY divided by THLB area. Unique LRSY and MAI values have been prepared for each inventory polygon within the GIS resultant file in the preparation of Table 9.

TABLE 9 - LRSY AND CULMINATION VALUES BY PROJECT COMPONENT

Project Component	Owner	Tenure	THLB (ha)	LRSY (m3/ha/yr)	MAI (m3/yr)
Statutory ROW in Project Footprint	Crown		115.5	671.6	5.8
	Crown	ComFrst	18.8	160.8	8.6
	Crown	TFL41	58.4	360.0	6.2
	Private		9.0	45.8	5.1
New Roads outside of Statutory ROW within Project Footprint	Crown		2.8	16.0	5.8
	Crown	ComFrst	0.6	5.0	8.6
	Crown	TFL41	0.7	5.0	6.8
	Private		0.1	0.4	5.3
New Roads outside Project Footprint within Study Area	Crown		14.8	74.8	5.1
	Crown	ComFrst	0.8	7.2	9.3
	Crown	TFL41	9.7	59.4	6.1
	Private		4.7	20.0	4.3
New Roads outside Project Footprint and Study Area	Crown		3.7	24.9	6.7
	Crown	TFL41	0.0	0.0	0.0
	Private		0.5	2.1	4.6
Total in Permanently Cleared Area			**240.0**	**1,453.0**	**6.1**
Project Footprint outside Statutory ROW and New Roads	Crown		25.3	150.4	5.9
	Crown	ComFrst	4.7	40.5	8.6
	Crown	TFL41	6.3	40.4	6.4
	Private		2.2	11.9	5.5
Total in Temporarily Cleared Area			**38.5**	**243.3**	**6.3**
Total			**278.5**	**1,696.3**	**6.1**

The values in Table 9 show that permanently removing the productive areas under proposed Statutory Right-of-Way clearing and new road openings will impact the future AAC by up to 1,453m3 per year. Within the Statutory Right-of-Way clearing and new road openings, approximately 68m3 per year of this LRSY volume is held in privately held land and not a factor in AAC projections of volume on Crown owned forest. TFL41 and the Terrace Community Forest may lose timber growing sites that are capable of producing 424m3 per year and 173m3 per year respectively. The Crown owned land in the Kalum Timber Supply Area (i.e. those crown owned areas outside of TFL41 and the Terrace community forest) may see a short fall in future harvest volumes of up to 787m3 per year.

Removing the one-time danger trees area is considered a temporary removal of timber and therefore these areas will not impact the future timber volume in the Project Footprint outside of the Statutory Right-of-Way or new road openings. In Table 9 these areas show a combined area of 38.5 ha and a LRSY value of 243m3 per year.

The LRSY values and culmination MAI estimates are based solely on the VDYP7 inventory model forecasts using current inventory attributes and are estimates do not consider any stand enhancement treatments.

Mitigation Measures

A number of mitigation measures can be employed by the proponent to reduce both direct and indirect effects on forestry activities as a result of project development.

Direct Effects

Direct effects on timber production and yield primarily involves the harvest of existing stands of timber and the lost opportunity to grow timber in areas that are proposed for permanent clearing (i.e. Statutory Right-of-Way and road openings) as described in the Standing Timber Volume and Future Timber Volume sections of this report. Mitigation measures to reduce these direct effects may include such things as:

- Minimize clearing where practicable.
- Use best efforts to utilize merchantable timber and provide harvest opportunities and access to this timber by the respective tenure holder or private land owner, where possible.
- Use best management practices and following the EMP/EPPs developed for the project.

Timber production is also related to the amount of productive area and site productivity of the area. Project activities that reduce the productive area or hinder the site productivity in some manner will result in lower timber yields. Mitigation measures to reduce these direct effects may include such things as sorting, separating and storing top soil on sites where short-term soil stripping and grubbing is required during construction, where practicable. This material can be spread back onto sites during reclamation and will help increase the success rate of establishing commercial species.

Indirect Effects

Transmission lines have the potential to isolate adjacent stands of timber and may restrict conventional logging activities when the lines are located across or along forestry roads. Transmission lines also have the potential to restrict aerial harvesting flight paths as helicopters carrying logs cannot cross transmission lines without risk to the circuit (i.e. potential for logs and or debris to fall on the circuit). These effects have the potential to affect the economic and practical feasibility of harvesting timber.

It is suggested that Ministry of Forests, Lands and Natural Resource Operations (FLNRO), surrounding area based forest tenure holders and private land representatives have an opportunity to review the proposed project and provide comment. Access (i.e. roads and bridges) may be improved during construction. Improved road access may have a favorable effect on forest tenure and private land holders. This may be an appropriate discussion point with surrounding tenure holders and FLNRO when consideration is given to lost timber production areas.

In summary, to reduce the indirect effects of isolating timber and increasing the material cost of wood delivery, the project should consider such things as:

- Ensuring design considers appropriate limits of approach under Transmission Lines on Forest Service Roads for forestry harvesting equipment to cross, even when travelling on a low-bed
- Where timber harvesting activities are planned, review the proposed project with FLNRO and affected area based forest tenure holders to minimize flight path impacts and potential timber isolation.
- Review access plans with FLNRO, area based tenure holders and private land owners to minimize potential timber access conflicts.
- Design bridge crossings to a minimum BCL 625 Load Rating (legal highway load rating).
- Give consideration to road and crossing improvements in any offset negotiation discussions with adjacent area based forest tenure and private land holders for lost timber growing space.

Mike Bowering, RPF
January 22, 2016

Appendix F

Visual Resource

Appendix F.1

Observation Points Screened from the Project

Appendix F.1: Observation Points Screened from the Project

OP #	Observation Point	Type
OP-01	Lakelse Park (11518)	Major Recreation Viewpoint
OP-02	Catt Point Road (11521)	
OP-03	Hwy 37 (11524)	Recreation Photopoint
OP-04	Hatchery Creek (11520)	
OP-05	Hwy 37 (11516)	
OP-06	Clearwater Lake (11511)	
OP-07	Onion Lake (11508)	
OP-08	Hwy 37 (11504)	
OP-09	Hwy 37 (11503)	
OP-10	Hwy 37 (11501)	
OP-12	Oolichan Ave (11488)	
OP-13	Hirsch Creek (11487)	
OP-14	Onion Lake (11513)	Potential Viewpoint
OP-16	Hwy 37 (11505)	
OP-17	Hwy 37 (11491)	
OP-18	Jugwees 5	First Nation Reserve
OP-19	Kitamaat 1	
OP-23	Lakelse 25	
OP-24	Hai Lake	Park
OP-25	Lakelse Lake	
OP-26	Lakelse Lake Wetland	
OP-27	Nalbeelah Creek	
OP-28	Kitamat River	
OP-29	West Lake	Recreation Site
OP-30	Enso	
OP-31	Mount Claque Cabin	
OP-32	Robinson Lake	
OP-37	Terrace Airport	Urban Area
OP-38	Lakelse River Fishing Spot	Other Viewpoint
OP-39	Adele Road	
OP-40	Iron Mountain	

Appendix F.2

Photographs taken from Observation Points towards the Project

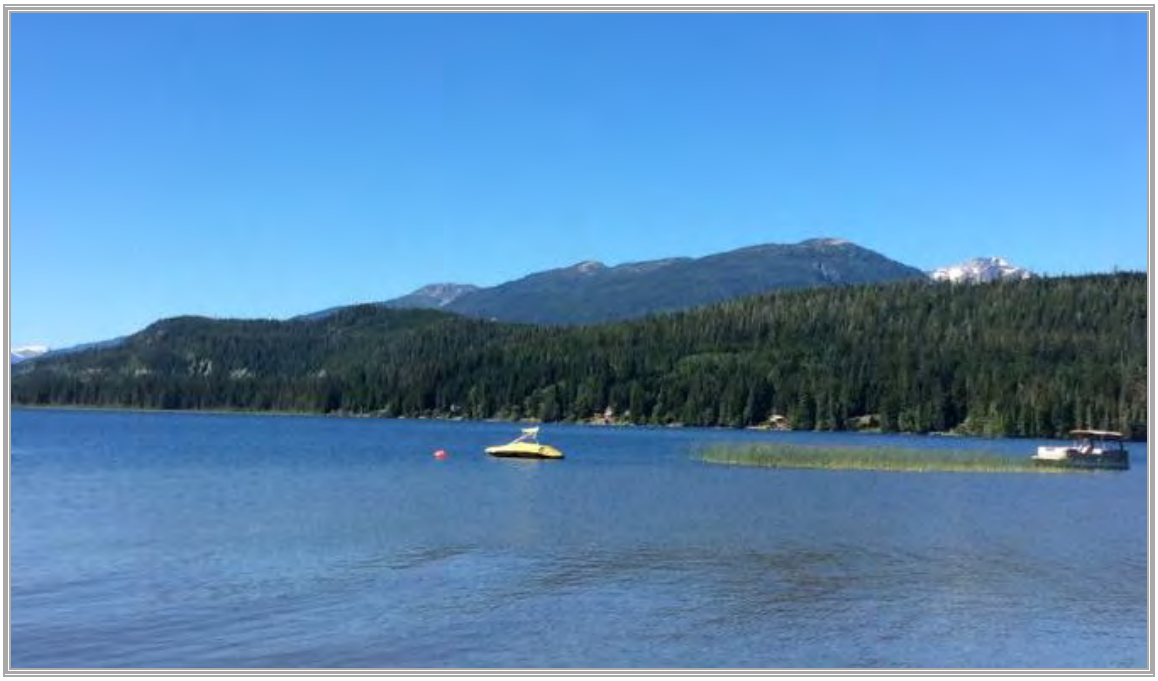

Photo 1: OP-02 Catt Point Road (11521)

Photo 2: OP-03 Hwy. 37 (11524)

Photo 3: OP-04 Hatchery Creek (11520)

Photo 4: OP-05 Hwy. 37 (11516)

Photo 5: OP-07 Onion Lake (11508)

Photo 6: OP-08 Hwy. 37 (11504)

Photo 7: OP-09 Hwy. 37 (11503)

Photo 8: OP-10 Hwy. 37 (11501)

Photo 9: OP-11 Hwy. 37 (11489)

Photo 10: OP-12 Oolichan Ave (11488)

Photo 11: OP-13 Hirsch Creek (11487)

Photo 12: OP-14 Onion Lake (11513)

Photo 13: OP-17 Hwy. 37 (11491)

Photo 14: OP-29 West Lake

Photo 15: OP-39 Adele Road

Photo 16: OP-40 Iron Mountain

Photo 17: OP-42 Lakelse River

Photo 18: OP-43 Coldwater Creek

Photo 19: OP-44 Wedeene River

Photo 20: OP-45 Little Wedeene River

Photo 21: OP-15 Onion Lake Ski Trail (RVP-11515)

Appendix G

Archaeology

Appendix G.1

Pedestrian Survey Coverage, Subsurface Test Locations and Newly Identified Archaeological and Cultural Heritage Resource Sites

520,000 521,000 522,000 523,000 524,000 525,000

6,035,000 6,034,000 6,033,000 6,032,000 6,031,000 6,030,000 6,029,000 6,028,000

Terrace
Lakelse Lake
Kitimat
1 2 3 4 5 6 7 8

N

Alwyn Creek
Alwyn Creek
BCH Sub Rd 1004
2L101
1L387
60L394
60L383
LOC20001 (ST=8)
(192)
(194)
(193)
(195)
Skeena (SKA)
CHR 1
LOC20002 (ST=26)
1200R
1202
CHR 11
2L099
5L063
LOC10001 (ST=8)
1203
(196)
(197)
Old Skeena Sub Access 1007
(198)
LOC30016 (ST=8)
1010R
1205
1011
Thunderbird East FSR
(199)
Rd6R 1012
1012
LOC10002 (ST=10)
(200)
1013
(201)
LOC30003 (ST=14)
R19311 1-1 0
LOC30002 (ST=12)
CHR 4
GcTd-29
(202)
LOC30001 (ST=8)
Site 44
(203)
LOC CV-5 (ST=5)
LOC20003 (ST=10)
(204)
Thunderbird West FSR STR 210
HAI LAKE - MOUNT HERMAN PARK [PROVINCIAL PARK]
Hai Lake
(205)
1101R
LOC CV-4 (ST=8)
(206)
(207)
(208)
Thunderbird Hai CR 1223R
GcTd-82
(209)
GcTd-87
R07737 D 1.3767
1225
(210)
LOC30007 (ST=8)
LOC30006 (ST=13)
White Creek
(241)
GcTd-89
R07737 b 0
1218R
R07737 D 4.0633
GcTd-83
(212)
(213)
(214)
(215)
Herman BR500
Herman Creek FSR 8262 01 0
Herman BR200

LOC30005 (ST=55)
Lakelse River
CHR 6
GcTd-87
CHR 7
CHR 3
CHR 2-1
CHR 2-2
LOC20009 (ST=55)
CHR 2-3
CHR 2-5
CHR 2-4
LOC30018 (ST=10)
Coldwater North FSR
CHR 5
LOC30004 (ST=16)
GcTd-89

Helipad
Embedded Pipe
Crossing Site (Bridge or Culvert)
Cultural Heritage Resource
Subsurface Test Location
VRI (Vegetation Resource Inventory) Age Class
New Archaeological Site Boundary
Original Archaeological Site Boundary
Archaeology Study Area

Populated Place
Existing Substation
Existing Transmission Line
Local Road
Forest Service Road
Existing Road
Railway
Recreation Trail
Watercourse
Waterbody
Wetland
Recreation Site

Lakelse Subzone 1
Lakelse Subzone 2
Park
First Nation Reserve
Private Land
Private Land - Sandhill
Private Land - Kitimat LNG
Private Land - RioTinto

Proposed Components
Project Structure
Proposed Structure (Spring 2015)
Provisional Route
Original Route (Spring 2015)
Original Route (SKA)
New Permanent Road
New Temporary Road
Reconstruction Road
Transmission Line
Right of Way (120m)
Local Study Area

0 100 200 400
Meters
Scale: 1:20,000

Reference:
DataBC Data Distribution Service
Open Government License
(http://www.data.gov.bc.ca/)
Geogratis/Geobase
Open Government License - Canada
(http://data.gc.ca/eng/about-datagcca)
MFLNRO - Archaeology Branch
Archaeological Sites RAAD
(Remote Access to Archaeological Data)

CLIENT: Prepared for BC Hydro

PROJECT: Terrace to Kitimat Transmission Project (TKTP)

TITLE: Appendix G1
Pedestrian Survey Coverage, Subsurface Test Locations and Newly Identified Archaeological and Cultural Heritage Resource Sites

DATE: October, 2016
ANALYST: PK
QA/QC: SKS

GIS FILE: 14-03-041_Arch_Existing_Conditions_p1
JOB No: VE52379
COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

amec foster wheeler

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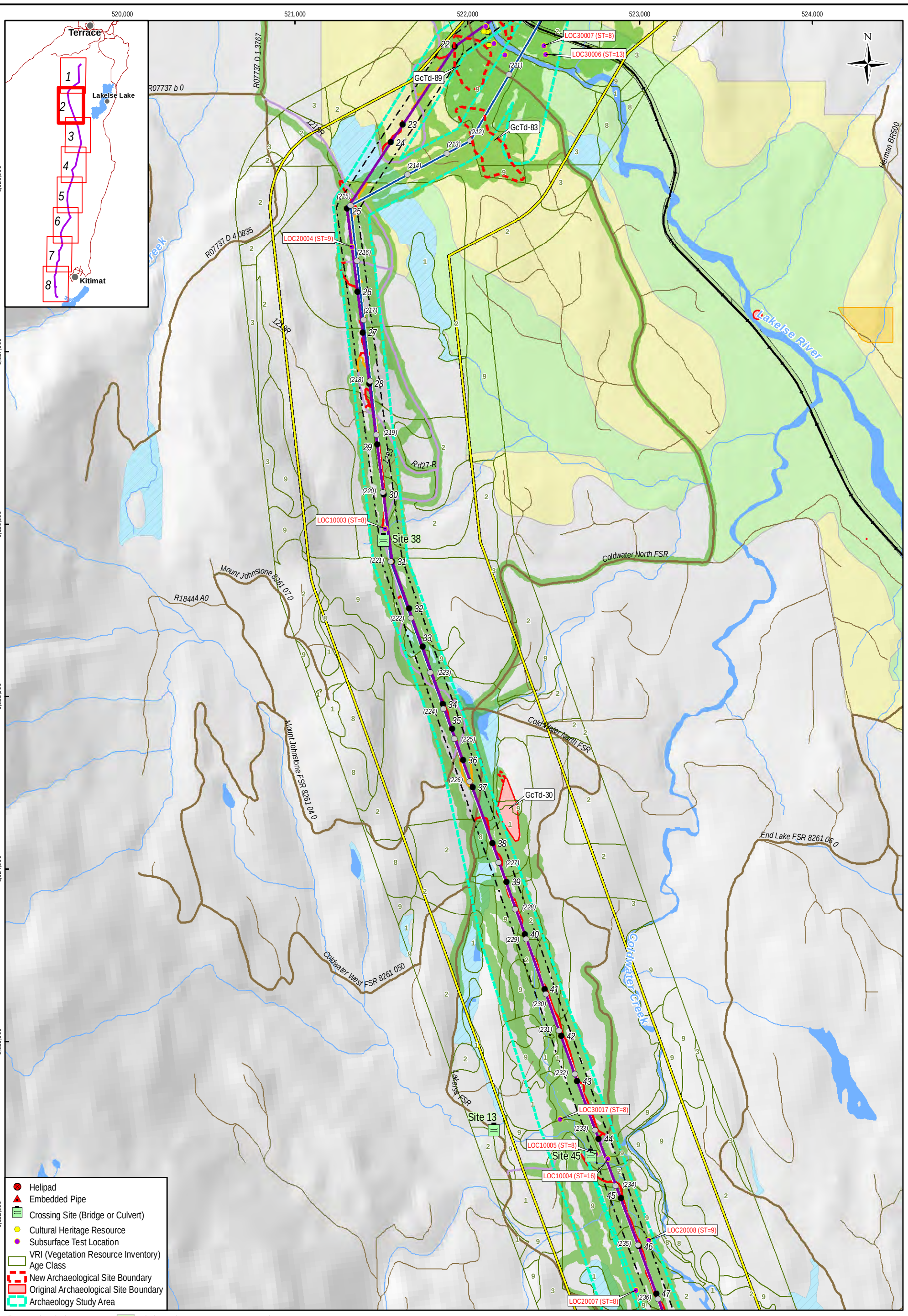

CLIENT:
Prepared for BC Hydro

PROJECT:
Terrace to Kitimat Transmission Project (TKTP)

TITLE:
Appendix G1
Pedestrian Survey Coverage, Subsurface Test Locations and Newly Identified Archaeological and Cultural Heritage Resource Sites

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COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

amec foster wheeler

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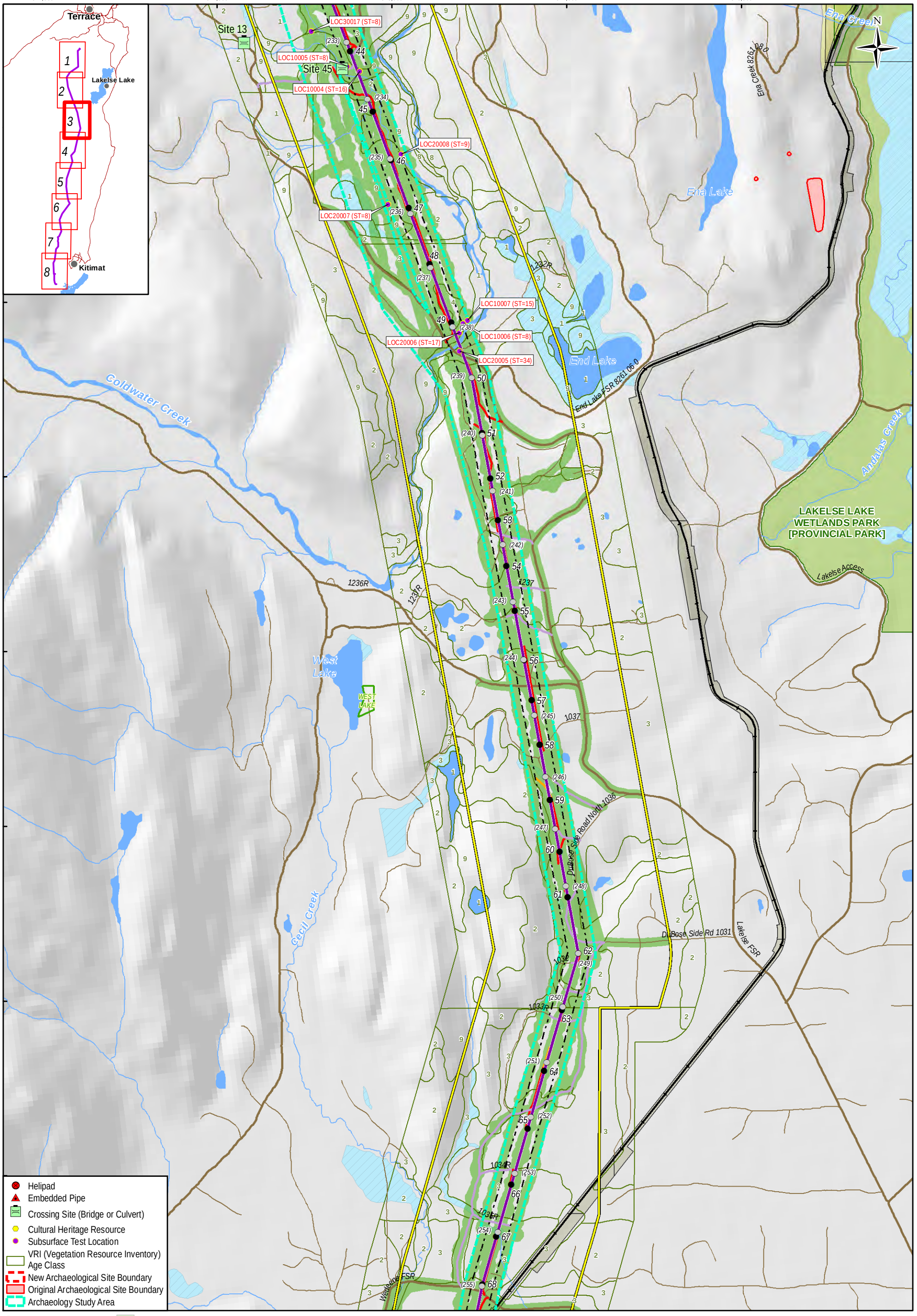

CLIENT:
Prepared for BC Hydro

PROJECT:
Terrace to Kitimat
Transmission Project (TKTP)

TITLE:
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amec foster wheeler

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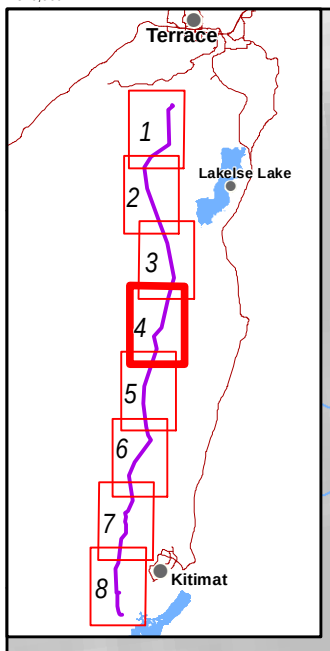

N

Cecil Creek

DuBose Side Rd 1031

1033R 1034R 1035R 1036R 1037R 1048R 1049R 1050R 1058R

Wedeene FSR

LOC10009 (ST=8)

LOC10008 (ST=8)

PTPL 01

Lone Wolf Creek

BR 13A (PTPL 03

BR 13 (PTPL 02)

PTPL 05

CAL-001

(252) 65 (253) 66 (254) 67 (255) 68 69 (256) 70 (257) 71 (258) 72 (259) 73 (260) 74 75 (261) 76 (262) 77 (263) 78 79 (264) 80 (265) 81 (266) (267) 82 (268) 83 (269) 84 (270) 85 (271) 86 (272) 87 88 (273) 89 (274) 90

Helipad
Embedded Pipe
Crossing Site (Bridge or Culvert)
Cultural Heritage Resource
Subsurface Test Location
VRI (Vegetation Resource Inventory) Age Class
New Archaeological Site Boundary
Original Archaeological Site Boundary
Archaeology Study Area

Populated Place
Existing Substation
Existing Transmission Line
Local Road
Forest Service Road
Existing Road
Railway
Recreation Trail
Watercourse
Waterbody
Wetland
Recreation Site

Lakelse Subzone 1
Lakelse Subzone 2
Park
First Nation Reserve
Private Land
Private Land - Sandhill
Private Land - Kitimat LNG
Private Land - RioTinto

0 100 200 400
Meters
Scale: 1:20,000

Proposed Components
Project Structure
Proposed Structure (Spring 2015)
Provisional Route
Original Route (Spring 2015)
Original Route (SKA)
New Permanent Road
New Temporary Road
Reconstruction Road
Transmission Line Right of Way (120m)
Local Study Area

Reference:
DataBC Data Distribution Service
Open Government License
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Geogratis/Geobase
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(http://data.gc.ca/eng/about-datagcca)
MFLNRO - Archaeology Branch
Archaeological Sites RAAD
(Remote Access to Archaeological Data)

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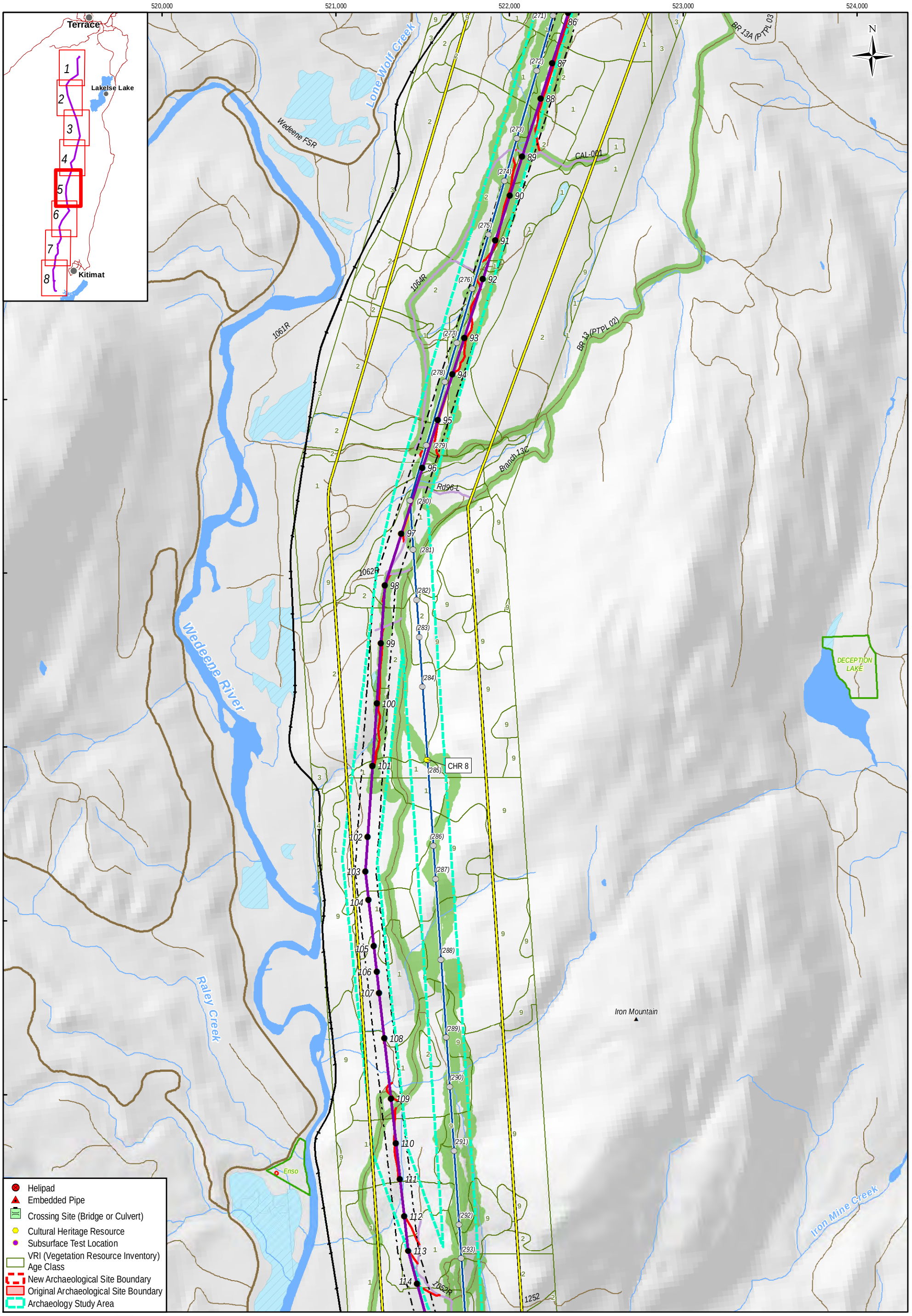

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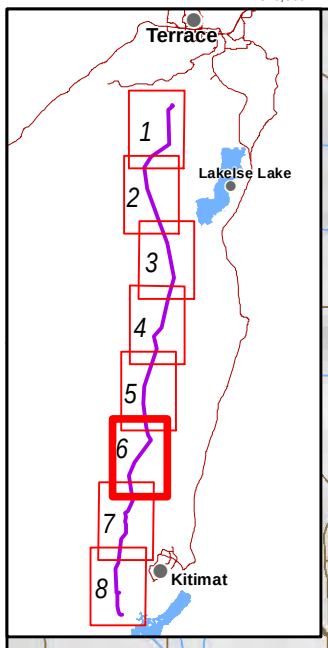

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6,003,000 6,002,000 6,001,000 6,000,000 5,999,000 5,998,000 5,997,000

N

Enso
Branch 13C
110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137
(291) (292) (293) (294) (295) (296) (297) (298) (299) (300) (301) (302) (303) (304) (305) (306) (307) (308) (309) (310) (311) (312) (313) (314) (315) (316) (317)
1252
1-34
1012R
1258
1255
1052R
Iron Mine Creek
Wedeene River
LOC20010 (ST=49)
LOC30013 (ST=21)
LOC30014 (ST=25)
LOC30015 (ST=12)
LOC20011 (ST=30)
1067
1068R
1069R
1070R
1071
1072R
1074R
1076
1078
1080R
1073
LOC30011 (ST=22)
LOC30009 (ST=41)
LOC30012 (ST=71)
LOC30010 (ST=41)
Helipad 128
Wedeene FSR
Little Wedeene River
Site 26
Bowbyes Creek

Helipad
Embedded Pipe
Crossing Site (Bridge or Culvert)
Cultural Heritage Resource
Subsurface Test Location
VRI (Vegetation Resource Inventory) Age Class
New Archaeological Site Boundary
Original Archaeological Site Boundary
Archaeology Study Area

Populated Place
Existing Substation
Existing Transmission Line
Local Road
Forest Service Road
Existing Road
Railway
Recreation Trail
Watercourse
Waterbody
Wetland
Recreation Site

Lakelse Subzone 1
Lakelse Subzone 2
Park
First Nation Reserve
Private Land
Private Land - Sandhill
Private Land - Kitimat LNG
Private Land - RioTinto

0 100 200 400
Meters
Scale: 1:20,000

Proposed Components
Project Structure
Proposed Structure (Spring 2015)
Provisional Route
Original Route (Spring 2015)
Original Route (SKA)
New Permanent Road
New Temporary Road
Reconstruction Road
Transmission Line Right of Way (120m)
Local Study Area

Reference:
DataBC Data Distribution Service
Open Government License
(http://www.data.gov.bc.ca/)
Geogratis/Geobase
Open Government License - Canada
(http://data.gc.ca/eng/about-datagcca)
MFLNRO - Archaeology Branch
Archaeological Sites RAAD
(Remote Access to Archaeological Data)

CLIENT: Prepared for BC Hydro

PROJECT: Terrace to Kitimat Transmission Project (TKTP)

TITLE: Appendix G1
Pedestrian Survey Coverage, Subsurface Test Locations and Newly Identified Archaeological and Cultural Heritage Resource Sites

DATE: October, 2016
ANALYST: PK
QA/QC: SKS

GIS FILE: 14-03-041_Arch_Existing_Conditions
JOB No: VE52379
COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

amec foster wheeler

Last updated by willem.van-riet
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N

Terrace
Lakelse Lake
Kitimat
1 2 3 4 5 6 7 8

Helipad 138
Helipad 147
Helipad 150
Helipad 160
Helipad 162
Helipad 164
Helipad 165
Helipad 167

Site 30 Site 33 Site 41 Site 42 Site 46 Site 47 Site 48 Site 49 Site 50 Site 51

GaTe-6 GaTe-7

CHR 9 CHR 10

1075 1076 1076R 1080R 1081R 1083R 2L099

Bowbyes Lake
Bowbyes Creek
Clague Mtn Hiking Trail
Clague Mountain Snowmobile Trail
Clague Mtn Cabin
Mt Clague Road
Saunders Haul Road
Webbene FSR
Kitimat River
9th St
6th St

Helipad
Embedded Pipe
Crossing Site (Bridge or Culvert)
Cultural Heritage Resource
Subsurface Test Location
VRI (Vegetation Resource Inventory) Age Class
New Archaeological Site Boundary
Original Archaeological Site Boundary
Archaeology Study Area

Populated Place
Existing Substation
Existing Transmission Line
Local Road
Forest Service Road
Existing Road
Railway
Recreation Trail
Watercourse
Waterbody
Wetland
Recreation Site

Lakelse Subzone 1
Lakelse Subzone 2
Park
First Nation Reserve
Private Land
Private Land - Sandhill
Private Land - Kitimat LNG
Private Land - RioTinto

0 100 200 400
Meters
Scale: 1:20,000

Proposed Components
Project Structure
Proposed Structure (Spring 2015)
Provisional Route
Original Route (Spring 2015)
Original Route (SKA)
New Permanent Road
New Temporary Road
Reconstruction Road
Transmission Line Right of Way (120m)
Local Study Area

Reference:
DataBC Data Distribution Service
Open Government License (http://www.data.gov.bc.ca/)
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DATE: October, 2016
ANALYST: PK
QA/QC: SKS

GIS FILE: 14-03-041_Arch_Existing_Conditions
JOB No: VE52379
COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

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Last updated by willem.van-riet
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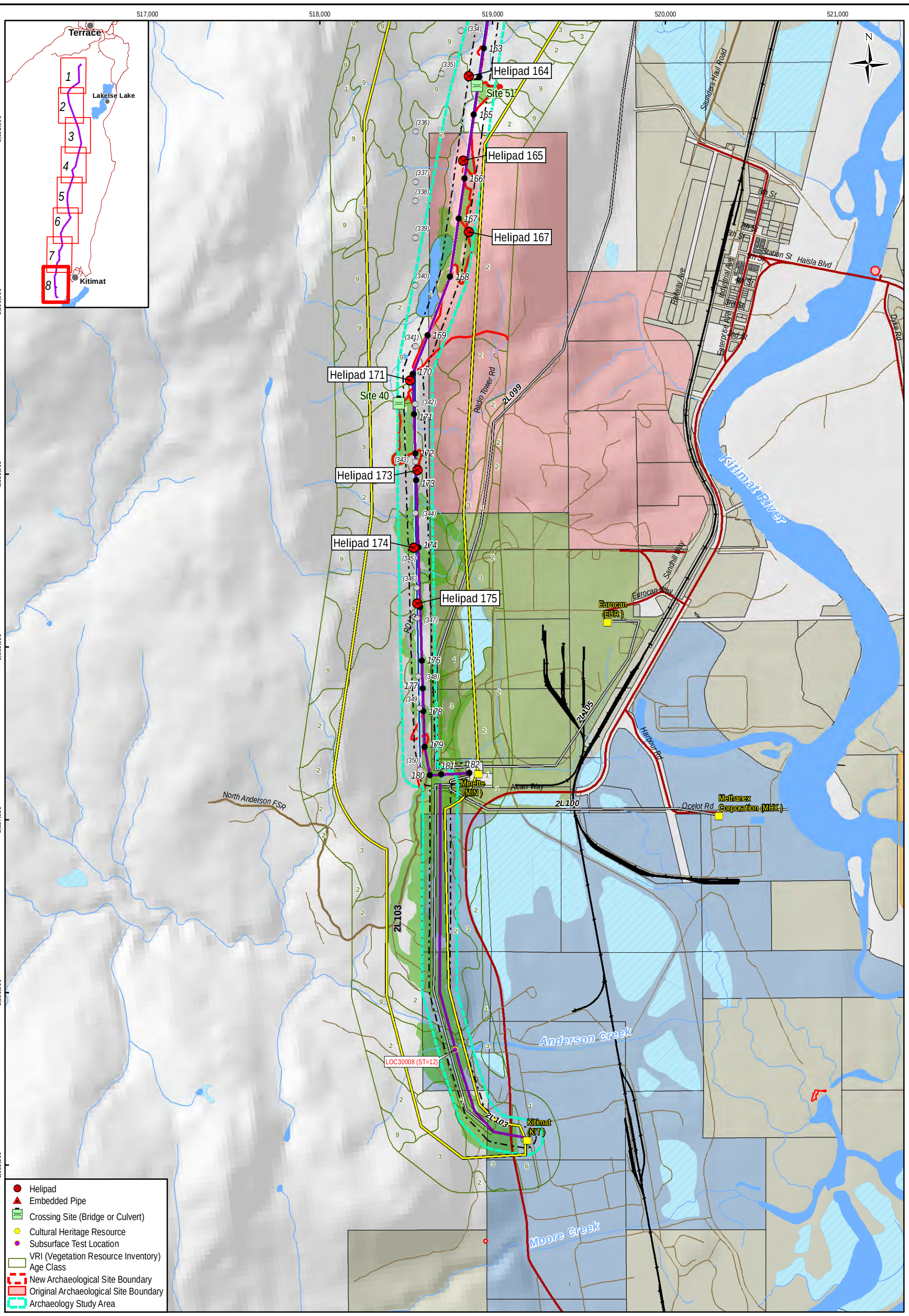

CLIENT: Prepared for BC Hydro

PROJECT: Terrace to Kitimat Transmission Project (TKTP)

TITLE: Appendix G1 Pedestrian Survey Coverage, Subsurface Test Locations and Newly Identified Archaeological and Cultural Heritage Resource Sites

DATE: October, 2016 | ANALYST: PK | QA/QC: SKS

GIS FILE: 14-03-041_Arch_Existing_Conditions

JOB No: VE52379

COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

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Appendix G.2

Potential Project Effects on Archaeology and Historical Heritage Sites

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GcTd-81

GcTd-79

GcTd-80

GcTd-29

GcTd-78

GcTd-82

GcTd-86

GcTd-87

GcTd-88

GcTd-85

GcTd-84

GcTd-89

GcTd-83

Terrace

Lakelse Lake

Kitimat

Alwyn Creek

Skeena (SKA)

Old Skeena Sub Access 1007

Thunderbird FSR 1006

Rd6R 1012

R19311 1-1 0

Thunderbird West FSR STR 210

Thunderbird Hai CR 1213R

Coldwater North FSR

Lakelse River

HAI LAKE - MOUNT HERMAN PROVINCIAL PARK

Hai Lake

Site 44

1200R 1201 1202 1203 1205 1010R 1011 1012 1013 1101R 1225

601.394

Culturally Modified Tree (CMT)
Fallen CMT
New Archaeological Site Boundary
Original Archaeological Site Boundary

Existing Substation
Existing Transmission Line
Local Road
Forest Service Road
Existing Road
Railway
Watercourse
Waterbody
Wetland
Lakelse SRMZ Subzone 1
Lakelse SRMZ Subzone 2
Park
Private Land

Proposed Components
Project Structure
Crossing Site (Bridge or Culvert)
New Permanent Road
New Temporary Road
Reconstruction Road
Provisional Route
Transmission Line Right of Way (120m)
Clearing Standard

0 100 200 400
Meters
Scale: 1:20,000

Reference:
DataBC Data Distribution Service (www.data.gov.bc.ca)
MFLNRO - Archaeology Branch
Archaeological Sites RAAD (Remote Access to Archaeological Data)

Prepared for BC Hydro

Appendix G2
Potential Project Effects on Archaeology and Historical Heritage Sites

PROJECT:
Terrace to Kitimat Transmission Project (TKTP)

DATE: October, 2016 | ANALYST: WR/PK | QA/QC: SKS

GIS FILE: 14-03-040_Arch_Potential_Effects_v3_p1

JOB No: VE52379

COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

amec foster wheeler

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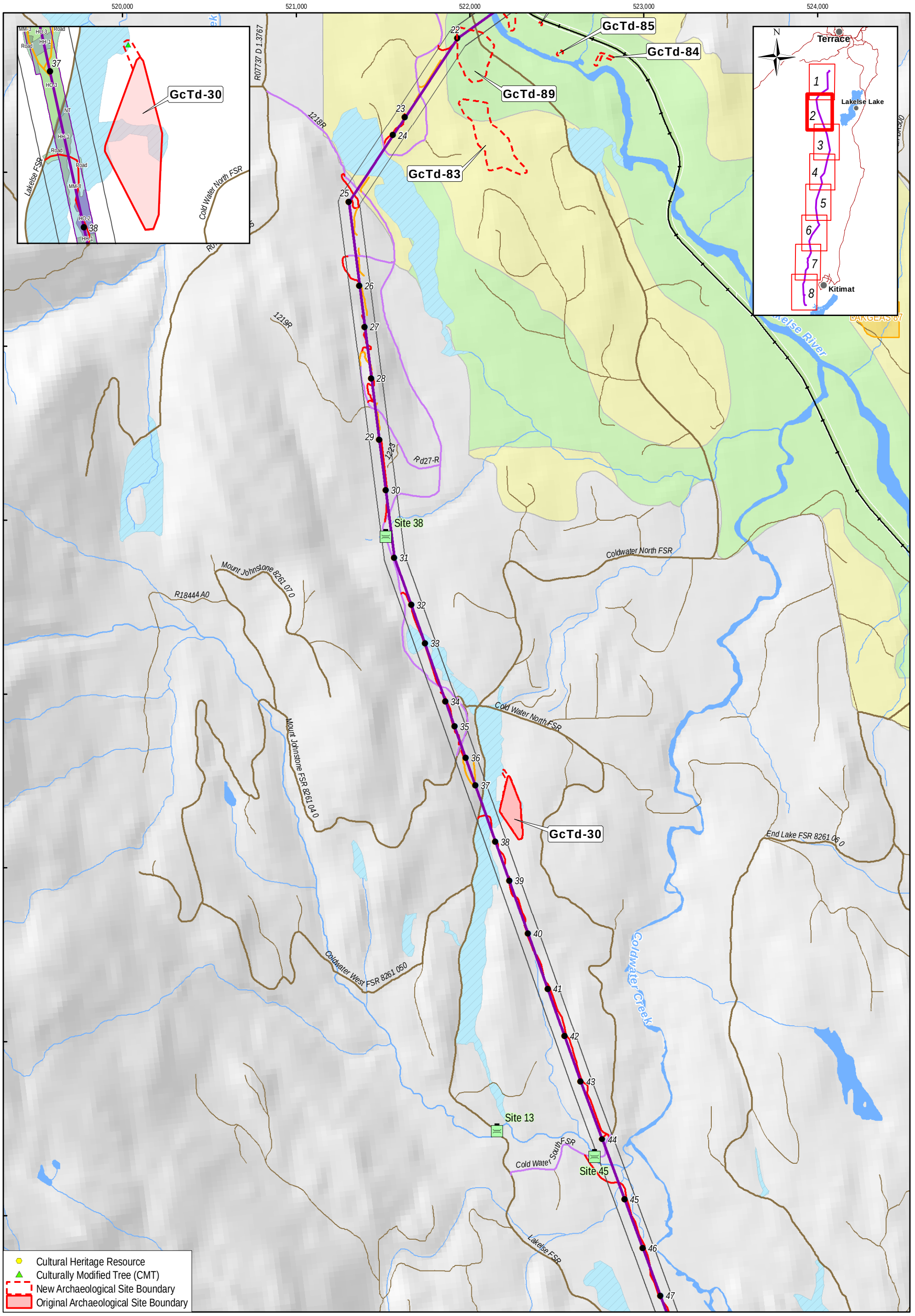

Prepared for BC Hydro

Appendix G2
Potential Project Effects on Archaeology and Historical Heritage Sites

PROJECT:
Terrace to Kitimat Transmission Project (TKTP)

DATE:	ANALYST:	QA/QC:	
October, 2016	WR/PK	SKS	**Page 2 of 8**

GIS FILE: 14-03-040_Arch_Potential_Effects_v3_p2

JOB No: VE52379

COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

amec foster wheeler

Last updated by willem.van-riet
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6,022,000 6,021,000 6,020,000 6,019,000 6,018,000 6,017,000 6,016,000

Site 13
Site 45
Cold Water South FSR
44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68
Ena Lake
End Lake
End Lake FSR 8261060
1232R
Lakelse FSR
Coldwater Creek
LAKELSE LAKE WETLANDS PARK [PROVINCIAL PARK]
Lakelse Access
1236R
1237
1237R
West Lake
WEST LAKE Recreation Site
1037
DuBose Side Road North 1036
Cecil Creek
DuBose Side Rd 1031
1032
1033R
1034R
1035R
Wedeene FSR

N
Terrace
Lakelse Lake
Kitimat
1 2 3 4 5 6 7 8

Forest Service Road
Existing Road
Railway
Watercourse
Waterbody
Wetland
Recreation Site
Lakelse Subzone 2
Park
Private Land

Proposed Components
Project Structure
Bridge Site
New Permanent Road
New Temporary Road
Reconstruction Road
Provisional Route
Transmission Line Right of Way (120m)

0 100 200 400
Meters
Scale: 1:20,000

Reference:
DataBC Data Distribution Service (www.data.gov.bc.ca/)
MFLNRO - Archaeology Branch Archaeological Sites RAAD (Remote Access to Archaeological Data)

Prepared for BC Hydro

Appendix G2
Potential Project Effects on Archaeology and Historical Heritage Sites

PROJECT: Terrace to Kitimat Transmission Project (TKTP)

DATE:	ANALYST:	QA/QC:	
October, 2016	WR	SS	**Page 3 of 8**

GIS FILE: 14-03-040_Arch_Potential_Effects_v3
JOB No: VE52379
COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

amec foster wheeler

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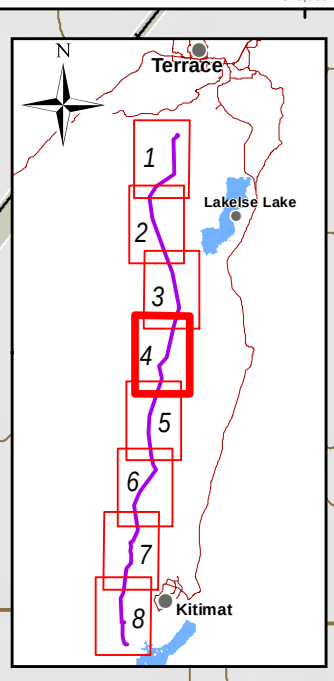

Cecil Creek
Lone Wolf Creek
Wedeene River
Cecil Creek
Lone Wolf Creek

DuBose Side Rd 1031
1033R
1034R
1035R
1057R
1058R
PTPL 01
1044R
1050R
1049R
1048R
BR 13A (PTPL 03
BR 13 (PTPL 02)
PTPL 05
1064R
1061R
CAL-001

65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90

Forest Service Road
Existing Road
Railway
Watercourse
Waterbody
Wetland
Private Land

Proposed Components
Project Structure
New Permanent Road
New Temporary Road
Reconstruction Road
Provisional Route
Transmission Line Right of Way (120m)

0 100 200 400
Meters
Scale: 1:20,000

Reference:
DataBC Data Distribution Service (www.data.gov.bc.ca/)
MFLNRO - Archaeology Branch Archaeological Sites RAAD (Remote Access to Archaeological Data)

Prepared for BC Hydro

Appendix G2
Potential Project Effects on Archaeology and Historical Heritage Sites

PROJECT:
Terrace to Kitimat Transmission Project (TKTP)

DATE:	ANALYST:	QA/QC:	
October, 2016	WR	SS	**Page 4 of 8**

GIS FILE: 14-03-040_Arch_Potential_Effects_v3

JOB No: VE52379

COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

amec foster wheeler

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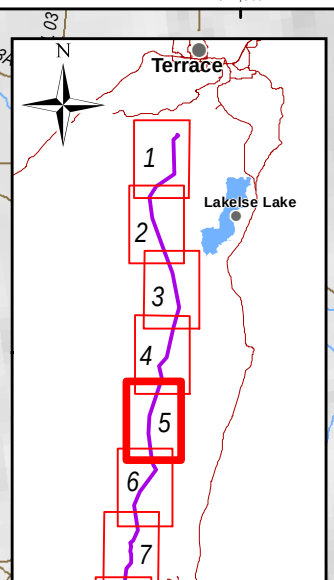
520,000 521,000 522,000 523,000 524,000

6,010,000 6,009,000 6,008,000 6,007,000 6,006,000 6,005,000 6,004,000 6,003,000

Lone Wolf Creek
Wedeene FSR
CAL-001
1064R
1061R
BR 13 (PTPL 02)
Branch 13C
Rd96-L_R
1062AR
1062R
Wedeene River
Raley Creek
Iron Mountain
Iron Mine Creek
1052R
1252
DECEPTION LAKE
Recreation Site
Enso Recreation Site

87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114



Forest Service Road
Existing Road
Railway
Watercourse
Waterbody
Wetland
Recreation Site

Proposed Components
Project Structure
New Permanent Road
New Temporary Road
Reconstruction Road
Provisional Route
Transmission Line Right of Way (120m)

0 100 200 400
Meters
Scale: 1:20,000

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Appendix G2
Potential Project Effects on Archaeology and Historical Heritage Sites

PROJECT:
Terrace to Kitimat Transmission Project (TKTP)

DATE:	ANALYST:	QA/QC:	
October, 2016	WR	SS	**Page 5 of 8**

GIS FILE: 14-03-040_Arch_Potential_Effects_v3
JOB No: VE52379
COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

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519,000 520,000 521,000 522,000 523,000

6,003,000 6,002,000 6,001,000 6,000,000 5,999,000 5,998,000 5,997,000

Enso Recreation Site

110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137

Branch 13C

RD112R

1252 1254 1253 1255 1067 1068R 1069R 1070R 1071 1072R 1258 1074R 1079R 1077R 1073 1075 1076 1078R 1080R

Wedeene River

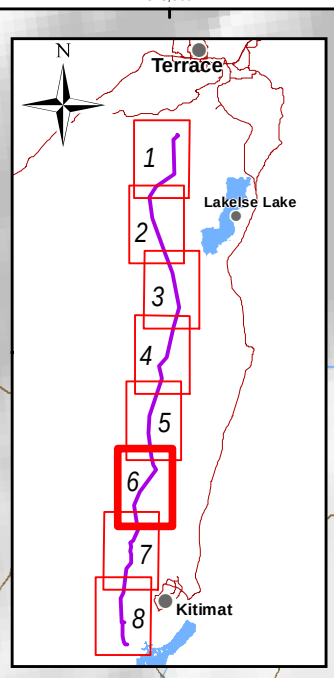
Little Wedeene River

Wedeene FSR

Helipad 128

Site 26

Bowbyes Creek



Forest Service Road
Existing Road
Railway
Watercourse
Waterbody
Wetland
Recreation Site
Private Land

Proposed Components
Project Structure
Helipad
Bridge Site
New Permanent Road
New Temporary Road
Reconstruction Road
Provisional Route
Transmission Line Right of Way (120m)

0 100 200 400
Meters
Scale: 1:20,000

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Appendix G2
Potential Project Effects on Archaeology and Historical Heritage Sites

PROJECT:
Terrace to Kitimat Transmission Project (TKTP)

DATE:	ANALYST:	QA/QC:	
October, 2016	WR	SS	**Page 6 of 8**

GIS FILE: 14-03-040_Arch_Potential_Effects_v3

JOB No: VE52379

COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

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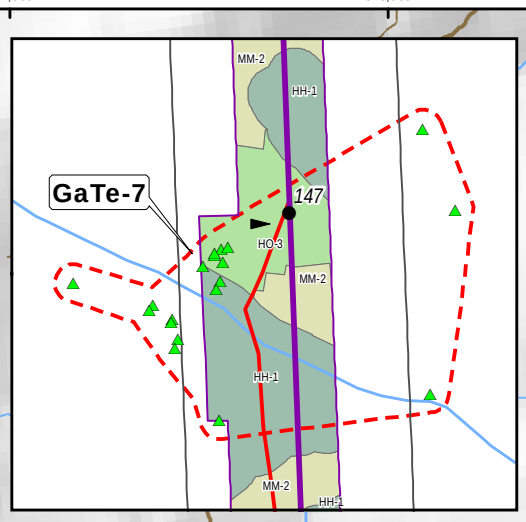

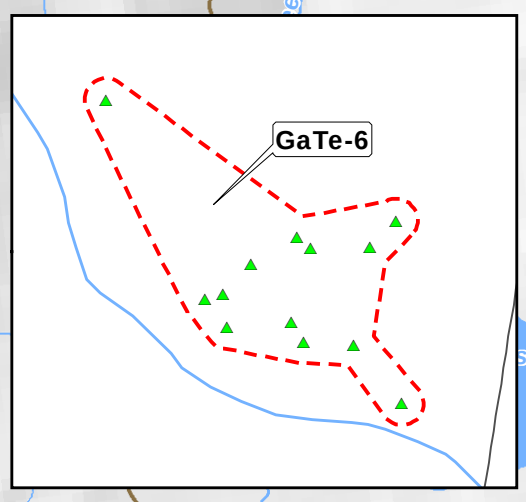

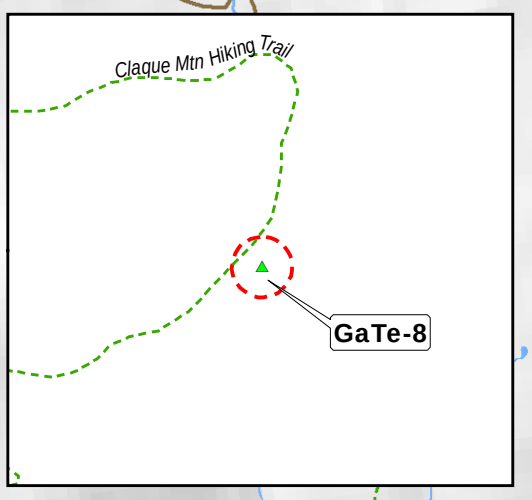

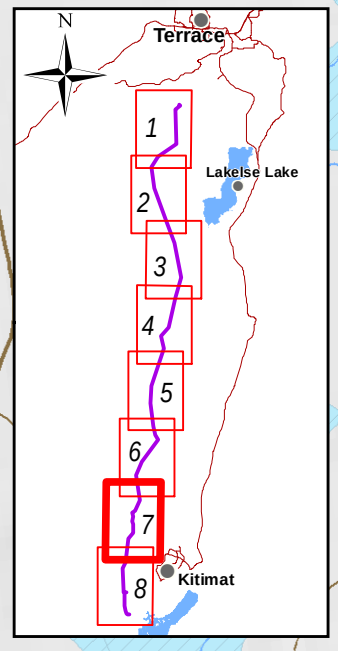

517,000 518,000 519,000 520,000 521,000 522,000

5,997,000 5,996,000 5,995,000 5,994,000 5,993,000 5,992,000 5,991,000

133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 159 161 162 163 164 165 166 167

1079R 1076 1075 1080R 1081R 1083R 2L099

Helipad 138 Helipad 147 Helipad 150 Helipad 160 Helipad 162 Helipad 164 Helipad 165 Helipad 167

GaTe-7 GaTe-6 GaTe-8

Site 48 Site 47 Site 46 Site 49 Site 50 Site 41 Site 42 Site 30 Site 33 Site 51

Bowbyes Creek
Clague Mtn Hiking Trail
Clague Mountain Snowmobile Trail
Clague Mtn Cabin Recreation Site
Mt Claque Road
Saunders Haul Road
Wedeene FSR
Kitimat River
8th St
7th St
6th St

Culturally Modified Tree (CMT)
Fallen CMT
New Archaeological Site Boundary

Existing Transmission Line
Local Road
Forest Service Road
Existing Road
Recreation Trail
Watercourse
Waterbody
Wetland
Recreation Site
Private Land
Private Land - Sandhill

Proposed Components
Project Structure
Helipad
Crossing Site (Bridge of Culvert)
Embedded Pipe
New Permanent Road
New Temporary Road
Reconstruction Road
Provisional Route
Transmission Line Right of Way (120m)

0 100 200 400
Meters
Scale: 1:20,000

Reference:
DataBC Data Distribution Service (www.data.gov.bc.ca)
MFLNRO - Archaeology Branch
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Appendix G2
Potential Project Effects on Archaeology and Historical Heritage Sites

PROJECT: Terrace to Kitimat Transmission Project (TKTP)

DATE:	ANALYST:	QA/QC:	
October, 2016	WR/PK	SKS	Page 7 of 8

GIS FILE: 14-03-040_Arch_Potential_Effects_v3_p7

JOB No: VE52379

COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

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517,000 518,000 519,000 520,000 521,000

5,991,000 5,990,000 5,989,000 5,988,000 5,987,000 5,986,000 5,985,000

163 Site 51 Helipad 164 165 Helipad 165 166 167 Helipad 167 168 169 170 Helipad 171 Site 40 171 172 Helipad 173 173 174 Helipad 174 175 Helipad 175 176 177 178 179 180 181 182 Minette (MIN) 2L099 2L105 2L100 2L103

Saunders Haul Road Railway Ave Industrial Ave Enterprise Ave 7th St 6th St 4th St 3rd St 2nd St Dyke Rd Radio Tower Rd Sandhill Way Eurocan Way Eurocan (EUR) RD175 Atcan Way Harbour Rd Ocelot Rd Methanex Corporation (MHX) Kitimat (KIT) North Anderson FSR

Private Land - Sandhill

Private Land - Kitimat LNG Operations

Private Land - RioTinto Operations

KITAMAAT 1

Kitimat River Anderson Creek Moore Creek

N

Terrace Lakelse Lake Kitimat

1 2 3 4 5 6 7 8

Existing Substation
Existing Transmission Line
Local Road
Forest Service Road
Existing Road
Railway
Watercourse
Waterbody

Wetland
First Nation Reserve
Private Land
Private Land - Sandhill
Private Land - Kitimat LNG
Private Land - RioTinto

Proposed Components
Project Structure
Helipad
Bridge Site
New Permanent Road
New Temporary Road
Reconstruction Road
Provisional Route
Transmission Line Right of Way (120m)

0 100 200 400
Meters
Scale: 1:20,000

Reference: DataBC Data Distribution Service (www.data.gov.bc.ca/) MFLNRO - Archaeology Branch Archaeological Sites RAAD (Remote Access to Archaeological Data)

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Appendix G2 Potential Project Effects on Archaeology and Historical Heritage Sites

PROJECT: Terrace to Kitimat Transmission Project (TKTP)

DATE: October, 2016 | ANALYST: WR | QA/QC: SS

GIS FILE: 14-03-040_Arch_Potential_Effects_v3

JOB No: VE52379

COORDINATE SYSTEM: NAD 1983 UTM Zone 9N

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