SITE C CLEAN ENERGY PROJECT

PROJECT TRAFFIC ANALYSIS REPORT

Doc EIS-4A-008
[Final]

Prepared for BC Hydro by

Tetra Tech

December 2012

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by
Tetra Tech WEI Inc.
NovaTrans Engineering Inc.
December 2012

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Executive Summary

The transportation of materials, goods and people associated with the Site C Clean Energy Project's (the Project) components and activities is an important aspect of the planning for, and construction of, the proposed Project. The area to be affected by traffic associated with the Project includes Highway 29 between Chetwynd and Highway 97 at Charlie Lake, Highway 97 (north) between Dawson Creek and Charlie Lake, Highway 97 (south) between West Pine Quarry and Chetwynd, roads located on the south bank of the Peace River (including Jackfish Lake Road and a new Project Access Road) and roads located on the north bank of the Peace River. For the purposes of the analysis these roadways have been split into a discrete set of segments with this segmentation presented in Appendix A.

This document is intended to guide BC Hydro in planning for the delivery of materials, goods and people that would be required for the construction of the Project, and to supplement construction management plans. It describes potential changes in traffic, traffic operations and safety generated by the Project during construction on existing transportation facilities. It provides technical traffic analyses information in support of the effects assessment on Transportation (see EIS Volume 4 Section 31 Transportation). It also presents management strategies to be implemented during construction and operations.

For each highway or access road segment, background and Project traffic were forecast, and traffic operations and safety on the roadways and intersections were analysed.

Existing traffic was measured and background future traffic forecasts were made over the 8-year construction period. Project traffic forecasts were then made using a two-step process. Firstly, traffic generated by the following Project components and activities was calculated: worker housing, bulk materials movement, materials and equipment, clearing, transmission lines, Highway 29 realignment and the Hudson's Hope berm. Secondly, traffic from each of these different activities was aggregated along the various roadway segments. This aggregated Project traffic was then added to background traffic to create a forecast of total with Project traffic for comparison with the background traffic.

Traffic operations at important intersections within the various segments were presented in terms of a Level of Service (LoS) scale typically used by the transportation industry which varies from a LoS A, representing little delay, to LoS F, representing much delay. Safety was presented in terms of collisions per year and total collisions over the Project's 8-year construction period.

Highway 29 North

Outside of Hudson's Hope, the primary intersection considered was at Farrell Creek Road. The traffic operations for the left turn out only would decrease from a LoS A (less than 10-second delay) under background conditions to a LoS B service level (just over 10-second delay) during the construction period. In Hudson's Hope traffic operations on Clarke Avenue would remain at a maximum LoS B level with and without the Project. At the Highway 29 at Canyon Drive intersection there was a slight decrease in service levels on the south leg (Beattie Drive), from LoS A to LoS B.

Some additional delay may initially be caused by trucks on some hills along Highway 29. Project construction truck traffic in the peak year travelling on the longest of the grades would amount to approximately five vehicles (two-way) travelling during peak hours or 1 additional heavy vehicle every 20 minutes. While some vehicle delays may occur during construction, this would be countered by the reduction in delay and improved safety during the latter two years of construction of the Project and into the future operational phase of the Project

Reconstruction of the realignment sections of Highway 29 would reduce the grade and curvature of the existing highway in areas and would provide safety benefits during Project construction and beyond.

Active traffic management during construction would minimize construction related delays.

Highway 97 North

For the year of peak Project traffic for each segment, annual average daily traffic (AADT) volumes as a result of the Project on Highway 97 would range from 34 vehicles per day between south of Highway 29 at Charlie Lake to 532 vehicles per day south of 85th Avenue.

Sections of Highway 97 North have been recently upgraded resulting in adequate capacity to absorb the additional vehicles that would be generated by the Project. At the intersection of Highway 97 at Old Fort Road / 100th Avenue, there would be no change in service levels during construction of the Project. One level changes in the LoS would be expected for the left turns from the highway at both the 100th Street (LoS A to B: 1 second per vehicle difference) and 85th Avenue Intersection (LoS B to C: 8 seconds per vehicle difference) as well as for the left turn from 100th Street onto the highway (LoS B to C: 2 seconds per vehicle difference). Some delay would result from additional traffic volumes through the intersections of Highway 97 at Highway 29, 271 Road and 269 Road; however, service levels would remain in the A and B range.

Active traffic management during construction would minimize construction related delays.

Highway 97 South

On Highway 97 South, during the year of peak Project traffic AADT volumes as a result of the Project would range from 2 vehicles per day on Highway 97 east of Highway 29 to 90 vehicles per day on Highway 97 west of Chetwynd. At the intersection of Highway 97 at Highway 29, there would be no drop in LoS expected due to the addition of Project traffic during the peak year of construction.

South Bank Roads

On Jackfish Lake Road, during the year of peak Project traffic during construction, Project-related AADT volumes, largely consisting of deliveries of rip-rap from West Pine Quarry, would be approximately 100 vehicles per day along the Jackfish Lake Road. For the resource roads north-east of Jackfish Lake Road, volumes would peak in Year 1 with Project volumes of 70 vehicles per day, largely consisting of material required for the construction of the Project Access Road. A maximum frequency for all vehicles of one vehicle every 52 seconds in the peak direction of travel (1-way) was estimated for the portion of Jackfish Lake Road towards Highway 29 (Year 7), and one vehicle every 3 minutes within the resource road section (Year

1). No changes in the service levels were noted at the intersection of Highway 29 at Jackfish Lake Road.

Active traffic management during construction would minimize construction related increases in traffic and may involve the use of employee shuttles to the south bank from Chetwynd.

North Bank Roads

For the North Bank roads, during the year of peak Project traffic during construction, Project-related AADT volumes would range from 1,155 vehicles per day on Old Fort Road south of 85th Avenue, on 240 Road and on 269 Road south of 240 Road, to 38 vehicles per day on Old Fort Road south of 240 Road. Comparison with the background traffic showed that there would generally be few changes in the LoS resulting from the addition of Project traffic during the peak year of construction, with maximum delays up to 17 seconds per vehicle for a LoS C. The changes in the service levels noted include 1) a drop from LoS B to C for the left turn from 242 Road onto Old Fort Road northbound 2) a drop from LoS A to B for the left turn from 240 Road onto Old Fort Road northbound, 3) a drop from LoS B to C for the eastbound movements on 85 Avenue at 100 Street, and 4) a drop from LoS A to B for the left turn from 240 Road onto 269 Road southbound.

Active traffic management during construction would minimize construction related increases in traffic and may involve the use of shuttle busses and car-pooling, and/or restricting Project-related vehicle access to sections of specific roads.

Projected increases in Project-related traffic have the potential to increase vehicle safety risk. These risks would be partially off-set by safety improvements caused by upgrades in the roadway geometry, particularly for the Highway 29 Realignment sections. The net or incremental number of vehicle collisions for the Project would be 29 collisions over the 8-year Project construction phase, or approximately four collisions per year. This would amount to a 1.8% increase over the number of collisions that would have occurred without the Project over the 8-year construction period. However, beyond the Project time frame the benefits of Project-related upgrades such as the straightening out of curves on Highway 29, paving gravel portions on Jackfish Lake Road and adding shoulders to the north bank access roads would continue to benefit local residents reducing expected collisions.

Sensitivity analyses were carried out for parameters that were considered subject to some change. These were 1) shipment of bulk materials from West Pine Quarry by rail rather than road, 2) shipment of cement, fly-ash and fuel by road rather than rail, 3) a reduction in the peak work force from 2,100 peak workers to 1,700 peak workers, and 4) all clearing volumes to be incremental, with no replacement of existing logging. All sensitivity analyses produced marginal differences in traffic operations, with minimal delay differences and with service levels staying within existing levels or increasing to a maximum of LoS C. Marginal differences in traffic safety were found as well with a maximum incremental increase in collisions from 29 with the original Project scenario to 32.2 collisions for the Materials and Equipment increase scenario.

List of Acronyms

AADT	**Annual Average Daily Traffic**
HT	**Heavy Trucks**
km	**kilometres**
LoS	**Level of Service**
LT	**Light Trucks**
MOTI	**British Columbia Ministry of Transportation and Infrastructure**
Pass	**Passenger vehicles**
PDR	**Petroleum Development Road**
SLAT	**Single Lane Alternating Traffic**

Glossary

Average:	Volumes averaged over a longer time period; AADT = Annual Average Daily Traffic, SADT = Summer Average Daily Traffic (July and August)
Average Annual Daily Traffic	The average of the daily traffic for the 365 days in any one year
Average Peak Hour	More typical daily peak hour volumes averaged over the year and used to present typical peak forecast expectations
Background Traffic	Traffic expected throughout the Project construction period without Project traffic
Forecasted Traffic	Future traffic, this can be either Project traffic or background traffic
Level of Service	a quality measure describing operational conditions within a traffic stream, generally in terms of speed and travel time, freedom to manoeuvre, traffic interruptions, and comfort and convenience
Peak	Peak volumes to be expected over the same shorter work period; e.g., peak monthly or quarter volumes
Peak Year	The year of highest Project traffic volume on any one segment over the 8-year Project construction period. This may be a different year for each segment because different Project activities use different roads
Peak Hour	Peak hour volumes to be expected over a period of more intense work activity during the peak year and used for calculations of traffic operations
Sensitivity Analysis	An analysis of how sensitive one factor may be to changes to another factor. For example how traffic delay may vary with a greater number of workers
Segment	A discrete portion of a roadway of interest with a common traffic volume forecast. These are presented in Appendix A
Typical:	Typical volumes to be expected over a shorter work period; e.g., typical monthly or quarter volumes

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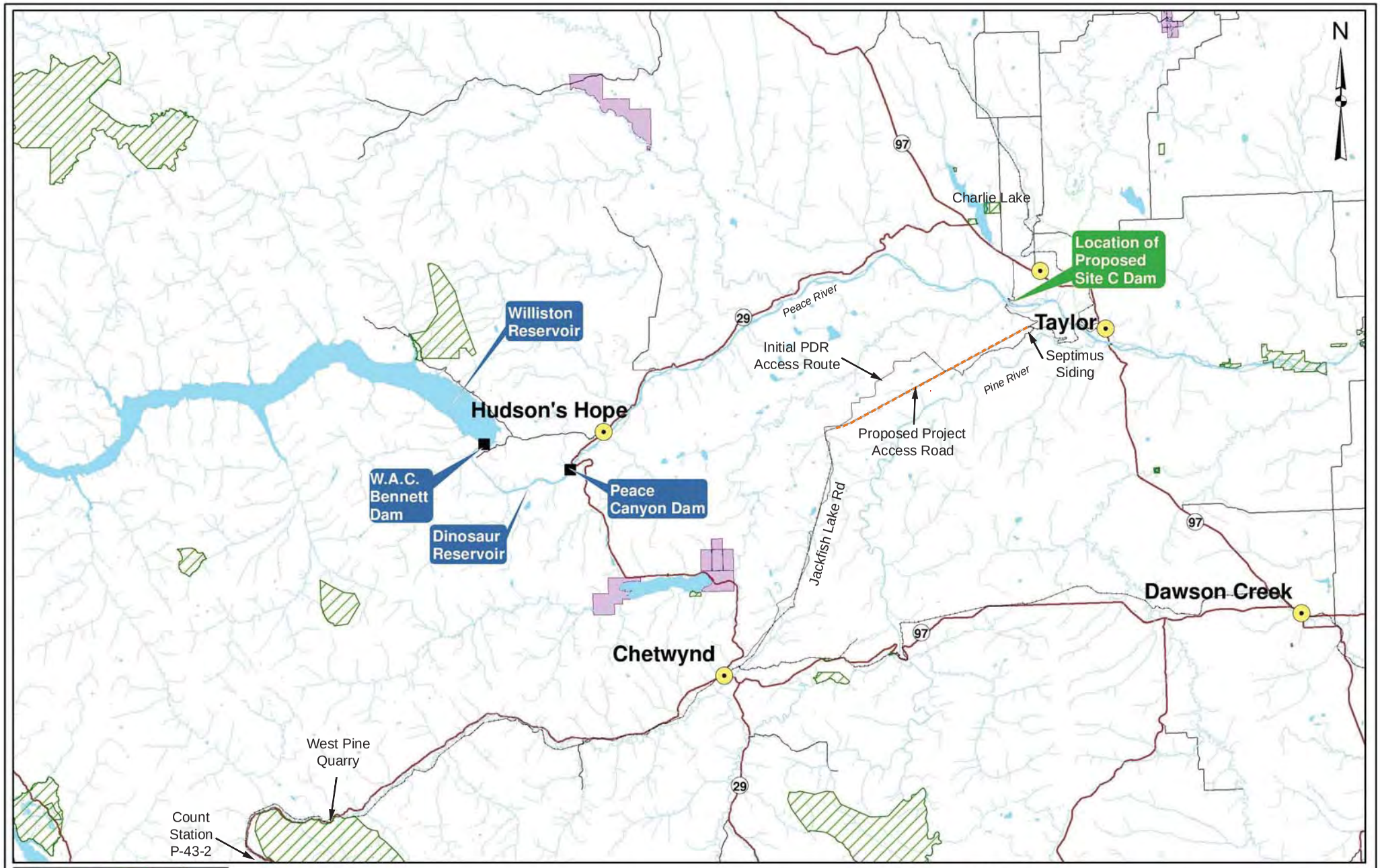
1.0 BACKGROUND

Transportation of materials, goods and people to and from the proposed dam, Hudson's Hope berm and Highway 29 relocation construction sites is an important aspect of planning and construction of these projects. The area to be affected by traffic associated with the Project includes Highway 29 between Chetwynd and Highway 97 at Charlie Lake, Highway 97 (north) between Dawson Creek and Charlie Lake, Highway 97 (south) between West Pine Quarry and Chetwynd, roads located on the south bank of the Peace River (including Jackfish Lake Road and a new Project Access Road) and roads located on the north bank of the Peace River. A detailed description of the Project is described in the Environmental Impact Statement, Volume 1, Section 4 Project Description. Figures 1.1, 1.2, and 1.3 show the main highway routes and areas analysed within the technical study area. The main roadways considered are listed below. For the purpose of analysis these have been segmented into sections with similar traffic volumes with the segments presented in Appendix A.

- Highway 29 leading north from Highway 97 in Chetwynd to Highway 97 at Charlie Lake. This includes Canyon Drive and Clarke Avenue accessing Portage Mountain and the Hudson's Hope berm respectively
- Highway 97 North leading to and north of Fort St. John from Dawson Creek and Alberta via Highway 2
- Highway 97 South leading from the West Pine Quarry and entering the area at Chetwynd at the junction of Highways 97 and 29
- South bank roads: mainly Jackfish Lake Road and a new Project Access Road to the dam site. Jackfish Lake Road is accessed via a junction with Highway 29 approximately three kilometres to the north of the junction of Highway 29 and Highway 97 in Chetwynd.
- North bank roads: Old Fort Road and 269 Road with 242 Road and 240 Road joining these two, and 85th Avenue also providing access from Highway 97

As the dam spans the Peace River, construction activities would occur on the left (north) bank and the right (south) bank with a necessity for access roads on both sides. As access roads leading to the exact locations of the construction sites do not presently exist they would have to be constructed with local roadways used to access these. Local routes leading from Highway 97 to the north bank access roads include Old Fort Road and 269 Road with 242 Road and 240 Road joining these two. 85th Avenue also provides access from Highway 97 (Figure 1.3 Key Plan – North Bank Roads). Local routes leading from Highway 29 to the south bank access roads include Jackfish Lake Rd. with the temporary use of a number of Petroleum Development Roads (PDRs) until the Project Access Road is constructed (Figure 1.1 Key Plan). The local route leading to the area of the south bank is Jackfish Lake Road (Figure 1.1).



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:775,000

0 22 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
KEYPLAN

FIGURE 1.1

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-1	v1

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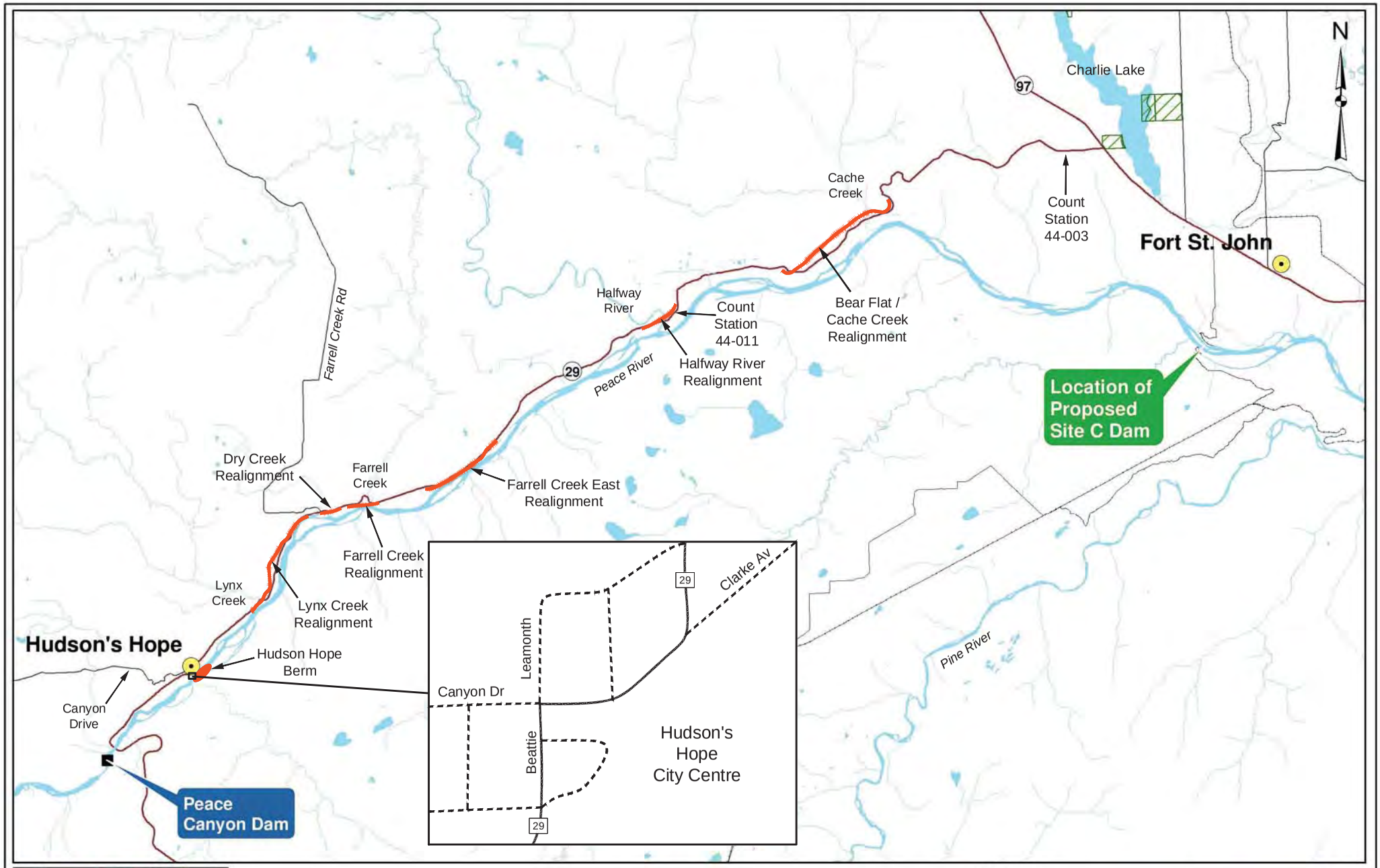

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:310,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

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Project Traffic Analysis
KEYPLAN
Highway 29

FIGURE 1.2

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-2	v1

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3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:50,000

0 1.4 Km

SITE C CLEAN ENERGY PROJECT

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Project Traffic Analysis
KEYPLAN
North Bank Roads

FIGURE 1.3

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-3	v1

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1.1 OBJECTIVE

This document is intended to guide BC Hydro in planning for the delivery of materials, goods and people that would be required for the construction of the Project, and to supplement construction management plans. It describes potential changes in traffic, traffic operations and safety generated by the Project during construction on existing transportation facilities. It provides technical traffic analyses information in support of the effects assessment on Transportation (see EIS Volume 4 Section 31 Transportation). It also presents management strategies to be implemented during construction and operations.

1.2 METHODOLOGY

A four-step process was followed:

- Background Traffic Forecasts: the forecast of the anticipated increase to existing and future traffic without the Project
- Project Construction and Project Operations Traffic Forecasts: the forecast of traffic generated by the Project and its various activities, during construction and dam operations, as well as the Total traffic (Background traffic plus Project traffic)
- Background Transportation Facility Traffic Operations: the analysis of the operations of the various roadways without the Project traffic, generally characterized by an analysis of the delay expressed in seconds per vehicle
- Transportation Facility Traffic Operations Changes with the Project: the analysis of the operations of the various roadways with the additional traffic generated by the Project, again generally characterized by an analysis of the delay expressed in seconds per vehicle

The details of the methodology used for each of the above steps are presented below.

Background Traffic Forecasts

The background traffic forecasts were necessary in order to set the baseline without the Project construction. This was done by establishing existing traffic volumes, and then carrying out a forecast of the background traffic into the future. As the sources of background traffic were diverse and changing, forecasting background traffic into the future was done on the basis of trend lines developed from historic traffic volume data. These trends took into account the past growth of residential, commercial and industrial development in the area and used similar rates to predict future growth. This accounted for traffic volumes to be expected from additional development in the area over the Project construction time period.

The results of the various traffic volume forecasts are presented in a series of plans within each of the geographic areas. The results are presented in terms of Peak Year Annual Average Daily Traffic (AADT) as well as the 8-year Project Period Average Daily Traffic. The “Peak” Year was taken to be the year of peak project traffic for each individual project activity and roadway segment. This year will vary between segments as different project activities with different schedules and travel patterns occur.

The Peak Year Annual Average Daily Traffic (AADT) was useful for comparing peak year traffic to background traffic and for achieving an overall sense of variations in traffic over the project construction period. However, as the AADT is an average over the year which also included weekends and periods of lower activity then higher daily volumes also can occur over the year.

Traffic operations were calculated on the basis of hourly traffic volumes. As a result, peak hourly volumes were calculated taking into account variations throughout the year, particularly quarterly variations, as well as allowing for shorter duration variations such as weekends and shifts.

Details of the traffic volume forecasts are included in the Appendices B through F of this report. For each segment and each year these include:

1) AADT and Summer Average Daily Traffic (SADT) for the background traffic including vehicle classification in terms of the split between Heavy Trucks (HT), Light Trucks (LT) and Passenger Vehicles (Pass)
2) AADT for each project activity
3) Vehicle classification

Future background traffic was estimated by the application of trend regression analyses. The regression analyses were carried out using available traffic data from the B.C. Ministry of Transportation and Infrastructure (MOTI). Three locations were identified as appropriate for setting growth rates for the roads within the 5 geographic areas described in section 1.0. Each location needed to have a reasonable period of data in order for the trend analysis to be statistically significant. The three locations selected and the geographic areas for which they were used are as follows:

- MOTI count location #44-011 which is on Highway 29 approximately 40 kilometres east of Hudson's Hope and 35 kilometres west of the intersection with Highway 97 at Charlie Lake (Figure 1.2). This location was used for the Highway 29 geographic area. This analysis resulted in a growth rate of approximately 1.4% per annum based on data spanning from 1989 to 2011. MOTI data was last collected here in 2005 with 2011 data added by BC Hydro.
- MOTI traffic count location #44-003 which is on Highway 29 approximately 0.5 kilometres west of Highway 97 at Charlie Lake (Figure 1.2). This location was used for the Highway 97 North and the North Bank Roads geographic areas. This analysis resulted in a growth rate of approximately 1.5% per annum based on data spanning from 1989 to 2011. MOTI data was last collected here in 2001 with 2011 data added by BC Hydro.
- MOTI Permanent Count Station P-43-2 located on Highway 97 approximately 100 kilometres South of Chetwynd (Figure 1.1). This location was used for the Highway 97 South and Jackfish Lake Road geographic areas. This analysis resulted in a growth rate of approximately 1.5% per annum based on data spanning from 1989 to 2011. MOTI data was last collected here in 2011.

The above information was used within each geographic segment to set the expected growth rates. However, for each individual roadway segment, specific traffic volume data describing the existing conditions was also collected. The traffic counts upon which the background forecasts are based are presented at the beginning of each of the geographic sections 3 - 7.

In general, the report presents summary data in the text with details in the set of Appendices. For simplicity, and in order to reflect the accuracy of the numbers, the numbers in many tables of the report have been rounded. This may occasionally lead to rounding error.

Project Traffic Forecasts

Traffic forecasting for the anticipated project construction traffic was carried out using a different methodology than that used for the background traffic. Project traffic forecasting was carried out based on individual forecasts of the various Project activities, with the activity traffic then aggregated on each of the roads being studied. Project activities generating traffic would include:

- Worker Housing: Trips generated by Project employees and contractors not resident in the worker camps
- Bulk Materials Movement: Trips created by the movement of Bulk Materials that would be required for the construction of the dam. This would generally include:
    - Temporary riprap from the Wuthrich Quarry
    - Permanent riprap from the West Pine Quarry
    - Note that till required for the dam's core would be extracted from the 85th Avenue Industrial Lands and carried to the site via conveyor with no consequence to traffic. The forecast trips from West Pine Quarry were based on a road haul. The consequence of the possibility of movement by rail is covered in the sensitivity analyses presented in Section 10.
- Materials and Equipment Movement: Delivery of dam components, supplies, work materials and equipment. It was assumed that the delivery of the bulk type materials such as cement and fly-ash would occur by rail.
- Clearing: Trips generated by logging trucks required to clear the dam site, transmission lines, work camp and roadway construction areas, as well as logging trucks required for clearing of the reservoir area prior to flooding.
- Transmission Corridor: All activities that would be required for construction of the transmission lines
- Highway 29 Realignment: Trips created by the movement of fill, riprap and bridge construction materials. Riprap was assumed to originate from Portage Mountain, fill materials would typically be moved from within the site (cut and fill equalization), and bridge materials were assumed to originate in Fort St. John
- Hudson's Hope Berm: Trips required for the delivery of fill and riprap materials. Riprap was assumed to originate from Portage Mountain with fill generated locally or from the Lynx Creek area (several kilometers to the east).

Background and With Project Traffic Operations Analyses

The Synchro / SimTraffic software suite was utilized for the operational analyses. The Synchro portion of the software provided methods for optimization of roadway facilities as well as the standard set of performance measures based on Level of Service as defined in the Transportation Research Board Highway Capacity Manual (HCM). The SimTraffic portion of the software suite is based on the "translation" of the Synchro input data into a traffic simulation using a complex set of algorithms of car interactions within the software. The SimTraffic simulations provided insights into the traffic operational characteristics of the network, particularly the interaction of various transportation system elements, such as adjacent traffic signals, and other interactions that are not wholly considered within the existing HCM methodologies.

As roadway intersections tend to be the critical operational element in any transportation corridor or system operational analyses were carried out for important intersections within each geographic area. The selection of the critical intersection(s) for each area is presented in the introduction to each area in Sections 3 to 7 of this report.

The results of the operational analyses were presented separately for each of the subject roadways in a series of plans within the report section for each geographic area. The figures include the HCM-based performance measures for each of the three movements (left turn, through and right turn) for each of the four legs (eastbound, westbound, northbound and southbound) at each of the important intersections identified for each of the geographic areas. For each movement two performance measures were indicated:

1) the delay in seconds per vehicle, and

2) the Level of Service (LoS).

Additional performance measures, such as expected queue length, are provided in tabular format in Appendix G.

Note: The Level of Service performance scale is "a quality measure describing operational conditions within a traffic stream, generally in terms of speed and travel time, freedom to manoeuvre, traffic interruptions, and comfort and convenience" (TRB 2000). The scale utilizes the letters A through F to categorize the operating conditions of a facility from highest (Level of Service A) to lowest (Level of Service F). It is commonly used in the industry to describe traffic operations and is based on the average delay per vehicle measured in seconds. The LoS legend is presented below in Table 1.1 for the intersection types analyzed within this report. As a rule Level of Service E and F indicate congested operations. It should be emphasized that the delays quoted are average delays and as a result there would be variations around these over the hour, with some vehicles having no delay at all and others having longer delays than the average.

Table 1.1 Level of Service Criteria

Traffic Signals

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

Stop Control

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50

2.0 PROJECT ACTIVITIES

2.1 WORKER HOUSING

Traffic generated by the workforce has been calculated based on information provided by BC Hydro. Both the type and the location of the workforce housing has been taken into consideration. Calculations are provided for the peak year, project year 5, with reductions applied to the remaining years of the construction schedule. Two main work camps are proposed: one on the north bank and one on the south bank, supported by a number of smaller regional camps as required. The north and south banks would be primarily self-sufficient accommodation facilities with limited access across the river and construction site due to safety and efficiency considerations. An internal project shuttle bus system is proposed for worker transportation from the north bank to the southern work site and vice versa. Shuttles from park and ride locations in Fort St. John and Chetwynd to the camps may be provided as deemed necessary.

As a result of the proximity of the camps and the distance to the regional communities, it is assumed that the majority of the interaction between the camps and a community would be with Fort St. John to the north and Chetwynd to the south. Table 2.1 Project Worker Housing Distribution presents the current assumptions with regard to the distribution and type of worker housing.

BC Hydro estimates it will generate approximately 10,000 person-years of direct employment during the construction period. The estimated average annual construction phase workforce on-site would be between 800 and 1,700 workers (with contingency, up to 2,100 workers). The conservative contingency figure of 2,100 workers was used for the base analysis.

About 90 per cent of the construction workforce would construct the dam and generating station. The distribution of work at the dam site would shift between the north and south banks during the construction years. The remainder of the workforce would be needed away from the dam site, including work sites for Highway 29 Realignment, Hudson's Hope berm construction, general road works, clearing, construction material transport and transmission lines' construction.

The workforce estimates are the basis of preliminary workforce accommodation planning. The actual workforce numbers and timing would be based on final design and procurement, including contractor plans, methods, and construction considerations. Annual monitoring of the regional labour and housing market during construction would inform adjustments to the project's accommodation plan in relation to current regional conditions.

The workforce estimates are based on a total of 2,068 workers that would be required for the project's construction in the peak year, Year 5. Of these 1,372 are predicted to be housed in-camp and 696 housed off-site. The In-Camp workers would be housed in two main camps, with a larger one with expansion capacity to 950 workers on the south bank and a smaller one with capacity for approximately 500 workers on the north bank.

Table 2.1 Project Worker Housing Distribution

Source	Workforce Totals	On-Site			Off-Site (Daily)				
		Drive	Air/Bus	Total	FSJ	PRRD*	H. Hope	Chet	Total
	2068 workers 1372 Camp Workers								
In Camp	1372 N. & S. Bank Camp	823 60%	549 40%	1,372 100%					
	Total	823 60%	549 40%	1,372 100%					
	Max Day Arrivals	137	91	229					
Off-Site	Local Hire				103 5%	92 4%	5 0%	4 0%	204 10%
	In-Community				252 12%	227 11%	13 1%	0 0%	492 24%
	Total				355	319	18	4	696

* PRRD: Peace River Regional District - Includes Taylor and Dawson Creek

Trip volumes were generated for the workers housed in Fort St. John, and then these trips were assigned to routes leading to the dam site. The in-camp workers can be assumed to generate very few trips, limited to their arrivals and departures and their social and business interaction with the communities, mostly Fort St. John. As the camps are planned to be self-sufficient, including having their own recreational facilities, this interaction would be reduced further.

Off-Site workers, on the other hand, would commute to and from the site and use local roads to do so. Tables 2.2 and 2.3 present the calculations of the trips that off-site workers destined to both north and south bank camps would be expected to make. Of the 696 off-site workers, 355 workers would be expected to originate from Fort St. John, a further 319 from the Peace River Regional District (PRRD) including Taylor and Dawson Creek and a final 18 from Hudson's Hope. These would be destined for the north bank parking lot to then be distributed to north and south bank camps via the internal shuttle bus. The remaining 4 workers would be expected to originate from the Chetwynd area and be destined for the south bank camp. Present policy assumptions anticipate that workers would not be allowed in their private vehicles onto the Project Access Road due to safety and traffic management objectives, and would be required to take a shuttle bus to be provided from a pick up/drop off point somewhere in the Chetwynd area.

Table 2.2 shows that the 692 workers destined for the north bank parking lot can be assumed to travel in 577 vehicles with a typical occupancy of 1.2 persons per vehicle. This would be 1,154 2-way vehicle trips or 577 trips per direction. As they would be spread out over the two shifts, approximately two-thirds, or 67 per cent, are assumed to arrive or leave during the peak day-time shift. As the different contractors would have different start times, the peak hour arrivals would be staggered over a two hour period with 60% arriving in the peak hour. Applying these factors, a total of 277 employees can be expected to make 231 peak hour trips in the peak direction. Table 2.4 provides the routing for these trips based on the origins.

Table 2.3 shows that the 4 workers destined for the south bank parking lot can be assumed to travel in 3 vehicles with a typical occupancy of 1.2 persons per vehicle. This would be 6 2-way vehicle trips or 3 trips per direction. However, it has been assumed that the employees accessing the south bank camp would take advantage of a potential shuttle service from the Chetwynd area. As the shifts start times would be spread out it is assumed that two shuttles would be going up and returning every shift for a total of eight shuttle trips per day. Again, Table 2.4 provides the routing for these trips based on the origins although this would only be the routing to the shuttle bus pick up / drop off point.

Table 2.2 Project Off-Site Worker Trip Distribution

Location	Type	Source		Daily Trips			
				#	Occ.	Veh	2-Way
N. Bank	Commuters	Local Hire		200	1.2	167	334
		In-Community		492	1.2	410	820
	Pass. Veh.	Total		692		577	1154
	Shift	Day	67%	462		385	769
		Night	33%	231		192	385
	Staggered Start	Peak	60%	277		231	

Table 2.3 Project Off-Site Worker Trip Distribution

Location	Type	Source		Daily Trips			
				#	Occ.	Veh	2-Way
S. Bank	Commuters	Local Hire		4	1.2	3	6
		In-Community		0	1.2	0	0
	Pass. Veh.	Total		4		3	6
	Shift	Day	67%	3		2	4
		Night	33%	1		1	2
	Staggered Start	Peak	60%	2		1	

Table 2.4 Project Off-Site Worker Trip Routing

Source	Proportion (%)	Workers (#)	Trips Daily	Trips Peak Hr	Route
North Bank					
Fort St. John	26%	177	296	59	100 Ave across Hwy to Old Fort to 240 Crossover to Rd 269
	26%	177	296	59	100 St across Hwy 85th Ave to Old Fort to 240 Crossover to Rd 269
PRRD*	46%	319	532	106	Hwy 97, left at 85 Ave to Old Fort to 240 Crossover to Rd 269
Hudson's Hope	3%	18	31	6	Hwy 29 and 97 to Old Fort to 240 Crossover to Rd 269
Total		692	1,154	231	
South Bank					
Shuttle	100%	4	8	4	Hwy 29 to Jackfish Lake Rd.: Shuttles
Chetwynd	70%	3	5	2	From West of Hwy 29
	30%	1	2	1	From East of Hwy 30

The traffic forecasts identified in the table above have been included in the Project combined trips on each of the routes and intersections identified in the route column of the table.

2.1.1 Project Shuttle Services

Shuttle bus services would be one element of the transportation planning for the Project. Early on in the Project, a temporary bridge would link the north and south bank work sites (for the purpose of project construction – not for camps). No private vehicles would have access across the work site bridge. Once in place this would enable controlled and managed transportation between north and south bank work sites, parking areas, and arrival transfer points. This is important as it would provide commuters from north of the Peace River access to the larger south bank work site.

Additional potential external shuttle routes may be considered for worker access to both the north and south bank camp as deemed necessary. For the purposes of the traffic forecast, as a result of the longer trip and the desire to manage use of the Project Access Road, a shuttle has been assumed on the south side. This shuttle may carry workers from a pick up / drop off point (a Park ‘n’ Ride) in the Chetwynd area to the south bank camp and from the Fort St. John area to the north bank camp. The potential pick up/drop off point in the Chetwynd area (the Park ‘n’ Ride) is as yet undefined and could be located either within Chetwynd itself or somewhere at the bottom of Jackfish Lake Road in proximity to the intersection with Highway 29.

As a result of the greater use of public roads, no shuttle service has been assumed for the north bank. Should the north bank shuttle be deemed appropriate, then the shuttles would also be available and in-place for other uses such as Fort St. John airport pick-up should the workforce volumes warrant this.

All internal travel between pick up / drop off points and worksites would be managed by separate contracts as the work-site roads are not public roads.

2.1.2 Regional Camps

It is also likely that a number of smaller project specific regional camps would be set-up to service a number of the non-dam site activities. While these are expected to be put in place,

their exact location would be determined by the final project schedule and regional work site contracts, therefore any resulting trips have not been allocated to any roads in the regional network. They can be expected to have a very minor impact as the majority of the workers at these camps would make one trip in at the beginning of their shift rotation (five weeks on, one week off), one trip out at the end of the rotation, with maybe a few recreation and/or personal business trips in-between.

2.1.3 Air, Long-Distance Bus, Rail

Table 2.1, Project Worker Housing Distribution, also presents the number of employees who could be expected to arrive from out of the area and the expected mode of arrival. Of the 1,372 camp workers, approximately 60 per cent or 823 workers could be expected to drive and 40 per cent, or 549 workers, could be expected to arrive from outside of the region by air or bus. Assuming a shift schedule of five weeks on and one week off, should all employees leave and return on their week off then this would have 229 employees arriving the day before a weekly shift change; 91 by air or bus and 137 by car. Further work would be required to determine the proportions amongst the air and bus split. However, given the relatively remote location of Fort St. John and the distances involved, the vast majority of workers not driving could be assumed to arrive by air.

2.1.4 Parking

Table 2.1, Project Worker Housing Distribution, can also be used to calculate the parking requirements. At the north bank camp, if the in-camp workers on their off week all choose to leave then the number of working in-camp workers desiring to park would be 5/6 x 823 or 686 workers. Not all workers would drive on their own so, assuming typical car occupancy of 1.5 for longer trips, this would require parking for 457 vehicles. Add to this the 385 vehicles from the off-site day shift workers (Table 2.2) and the overall requirement would be approximately 850 parking spaces. Allowing for additional day to day business activity a parking lot for up to 900 – 1,000 vehicles would be recommended. Any additional “non project” facilities added to the site, such as accommodation for a potential local BC Hydro office would need to be added to this.

2.1.5 Service Vehicles

Camps would need to be regularly stocked with goods and provided with services. On a daily and hourly basis, however, these numbers are likely to be rather small, in particular in comparison to the delivery of goods and services to the project construction sites. As these are in the same locations, it is assumed that the goods and service vehicles for the camps are a sub-set of, and within the margin of error of, the goods and services vehicles required for the site construction. These are addressed more thoroughly in Section 2.3.

The issue of access to the site for these vehicles would also have to be addressed once a contract is awarded. The majority of service vehicles would approach the site from Fort St. John. However, given that the south bank camp is the larger of the two camps many of these vehicles would want access across the temporary bridge. If the intent is to keep the work sites relatively free of private vehicles in order to avoid disruption to construction activities (and possible liability) then security measures or policies would need to be put in place in order to

determine which vehicles would be provided access across the temporary bridge and which would be expected to travel to the south bank access.

2.2 BULK MATERIALS MOVEMENT

The bulk materials movement for the construction of the dam would include:

- Till material for the construction of the dam's core sourced from the 85th Avenue Industrial Lands located east of Old Fort Road southwest of Fort St. John (Figure 1.3 Key Plan - North Bank Roads). As it is proposed that this material be moved via conveyor system, it will not be considered further within this report
- Temporary riprap sourced from the Wuthrich Quarry off of 271 Road and north of Highway 97, northwest of Fort St. John (Figure 1.3 Key Plan - North Bank Roads)
- Permanent riprap sourced from the West Pine Quarry off of Highway 97 west of Chetwynd (Figure 1.1 Key Plan)

The potential shipping of Bulk Materials, in particular the permanent riprap from West Pine Quarry, has been studied by the Site C Integrated Engineering Team with the roadway option determined to be the most likely scenario. However, given that the rail option may also be a viable alternative, the consequences of the shipment of this material by rail on transportation planning are considered in Section 10.

2.2.1 Wuthrich Quarry

Temporary riprap required for the construction of the dam is proposed to be sourced from Wuthrich Quarry accessed off of 271 Road, approximately three kilometres north of Highway 97. The location of the quarry is shown in Figure 1.3 Key Plan - North Bank Roads. Wuthrich Quarry materials' requirements are estimated to be approximately 350,000 cubic meters of riprap to be delivered over a three to four year period peaking in year 3 of the Project. The routing would take the material from the quarry access off 271 Road, south on 271 Road to Highway 97, east on Highway 97 to Old Fort Road, and south on Old Fort Road accessing the site from Old Fort Road south of 240 Road.

The 350,000 cubic meters of material is expected to be moved in 17,350 truckloads. The peak year would see 6,600 loads moved amounting to 13,200 2-way trips. Thus, additional average daily traffic would amount to 38 loads per day, or 76 2-way trips per day. The one-way peak hour volume would be 8 trips per hour per direction. This would be one truck every 7-1/2 minutes in each direction during the working day or every 3-3/4 minutes both directions.

2.2.2 West Pine Quarry

Permanent riprap required for the construction of the dam is proposed to be sourced from West Pine Quarry accessed from Highway 97 west of Chetwynd. The location of the quarry is shown in Figure 1.1 Key Plan. West Pine Quarry materials' requirements are estimated to be approximately 800,000 cubic meters of riprap to be delivered over an eight year period peaking in year 7 of the Project. The routing would take the material from the quarry access on Highway 97 west of Chetwynd east on Highway 97 to Highway 29 in Chetwynd, then north on Highway

29 to Jackfish Lake Road and east again on Jackfish Lake Road and the Project Access Road to the south bank construction site.

The 800,000 cubic meters of material is expected to be moved in approximately 40,000 truckloads. The peak year would see 15,500 loads moved which would amount to 31,000 2-way trips. Average daily traffic would amount to just over 40 loads or 85 2-way trips per day. The typical one-way peak hour volume would be 5 trips per hour per direction. This would be one truck every 12 minutes in one direction or every 6 minutes considering both directions.

2.2.3 Portage Mountain Quarry

The reservoir would inundate several segments of Highway 29 North between Hudson's Hope and Charlie Lake, B.C., requiring realignment. The reconstruction of these segments would involve delivery of material for grading, pavement and bridge structures. Riprap would be sourced from a quarry on Portage Mountain west of Hudson's Hope. Similarly, a berm is proposed to stabilize the existing shoreline below the community of Hudson's Hope, and the riprap required for this would also be sourced from Portage Mountain. The details of the volume of materials required, the traffic loadings expected and the routes to be taken are addressed in Section 2.6 of this report.

2.2.4 Rail

Canadian National Railway (CN) has a rail line between Chetwynd and Fort St. John that passes through the Jackfish Lake Plateau. The closest CN stop to the proposed location of the Project is Septimus Siding (Figure 1.1). Although the direct distances between Septimus and both the south bank camp and the south bank construction site are only a couple of kilometres, access to these two locations would be via a circuitous routing using existing resource roads. Alternatively, materials could be shipped through Fort St. John and delivered to the north bank site via 100th Street and 85th Avenue. Early analyses by BC Hydro indicate a likely lower cost for roadway delivery for the bulk materials and this has been the assumption utilized to date. Any use of rail to deliver bulk goods would reduce traffic on the roadways indicated above, in particular the use of Jackfish Lake Road for the delivery of riprap from the West Pine Quarry. Sensitivity analysis related to greater rail use is dealt with in Section 10 of this report.

2.3 MATERIALS AND EQUIPMENT MOVEMENT

The Materials and Equipment Movement includes the delivery of a number of different materials and equipment types including some "bulk" type materials such as bulk cement and fly-ash, as well as the delivery of dam components, supplies, work materials and equipment. These materials do not include bulk materials specifically addressed such as riprap from West Pine and Wuthrich Quarries, as well as material included in the construction of the Highway 29 realignments, the Project Access Road and the Hudson's Hope berm. The forecast trips are based on detailed calculations of the requirements for each material type by the Project's construction estimating group. The calculations take into account the following:

- the total volume required
- the schedule requirements
- the proportion to be delivered by rail
- the origins and desired destinations

Materials and equipment can be sourced either from Dawson Creek, Grande Prairie, Alberta and sources East and South, or from Prince George, Vancouver or BC's ports to the south and west. These movements can be destined to either the north or the south bank construction sites although it is assumed that the temporary bridge would be available for materials delivery. As a result, it has been assumed that the deliveries from the south-east would access the site via Fort St. John and the north bank and deliveries from the south-west via Jackfish Lake Road and the south bank. It has also been assumed that 65 per cent of the materials and equipment would originate from Alberta and the south-east and 35 per cent from BC and the south-west. Routing for these two movements are as follows:

- Southwest via Highway 97 to South Bank (Figure 1.1):
    - Highway 97 eastbound to Highway 29 in Chetwynd
    - Highway 29 northbound to Jackfish Lake Road
    - Jackfish Lake Road and Project Access Road to south bank
- Southeast via Highway 97 to North Bank (Figure 1.3):
    - Highway 97 northbound to 85th Avenue in Fort St. John
    - 85th Avenue westbound to Old Fort Road
    - Old Fort Road southbound to 240 Road
    - 240 Road westbound to 269 Road
    - 269 Road southbound to the north bank

A summary of the expected materials and equipment volumes and their scheduling is presented in Table 2.5: Materials and Equipment Loads and Peak Trips. 1.012 Million tonnes of material are estimated to be carried; 97 per cent by rail, 1 per cent (298 loads) by road from the southwest and 2 per cent (625 loads) by road from the southeast. The majority of these loads fall into the three materials categories (cement, fly-ash and fuel) which are generally shipped via rail. As a result, the maximum yearly trips expected by road is 423 trips per year arriving from Alberta and the southeast in 2016, or year 2 of the project schedule, via Highway 97 North and Old Fort Road or almost one trip per day. The maximum number of yearly trips arriving from the BC and the southwest via Jackfish Lake Road is 151 trips per year, or less than one trip per day, in addition to riprap deliveries from West Pine Quarry.

The above calculations refer to typical loadings that can be broken down for the utilization of standard heavy vehicles. There are some components, mainly transformers, generators and turbines that are significantly overweight and over-sized and would require special transport considerations. Data has been collected with regard to these overloads and an initial high-level

investigation (Apex 2012) carried out. However, further analysis would be required prior to the selection of transportation modes and routes.

Table 2.5 Materials and Equipment Loads and Peak Trips

Project Year	Rail		Heavy Vehicles									
			From SW to South Bank				From Alberta to North Bank				Total	
	Tonnes	Cars	Tonnes	Loads Yearly (veh/yr)	2-Way Trips Yearly (veh/yr)	2-Way Trips Daily (veh/day)	Tonnes	Loads Yearly (veh/yr)	2-Way Trips Yearly (veh/yr)	2-Way Trips Daily (veh/day)	Tonnes	Yearly Trips (veh/yr)
0											-	-
1	15,977	178	291	10	20	0	540	18	37	0	16,808	57
2	35,488	394	2,255	75	151	0	6,336	211	423	1	44,078	574
3	99,265	1,103	1,457	49	98	0	2,706	90	181	0	103,428	279
4	256,765	2,853	1,341	45	90	0	2,491	83	167	0	260,598	257
5	285,445	3,172	1,267	42	85	0	2,353	78	157	0	289,065	242
6	200,104	2,223	1,242	41	83	0	2,307	77	154	0	203,653	237
7	90,927	1,010	1,089	36	73	0	2,023	67	135	0	94,039	208
8											-	-
Total	983,971	10,933	8,942	298	600	0	18,756	625	1,254	0	1,011,669	
%	97%		1%				2%				100%	

2.4 CLEARING

The trips generated under the Clearing category include logging trucks that would be required to clear the dam site area, transmission lines, work camp and roadway construction areas as well as logging trucks required for clearing the reservoir area prior to flooding. The source of the information is EIS Volume 1 Appendix V1AVegetation, Clearing and Debris Management Plan. Overall, 2,601,000 cubic meters of timber and waste would be created to be moved or disposed of between years 1 and 4 of the project construction period including 1,413,000 cubic meters of merchantable timber. This is calculated to require the movement of approximately 40,000 truck loads or 81,000 2-way trips.

It is assumed that 100% of the waste would be disposed of on-site. It is also assumed that not all of the merchantable wood produced would be incremental to the background traffic. The clearing plan outlines the forest industry capacity in the region and confirms that there is ample capacity (a ten year history) to consume all of the merchantable wood from the project. BC Hydro is working with the local forest industry to encourage the utilization of wood from the project and this utilization of wood will offset the use of wood from other sources during the clearing period. As such it is expected that all the wood that would be extracted from the Project Clearing areas would replace other merchantable timber tributary to the Jackfish Lake Road and Highway 29 areas during the Project clearing phase. This results in no net traffic caused by the Project on the major roadways within these areas. However, localized volume differences would occur. For example, while overall logging truck flows on Highway 97 would be expected to remain fairly constant, the use of 240 Road and Old Fort Road to carry north bank clearing vehicles to the Highway would create truck trips not presently in the background traffic. As a result, local consequences such as those on the North Bank access roads are accounted for.

The reservoir clearing operations have been disaggregated in terms of year and allocated to a number of catchment areas. Table 2.6 presents the results of the disaggregation. Results are presented in terms of the volume of material to be cleared, the total number of loads over the

full year, the total number of 2-way trips over the year and the average daily trips during the year. This is done for each of the catchment areas (i.e., Jackfish Lake Road, Highway 29 South, Highway 29 North and local roadways). However, as mentioned, only the local roadway volumes are applied as additional Project generated traffic.

Table 2.6 Clearing Volume, Loads and Peak Trips

Year	Log Volume (cu.m.)	Trips		
		Loads (#)	2-Way Trips (#)	Daily (veh / Day)
Jackfish Lake Rd.				
1	263,062	7,516	15,032	41
2	324,207	9,263	18,526	51
3	170,246	4,864	9,728	27
4	217,686	6,220	12,439	34
Total	975,201	27,863	55,726	
Highway 29S				
1	-	-	-	-
2	20,945	598	1,197	3
3	9,219	263	527	1
4	10,896	311	623	2
Total	41,059	1,173	2,346	
Highway 29N				
1	153,046	4,373	8,745	24
2	62,525	1,786	3,573	10
3	56,680	1,619	3,239	9
4	93,092	2,660	5,320	15
Total	365,343	10,438	20,877	
271 Rd				
1	2,006	57	115	0
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
Total	2,006	57	115	
269 Rd.				
1	29,767	850	1,701	5
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
Total	29,767	850	1,701	
Grand Total	1,413,376	40,382	80,764	

* 100% Replacement / 0% Incremental Assumed for Jackfish Lake Rd.
* 100% Replacement / 0% Incremental Assumed for Hwy 29 North

Jackfish Lake Road:

The Jackfish Lake Road catchment area encompasses much of the area that would be cleared along the south bank of the dam construction site, the south bank of the reservoir flooding areas and the construction of the Project Access Road and transmission lines. Logging trucks would enter and exit Jackfish Lake Road and the Project Access Road at numerous points north of Old Jackfish Lake Rd. They would then exit Jackfish Lake Road onto Highway 29 and distribute themselves to the various mills using the provincial highway network. This catchment area is the largest of the catchment areas with approximately 27,900 loads, or 70 per cent of the total loads to be transported. As these would replace existing logging in the area the incremental traffic volumes would be zero.

Highway 29 South:

The Highway 29 South catchment area encompasses a portion of the area to be cleared along the south bank of the west reservoir flooding area. Logging trucks would enter from and exit to Highway 29 South at numerous points to the south of the existing Hudson's Hope Bridge. They would then distribute themselves to the various mills using the provincial highway network. This catchment area is expected to produce approximately 1,200 loads, or 3 per cent of the total loads to be transported. As these would replace existing logging in the area the incremental traffic volumes would be zero.

Highway 29 North:

The Highway 29 North catchment area encompasses much of the area to be cleared along the north bank of the reservoir flooding areas and the Highway 29 Realignment construction sites. Logging trucks would enter from and exit to Highway 29 North at numerous points along Highway 29 between Hudson's Hope and Charlie Lake. They would then distribute themselves to the various mills using the provincial highway network. This catchment area is expected to produce approximately 10,400 loads, or 26 per cent of the total loads to be transported. As these would replace existing logging in the area the incremental volumes would be zero.

Local Roadways:

The use of a number of smaller local roadways would be required for the catchment area encompassing some of the area to be cleared along the north bank of the east reservoir flooding areas and the north bank of the dam construction site. These roads include 271 Road and 269 Road Logging trucks would generally enter from and exit to Highway 97 North at numerous points along Highway 97 between Charlie Lake and Fort St. John. They would then distribute themselves to the various mills using the provincial highway network. These catchment areas are expected to produce approximately 900 loads, or 2 per cent of the total loads to be transported with a peak average incremental daily volume of 5 vehicles per day and a maximum hourly volume of one vehicle per hour 1-way.

2.5 TRANSMISSION CORRIDOR

The construction of the transmission lines would generate approximately 9,800 vehicle trips along Jackfish Lake Road (Table 2.7). These activities are assumed to occur between years 3 and 8 of the construction schedule peaking in year 4. The peak trips are expected to be 4,400 vehicles in the peak year amounting to an average trip rate of 12 vehicles per day. These vehicles are shown by vehicle type.

Table 2.7: Transmission Line Construction: Yearly and Daily Trips

Year	Transmission Line Traffic Yearly (Veh/yr)				Average Daily
	Passenger	Light Truck	Heavy Truck	Total	Veh/day
1	-	-	-	-	-
2	-	-	-	-	-
3	219	48	27	294	1
4	3,291	716	403	4,411	12
5	219	48	27	294	1
6	512	111	63	686	2
7	2,926	637	358	3,921	11
8	146	32	18	196	1
Total	7,314	1,592	896	9,802	0

These vehicles would access the road network via Jackfish Lake Road or the Project Access Road, entering and exiting the transmission corridor in the vicinity of the T-Intersection (Figure 6.1). It has been assumed that the vehicles are generally coming from Chetwynd.

2.6 HIGHWAY 29 REALIGNMENT AND HUDSON'S HOPE BERM

As a result of the filling of the reservoir for the dam, certain portions of Highway 29 would be flooded. As a result, these highway sections would require realignment to areas higher up on the banks of the Peace River. In many cases this would also require the construction of a new bridge across the creeks and rivers flowing into the Peace River. In addition, a berm is proposed to stabilize the existing shoreline below the community of Hudson's Hope. This project is referred to as the Hudson's Hope Berm. The five realignment segments are Lynx Creek, Dry Creek, Farrell Creek, Halfway River and Cache Creek. These realignment areas and the location of the berm are presented in Figure 1.2 with the segmentation for analysis illustrated in Appendix A Figure A-1.

As the berm access is generally via Highway 29 just to the west of Lynx Creek segment, and the same sources would be utilized for the berm as for the Highway realignments, the traffic forecasting for the berm works has been included in this section. The works are to be staggered with construction of the Bear Flats segment commencing in year 2 and ending with the completion of the Hudson's Hope berm and Lynx Creek segment in year 6.

Traffic volumes created by the Highway 29 Realignment and the Hudson's Hope berm works include trips created by the movement of fill, riprap and construction materials. Riprap was

assumed to originate from Portage Mountain, fill materials would be moved from within each project site (cut and fill equalization) and construction materials were assumed to originate in Fort St. John.

Table 2.8 presents the volume of materials on the various segments of the highways. Portage Mtn. lies to the west of the Highway 29 technical study area with rip-rap deliveries entering Highway 29 at Canyon Drive (Figure 1.2). As the materials are delivered from west to east to the various Highway 29 project sites total traffic volumes on the highway beyond that site are reduced. Therefore, they are shown as eastbound volumes to the west of each re-alignment location. Conversely, the volumes from Fort St. John enter Highway 29 at Charlie Lake in the segment prior to Cache Creek westbound and again decrease as they are delivered to the various sites. Therefore, they are shown as westbound volumes to the east of each site.

Portage Mountain riprap traffic volumes decrease from 17,500 loads entering the highway at Canyon Drive and prior to delivery to the Hudson's Hope berm, to 1,800 loads just prior to delivery to the Cache Creek realignment segment. Fort St. John construction traffic volumes decrease from 1,800 loads entering the highway at Charlie Lake and prior to delivery to the Cache Creek realignment segment, to 300 loads just prior to delivery to the Lynx Creek realignment segment.

Table 2.8 Highway 29 Realignment: Riprap and Construction Materials Volumes

Source	Delivered To	Volume (# of Loads)	
		EB West of	WB East of
Portage Mtn	Hudson's Hope	17,461	
	Lynx Creek	7,309	
	Dry Creek	3,911	
	Farrell Creek	3,646	
	Halfway River	3,124	
	Cache Creek	1,754	
Fort St. John	Hudson's Hope		-
	Lynx Creek		275
	Dry Creek		383
	Farrell Creek		687
	Halfway River		1,273
	Cache Creek		1,777

3.0 HIGHWAY 29

3.1 TRAFFIC FORECASTS: HIGHWAY 29

Average Annual Daily Traffic (AADT) was estimated for background traffic for the existing (2011) year. Background traffic was then forecast into the future for the Background scenario and Project traffic added for the "With Project" scenario.

A number of areas were selected based on known routes that would be taken by project oriented traffic. Specific areas considered shown in Figure 1.2 and Figure A-1 of Appendix A were:

- The segments of Highway 29 between Hudson's Hope and Fort St. John that would be subject to realignment as described in Section 1 of this report
- The portions of Highway 29 in and around Hudson's Hope that may be subject to Project traffic required for construction of the Hudson's Hope berm
- Canyon Drive: As the access road to Portage Mountain, this road would be subject to bulk materials' deliveries originating from the quarry
- Clarke Avenue: As the access road leading to DA Thomas Road and to the Hudson's Hope berm, this road would be subject to bulk materials from Portage Mountain as well as general materials and equipment destined for the Hudson's Hope berm works
- The portion of Highway 29 leading from Chetwynd to Jackfish Lake Road that may be utilized for delivery of workers, goods and materials to the south bank construction site is more closely related to the forecasts carried out for Jackfish Lake Road. As a result, the forecast for this segment is described in Section 5.0 Highway 97 South

The background analysis was based on existing data collected from the BC Ministry of Transportation and Infrastructure website and databases whenever possible. However, as little data has been collected by MOTI over the last decade, this was supplemented with data collected by BC Hydro during 2011 as follows:

- Farrell Creek Road approximately 13 kilometres east of Hudson's Hope: Manual turning movement counts obtained in August 2011
- Highway 29 at Canyon Drive, Hudson's Hope: Manual turning movement counts obtained in August 2011
- Highway 29 at Jackfish Lake Road: Manual turning movement counts obtained in August 2011
- Highway 29 at Highway 97: Traffic signal download obtained from MOTI in November 2011

Analysis of the daily traffic patterns indicates that they are typical of urban travel patterns with distinct morning and afternoon directional peaks. This indicates that the prevailing pattern on this highway is "commuter" trips between Hudson's Hope and Fort St. John, as well as from these two communities to various resource work sites accessible off of Highway 29.

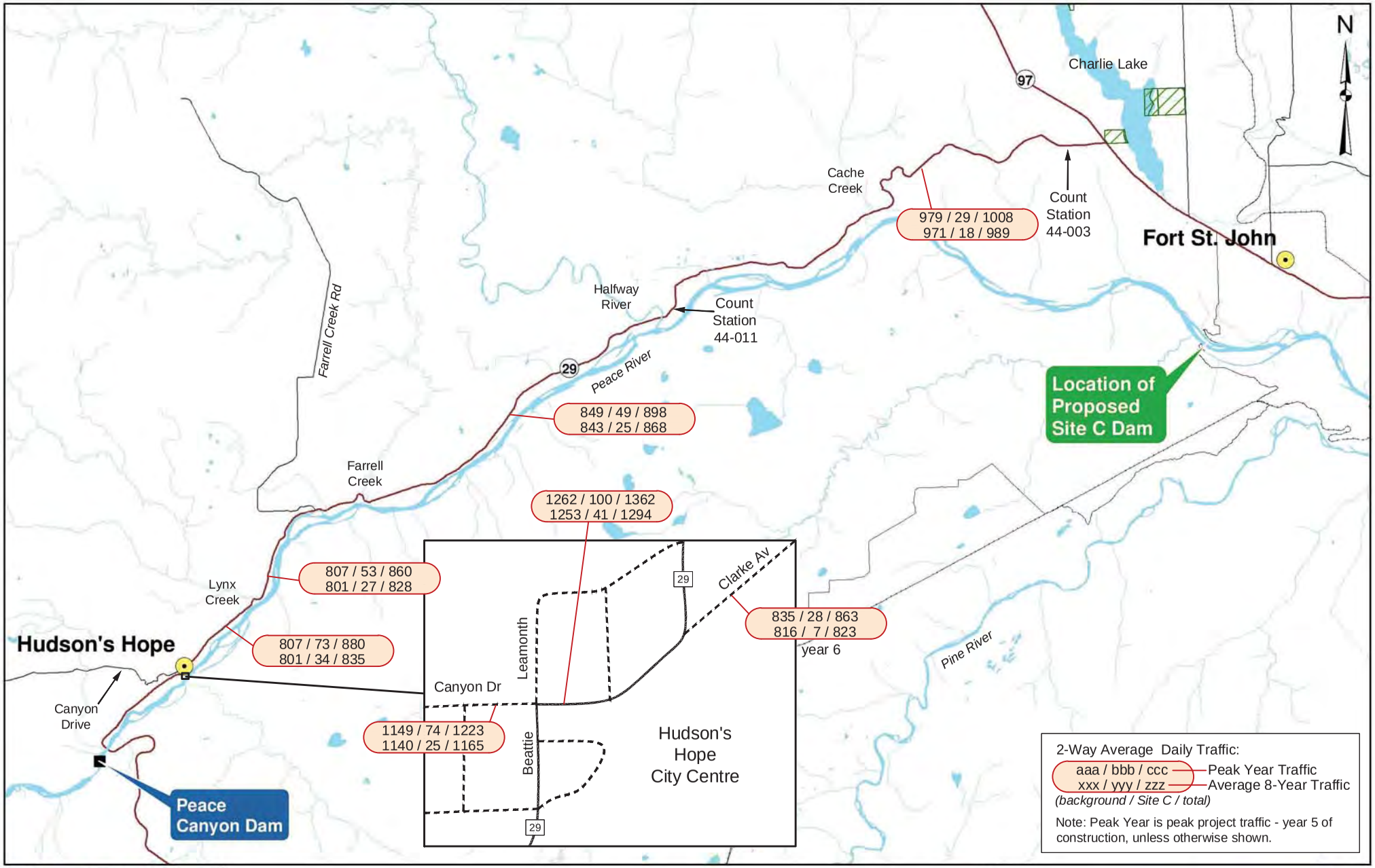
Future background traffic was estimated by applying the 1.4% per annum growth rate calculated at the MOTI count location #44-011 (Figure 1.2) to the existing background traffic. Future project traffic was estimated by aggregating traffic from the various project activities along the various segments of Highway 29 to create an estimate of the project traffic for all of the project activities.

Figure 3.1 presents the background traffic, the Project traffic and the Total With Project traffic forecasts for all assessed segments related to Highway 29. , This information is presented in terms of two-way Peak Year AADT as well as the eight-year Project Period Average Daily Traffic. More detailed tables presenting the full range of traffic forecasts over a 25-year period and vehicle classification are included in Appendix B: Traffic Forecast Details: Highway 29. The peak year for Highway 29 is Year 5 of the Project based on the combination of Highway 29 Realignment materials delivery and maximum worker movements to and from the dam site.

Background peak year daily traffic volumes range from just over 800 vehicles per day west of Lynx Creek to almost 1,000 vehicles per day between Cache Creek and Highway 97 at Charlie Lake.

In the peak year the contribution of Project traffic to Highway 29 varied from about eight per cent of the total traffic on the western approach to Lynx Creek (73 of 880 vehicles per day) to three per cent of the total traffic on the eastern approach to Cache Creek (29 of 1008 vehicles per day). 8-Year Average volumes dropped to four per cent and two per cent for Lynx Creek and Cache Creek respectively.

Similarly for Canyon Drive traffic the contribution of project traffic varied from about six per cent of the total traffic in the peak year (74 of 1,223 vehicles per day) to just over two per cent for the 8-Year Average traffic. For Clarke Avenue traffic the contribution of project traffic varied from about three per cent of the total traffic in the peak year (28 of 863 vehicles per day) to less than one per cent for the 8-Year Average traffic.



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:310,000

0 — 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 29
Peak Year and 8-Year
Average Traffic Comparison

FIGURE 3.1

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-4	v1

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Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification.

3.2 TRAFFIC OPERATIONS: HIGHWAY 29

The Highway 29 realignment segments are rural highway segments intersected by a variety of rural local roadways, mainly resource roads. Farrell Creek Road is the intersection in this portion of the highway with the greatest number of turning movements. As a result, the traffic operations at this location should be equivalent or worse than those of other intersections within this portion of the highway and the results here will be used as indicative of all of the intersections along the rural portion of Highway 29 between Hudson's Hope and Charlie Lake. As Clarke Avenue will be the access point to the Hudson`s Hope Berm Project and Canyon Drive is the access to the Portage Mountain Quarry the intersections of these two roads with Highway 29 will also be analyzed.

Background and Total With Project traffic operations analyses were carried out for the three intersections mentioned above. The results are presented in Figure 3.2, Highway 29 Background Peak Year Traffic Operations, Figure 3.3, Highway 29 Peak Year Traffic Operations with Site C, and Figure 3.4, Highway 29 Peak Year Traffic Operations Level of Service Comparison with comparative details also provided in Table 3.1.

For Farrell Creek Road, the results, presented in Figure 3.2, indicate that background traffic operations are within a LoS A. This indicates that adequate gaps are available for vehicles turning out of Farrell Creek Road. For the With Project case (Figure 3.3), the service levels reach a LoS B but again with a maximum delay of 10 seconds per vehicle. As 10 seconds is the threshold for LoS A, this indicates a rounding down from a delay just over 10 seconds per vehicle. Again, adequate gaps are available for vehicles turning out of Farrell Creek Road. The comparison with the Background traffic presented in Figure 3.4 and Table 3.1 shows the drop in LoS from A to B to be expected by the addition of Project traffic caused by less than 1 second of additional delay.

However, it should be noted that the traffic operations analysis is intended to address the effects of conflicting traffic on the turning or through vehicles. It does not address geometric difficulties such as narrow lanes or inadequate turning radii. It is understood that longer heavy vehicles (non-project traffic as project traffic is not anticipated to use Farrell Creek Road), often have difficulties turning right into Farrell Creek Road requiring a swing into the opposing lane to make their turn.

Clarke Avenue in Hudson's Hope is the access road leading to DA Thomas Road and on to the Hudson's Hope berm works. As a result, the intersection of Clarke Avenue with Highway 29 was assessed operationally. The results for the background traffic, as presented in Figure 3.2, indicate that the existing service level is LoS B. These vehicles would have an average delay of about ten seconds per vehicle. The results for the With Project scenario, presented in Figure 3.3, indicate that the service level is also a LoS B for traffic turning left out of Clark Avenue with an average delay of 10 seconds per vehicle. The comparison with the Background traffic presented in Figure 3.4 and Table 3.1 shows that there is no drop in LoS to be expected by the addition of project traffic with the LoS remaining at a LoS B.

Canyon Drive also in Hudson's Hope is the access roadway to Portage Mountain. As a result, the intersection of Canyon Drive with Highway 29 was assessed operationally. The results for

the background traffic, as presented in Figure 3.2, indicate that existing service levels range to LoS B. The maximum delay encountered would be an average delay of about 12 seconds per vehicle for the northbound left turn. The results for the With Project scenario presented in Figure 3.3 indicate that the service level is LoS B for traffic on the south (Beattie Drive) leg with an average delay of 12 seconds per vehicle for vehicles turning left onto Canyon Drive and 10 seconds for the through and right turn (onto Highway 29). The comparison with the Background traffic presented in Figure 3.4 and Table 3.1 shows that there is a slight drop in LoS to be expected by the addition of project traffic with through and right turning traffic on Beattie Drive dropping from a LoS A to a LoS B. However, from Table 3.1 it is apparent that this occurs as a result of the fact that background LoS A traffic is right at the threshold at 9.9 seconds per vehicle delay and that it is only a 0.2 additional seconds of delay which pushes it over the threshold.

There are currently a number of problem spots along Highway 29. These are, in particular, a few of the steeper and more curvilinear portions of the highway where the differential in speed between heavy vehicles and passenger vehicles is more acute, passing opportunities fewer and “platoons” of vehicles often form. Fortunately, a number of these curvilinear areas occur where the Highway 29 realignments would occur. This is because they occur where the smaller river valleys feeding the Peace River need to be crossed by the highway. As these rivers would see their water levels rise with the filling of the reservoir, new bridges and highway approach realignments are proposed. These proposed realignment areas would be constructed to a higher standard than the existing highway, reducing many of the grades and ’flattening’ the horizontal curves. Figure 1.2 illustrates the locations of these realignment areas and the straighter realignments proposed. In addition, there are a number of hill sections that affect vehicle operations:

- “The Hump”, located immediately west of Farrell Creek Road;
- A hill located east of Halfway River;
- Watson Hill, located immediately west of Bear Flat.

Additional project traffic, particularly workers from Hudson’s Hope and material deliveries from Portage Mountain, would travel along Highway 29 through these sections. These would be countered by the reduction in delay and improved safety during the last 2 years of the Project period and into the future as the higher standard realignment sections are put in place, one of which would be an improvement over the existing condition on the hill west of Farrell Creek Road.

The additional traffic in the peak year for these hill sections is presented in Figure 3.1 with details provided in Appendix B. During the Peak Year (year 4) of “The Hump”, additional traffic consists of 73 of an estimated 880 vehicles per day or about 8% of the total. 26 of these trips would be attributed to the workforce commuters which would largely be passenger vehicles and pick-up trucks with the remaining 46 (32% of total trucks) being heavy vehicles. Of the 46 heavy vehicles per day, approximately 5 of these would be travelling during the peak hour, 2.5 heavy vehicles per direction or 1 additional heavy vehicle every 20 minutes. These numbers trail off quickly for the non Peak Years. The total proportion of additional trucks attributable to the Project averaged over the entire project period is 18 trucks per day (16% of the total trucks) or

about 2 trucks during the peak hour. The numbers for the east of Halfway and Watson Hills are about ¾ of these as deliveries to the Farrell Creek Realignment are accounted for. As a result, trucks can be expected to have minimal operational affect on commuters travelling between Hudson's Hope and Fort St. John. Traffic safety is covered more thoroughly in the Roadway Safety Engineering Study Site C Clean Energy Project (Safety Report) included in Appendix H.

Table 3.1 Highway 29 Peak Year Traffic Operations Level of Service Comparison

Location	Leg	Level of Service (LoS)					
		Without Project			With Project		
		L	Th	R	L	Th	R
Canyon Drive							
EB	Canyon	A	A	A	A	A	A
WB	Hwy 29	A	A	A	A	A	A
NB	Beattie	B	A / 9.9	A / 9.9	B	B / 10.1	B / 10.1
SB	Beattie	B	B	B	B	B	B
Clarke Ave.							
EB							
WB	Clarke	B		B	B		B
NB	Hwy 29		A	A		A	A
SB	Hwy 29	A	A		A	A	
Farrell Creek Rd.							
EB	Farrell Cr	A / 9.9		A / 9.9	B / 10		B / 10
WB							
NB	Hwy 29	A	A		A	A	
SB	Hwy 29		A	A		A	A

L – Left Turn, Th – Through, R – Right Turn

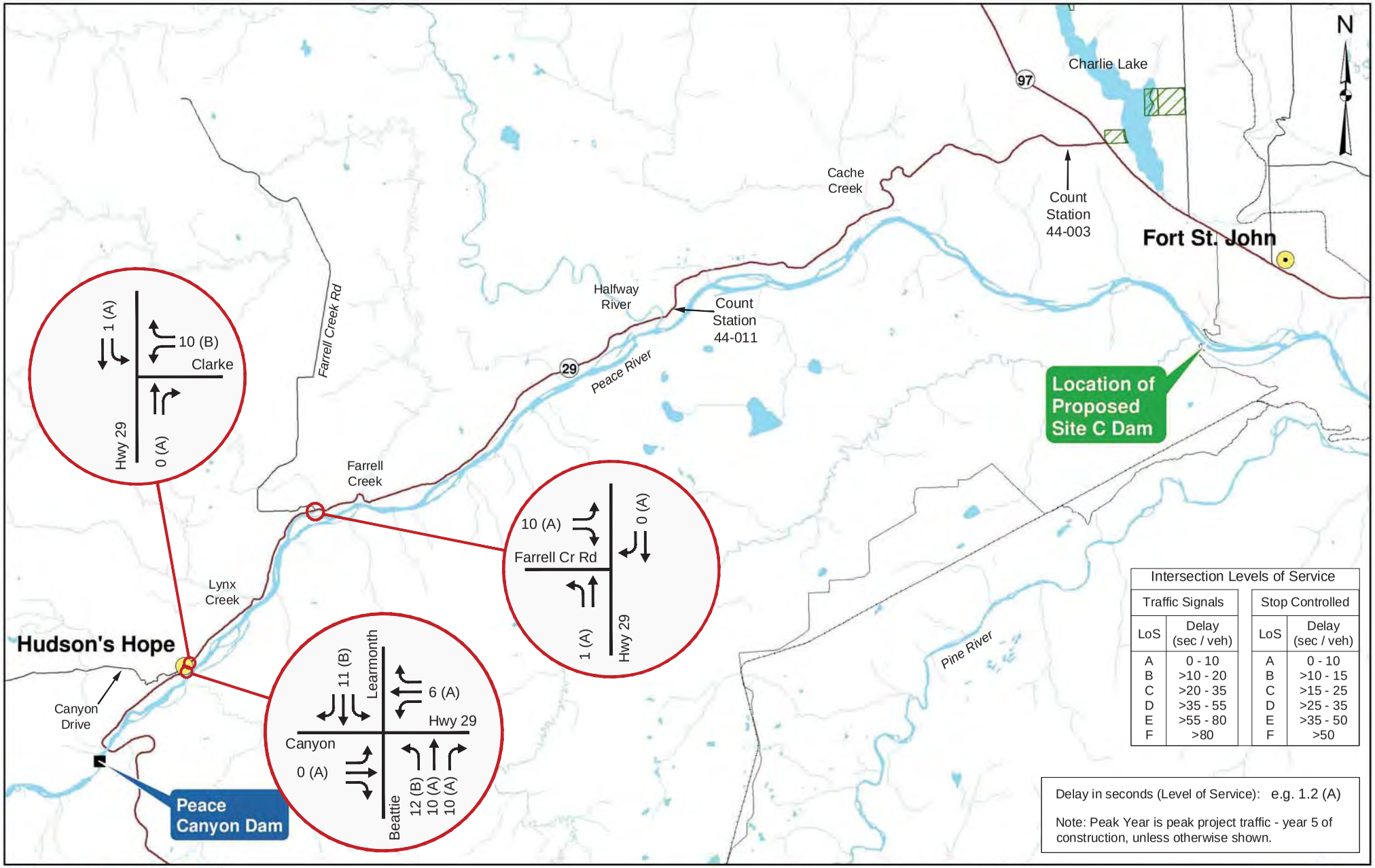
Level of Service Criteria

Traffic Signals

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

Four Way Stop Control

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50



Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): e.g. 1.2 (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:310,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 29
Background Peak Year Traffic Operations

FIGURE 3.2

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-5	v1

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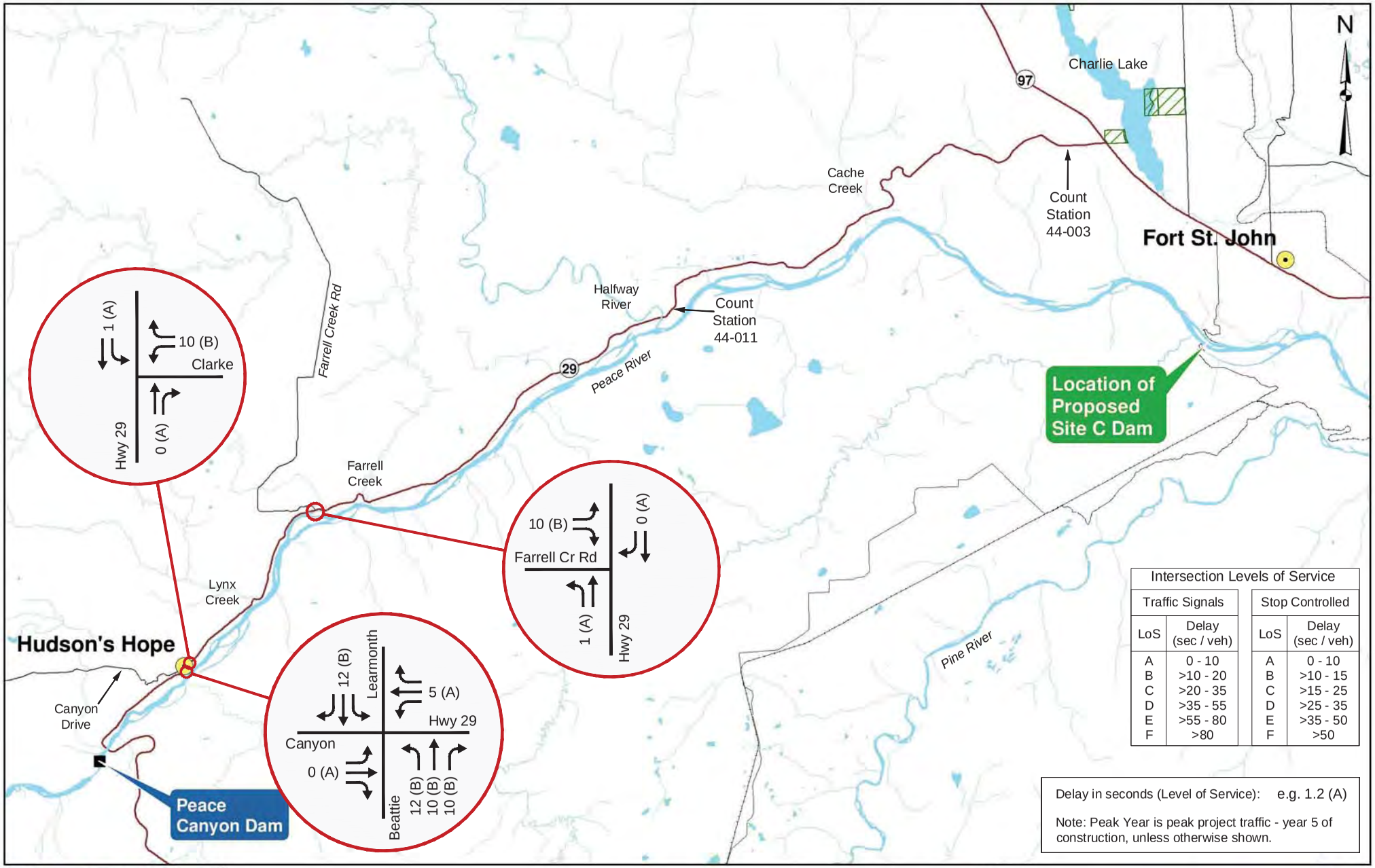

Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): e.g. 1.2 (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:310,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 29
Peak Year Traffic Operations with Project

FIGURE 3.3

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-6	v1

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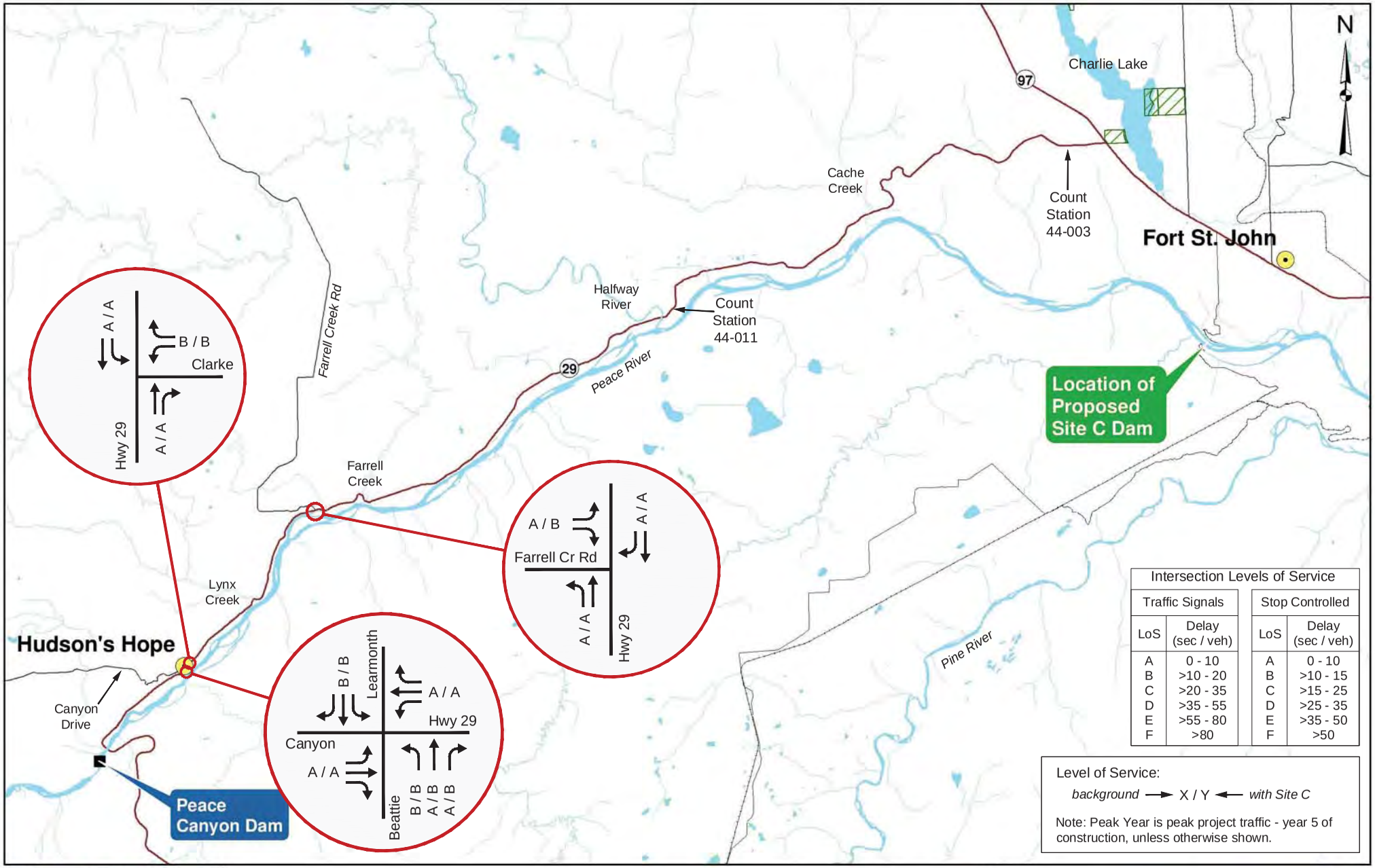

Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Level of Service:

background → X / Y ← *with Site C*

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:310,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 29
Peak Year Traffic Operations
Level of Service Comparison

FIGURE 3.4

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-7	v1

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3.2.1 Traffic Management During Construction

Traffic Management plans would be required for the construction sites along Highway 29 and the access point(s) for the Hudson's Hope berm. While these would be prepared prior to construction as more details of the actual contracting arrangements are known, some general comments as to what could be expected can be made at this time.

The Highway 29 Realignment projects would be constructed parallel to, and out of the highway right-of-way, generally north of the existing highway location. As such, these types of projects are considerably different from "On-Line" projects such as the 4-laning of an existing 2-lane highway. On-Line projects often require single lane alternating traffic (SLAT) when works are carried out immediately adjacent to, or even within, the actual existing travel lanes with considerable disruption to the motoring public. The potential result of the highway realignment projects would largely be limited to allowing heavy vehicles access into and out of a few project tie in points. While traffic management personnel would be required for this, and may occasionally need to stop traffic to allow exiting heavy vehicles to turn onto the highway, these changes are considerably less than the delays and queuing typically experienced with SLAT management scenarios. Occasional limited sections of SLAT may be required during the construction of the tie-in points for the off-line segments.

4.0 HIGHWAY 97 NORTH (FORT ST. JOHN, TAYLOR, DAWSON CREEK)

4.1 TRAFFIC FORECASTS: HIGHWAY 97 NORTH (FORT ST. JOHN, TAYLOR, DAWSON CREEK)

Average Annual Daily Traffic (AADT) was estimated for background traffic for the existing (2011) year. Background traffic was then forecast into the future for the Background scenario and Project traffic added for the "With Project" scenario.

A number of areas were selected based on known routes that would be taken by project oriented traffic. Specific areas considered shown in Figure A-2 in Appendix A were:

- The segment of Highway 97 south of Charlie Lake with proposed interaction between Fort St. John and the Highway 29 Relocation and Hudson's Hope berm construction activities, as well as logging from proposed reservoir clearing along the north bank of the Peace River, and worker movements from Highway 29, Hudson's Hope and areas in the Peace River Regional District north of Charlie Lake
- The segment of Highway 97 between 271 Road and Old Fort Road subject to interaction between Fort St. John and the Highway 29 realignment and Hudson's Hope berm construction activities, logging from reservoir clearing along the north bank of the Peace River, worker movements from Highway 29, Hudson's Hope and areas in the Peace River Regional District north of Charlie Lake, as well as the movement of temporary riprap from Wuthrich Quarry (off 271 Road) to the north bank dam site
- The segment of Highway 97 south of 85th Avenue subject to clearing volumes originating from the north bank of the Peace River, worker movements from Taylor and Dawson Creek, as well as materials and equipment transport from Alberta and B.C. destined for the north bank
- The segment of Highway 97 south of 72nd Street subject to worker movements from Taylor and Dawson Creek, as well as materials and equipment transport from Alberta and B.C. destined for the north bank

The background analysis was based on existing data collected from the BC Ministry of Transportation and Infrastructure website and databases whenever possible. However, as little data has been collected by MOTI over the last decade, this was supplemented with data collected by BC Hydro during 2011 as follows:

- Highway 97 at Highway 29, Charlie Lake: Manual turning movement counts obtained in August 2011
- Highway 97 at 269 Road, 271 Road and 100th Avenue: Manual turning movement counts obtained in November 2011

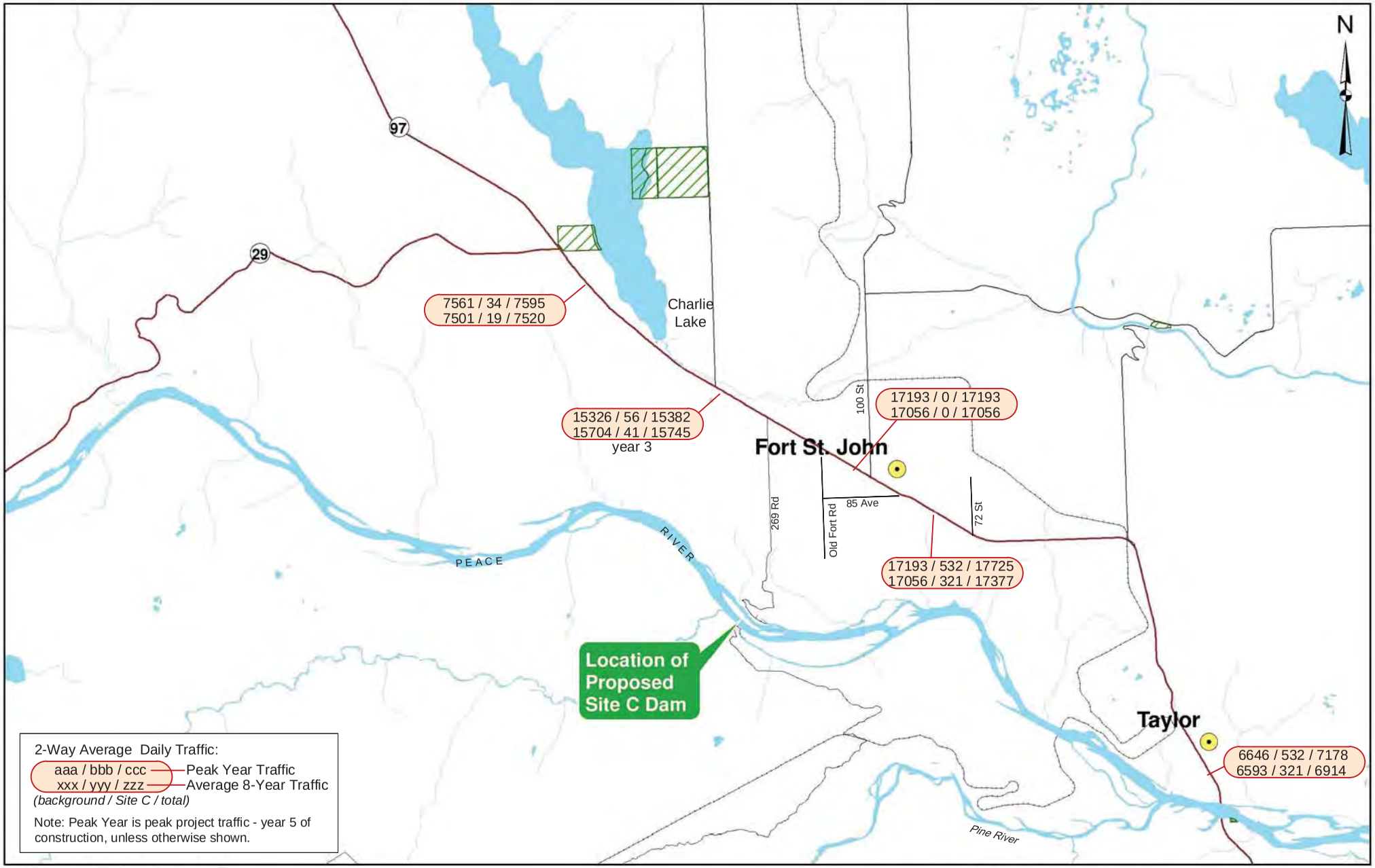
Analysis of the daily traffic patterns suggests that Highway 97 has typical urban travel patterns with distinct morning and afternoon directional peaks. In other words, the prevailing pattern on Highway 97 is "commuter" trips in and around Fort St. John.

Future background traffic was estimated by applying the 1.5% per annum growth rate calculated at the MOTI count location #44-003 (Figure 1.2) to the existing background traffic. Future

project traffic was estimated by aggregating traffic from the various project activities along the various segments of Highway 97 to create an estimate of the project traffic for all of the project activities.

Figure 4.1 presents the background traffic, the Project traffic and the Total With Project traffic forecasts for the individual segments assessed for Highway 97. This information is presented in terms of two-way Peak Year AADT as well as the eight-year Project Period Average Daily Traffic. More detailed tables presenting the full range of traffic forecasts over a 25-year period and vehicle classification are included in Appendix C: Traffic Forecast Details: Highway 97 North. For the peak year background daily traffic volumes on Highway 97 range from almost 7,600 vehicles per day south of the intersection at Highway 29 near Charlie Lake, to over 17,000 vehicles per day in the vicinity of Old Fort Road, and over 6,600 between Fort St. John and Dawson Creek.

The forecasts of traffic from each of the Project activities were aggregated along the various segments of Highway 97 to create an estimate of the total With Project traffic for all of the project activities and activities. In the peak year, in the urban area of Highway 97 between 85th Avenue and Charlie Lake, the contribution of project traffic varied from under 1 per cent of the total traffic on the southern approach to Highway 29 at Charlie Lake (34 of 7,595 vehicles per day) to three per cent of the total traffic on the southern approach to the traffic signal at 85th Avenue / 92A Street (532 of 17,725 vehicles per day). In the rural area of Highway 97 towards Taylor, the contribution of project traffic to Highway 97 was less than over 7 per cent of the total traffic between the two communities (532 of 7,178 vehicles per day). 8-Year Average volumes were below one per cent for all areas of the highway.



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:165,000

0 4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 97 North
Peak Year and 8-Year
Average Traffic Comparison

FIGURE 4.1

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-8	v1

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4.2 TRAFFIC OPERATIONS: HIGHWAY 97 NORTH (FORT ST. JOHN, TAYLOR, DAWSON CREEK)

The Highway 97 North segments of interest (Figure A-2, Appendix A) are access controlled highway segments intersected by a variety of both rural and urban local roadways. Intersections of interest within these segments are as follows:

- Highway 97 at Old Fort Road / 100th Avenue
- Highway 97 at 100th St.
- Highway 97 at 85th Avenue / 92A Street
- Highway 97 at 269 Road
- Highway 97 at 271 Road
- Highway 97 at Highway 29 (Charlie Lake)

Background and Total With Project traffic operations analyses were calculated at each of the above intersections. The results are presented in the Figure 4.2, Highway 97 North Background Peak Year Traffic Operations, Figure 4.3 Highway 97 North Peak Year Traffic Operations with Project, and Figure 4.4, Highway 97 North Peak Year Traffic Operations Level of Service Comparison with comparative details also provided in Table 4.1.

Highway 97 at Old Fort Road / 100th Avenue is a signalized intersection that would carry the greatest volume of project traffic as it is assumed to be the main access to the Site south of the highway for residents of Fort St. John and workers residing in Fort St. John. Since the highway has been recently upgraded through this section, background service levels are generally LoS C with delays up to 35 seconds (Figure 4.2). Slightly heavier delays for background traffic are observed particularly to the southbound left turn movement from 100th Avenue onto the highway with LoS D and an average delay of about 36 seconds per vehicle. The results of the traffic operations analysis with the Project traffic for this intersection are presented in Figure 4.3. They indicate that, as the highway has been recently upgraded, traffic operations with the Project can be expected to remain within adequate levels. There would be some delays observed, particularly to the southbound left turn movement from 100th Avenue onto the Highway with a LoS D logged and average delays increasing to 43 sec/vehicle. The comparison with the background traffic presented in Figure 4.4 shows that there would no drop in LoS to be expected by the addition of the Project during this peak.

Highway 97 at 100th Street is a signalized intersection that is also expected to be used by Project vehicles as it is an alternative access to residential areas of Fort St. John. Since the highway has been recently upgraded through this section, background service levels generally range to LoS B with a maximum delay of 19 seconds (Figure 4.2). The results of the traffic operations analysis with the Project for this intersection are presented in Figure 4.3. They indicate that as the highway has been recently upgraded, traffic operations with the Project would be generally within service levels in the LoS A to C range with no delays higher than 21 second per vehicle. The comparison with the background traffic presented in Figure 4.4 shows that there would be a slight drop in LoS to be expected by the addition of the Project during this peak year with the LoS for the westbound left turn movement from the highway onto 100th Street

dropping from a LoS A to a LoS B and the LoS for the southbound left turn movement from 100th Street onto the highway dropping from a LoS B to a LoS C. Table 4.1 shows that this occurs as a result of delays just crossing the threshold limits with less than a 3 second per vehicle delay difference.

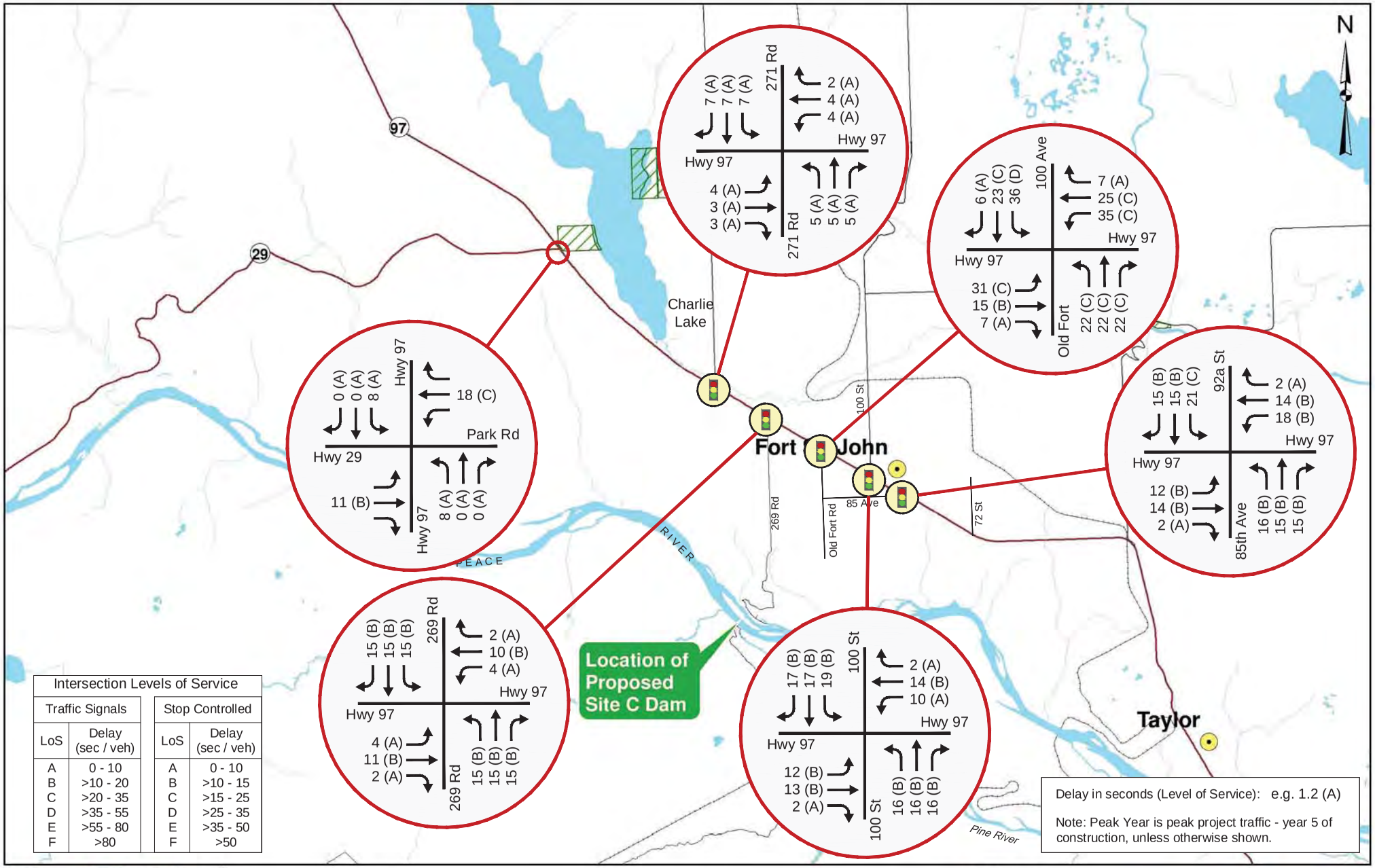
Highway 97 at 85th Avenue / 92A Street is a signalized intersection that may also carry project traffic. This intersection is assumed to be the main access to the Project north bank site for residents arriving from or destined for Taylor and Dawson Creek. It is also the main access for materials and equipment arriving from Alberta and for all goods destined for the north bank camp. Since the highway has been recently upgraded through this section, existing service levels are generally at LoS B with a maximum delay of 18 seconds (Figure 4.2) with the exception of the southbound left turn at LoS C and a delay of 21 seconds. The results of the traffic operations analysis with the Project for this intersection are presented in Figure 4.3. They indicate that, as the highway has been recently upgraded, traffic operations with the Project would similarly be at LoS B with the exception of the southbound left turn at LoS C but also with a LoS C for the westbound left turn from the highway. The comparison with the background traffic presented in Figure 4.4 shows that there would be a drop in LoS from B to C for the westbound left turn from the highway based on an additional 8 seconds per vehicle of delay (18 to 26 seconds per vehicle) to be expected by the addition of the Project during this peak year.

Highway 97 at 269 Road is a signalized intersection. Use of 269 Road for Project traffic may be restricted due to the relatively dense residential development. However, Project traffic destined to Old Fort Road would go through this intersection on the highway. Since the highway has been recently upgraded through this section, existing service levels are generally at LoS B with a maximum delay of 15 seconds (Figure 4.2). The results of the traffic operations analysis with the Project for this intersection are presented in Figure 4.3. They indicate that as the highway has been recently upgraded, traffic operations with the Project would be generally within service levels in the LoS A to B range with no delays higher than the 15 seconds per vehicle to be expected under project loading conditions. The comparison with the background traffic presented in Figure 4.4 shows that there is no drop in LoS anticipated by the addition of project traffic during the Project's peak year.

Highway 97 at 271 Road is a signalized intersection that would carry Project traffic for temporary riprap transport from the Wuthrich Quarry. Due to recent highway upgrades, existing service levels are at LoS A with a maximum delay of seven seconds (Figure 4.2). The results of the traffic operations analysis with the Project for this intersection are presented in Figure 4.3. They indicate that as the highway has been recently upgraded, traffic operations with the Project would generally be within service levels in the LoS A range with no delays higher than the 7 seconds per vehicle to be expected under project loading conditions. The comparison with the background traffic presented in Figure 4.4 shows that there would be no drop in LoS anticipated by the addition of project traffic during the Project's peak year.

Highway 97 at Highway 29 near Charlie Lake is an unsignalized intersection that would also carry Project traffic. This intersection would be the main access to the project north bank site for residents residing north of Fort St. John along Highway 97, Highway 29 and Hudson's Hope. Due to recent highway upgrades existing service levels are generally in the LoS A to C range with a maximum delay of 18 seconds (Figure 4.2). The results of the traffic operations analysis

with the Project for this intersection are presented in Figure 4.3. They indicate that as the highway has been recently upgraded, traffic operations with the Project would be generally within service levels in the LoS A to C range with a maximum delay of 19 second. The comparison with the background traffic presented in Figure 4.4 shows that there is no drop in LoS anticipated by the addition of project traffic during the Project's peak year.



Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): e.g. 1.2 (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:165,000

0 4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 97 North
Background Peak Year Traffic Operations

FIGURE 4.2

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-9	v1

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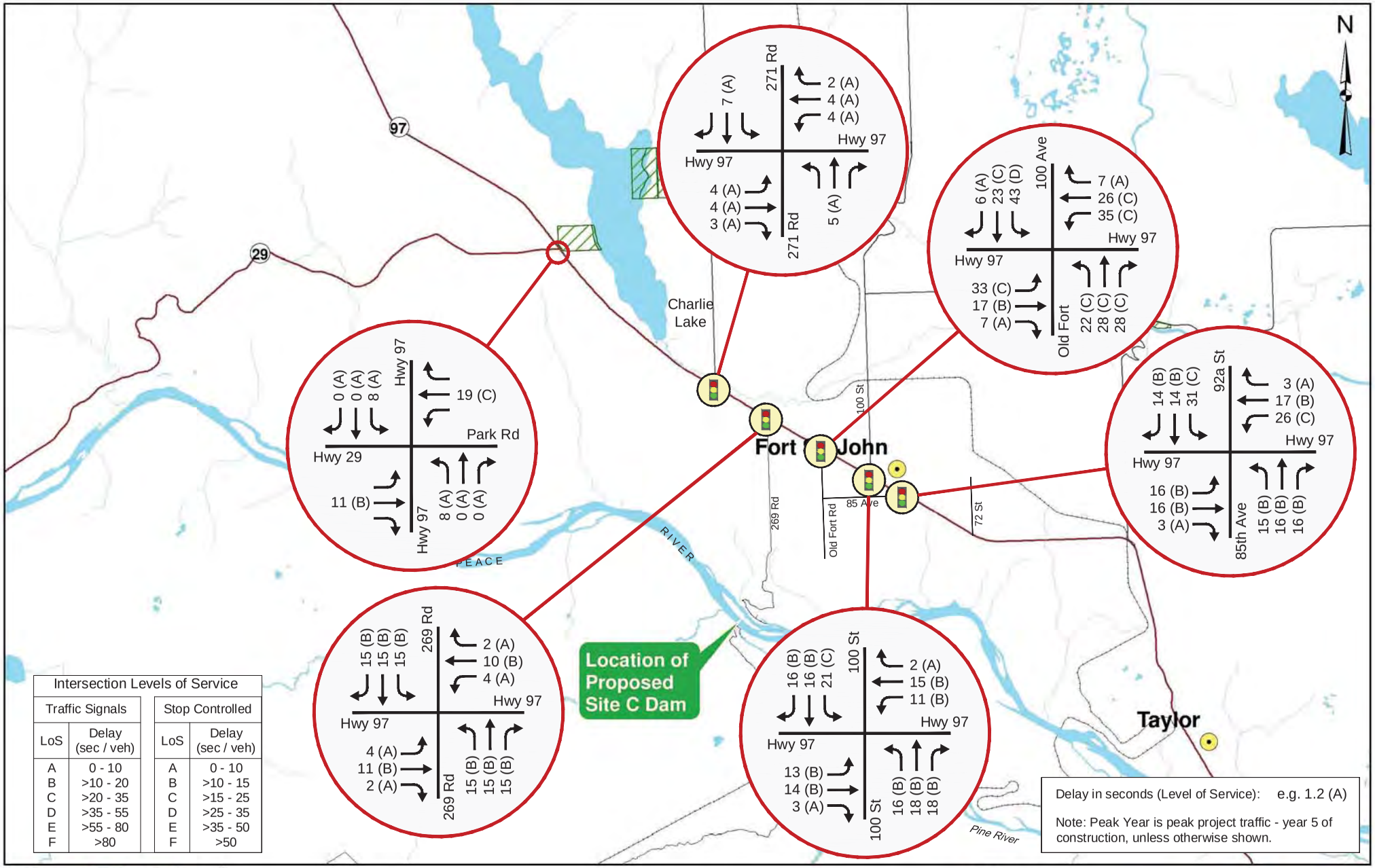

Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): e.g. 1.2 (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:165,000

0 4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 97 North
Peak Year Traffic Operations with Project

FIGURE 4.3

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-10	v1

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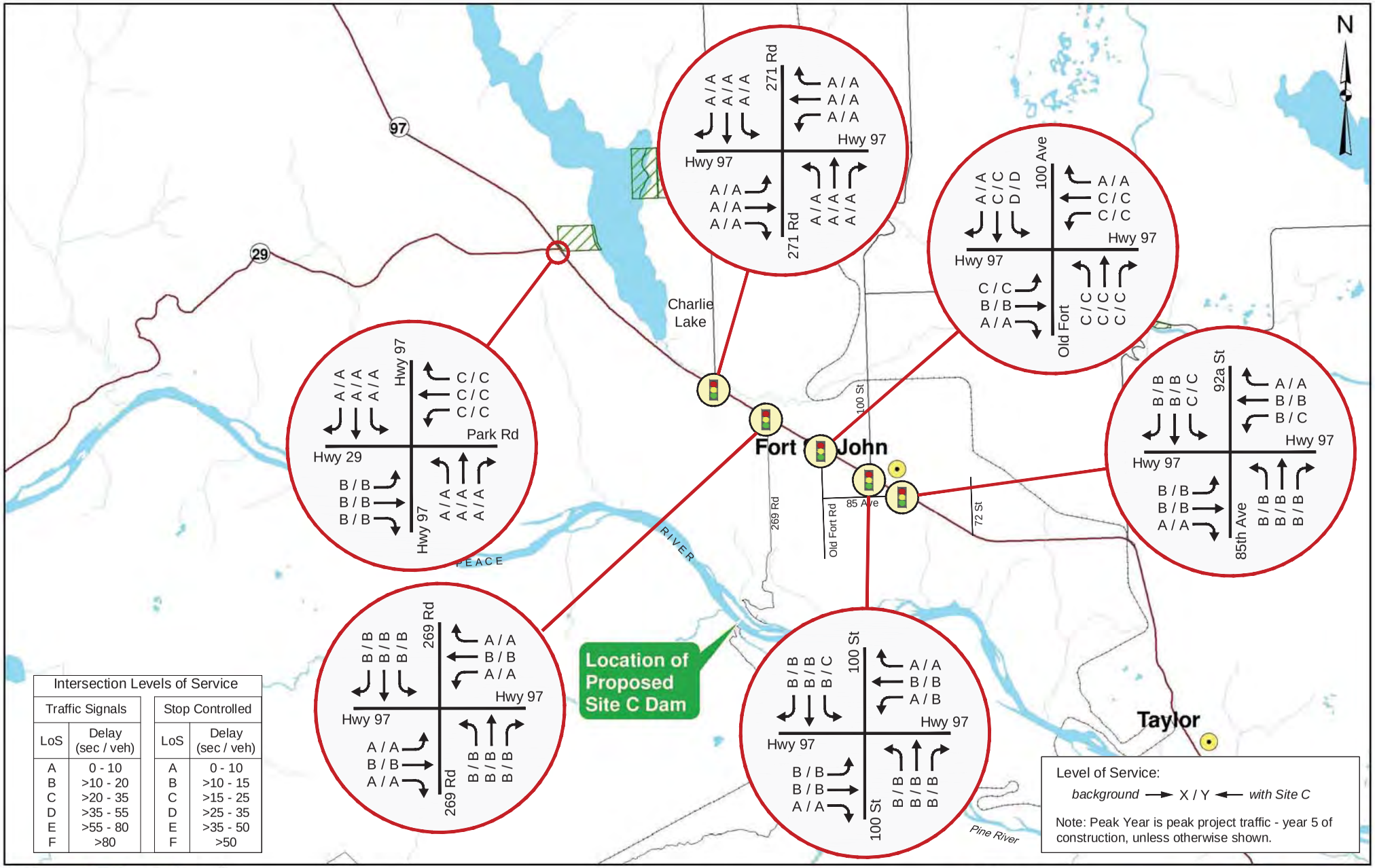

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Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification.

Table 4.1: Peak Year Traffic Operations Level of Service Comparison

Location	Leg	Level of Service (LoS)					
		Without Project			With Project		
		L	Th	R	L	Th	R
Hwy 97 @ Hwy 29 Charlie Lake							
EB	Hwy 29	A	A	A	A	A	A
WB	Hwy 29	A	A	A	A	A	A
NB	Hwy 97	B	B	B	B	B	B
SB	Hwy 97	C	C	C	C	C	C
Hwy 97 @ 271 Rd.							
EB	Hwy 97	A	A	A	A	A	A
WB	Hwy 97	A	A	A	A	A	A
NB	271 Rd.	A	A	A	A	A	A
SB	271 Rd.	A	A	A	A	A	A
Hwy 97 @ 269 Rd.							
EB	Hwy 97	A	B	A	A	B	A
WB	Hwy 97	A	B	A	A	B	A
NB	269 Rd.	B	B	B	B	B	B
SB	269 Rd.	B	B	B	B	B	B
Hwy 97 @ Old Fort							
EB	Hwy 97	C	B	A	C	B	A
WB	Hwy 97	C	C	A	C	C	A
NB	Old Fort	C	C	C	C	C	C
SB	Old Fort	D	C	A	D	C	A
Hwy 97 @ 100th St.							
EB	Hwy 97	B	B	A	B	B	A
WB	Hwy 97	A / 9.7	B	A	B / 11.1	B	A
NB	100th St.	B	B	B	B	B	B
SB	100th St.	B / 18.6	B	B	C / 21.1	B	B
Hwy 97 @ 85th Ave							
EB	Hwy 97	B	B	A	B	B	A
WB	Hwy 97	B / 17.7	B	A	C / 26	B	A
NB	85th Ave.	B	B	B	B	B	B
SB	85th Ave.	C	B	B	C	B	B

L – Left Turn, Th – Through, R – Right Turn

Legend: Change in Level of Service

5.0 HIGHWAY 97 SOUTH (CHETWYND SOUTH)

5.1 TRAFFIC FORECASTS: HIGHWAY 97 SOUTH (CHETWYND)

Average Annual Daily Traffic (AADT) was estimated for background traffic for the existing (2011) year. Background traffic was then forecast into the future for the Background scenario and Project traffic added for the "With Project" scenario.

A number of areas were selected based on known routes that would be taken by project oriented traffic. Specific areas considered presented in Figure A-3 of Appendix A were:

- The segment of Highway 97 west of Highway 29 subject to delivery of bulk materials (permanent riprap) from the West Pine Quarry to the south bank dam site as well as the delivery of general materials and equipment to the south bank dam construction sites. This section of Highway was divided into a rural segment in the vicinity of the West Pine Quarry, and a busier urban segment on the approach to Highway 29 within Chetwynd.
- The segment of Highway 29 between Highway 97 and Jackfish Lake Road subject to the delivery of bulk materials (permanent riprap) from the West Pine Quarry to the south bank dam site via Jackfish Lake Road, worker movements from Chetwynd to the south bank worksite as well as the delivery of materials and equipment from the south and west including Prince George, and B.C.'s coastal ports.

The background analysis was based on existing data collected from the BC Ministry of Transportation and Infrastructure website and databases whenever possible. However, as little data has been collected by MOTI over the last decade, this was supplemented with new data collected by both MOTI and BC Hydro during 2011 as follows:

- Highway 97 at Highway 29, Chetwynd: Traffic signal download data obtained in November 2011
- Highway 29 at Jackfish Lake Road: Manual turning movement counts obtained in August 2011

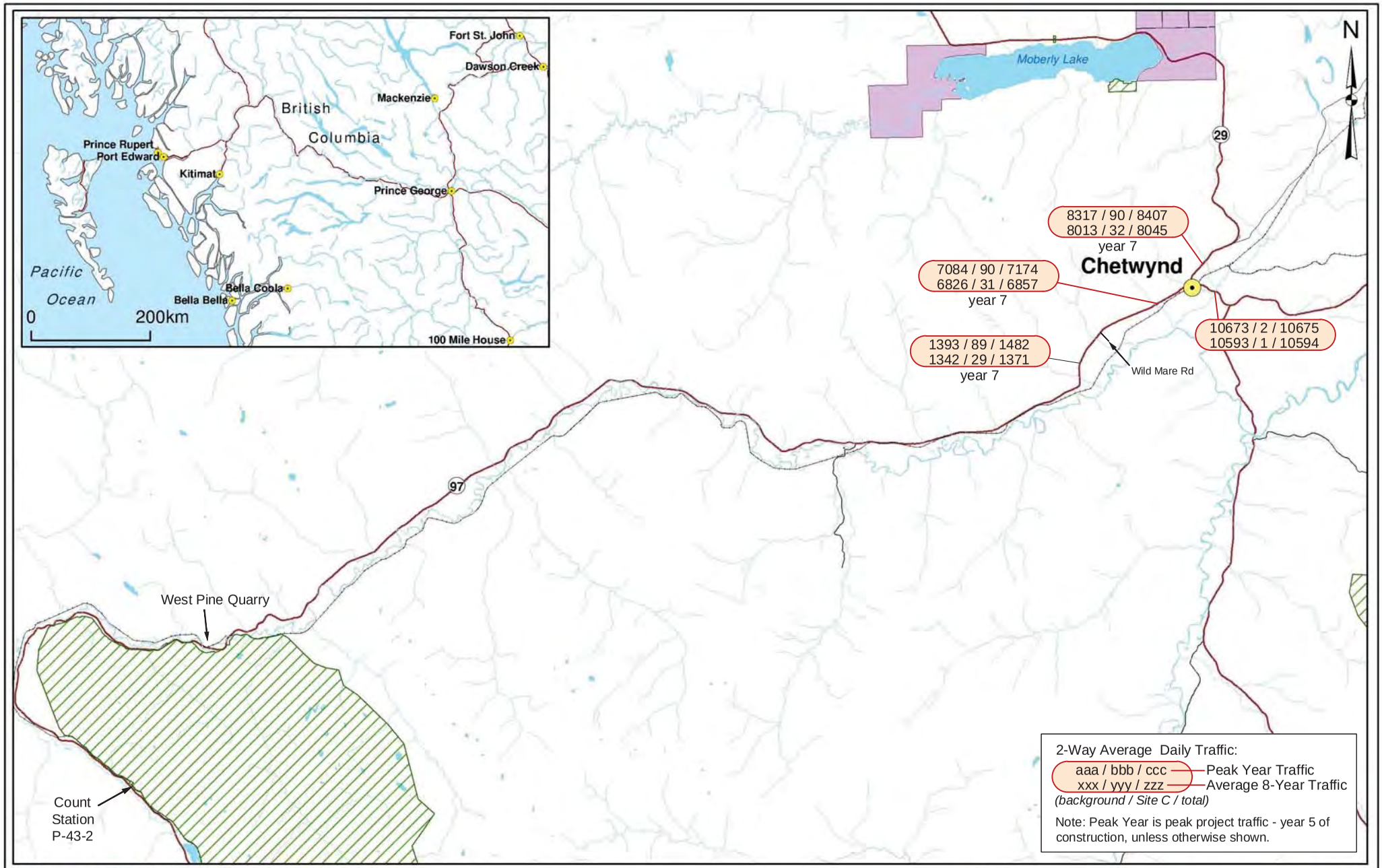
Analysis of daily traffic patterns indicated that they were typical of rural travel patterns with increasing traffic throughout the morning and afternoon peaking at 6 PM with fairly strong directional peaks of over 60% of the two-way traffic total. This is most likely "business" travel through Chetwynd.

Future background traffic was estimated by applying the 1.5% per annum growth rate calculated at MOTI count location P-43-2 located on Highway 97 0.3 kilometres south of the Westcoast Energy Pump Station #2 at Willow Flats (Figure 1.1) to the existing background traffic. Future project traffic was estimated by aggregating traffic from the various project activities along the above segments to create an estimate of the project traffic for all of the project activities.

Figure 5.1 presents the background traffic, the Project traffic and the Total With Project traffic forecasts for the various individual segments, This information is presented in terms of two-way Peak Year AADT as well as the eight-year Project Period Average Daily Traffic. More detailed tables presenting the full range of traffic forecasts over a 25-year period and vehicle classification are included in Appendix D: Traffic Forecast Details: Highway 97 South. For the

peak year, Year 7 of the Project, background daily traffic volumes ranged from almost 1,400 on the rural sections of Highway 97 to the south of Chetwynd to almost 11,000 vehicles per day on Highway 97 east of the Highway 29 traffic signal.

The forecasts of traffic from each of the Project activities were aggregated along the various segments of Highway 97 south to create an estimate of the total With Project traffic for all of the project activities and activities. On Highway 97 South, in the peak year, the contribution of project traffic varied from about six per cent of the total traffic on the rural western approach to Chetwynd (89 of 1,482 vehicles per day) to less than 0.1 per cent of the total traffic on the eastern approach to Chetwynd (2 of 10,675 vehicles per day). 8-Year Average volumes were approximately two and almost zero per cent respectively.



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:315,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 97 South
Peak Year and 8-Year
Average Traffic Comparison

FIGURE 5.1

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-12	v1

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Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification.

5.2 TRAFFIC OPERATIONS: HIGHWAY 97 SOUTH (CHETWYND SOUTH)

The critical element with regard to traffic operations within this area of operations is the signalized intersection of Highway 97 at Highway 29, Chetwynd. This intersection would carry Project traffic as it leads directly to the main access to the south bank camp and south bank construction site at the end of Jackfish Lake Road. Background and Total With Project traffic operations analyses were calculated at this intersection. The results are presented in the Figure 5.2, Highway 97 South Background Peak Year Traffic Operations, Figure 5.3, Highway 97 South Peak Year Traffic Operations with Project, and Figure 5.4, Highway 97 South Peak Year Traffic Operations Level of Service Comparison with comparative details also provided in Table 5.1.

Background service levels at the intersection of Highway 97 at Highway 29, Chetwynd ranged from LoS A to LoS C with a maximum delay of 24 seconds (Figure 5.2). Traffic operations at the signalized intersection of Highway 97 at Highway 29 with the Project (Figure 5.3) also ranged from LoS A to C with a maximum delay of 24 seconds. The comparison with the Background traffic presented in Figure 5.4 shows that there was no drop in LoS to be expected by the addition of project traffic during the Project's peak year.

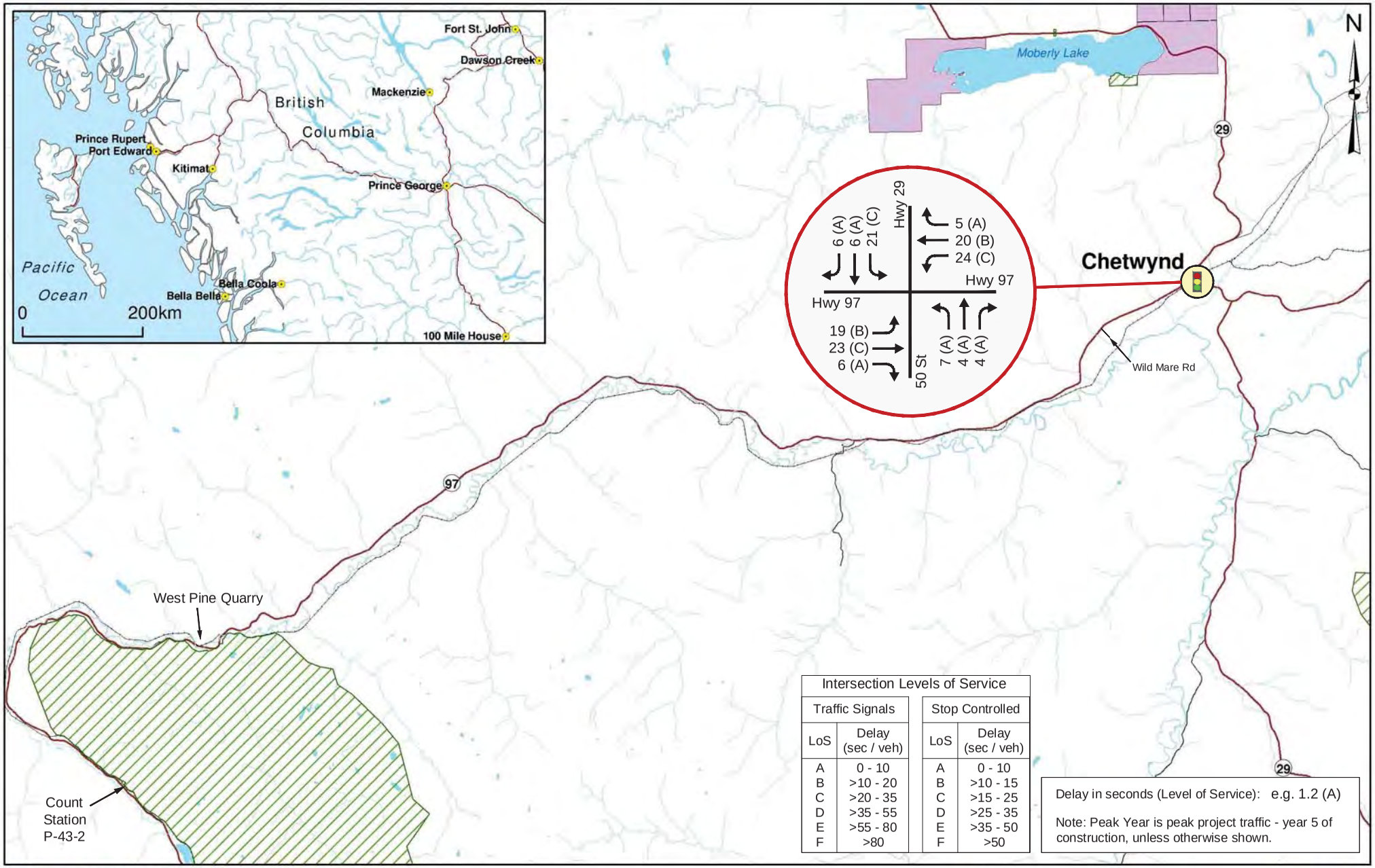
These results take into account the capability of the traffic signal to process the traffic volumes that appear. However, the proximity of the frontage road intersections to the signal may cause some turbulence at the intersection. Fortunately, their interference has already been mitigated by the MOTI in the restriction of the turning movements to right in / right out only. This should cause this turbulence to be minimal.

A few individual existing problem spots that may be exacerbated by additional Project traffic include:

- **The access to Tim Horton's on Highway 97 to the east of Highway 29.** This access lies beyond the turn-off from Highway 97 eastbound onto Highway 29 northbound, the regular route that would be taken by heavy vehicles destined to the south bank camp via Jackfish Lake Road. As a result trucks travelling between the West Pine Quarry and the south bank dam site would not typically drive directly past the entrance. In addition to this there are presently over 9,000 vehicles, including 2,000 trucks per day driving past this site. The Project total trucks south of the Highway 97 / Highway 29 intersection in the peak year would number just over 100, so they would account for an additional 4% of the truck traffic should they go north to access the Tim Horton's. Therefore, the additional truck traffic should not present any concerns to the highway operations at this restaurant.
- **The merge point on Highway 29 at the end of the 2-lane northbound segment just north of Highway 97.** Merging can often be a challenging manoeuvre, particularly under higher traffic conditions. The urban portion of Highway 29 within Chetwynd presently has over 8,000 vehicles per day and in the range of 900 vehicles per hour with 600 northbound merging. Merging capacity is usually in the 1,400 vehicles per hour to 1,600 vehicles per hour range. The Project total trucks on Highway 29 in the peak year would number just over 100 (10 per hour, 5 northbound) so they would account for an

additional 1% of the traffic merging at this location. Therefore, it is not anticipated that the increase in truck traffic would affect traffic operations.

- **The access points to the West Fraser Mills on Highway 29 north of Highway 97.** This access can be difficult for vehicles to exit from as a result of the large proportion of slower moving heavy vehicles as well as higher traffic volume periods on Highway 29. The left turn out can be particularly challenging as vehicles need to find a gap of approximately 7 seconds or more, depending on vehicle size, in the two way traffic stream. Service levels for the left out movement onto a major street drop into the LoS E range when 2-way traffic volumes reach about 1,500 vehicles per hour. Current volumes are almost 900 vehicles per hour on Highway 29. The Project segment peak year would be 2021 with future background traffic volumes estimated at just over 1,000 vehicles per hour. The project incremental traffic volume of 100 vehicles per day or 10 vehicles per hour would have minimal incremental impact on the egress operations.



Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): e.g. 1.2 (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:315,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 97 South
Background Peak Year Traffic Operations

FIGURE 5.2

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-13	v1

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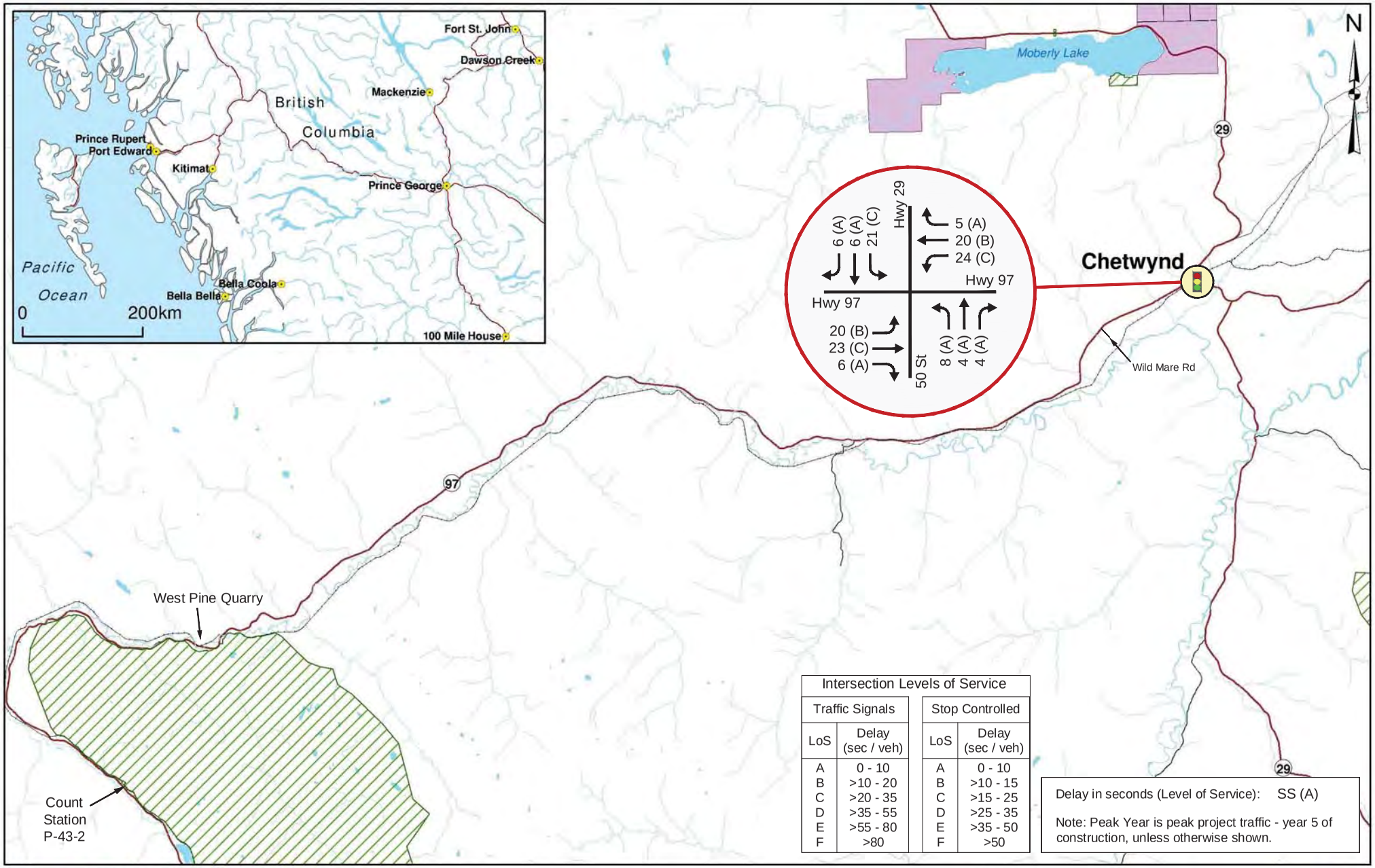

Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): SS (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:315,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 97 South
Peak Year Traffic Operations with Project

FIGURE 5.3

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-14	v1

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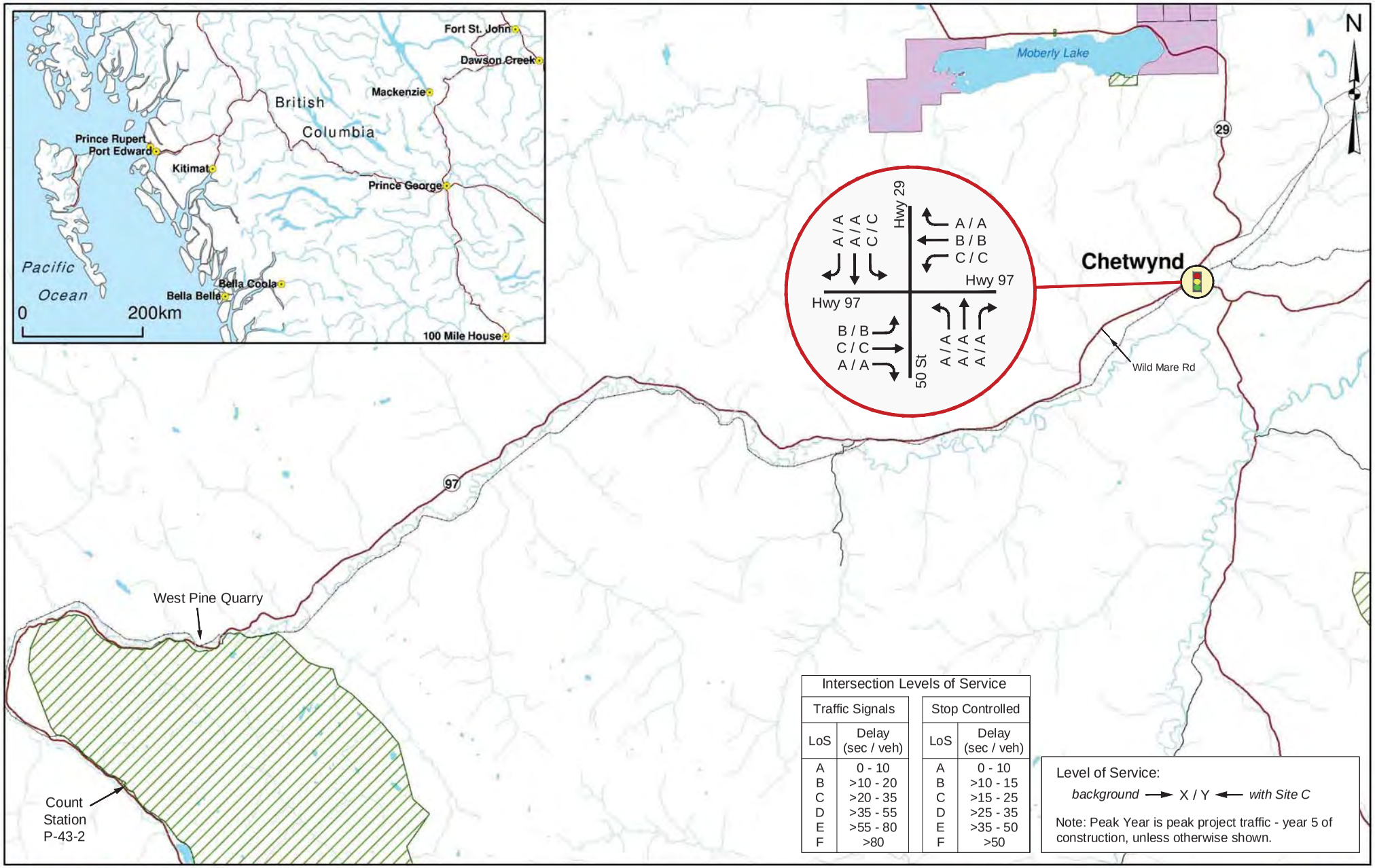

Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Level of Service:

background → X / Y ← *with Site C*

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:315,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Highway 97 South
Peak Year Traffic Operations
Level of Service Comparison

FIGURE 5.4

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-15	v1

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Table 5.1 Highway 97 South Peak Year Traffic Operations Level of Service Comparison

Location	Leg	Level of Service (LoS)					
		Without Project			With Project		
		L	Th	R	L	Th	R
Hwy 97 @ Hwy 29 Chetwynd							
EB	Hwy 97	B	C	A	B	C	A
WB	Hwy 97	C	B	A	C	B	A
NB	Hwy 29	A	A	A	A	A	A
SB	Hwy 29	C	A	A	C	A	A
Hwy 29 @ Jackfish Lake Rd.							
EB	Hwy 29		A	A		A	A
WB	Hwy 29	A	A		A	A	
NB	JL Rd.	B		B	B		B
SB							

L – Left Turn, Th – Through, R – Right Turn

Level of Service Criteria

Traffic Signals

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

Four Way Stop Control

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50

6.0 JACKFISH LAKE ROAD

6.1 TRAFFIC FORECASTS: JACKFISH LAKE ROAD

An analysis of the traffic and traffic patterns was carried out for Jackfish Lake Road just north of the Chetwynd and leading to the south bank camp (Figure 6.1). The existing Jackfish Lake Road extends from Highway 29 just north of Chetwynd to a predominantly resource industry area along the south bank of the Peace River and the north bank of the Pine River (Figure 6.1). An extension to Jackfish Lake Road is proposed to be constructed, the Project Access Road, for the easterly portion of the route, to create a dedicated access for Project traffic separate from the Petroleum Development Roads (PDRs) in this area. However, prior to the completion of the Project Access Road, the PDRs (labelled as Initial PDR Access Route in the figures) would be utilized during the construction of the Project Access Road.

Specific areas considered shown in Figure A-4 in Appendix A were:

- The portion of Jackfish Lake Road west of Calliou Road subject to delivery of bulk materials (permanent riprap) from the West Pine Quarry to the south bank dam site, materials for the construction of the transmission lines, logging from reservoir and transmission line clearing, worker movements from Chetwynd to the south bank camp, as well as delivery of general materials and equipment to the south bank dam construction site
- The portions of Jackfish Lake Road east of Calliou Road and to Old Jackfish Lake Road and the “T Intersection” where much of the transmission lines ‘construction and some of the logging traffic would enter and exit
- Roads to the east of the “T Intersection”. There is a short section of Jackfish Lake Road which would be used for all of the above traffic as well as the PDR Access Route mentioned earlier and identified in Figure 6.1 which would be utilized during construction of the Project Access Road

Average Annual Daily Traffic (AADT) was estimated for background traffic for the existing (2011) year. Background traffic was then forecast into the future for the Background scenario and Project traffic added for the “With Project” scenario.

The background analysis was based on existing data collected from the BC Ministry of Transportation and Infrastructure website and databases whenever possible. However, as little data has been collected by MOTI on Jackfish Lake Road, this was supplemented with new data collected by both MOTI and BC Hydro during 2011 (Figure 6.1) as follows:

- Highway 29 at Jackfish Lake Road: Manual turning movement counts obtained in August of 2011
- Jackfish Lake Road north of West Fraser Mills and north of Old Jackfish Lake Road: 7-day hose counts collected in August of 2011 (Figure 6.1)

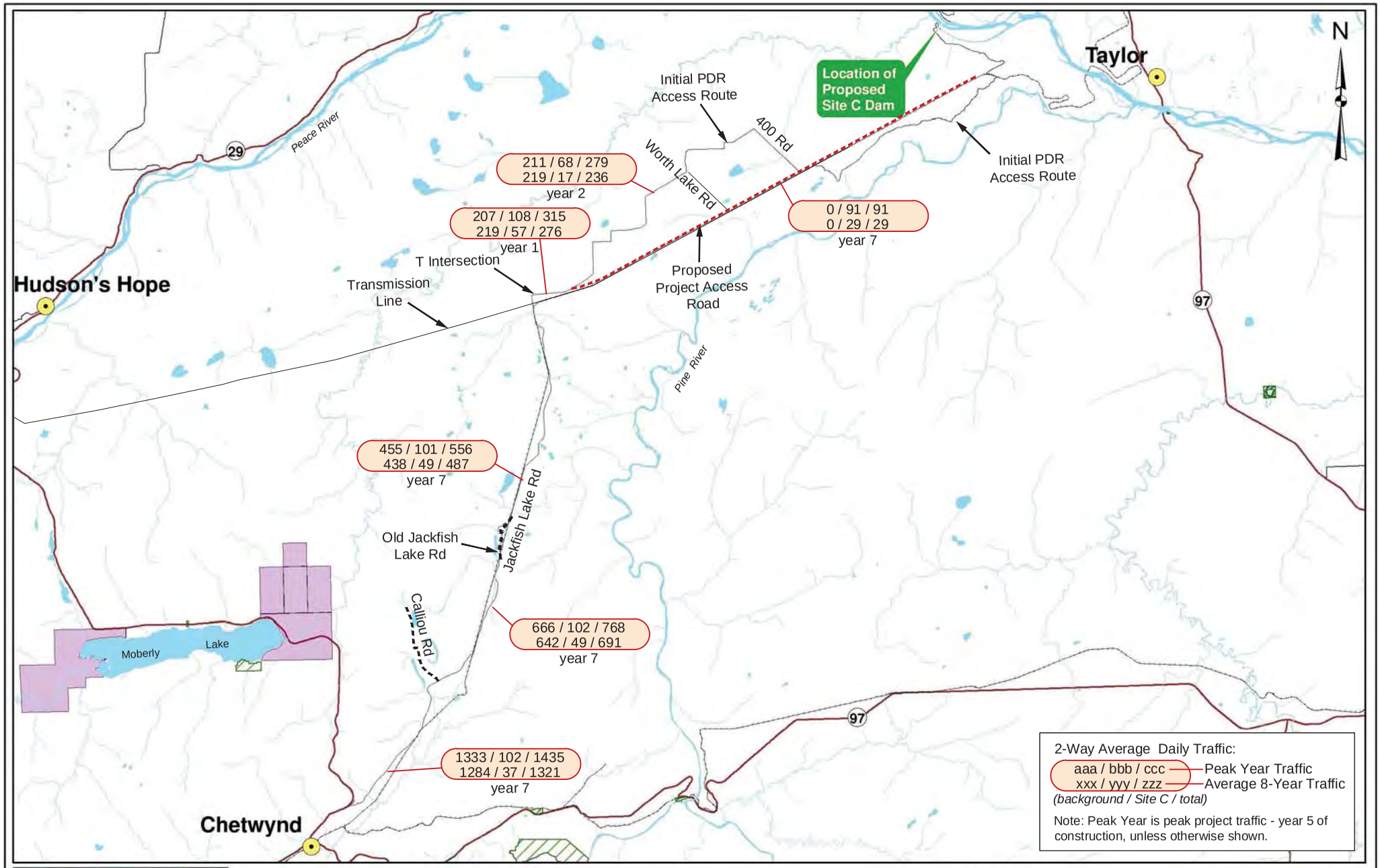
Analysis of the daily traffic patterns indicated that these were typical of urban travel patterns with distinct morning and afternoon directional peaks (i.e., “commuter” trips to and from the resource industry area).

Future background traffic was estimated by applying the 1.5% per annum growth rate calculated at MOTI count location P-43-2 located on Highway 97 0.3 kilometres south of the Westcoast Energy Pump Station #2 at Willow Flats (Figure 1.1) to the existing background traffic. Future project traffic was estimated by aggregating traffic from the various project activities along the above segments to create an estimate of the project traffic for all of the project activities.

Figure 6.1 presents the background traffic, the Project traffic and the Total With Project traffic forecasts for the various individual segments. This information is presented in terms of two-way Peak Year AADT as well as the eight-year Project Period Average Daily Traffic. More detailed tables presenting the full range of traffic forecasts over a 25-year period and vehicle classification are included in Appendix E: Traffic Forecast Details: Jackfish Lake Road.

For the peak year, Year 7 of the Project (2021), daily background traffic volumes ranged from over 1,300 vehicles per day west of Calliou Road to just over 200 vehicles per day on the section of Jackfish Lake Road to the east of the T-intersection. For the resource industry roads portion the peak year would be year 1 and daily background traffic volumes would be expected to be in the range of 200 vehicles per day.

The forecasts of traffic from each of the Project activities were aggregated along the various segments of Highway 29 South and Jackfish Lake Road to create an estimate of the total traffic for all of the project activities. In the peak year the contribution of project traffic to Jackfish Lake Road varied from about seven per cent of the total traffic on the bottom end of Jackfish Lake Road, north of West Fraser (102 of 1435 vehicles per day) to 25 per cent of the total traffic on the PDR Access Route east of the T-Intersection (68 of 279 vehicles). 8-Year average volumes dropped to three per cent and seven per cent respectively.



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:350,000

0 — 10 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Jackfish Lake Rd
Peak Year and 8-Year
Average Traffic Comparison

FIGURE 6.1

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-16	v1

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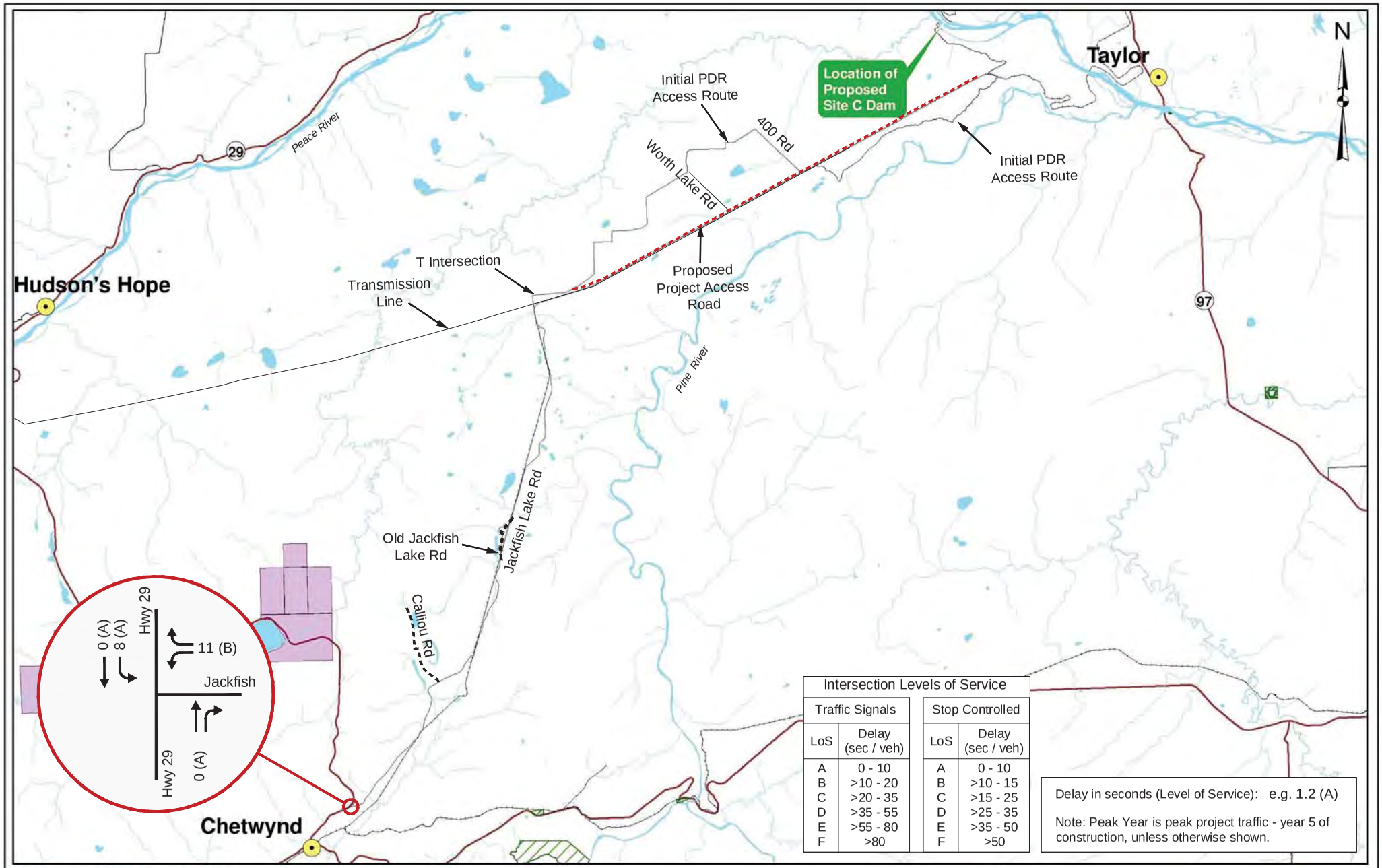
6.2 TRAFFIC OPERATIONS: JACKFISH LAKE ROAD

The intersection of Highway 29 South at Jackfish Lake Road is the most important element to consider with regard to the operations of Jackfish Lake Road. This intersection would be used by project vehicles as it would be the main access to the project's south bank site for workers from Chetwynd and the surrounding area. It would also be the main access for materials and equipment destined for the south bank camp and construction site from Prince George and areas of BC to the south and west including the BC coastal ports.

Background and Total With Project traffic operations analyses were calculated at the intersection of Jackfish Lake Road and Highway 29. The results are presented in Figure 6.2, Jackfish Lake Rd Background Peak Year Traffic Operations, Figure 6.3, Jackfish Lake Rd Peak Year Traffic Operations with Project, and Figure 6.4, Jackfish Lake Rd Peak Year Traffic Operations Level of Service Comparison with comparative details also provided in Table 6.1.

Referring to Figure 6.2, the service level for background traffic is LoS B with a maximum delay per vehicle of 11 seconds for the left turn movement from Jackfish Lake Road onto Highway 29 southbound as well as any right turning vehicles queued behind those waiting to turn left. The results of the analysis for the With Project case (Figure 6.3) indicate that traffic operations are similarly a LoS B with a maximum delay per vehicle of 11 seconds for the left turn movement from Jackfish Lake Road onto Highway 29 southbound. The comparison with the background traffic presented in Figure 6.4 shows that no drop in the LoS would be expected by the addition of Project traffic during the peak year.



Intersection Levels of Service

Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): e.g. 1.2 (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:350,000

0 10 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Jackfish Lake Rd
Background Peak Year Traffic Operations

FIGURE 6.2

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-17	v1

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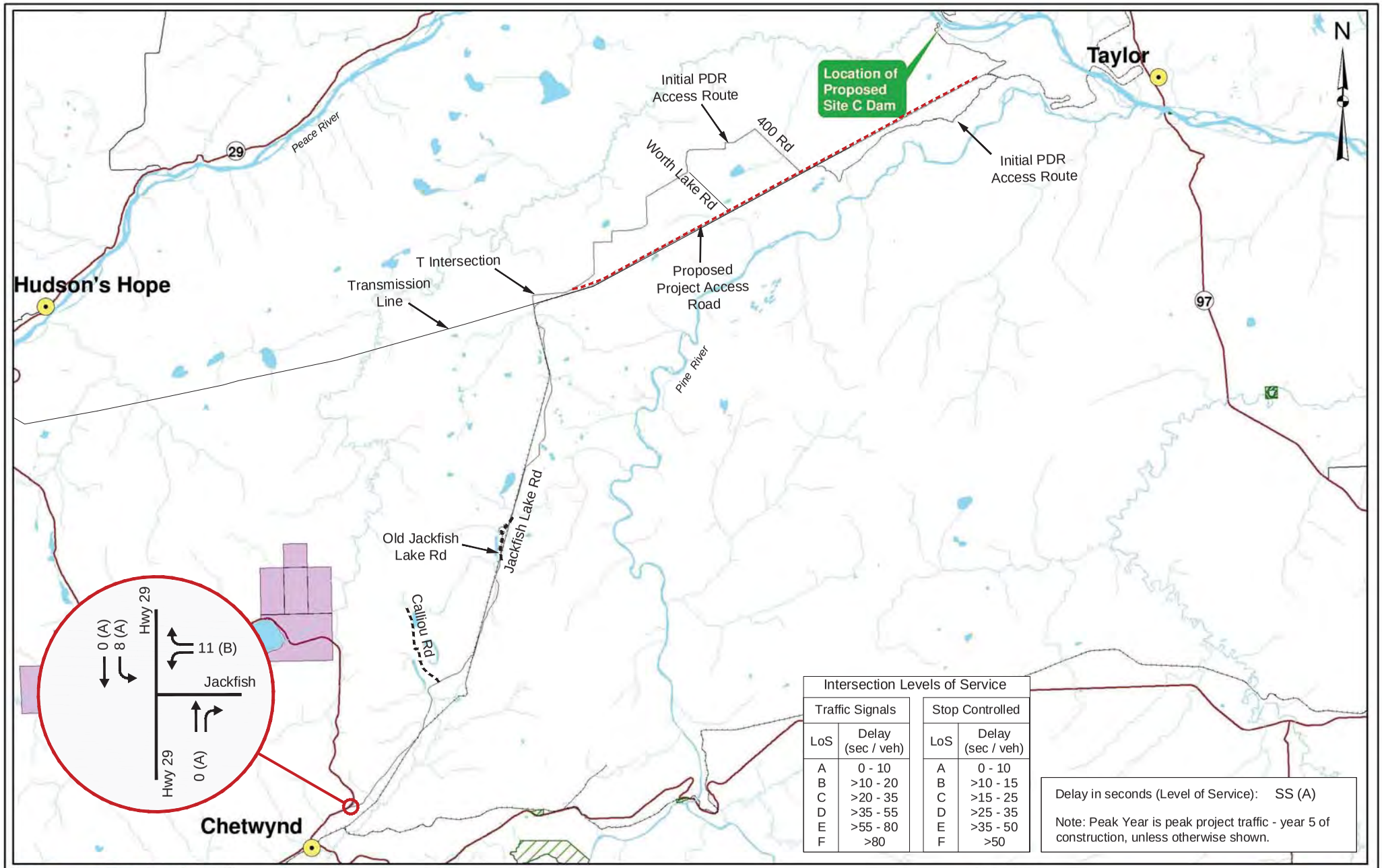

Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): SS (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:350,000

0 10 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Jackfish Lake Rd
Peak Year Traffic Operations with Project

FIGURE 6.3

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-18	v1

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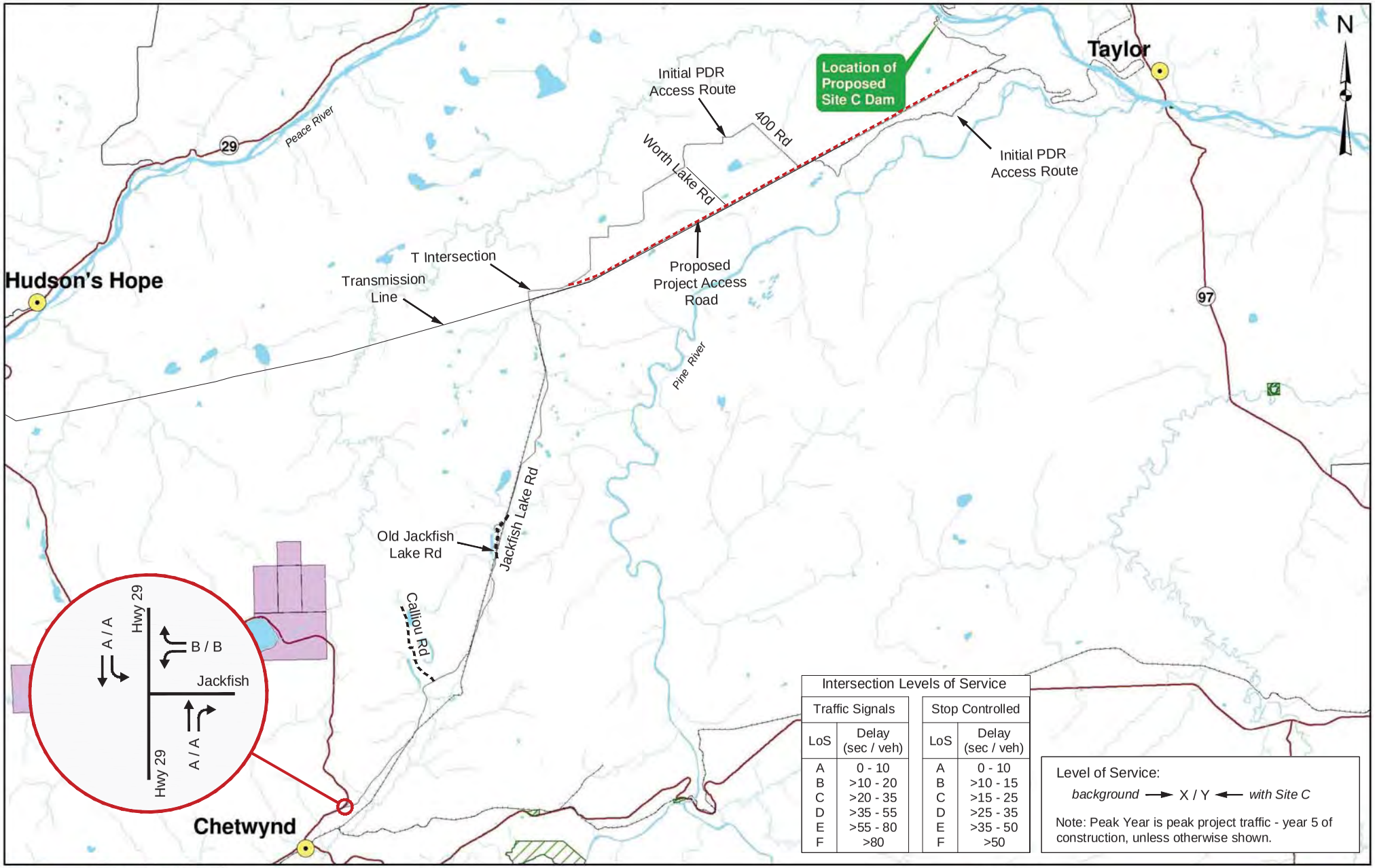

Intersection Levels of Service

Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Level of Service:

background → X / Y ← *with Site C*

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:350,000

0 10 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Jackfish Lake Rd
Peak Year Traffic Operations
Level of Service Comparison

FIGURE 6.4

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-19	v1

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Few intersections exist along Jackfish Lake Road itself so it was difficult to complete a typical capacity type analyses. However, a sense of the traffic volumes involved can be gained by conversion to peak volumes per hour and then to a vehicular frequency expressed in terms of a vehicle every "x" minutes or seconds. Table 6.1 below presents the daily and hourly traffic volumes and the resulting frequencies for background and With Project cases for two segments of Jackfish Lake Road. For the background case, a maximum frequency of one vehicle every 56 seconds (approximately 1 minute) in the peak direction was calculated for the "bottom end", towards Highway 29, and one vehicle every 290 seconds (approximately 5 minutes) minutes within the PDR Access Route section at the north east end. For the With Project case, the frequency increases to 1 vehicle every 52 seconds in the peak direction for the "bottom end", towards Highway 29, and 1 vehicle every 183 seconds (approximately 3 minutes) within the PDR Access Route section at the north east end.

Table 6.1 Jackfish Lake Road – Vehicle Volume and Peak Hour Frequency

Location	Daily Vehicles	Hourly		Frequency	
		2-way	1-way		
	(veh/day)	(veh/hr)	(veh/hr)	(min/veh)	(sec/veh)
Hwy 29 to N. of Calliou Rd. (km 0 - 12)					
With Project	1434	119	69	1	52
Background Only	1333	110	64	1	56
Difference	101	8	5	0	-4
PDR Access Route					
With Project	328	34	20	3	183
Background Only	207	21	12	5	290
Difference	121	12	7	-2	-107

* In peak direction

7.0 NORTH BANK ACCESS ROADS

7.1 TRAFFIC FORECASTS: NORTH BANK ACCESS ROADS

Average Annual Daily Traffic (AADT) was estimated for background traffic for the existing (2011) year. Background traffic was then forecast into the future for the Background scenario and Project traffic added for the "With Project" scenario.

An analysis of the existing traffic and traffic patterns was carried out for the various north bank access roads. A number of roadways were selected based on known routes potentially used by Project-related traffic (Figure 7.1). These are shown in Figure A- 5 in Appendix A and include:

- Old Fort Road: Separate forecasts for Old Fort Road were required for the segments south of 242 Road and north and south of 240 Road because of Project traffic entering and exiting at 85th Avenue and 240 Road. These segments would be subject to bulk materials transport from the Wuthrich Quarry, general materials and equipment transport destined for the north bank dam construction site, worker movements from Fort St. John, Hudson's Hope, Taylor and Dawson Creek destined for both north and south bank work sites, and logging from clearing along the north bank of the Peace River.
- 269 Road: A separate future forecast is provided for the portion of 269 Road south of 240 Road providing access to the north bank camp.
- 242 Road: May see some Project related traffic travelling between Old Fort Road and 269 Road.
- 240 Road: This segment would be subject to bulk materials from the Wuthrich Quarry, general materials and equipment transport destined for the north bank dam construction site, worker movements from Fort St. John, Hudson's Hope, Taylor and Dawson Creek destined for both north and south bank work sites, and logging from clearing along the north bank of the Peace River.
- 271 Road: As access to the Wuthrich Quarry this road would be subject to bulk materials transport from the quarry
- 85 Avenue: This segment would be subject to general materials and equipment transport destined for the north bank dam construction site as well as worker movements from the PRRD including Taylor and Dawson Creek destined for both north and south bank work sites.

The background analysis was based on existing data collected from the BC Ministry of Transportation and Infrastructure website and databases whenever possible. However, as little data has been collected by MOTI over the last decade, this was supplemented with new data collected by both MOTI and BC Hydro during 2011 as follows:

- Old Fort Road at 242 Road and 269 Road: Manual turning movement counts obtained by BC Hydro in August of 2011
- 242 Road at 269 Road: Manual turning movement counts obtained by BC Hydro in August of 2011

- Old Fort Road at 242 Road: Manual turning movement counts obtained by MOTI in September of 2011
- 269 Road at 240 Road: Fort St. John Community Landfill information collected by BC Hydro in October of 2011
- Highway 97 at 269 Road, 271 Road and 100th Avenue: Manual turning movement counts obtained in November of 2011
- 85 Avenue at 100 Street: Manual turning movement count obtained by BC Hydro in July of 2012

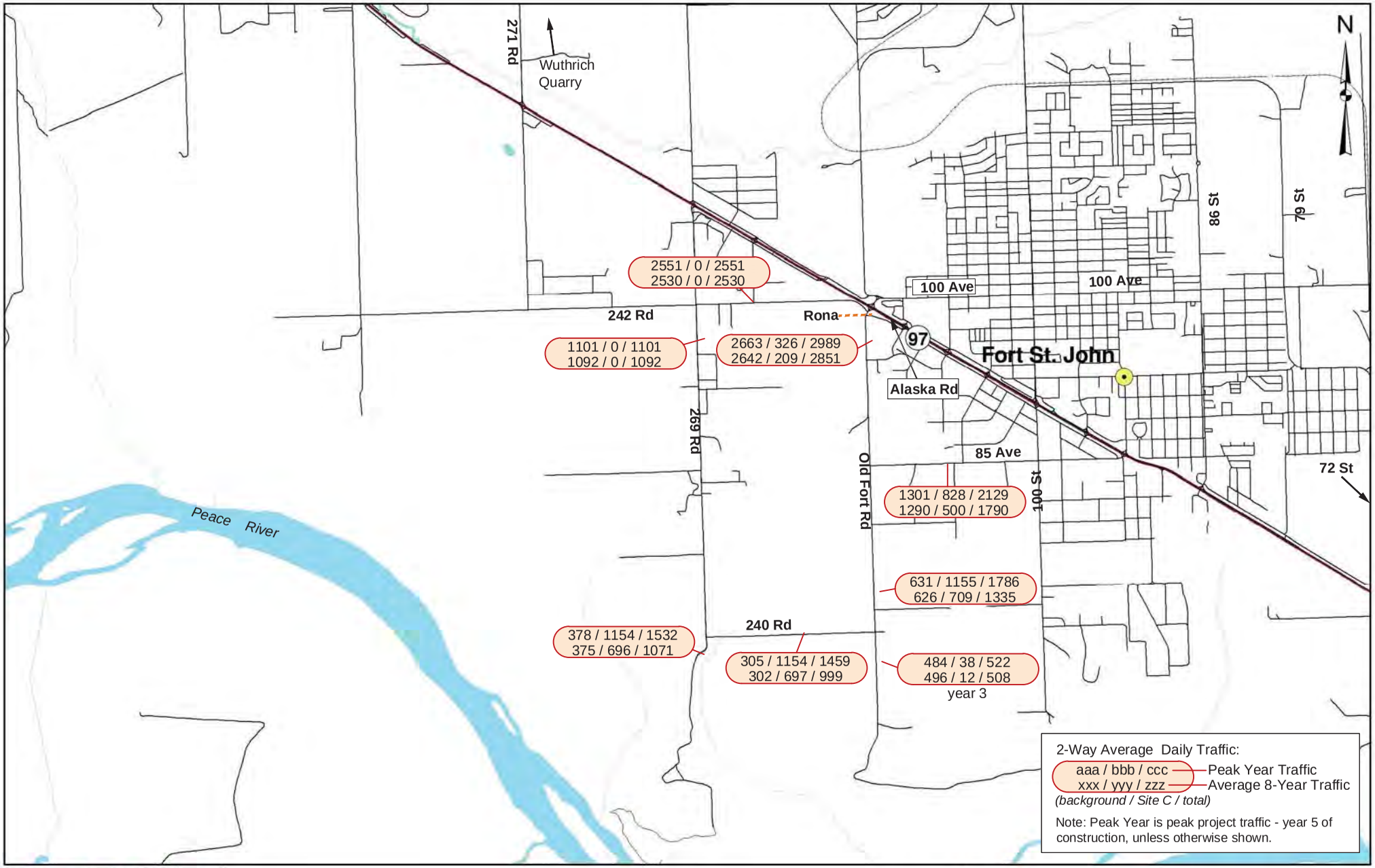
Analysis of the daily traffic patterns yielded no specific trend. The traffic volumes are likely a mix of morning and afternoon commuters combined with daytime movements to and from the businesses and farms in the area.

Future background traffic was estimated by applying the 1.5% per annum growth rate calculated at the MOTI count location #44-003 (Figure 1.2) to the existing background traffic. Future project traffic was estimated by aggregating traffic from the various project activities along the various segments of Highway 97 to create an estimate of the project traffic for all of the project activities.

Figure 7.1 presents the background traffic, the Project traffic and the Total With Project traffic forecasts for the various individual segments on the north bank, presented in terms of 2-way Peak Year AADT as well as the 8-year Project Period Average Daily Traffic for each individual segment. More detailed Tables presenting the full range of traffic forecasts over a 25 year period are included in Appendix F: Traffic Forecast Details: Construction and Materials Access Roadways. Vehicle classification in terms of Passenger, Light and Heavy Vehicles is also provided in the appendix.

For the peak year, Year 5 of the Project, background daily traffic volumes ranged from almost 2,700 vehicles per day on Old Fort Road just south of 242 Road to just over 300 vehicles per day along 240 Road.

The forecasts of traffic from each of the Project activities were aggregated along the various roadway segments to create an estimate of the total With Project traffic for all of the project activities and activities. Employees and contractors may be restricted from using 269 Road as access to the north bank camp. As a result, no project volumes are shown on 269 Road and on 242 Road. However, on Old Fort Road north of 240 Road and on 240 Road the contribution of project traffic varied from about eleven per cent of the total traffic on the Old Fort Road south of 242 Road (326 of 2,989 vehicles per day) to 80 per cent of the total traffic on 240 Road (1154 of 1459 vehicles per day). 8-Year average volumes dropped to 7 per cent and 70 per cent respectively. Project volumes on 85 Avenue were almost 40% of the total (828 of 2129 vehicles per hour) with this dropping to 28% for the 8-Year average volumes.



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:50,000

0 1.4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
North Bank Roads
Peak Year and 8-Year
Average Traffic Comparison

FIGURE 7.1

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-20	v1

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Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification.

7.2 TRAFFIC OPERATIONS: NORTH BANK ACCESS ROADS

Background and Total With Project traffic operations analyses were calculated at selected intersections leading to the north bank access roads. The results are presented in Figure 7.2, North Bank Roads Background Peak Year Traffic Operations, Figure 7.3, North Bank Roads Peak Year Traffic Operations with Project, and Figure 7.4, North Bank Roads Peak Year Traffic Operations Level of Service Comparison with comparative details also provided in Table 7.1.

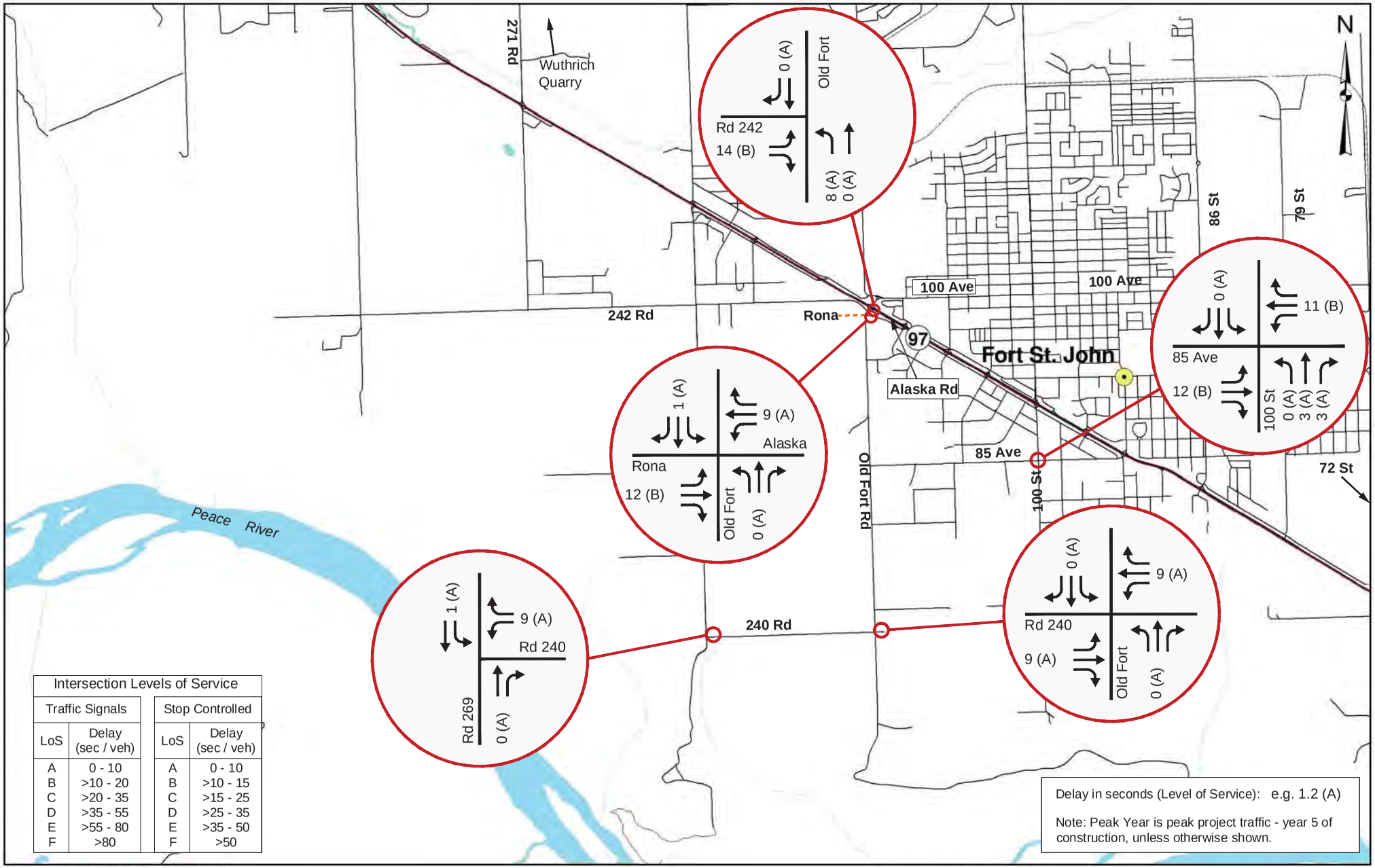
The intersections of interest are as follows:

- Old Fort Road at 242 Road
- Old Fort Road at 240 Road
- Old Fort Road at Alaska Road / Rona Entrance
- 269 Road at 240 Road
- 85 Avenue at 100 Street

Old Fort Road at 242 Road would be used by Project vehicles as the main access to the north and south bank construction sites and work camps for traffic originating either from Fort St. John or areas to the north and west such as Highway 29 and Hudson's Hope. Background traffic operations ranged from LoS A to B with few delays noted (Figure 7.2). The greatest delay would be for the eastbound left turn movement from 242 Road onto Old Fort Road northbound at LoS B and an average delay of about 14 seconds per vehicle. With the Project the results indicate that traffic operations still ranged from LoS A to B with few delays noted (Figure 7.3). The greatest delay would be for the eastbound left turn movement from 242 Road onto Old Fort Road northbound at LoS C and an average delay of about 15 seconds per vehicle. As a result, the comparison with the background traffic presented in Figure 7.4 shows that there is a change in the LoS to be expected by the addition of project traffic during the peak year for the eastbound left turn from 242 Road from LoS B at 14 seconds per vehicle delay to LoS C with 15 seconds of delay.

The intersection at 85 Avenue and 100 Street would be used by Project vehicles as the main access to the north and south bank construction sites and work camps for traffic originating either from Fort St. John (100 Street) or from the rest of the PRRD including Taylor and Dawson Creek (85 Avenue). Background traffic operations ranged from LoS A to B with maximum delays of 12 second per vehicle (Figure 7.2). With the Project the results indicate that traffic operations still generally ranged from LoS A to B with similar delays noted (Figure 7.3) with the exception of delays on the eastbound leg. During the PM peak hour delays on the eastbound leg would increase to 17 seconds per vehicle with a LoS C. As a result, the comparison with the background traffic presented in Figure 7.4 shows that there is a change in the LoS to be expected by the addition of project traffic during the peak year for the eastbound leg from LoS B at 12 seconds per vehicle delay to LoS C with 17 seconds of delay. Should any difficulties in the east / west directions become apparent, for example as a result of peaking within the peak hour, the alternative of converting this intersection to a 4-Way Stop configuration does exist.

The levels of service expected at the other three intersections are similarly low for both the background and the With Project cases. Figure 7.4 shows that service levels in the remaining intersections are generally LoS A with a few movements moving from a LoS A to a LoS B. Figure 7.3 confirms this showing the LoS B delays at 10 and 11 seconds per vehicle versus 9 second vehicle delays for the Background case. The longest delay expected would be at the left turns from 240 Road onto both Old Fort Road northbound and 269 Road southbound. Delays for these movement would be expected to change from a LoS A with delays of 9 sec/vehicle in the background case to LoS B with delays of 10 and 11 sec/vehicle for the with Project case for 269 Road and Old Fort Road respectively. (Figure 7.4 / Table 7.1).



Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): e.g. 1.2 (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:50,000

0 1.4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
North Bank Roads
Background Peak Year Traffic Operations

FIGURE 7.2

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-21	v1

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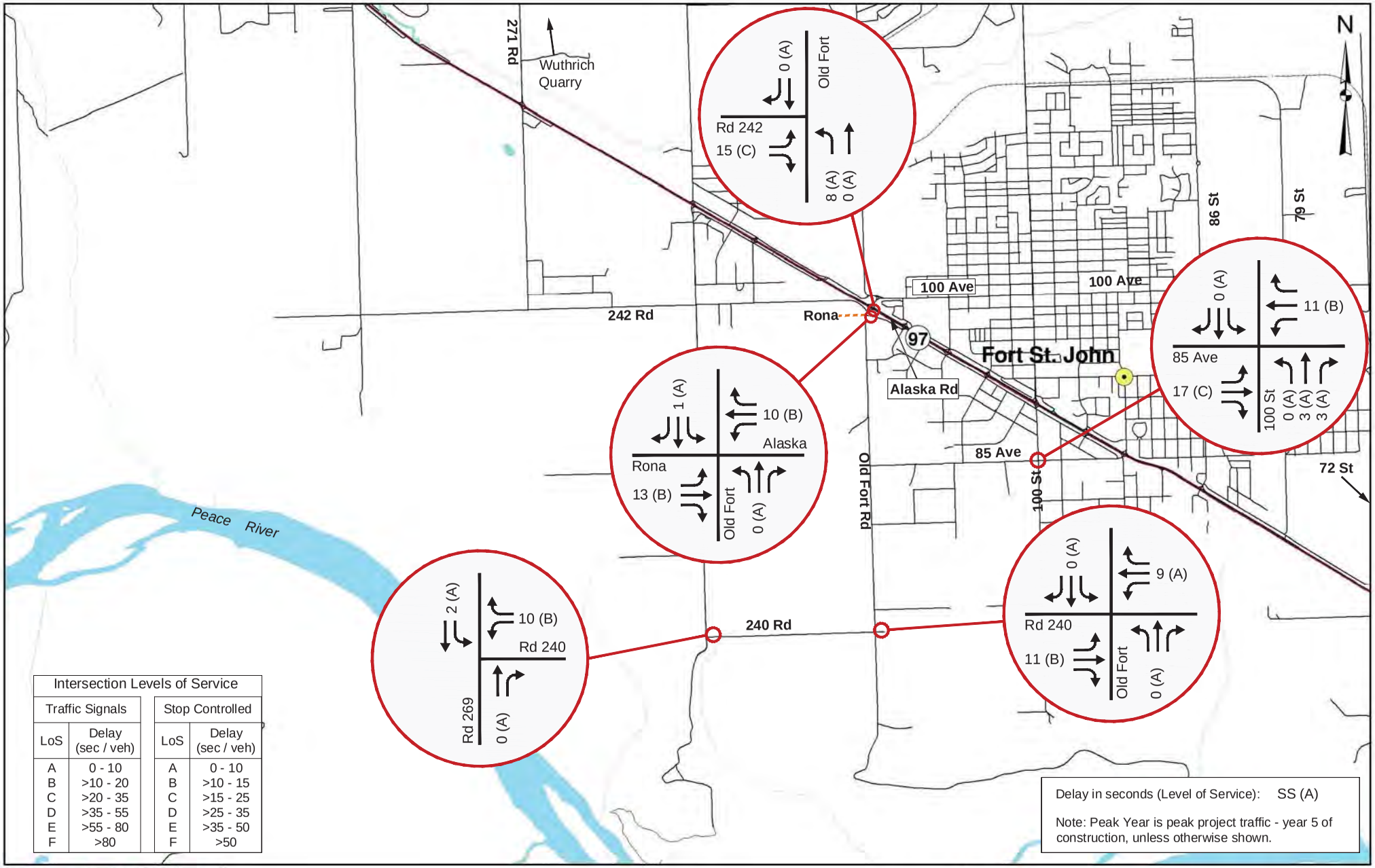

Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Delay in seconds (Level of Service): SS (A)

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:50,000

0 1.4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
North Bank Roads
Peak Year Traffic Operations with Project

FIGURE 7.3

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-22	v1

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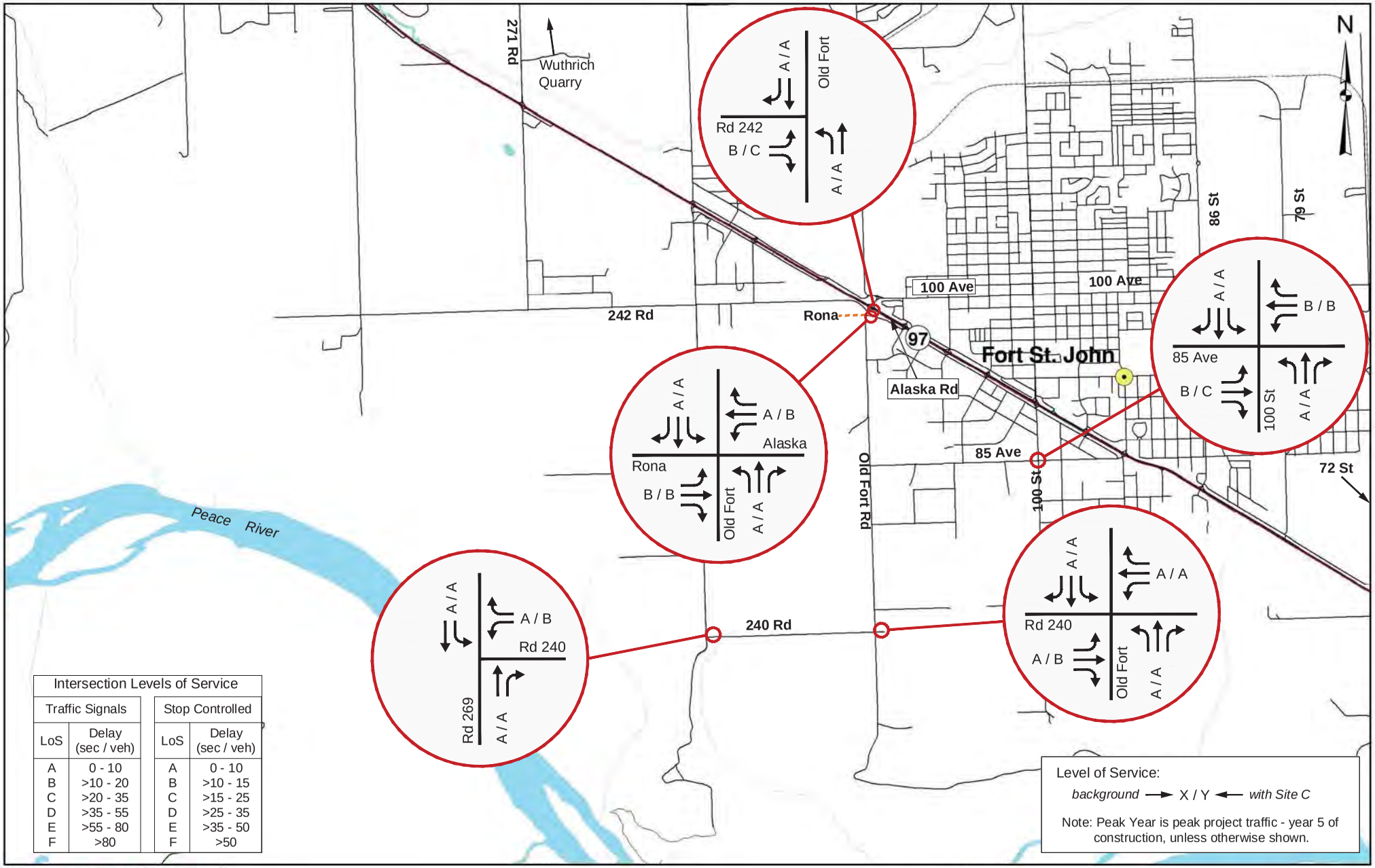

Intersection Levels of Service			
Traffic Signals		Stop Controlled	
LoS	Delay (sec / veh)	LoS	Delay (sec / veh)
A	0 - 10	A	0 - 10
B	>10 - 20	B	>10 - 15
C	>20 - 35	C	>15 - 25
D	>35 - 55	D	>25 - 35
E	>55 - 80	E	>35 - 50
F	>80	F	>50

Level of Service:

background → X / Y ← *with Site C*

Note: Peak Year is peak project traffic - year 5 of construction, unless otherwise shown.

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:50,000

0 — 1.4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
North Bank Roads
Peak Year Traffic Operations
Level of Service Comparison

FIGURE 7.4

DATE	Dec 3, 2012	DWG NO	1016-C14-A6099-23	v1

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Table 7.1 North Bank Roads Peak Year Traffic Operations Level of Service Comparison

Location	Leg	Level of Service (LoS)					
		Without Project			With Project		
		L	Th	R	L	Th	R
Old Fort @ 242							
EB	242 Rd	B / 14.4		B / 14.4	C / 15.1		C / 15.1
WB							
NB	Old Fort	A	A		A	A	
SB	Old Fort		A	A		A	A
Old Fort @ Alaska (Rona)							
EB	Rona	B	B	B	B	B	B
WB	Alaska	A / 9.4	A / 9.4	A / 9.4	B / 10.1	B / 10.1	B / 10.1
NB	Old Fort	A	A	A	A	A	A
SB	Old Fort	A	A	A	A	A	A
Old Fort @ 240							
EB	240 Rd	A / 9.1	A / 9.1	A / 9.1	B / 11.4	B / 11.4	B / 11.4
WB	240 Rd	A	A	A	A	A	A
NB	Old Fort	A	A	A	A	A	A
SB	Old Fort	A	A	A	A	A	A
269 @ 240							
EB							
WB	240 Rd	A / 9		A / 9	B / 10.2		B / 10.2
NB	269 Rd		A	A		A	A
SB	269 Rd.	A	A		A	A	
85th Avenue at 100 Street							
EB	85th Ave	B / 12	B / 12	B / 12	C / 16.5	C / 16.5	C / 16.5
WB	85th Ave	B	B	B	B	B	B
NB	100 St	A	A	A	A	A	A
SB	100 St	A	A	A	A	A	A

L – Left Turn, Th – Through, R – Right Turn

8.0 PROJECT OPERATIONS AFTER CONSTRUCTION

Once the Project is operational, there would be a requirement for operations and maintenance personnel to continue to access the site. The total number of employees is expected to be approximately 30. This is less than 10% of the number of employees (just over 400) that would require access to the site during the peak year of construction (2019).

Table 8.1 presents the analysis of the post construction dam operations and maintenance on the local roadways. As the operations and maintenance traffic volumes are considerably less than those during construction the results are very similar but less than those presented within Section 7.2. Levels of Service are seen to remain equivalent to the levels expected under background traffic conditions. This is due to very small differences in expected delays from the background condition. The Project Access Road is expected to remain open for BC Hydro employees only.

Table 8.1 Post-Construction Traffic Operations Level of Service Comparison

Location	Leg	Level of Service (LoS)					
		Without Project			With Project		
		L	Th	R	L	Th	R
Old Fort @ 242							
EB	242 Rd	B		B	B		B
WB							
NB	Old Fort	A	A		A	A	
SB	Old Fort		A	A		A	A
Old Fort @ Alaska (Rona)							
EB	Rona	B	B	B	B	B	B
WB	Alaska	A	A	A	A	A	A
NB	Old Fort	A	A	A	A	A	A
SB	Old Fort	A	A	A	A	A	A
Old Fort @ 240							
EB	240 Rd	A	A	A	A	A	A
WB	240 Rd	A	A	A	A	A	A
NB	Old Fort	A	A	A	A	A	A
SB	Old Fort	A	A	A	A	A	A
269 @ 240							
EB		B	B	B	B	B	B
WB	240 Rd	A	A	A	A	A	A
NB	269 Rd	A	A	A	A	A	A
SB							

L – Left Turn, Th – Through, R – Right Turn

Legend: Change in Level of Service

9.0 TRAFFIC SAFETY

Traffic safety refers to the safety of the travelling public in their vehicles on roadways to be utilized by Project traffic. It is expressed in terms of expected number of collisions in any one year. The difference in the number of collisions between the Background Case and the With Project case represents the potential change due to the Project. A traffic safety analysis was carried out for each of the segments considered within the traffic forecasting and traffic operations analyses above. The details of the Traffic Safety Analysis are presented in the report Roadway Safety Engineering Study Site C Clean Energy Project (Safety Report) provided in Appendix I. Similar to the traffic operations analyses the traffic safety analysis used the background traffic forecasts and the incremental project forecasts as a basis for the incremental difference of the Project. However, the safety analysis also considered changes to the roadway geometry proposed as a part of the Project. Proposed changes to the geometry include the following:

- Highway 29 Realignment segments: Major realignment / cross-section improvements;
- Old Fort Road: Some realignment and improvements to cross-section;
- 269 Road: Improvements to cross-section;
- 240 Road: Improvements to cross-section;
- Jackfish Lake Road: Improvements to cross-section.
- Project Access Road: New Road

A set of collision prediction models was set up and run for the background “Without Project” case and for the “With Project” case to determine any incremental changes to safety that could be associated with the project. The results of the analyses are summarized in Table 9.1 for Highway 29, Highway 97 North, Highway 97 South, Jackfish Lake Road, and the proposed Access roads. For each roadway assessed the number of collisions estimated for each year for both the Without and the With Project cases are recorded. Periods where the incremental Project changes cause an increase in collisions are shaded, while areas of no change or a decrease in collisions are left unshaded. Finally, the totals for all 5 segments are shown providing the combined Project change on vehicle safety.

Table 9.1 Potential Project Traffic Safety Summary

Year	Project Year	# of Collisions											
		Highway 29		Highway 97 North		Highway 97 South		Jackfish Lake Rd.		Access Roads		Total	
		Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
2014	0	28.87	29.63	89.03	91.88	34.38	34.82	9.32	9.87	14.66	15.61	176.27	181.81
2015	1	29.15	29.92	90.01	92.85	34.65	35.08	9.43	9.98	14.83	15.78	178.08	183.61
2016	2	29.43	30.22	90.99	93.82	34.92	35.35	9.54	10.09	15.00	15.06	179.88	184.53
2017	3	29.71	30.51	91.97	94.79	35.19	35.62	9.65	9.96	15.17	15.22	181.69	186.09
2018	4	29.98	29.09	92.94	95.75	35.46	35.88	9.76	10.05	15.34	15.38	183.49	186.15
2019	5	30.26	29.38	93.92	96.72	35.73	36.15	9.87	10.14	15.52	15.54	185.30	187.93
2020	6	30.54	29.67	94.90	97.69	36.00	36.42	9.98	10.24	15.69	15.70	187.10	189.71
2021	7	30.81	27.89	95.88	98.66	36.27	36.69	10.09	10.33	15.86	15.86	188.91	189.42
2022	8	31.09	28.19	96.85	99.62	36.54	36.95	10.20	10.42	16.03	16.02	190.71	191.21
Total	Total	269.85	264.50	836.49	861.78	319.14	322.95	87.84	91.08	138.10	140.15	1,651.43	1,680.46
Difference	Difference	-5.35		25.28		3.81		3.23		2.05		29.03	
%	%	-2.0%		3.0%		1.2%		3.7%		1.5%		1.8%	

Greater # of Collisions

Highway 29 and the access roads both show periods of increased and decreased collisions. As many activities in both of these areas would be early on within the proposed Project schedule the consequences of increased traffic volumes caused by these activities over this initial period would be an increase in collisions. However, roadway upgrades are also proposed as a part of these activities and the beneficial results of these upgrades can be seen in following years. While the total collisions over the 8-year period would decrease with the Project for the Highway 29 segments (-5.35 collisions),for the Access Roads they would increase overall (-2.14 collisions).

Highway 97 North and South show consistent periods of increased collisions over the 8-year Project time frame (25.28 collisions or a 3.0% increase and 3.81 collisions or a 1.2% increase in total collisions for North and South segments respectively).

Jackfish Lake Road also a shows a consistent period of increased collisions over the 8-year Project time frame (3.23 collisions or a 3.7% increase). This is as a result of the large number of trucks delivering riprap from West Pine Quarry to the south bank. The roadway is planned to be upgraded, these upgrades largely consisting of paving of existing gravel portions of the roadway. However, these upgrades would not be sufficient to reverse the overall project change during the project period. The roadway upgrades would, however, provide benefits beyond the project period.

The net or incremental number of vehicle collisions for the Project is calculated to be just over 29 collisions over the 8-year project period, or approximately 4 collisions per year. This amounts to a 1.8% increase over the existing collisions on the all of the roadways utilized by the Project. This is largely the result of the additional vehicles required for the Project activities and in particular commuting workers. It should also be noted that these results are for the Project time period only. Beyond the Project time frame the benefits of the project related to upgrades, such as safety improvements and travel time savings, on Highway 29, Jackfish Lake Road and the access roads would continue to be felt by local residents into the future.

Specific safety analyses were also carried out for three particularly hilly sections of Highway 29 because additional slow moving truck traffic on Highway 29, in conjunction with higher passenger car volumes, may adversely affect travel along these sections. The results of the analysis are presented in Table 9.2 Project Traffic Safety: Highway 29 Hills. The consequence of the project on vehicle safety decreases from west to east as the riprap trucks become fewer as they deliver their loads to each project site. An estimated decrease in safety is most pronounced at “The Hump”, west of Farrell Creek Road, with just under 5% increase almost equally divided by passenger vehicle and truck volume increases. The East of Halfway River and Watson Hills (approximately 7 kilometres west of Cache Creek) are about half this increase and are almost solely attributable to increases in passenger vehicles (commuting workers).

Table 9.2 Project Traffic Safety: Highway 29 Hills

Location	Criterion	Scenario 1 Background Traffic Only	Scenario 2 With Project No Truck	Scenario 3 With Project Truck Incl.
The Hump	Collisions (#)	5.32	5.46	5.57
	Change from Sc. 1		2.6%	
	Change from Sc. 2			2.0%
	Total Project Effects			4.7%
E of Halfway River	Collisions (#)	18.82	19.26	19.28
	Change from Sc. 1		2.3%	
	Change from Sc. 2			0.1%
	Total Project Effects			2.5%
Watson Hill	Collisions (#)	13.08	13.38	13.40
	Change from Sc. 1		2.3%	
	Change from Sc. 2			0.1%
	Total Project Effects			2.5%

10.0 SENSITIVITY ANALYSES

The above analyses were carried out on the basis of the assumptions described for the traffic forecast for each Project Activity within Section 2. As with any future forecast, there is some uncertainty as to whether the best estimate is the one that would actually occur. Consequently, a series of sensitivity analyses were also carried out testing the traffic operations results to variations in parameters which may be subject to the greatest amounts of volatility or change. An anticipated range, often the range limit, was selected for each assumption tested. The parameters tested, the existing assumption and the range tested are provided in Table 10.1. For each sensitivity the traffic operations resulting from the change in traffic forecast was calculated and compared to the operations at the same intersections for the background and With Project cases. The results are again presented in terms of the LoS, based on ranges in per vehicle delay as described in Section 1. The LoS alone is stated unless a change in LoS occurs in which case the delay is added to provide additional insight into the change.

Table 10.1 Sensitivity Analysis: Analyses and Parameters

Category	Parameter	Assumption	
		Existing	Sensitivity
West Pine Rip-Rap	Haul Trips	100% Road 0% Rail	0% Road 100% Rail
Mtls. and Equip.	Haul Trips	3% Road 97% Rail	100% Road 0% Rail
Peak Workforce	Off-Site Peak Year Workforce	2,068	1,700
Clearing	Replacement New Trips	100% 0%	0% 100%

10.1 SENSITIVITY ANALYSIS: WEST PINE QUARRY RIPRAP

Delivery of riprap from the West Pine Quarry is presently based on a scenario where none of this material is to be transported by rail. 800,000 cubic meters of material are potentially to be moved requiring 40,000 truckloads over an 8 year period peaking in year 7 of the Project. The peak year would see 31,000 2-way trips, amounting to 170 2-way trips per day with a one-way typical peak hour expectation of 5 trips per hour per direction, or 1 truck every 12 minutes per direction. Under the sensitivity test scenario all of the materials would be shipped by rail. This would effectively remove these trips from the road network with the required riprap delivered to the Septimus Siding just south of the south bank camp. The results of the analysis are presented below in Tables 10.2 and 10.3.

Table 10.2 Sensitivity Analysis: West Pine Quarry Riprap Intersection Traffic Operations

Location	Level of Service (LoS)								
	Without Project			With Project (Original)			With Project (Sensitivity)		
	L	Th	R	L	Th	R	L	Th	R
Hwy 97 @ Hwy 29 Chetwynd									
EB	B	C	A	B	C	A	B	C	A
WB	C	B	A	C	B	A	C	B	A
NB	A	A	A	A	A	A	A	A	A
SB	C	A	A	C	A	A	C	A	A
Hwy 29 @ Jackfish Lake Rd.									
EB		A	A		A	A		A	A
WB	A	A		A	A		A	A	
NB	B		B	B		B	B		B
SB									

L – Left Turn, Th – Through, R – Right Turn

Legend: Change in Level of Service

The intersections of Highway 97 at Highway 29 in Chetwynd and Highway 29 at Jackfish Lake Road were selected as those most likely to be the most sensitive to traffic volumes from the West Pine Quarry destined for the south bank dam site. As discussed in Section 5, however, there is no drop in LoS to be expected by the addition of project traffic during the Project's peak year. As a result, with the removal of the Quarry traffic the traffic operations would remain in the same operational range. This is reasonable as the West Pine Quarry traffic amounts to an average of 85 vehicles per day two-way with a peak expectation of 11 vehicles per hour one way in the peak direction in the peak hour. A difference of 11 vehicles per hour in any one turning movement will generally be within the margin of error of any one count and can be expected to have little result on the operations at an intersection.

Table 10.3 Sensitivity Analysis: Jackfish Lake Road Average Peak Hour Frequency

Location	Daily	Hourly		Frequency	
		2-way	1-way*	(min/veh)	(sec/veh)
Hwy 29 to N. of Calliou Rd. (km 0 - 12)	1434	119	69	0.87	52
Sensitivity	1344	111	65	0.93	56
Background Only	1333	110	64	0.93	56
Resource; West of Del Rio	328	34	20	3.06	183
Sensitivity	310	32	19	3.24	194
Background Only	207	21	12	4.84	290

* In peak direction

In keeping with the operations analysis methodology for Jackfish Lake Road used in Section 6 background and project volumes were also converted to average peak hour frequencies. This was done to provide a sense of the changes in additional project traffic on users and surrounding residents. Table 10.3 presents the traffic frequency information for the sensitivity analysis for both the busier “bottom end” section of Jackfish Lake Road towards Highway 29, as well as for the PDR Access Route west of the T-Intersection.

For the bottom end of Jackfish Lake Rd, as with the Level of Service analysis, without the West Pine Quarry riprap traffic the project sensitivity volumes are very close to the Background Only volumes with little additional frequency calculated. This is because without the riprap deliveries, remaining project traffic consists of 1) worker commuters which are assumed to be on shuttle buses, 2) clearing logging traffic which is assumed to be replacement of existing logging traffic rather than new traffic and 3) transmission line traffic which is a maximum of 13 vehicles per day.

For the resource sections of the roadway, with the West Pine Quarry riprap traffic removed from the analysis, traffic associated with other construction activities can be seen to have more impact. This is because at the top end of Jackfish Lake Road additional construction materials coming from local quarries for the construction of the Project Access Road are also travelling on these sections of roadway. As a result, the extra remaining 7 vehicles per hour (19 – 12) could be expected increasing the vehicle frequency from one vehicle every 4.8 minutes per vehicle in the background case to one vehicle every 3.2 minutes with the Project.

The sensitivity of the traffic safety results presented in Section 9 of the report to the traffic volumes from the West Pine Quarry was also carried out. The results of the analysis are presented in Table 10.4 below. The redirection of the material from the West Pine Quarry carried by heavy vehicles to rail would cause the traffic volumes to decline, particularly on Highway 97 South, Highway 29 between Highway 97 and Jackfish Lake Road and on Jackfish Lake Road itself. As a result the Total # of collisions caused by the Project on all roads and highway used by the Project would be reduced causing the total number of collisions to be reduced from 1680.5 under the Original with Project scenario to 1,673.8 under the sensitivity scenario. Thus the number of collisions would be reduced by just under 7 collisions over the 8-year period.

Table 10.4 Sensitivity Analysis: West Pine Quarry Riprap Roadway Safety

Project Year	Total # of Collisions		
	Without Project	With Project (Original)	With Project (Sensitivity)
0	176.27	181.81	181.04
1	178.08	183.61	182.85
2	179.88	184.53	183.77
3	181.69	186.09	185.34
4	183.49	186.15	185.41
5	185.30	187.93	187.19
6	187.10	189.71	188.98
7	188.91	189.42	188.69
8	190.71	191.21	190.49
Total	1,651.4	1,680.5	1,673.8
Difference		29.0	22.3
%		1.8%	1.3%

Increase in Collisions

10.2 SENSITIVITY ANALYSIS: EQUIPMENT AND MATERIALS

A summary of the expected materials and equipment volumes and their scheduling was presented earlier in Table 2.5. Of the 1.012 Million tonnes of material, 97% is expected to be carried by rail. This is because this large proportion is made up of bulk type materials such as cement, fly-ash and fuel which are rarely carried by road when large quantities are needed. However, as part of the sensitivity analysis, the sensitivity to the full volume being carried on the roads was tested. While this is unlikely to occur it was carried out to assess sensitivity of traffic operations to the general materials and equipment categories.

Based on the original assumptions (see Table 2.5), the maximum yearly trips expected by road is 423 trips per year arriving from Alberta and the southeast in 2016, or year 2 of the project schedule via Highway 97 North and Old Fort Road or almost 1 trip per day. The maximum number of yearly trips arriving from BC and the southwest via Jackfish Lake Road is 151 trips per year, or less than 1 trip per day. Under the sensitivity test scenario all of the materials would be transported by heavy vehicles on the road.

Table 10.5 presents the material volumes and their conversion to loads and traffic volumes for the “all road” materials and equipment case. The 1.01 Million tonnes would be carried in almost 34,000 loads or 67,000 2-way trips over 7 years, 35% from Prince George and the south-west and 65% from Alberta and points south and east. Under this test scenario, the peak year would see 18 trips per day from the south-west and 34 from the south-east.

Table 10.5 Sensitivity Analysis: Materials and Equipment Volumes

Project Year	Rail		Heavy Vehicles									
			From SW to South Bank				From Alberta to North Bank				Total	
	Tonnes	Cars	Tonnes	Loads	2-Way Trips		Tonnes	Loads	2-Way Trips		Tonnes	Yearly
				Yearly (veh/yr)	Yearly (veh/yr)	Daily (veh/day)		Yearly (veh/yr)	Yearly (veh/yr)	Daily (veh/day)		Trips (veh/yr)
0											-	-
1	-	-	5,883	196	393	1	10,925	364	729	2	16,808	1,122
2	-	-	13,825	461	922	3	29,403	980	1,961	5	43,228	2,883
3	-	-	36,200	1,207	2,414	7	67,228	2,241	4,482	12	103,428	6,896
4	-	-	91,209	3,040	6,081	17	169,389	5,646	11,293	31	260,598	17,374
5	-	-	101,173	3,372	6,745	18	187,892	6,263	12,527	34	289,065	19,272
6	-	-	71,279	2,376	4,752	13	132,374	4,412	8,825	24	203,653	13,577
7	-	-	32,914	1,097	2,195	6	61,125	2,038	4,076	11	94,039	6,271
8											-	-
Total	-	-	352,482	11,749	23,502	7	658,337	21,945	43,893	13	1,010,819	
%	0%		35%				65%				100%	

Table 10.6 Sensitivity Analysis: Materials and Equipment Traffic Operations

Location	Level of Service (LoS)								
	Without Project			With Project (Original)			With Project (Sensitivity)		
	L	Th	R	L	Th	R	L	Th	R
Highway 97 at 85th Ave									
EB	B	B	A	B	B	A	B	B	A
WB	B / 17.7	B	A	C / 26	B	A	C / 32	B	A
NB	B	B	B	B	B	B	B	B	B
SB	C	B	B	C	B	B	C	B	B
Old Fort Rd. at 240 Rd.									
EB	A / 9.1	A / 9.1	A / 9.1	B / 11.4	B / 11.4	B / 11.4	B / 11.6	B / 11.6	B / 11.6
WB	A	A	A	A	A	A	A	A	A
NB	A	A	A	A	A	A	A	A	A
SB	A	A	A	A	A	A	A	A	A
269 Rd. at 240 Rd.									
EB									
WB	A		A	B		B	B		B
NB		A	A		A	A		A	A
SB	A	A		A	A		A	A	

L – Left Turn, Th – Through, R – Right Turn

Table 10.6 presents the results of the application of these traffic volumes to the most sensitive of the locations potentially affected; namely, Highway 97 at 85th Avenue, Old Fort Road at 240 Road and 240 Road at 269 Road.

At the 85th Avenue traffic signal, under the original project traffic loadings the westbound left turn movements could drop from a LoS B to a LoS C with an additional 8 seconds per vehicle of delay. Under the materials and equipment sensitivity test the westbound left turn movements would be expected to remain at a LoS C with 4 seconds of additional per vehicle delay.

Similarly, at the Old Fort Road at 240 Road Avenue intersection, under the original project traffic loadings the eastbound movements could drop from a LoS A to a LoS B with an additional 2 seconds per vehicle of delay. Under the materials and equipment sensitivity test these movements would be expected to remain at a LoS B with less than 1 second of additional per vehicle delay.

Remaining movements at these two intersections and at the intersection of 240 Road at 269 Road maintain the LoS levels calculated for the background condition.

Table 10.7 presents the results of the application of these traffic volumes to the traffic safety results presented in Section 9 of the report. The redirection of the cement, fly-ash and fuel to the road network would cause the traffic volumes to increase, particularly on Highway 97 North and on the site access roads on the north bank. The result would be an increase in total number of collisions on all roads and highway used by the Project of 0.1% from 1,680.5 to 1,683.6. The incremental number of collisions would rise from 29.0 under the original assumptions to 32.2 collisions over the 8-year period under this sensitivity scenario tested.

Table 10.7 Sensitivity Analysis: Materials and Equipment Roadway Safety

Project Year	Total # of Collisions		
	Without Project	With Project (Original)	With Project (Sensitivity)
0	176.27	181.81	182.17
1	178.08	183.61	183.97
2	179.88	184.53	184.88
3	181.69	186.09	186.44
4	183.49	186.15	186.50
5	185.30	187.93	188.28
6	187.10	189.71	190.06
7	188.91	189.42	189.76
8	190.71	191.21	191.56
Total	1,651.4	1,680.5	1,683.6
Difference		29.0	32.2
%		1.8%	1.9%

Increase in Collisions

10.3 SENSITIVITY ANALYSIS: PEAK WORKFORCE

The assumptions leading to the calculations of the total peak workforce and the trips generated from these have been described previously in Section 2 of the report. The assumptions are based on a total of 2,068 workers that would be required for the project's construction in the peak year 5. Of these 1,372 would be housed In-Camp and 696 housed off-site. The In-Camp workers would be housed in two main camps, with a larger one housing 950 workers on the south bank and a smaller one housing 500 workers on the north bank. Under the expected

scenario, a total of 231 peak hour trips can be expected in the peak direction. As this workforce scenario is very conservative, for the purposes of the sensitivity test an allowance for a reduction in peak workforce to 1,700 persons was made. This effectively reduces the peak hour trips to 80 in the peak year in the peak direction.

Table 10.8 Sensitivity Analysis: Workforce Traffic Operations

Location	Level of Service (LoS)								
	Without Project			With Project (Original)			With Project (Sensitivity)		
	L	Th	R	L	Th	R	L	Th	R
Highway 97 at Old Fort Rd.									
EB	C	B	A	C	B	A	C	B	A
WB	C	C	A	C	C	A	C	C	A
NB	C	C	C	C	C	C	C	C	C
SB	D	C	A	D	C	A	D	C	A
Old Fort Rd. at 242 Rd.									
EB	B / 14.4		B / 14.4	C / 15.1		C / 15.1	B / 14.7		B / 14.7
WB									
NB	A	A		A	A		A	A	
SB		A	A		A	A		A	A
Old Fort Rd. at 240 Rd.									
EB	A / 9.1	A / 9.1	A / 9.1	B / 11.4	B / 11.4	B / 11.4	A	A	A
WB	A	A	A	A	A	A	A	A	A
NB	A	A	A	A	A	A	A	A	A
SB	A	A	A	A	A	A	A	A	A

L – Left Turn, Th – Through, R – Right Turn

Legend: Change in Level of Service

Table 10.8 presents the results of the application of these traffic volumes to the most sensitive of the locations potentially affected; namely, the intersections of Highway 97 at Old Fort Road and Old Fort Road at 242 Road and at 240 Road. As discussed in Section 7 of the report, at Highway 97 at Old Fort Road no changes in LoS would be expected to occur. The decrease in commuter traffic as a result of the sensitivity maintains this level of traffic operations. At Old Fort Road and 242 Road the eastbound left and right turns from 242 Road increase from a LoS B under the Background scenario to a LoS C under the original with Project scenario. With a decrease in traffic as a result of the sensitivity traffic operations would revert back to a LoS B, similar to operations for the Background. Similarly, at Old Fort Road and 240 Road the eastbound movements from 240 Road increase from a LoS A to a LoS B under the original with Project scenario. With a decrease in traffic as a result of the sensitivity, traffic operations would revert back to a LoS A, similar to operations for the Background.

Table 10.9 presents the results of the application of these traffic volumes to the traffic safety results presented in Section 9 of the report. The decrease in traffic volumes, particularly on Highway 97 North and on the site access roads on the north bank, results in a decrease, from the Original with Project scenario, in total number of collisions on all roads and highways used by the Project of 1.5% from 1,680.5 to 1,655.7. The incremental number of collisions drops from 29.0 under the original scenario to 4.3 under this sensitivity scenario tested.

Table 10.9 Sensitivity Analysis: Peak Workforce Roadway Safety

Project Year	Total # of Collisions		
	Without Project	With Project (Original)	With Project (Sensitivity)
0	176.27	181.81	178.97
1	178.08	183.61	180.78
2	179.88	184.53	181.80
3	181.69	186.09	183.37
4	183.49	186.15	183.42
5	185.30	187.93	185.21
6	187.10	189.71	187.00
7	188.91	189.42	186.68
8	190.71	191.21	188.49
Total	1,651.4	1,680.5	1,655.7
Difference		29.0	4.3
%		1.8%	0.3%

Increase in Collisions

10.4 SENSITIVITY ANALYSIS: CLEARING

The trips generated under the Clearing category include logging trucks that would be required to clear the dam, transmission lines, work camp and roadway construction areas as well as logging trucks required for clearing the reservoir area prior to flooding. Overall, 2,601,000 cubic meters of timber and waste would be created to be moved or disposed of between years 1 and 4 of the project construction period. This is calculated to require the movement of approximately 40,000 truck loads equivalent, to 81,000 2-way trips. 66% of these trips occur in the area of Jackfish Lake Road or exiting to Highway 29 South of Hudson's Hope with the remaining 34% occurring along Highway 29 North of Hudson's Hope or in and around the North Bank local roadways.

One of the more significant assumptions made was that of the proportion of the timber sources cleared that would replace existing sources being cleared and therefore simply replace traffic volumes presently included in the background traffic. It is expected that all the wood that would be extracted from the Project Clearing areas would replace the merchantable timber coming out of the Jackfish Lake and Highway 29 areas during the Project clearing phase. This results in no net traffic caused by the Project on the major roadways within these areas. For the purposes of sensitivity testing this assumption was changed to a 0% replacement / 100% incremental traffic assumption, testing the worst possible case of all clearing volumes being incremental to the present logging occurring in both areas. This produces peak incremental daily volumes of 51 vehicles per day for Jackfish Lake Road and 24 vehicles per day for Highway 29 North.

Table 10.10 presents the results of the application of these traffic volumes to the most sensitive of the locations potentially affected in and around Chetwynd; namely, the intersections of Highway 97 at Highway 29, Chetwynd and Highway 29 at Jackfish Lake Road As discussed in

Section 5 of the report, there is no drop in LoS to be expected by the addition of project traffic during the Project's peak year under the original with Project scenario. Under the clearing sensitivity test the operational levels remain as calculated for the Original with Project scenario. This is reasonable as the 51 additional vehicles per day expected under this scenario would amount to approximately 5 vehicles per hour per direction during the peak hour and this small number of vehicles would have little appreciable effect on traffic operations.

Table 10.10 Sensitivity Analysis: Clearing Traffic Operations - South Area

Location	Level of Service (LoS)								
	Without Project			With Project (Original)			With Project (Sensitivity)		
	L	Th	R	L	Th	R	L	Th	R
Highway 97 at Highway 29 Chetwynd									
EB	B	C	A	B	C	A	B	C	A
WB	C	B	A	C	B	A	C	B	A
NB	A	A	A	A	A	A	A	A	A
SB	C	A	A	C	A	A	C	A	A
Highway 29 at Jackfish Lake Rd.									
EB		A	A		A	A		A	A
WB	A	A		A	A		A	A	
NB	B		B	B		B	B		B
SB									

L – Left Turn, Th – Through, R – Right Turn

Legend: Change in Level of Service

Table 10.11 presents the results of the application of these traffic volumes to the most sensitive of the locations potentially affected in and around Fort St. John; namely, the intersections of Highway 97 at Highway 29, Charlie Lake and Highway 97 at Old Fort Road. As discussed in Section 4 of the report, there were no changes in service levels expected at Charlie Lake with the addition of potential Project volumes. This continues to hold true with additional clearing volumes generated under the Clearing sensitivity testing scenario. Once again, this is reasonable as the 24 additional vehicles per day expected under this scenario would amount to approximately 3 vehicles per hour per direction during the peak hour and this small number of vehicles would have little appreciable effect on traffic operations.

Table 10.11 Sensitivity Analysis: Clearing Traffic Operations - North Area

Location	Level of Service (LoS)								
	Without Project			With Project (Original)			With Project (Sensitivity)		
	L	Th	R	L	Th	R	L	Th	R
Highway 97 at Highway 29 Charlie Lake									
EB	B	B	B	B	B	B	B	B	B
WB	C	C	C	C	C	C	C	C	C
NB	A	A	A	A	A	A	A	A	A
SB	A	A	A	A	A	A	A	A	A
Highway 97 at Old Fort Rd.									
EB	C	B	A	C	B	A	C	B	A
WB	C	C	A	C	C	A	C	C	A
NB	C	C	C	C	C	C	C	C	C
SB	D	C	A	D	C	A	D	C	A

L – Left Turn, Th – Through, R – Right Turn

Legend: Change in Level of Service

Table 10.12 presents the results of the application of these traffic volumes to the traffic safety results presented in Section 9 of the report. The result of additional logging trucks, particularly on Highway 29 and on Jackfish Lake Road results in an increase, from the Original with Project scenario, in total number of collisions on all roads and highways used by the Project of 0.1% from 1,680.5 to 1,682.8. The incremental number of collisions rises from 29.0 under the original assumptions to 31.4 under this sensitivity scenario tested.

Table 10.12 Sensitivity Analysis: Clearing Roadway Safety

Project Year	Total # of Collisions		
	Without Project	With Project (Original)	With Project (Sensitivity)
0	176.27	181.81	182.08
1	178.08	183.61	183.89
2	179.88	184.53	184.80
3	181.69	186.09	186.36
4	183.49	186.15	186.41
5	185.30	187.93	188.19
6	187.10	189.71	189.96
7	188.91	189.42	189.66
8	190.71	191.21	191.46
Total	1,651.4	1,680.5	1,682.8
Difference		29.0	31.4
%		1.8%	1.9%

Increase in Collisions

11.0 MANAGEMENT STRATEGIES

The potential changes to traffic operations and traffic safety predicted during construction of the Project would be managed. Management strategies can vary from policies such as directives on routes to be taken, or the restrictions on use of private project roadways, to transportation demand measures such as the provision of shuttle buses to geometric upgrades such as widened shoulders. A list of potential management strategies is provided below in Table 11.1.

Table 11.1 Management Strategy Options

Type	Details
Policy	
Route Diversion	Directives to employees and contractors specifying routes to be used
Vehicle Operations	Restrictions on heavy vehicle use when necessary as well as on workforce use of specific roadways
Camp Operations	Provision of in-camp facilities such as commercial and recreational to make camps as self-sustaining as possible
On-site Emegency Response	Provision of on-site emergency response to make camps as self-sustaining as possible
Traffic Management	Active traffic management planning to current standards to be provided during construction activities
Transportation Demand Measures	
Shuttle Bus: Local	Provision of shuttle buses for local commuters from either Fort St John or Chetwynd
Shuttle Bus: Internal	Provision of shuttle buses internal to the site to allow for interaction between north and south banks and adjacent communities
Car-Pooling Incentives	Provision of car-pooling incentives such as preferred parking to increase car occupancy for local commuters
Incremental Volumes	Low incremental volumes in comparison to existing use
Roadway Upgrades	
Geometric Measures	Provide geometric upgrades such as shoulder widening, improved signing etc. to increase roadway capacity and safety
Pavements	Provide pavement upgrading to prevent seasonal closure and more uniformly spread out heavy vehicle traffic; Project and non-Project
Gravel or Grading	Provide surface upgrading to accomodate higher volume of heavy vehicles

12.0 REFERENCES

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M. Guarnaschelli

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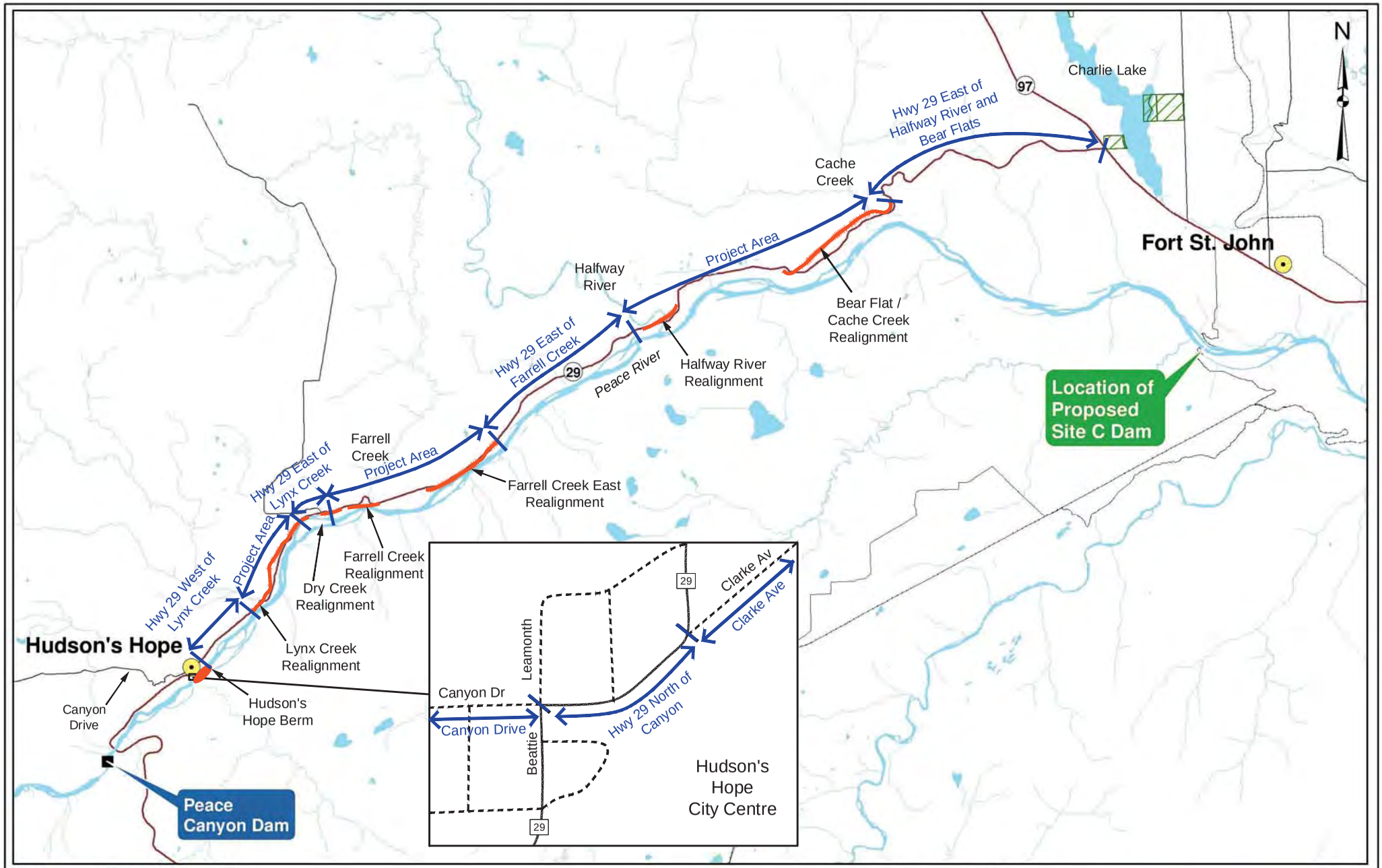
APPENDIX A: ROADWAY SEGMENTS



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Segment

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:310,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis

Segments
Highway 29

FIGURE A-1

DATE	Nov 1, 2012	DWG NO	1016-C14-A6099-24	v0

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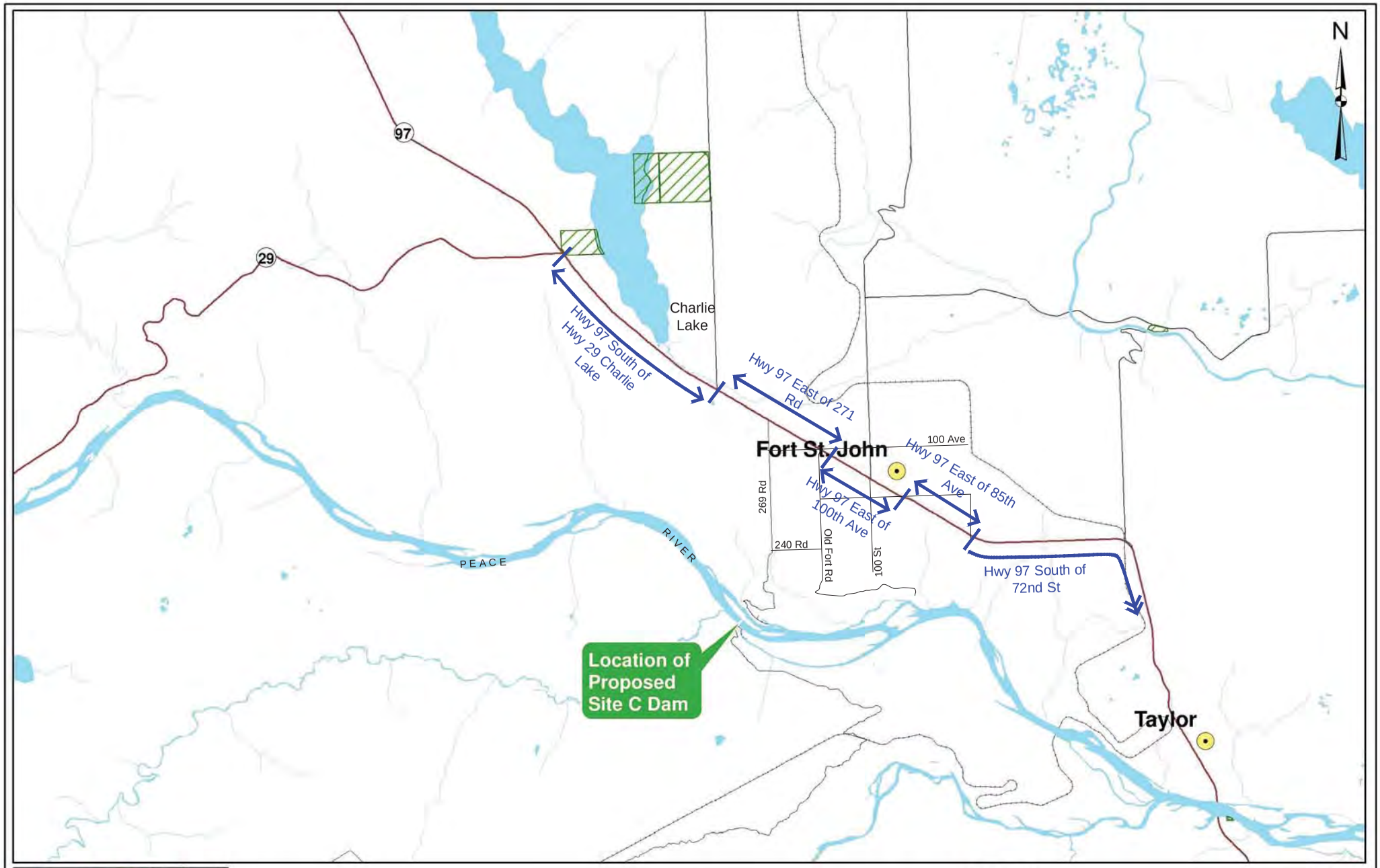
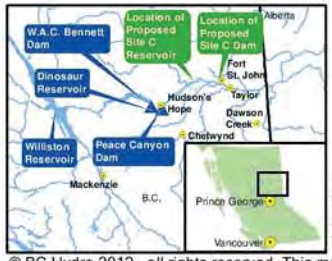
Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification.





Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Segment

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:165,000

0 4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Segments
Highway 97 North

FIGURE A-2

DATE	Nov 1, 2012	DWG NO	1016-C14-A6099-25	v0

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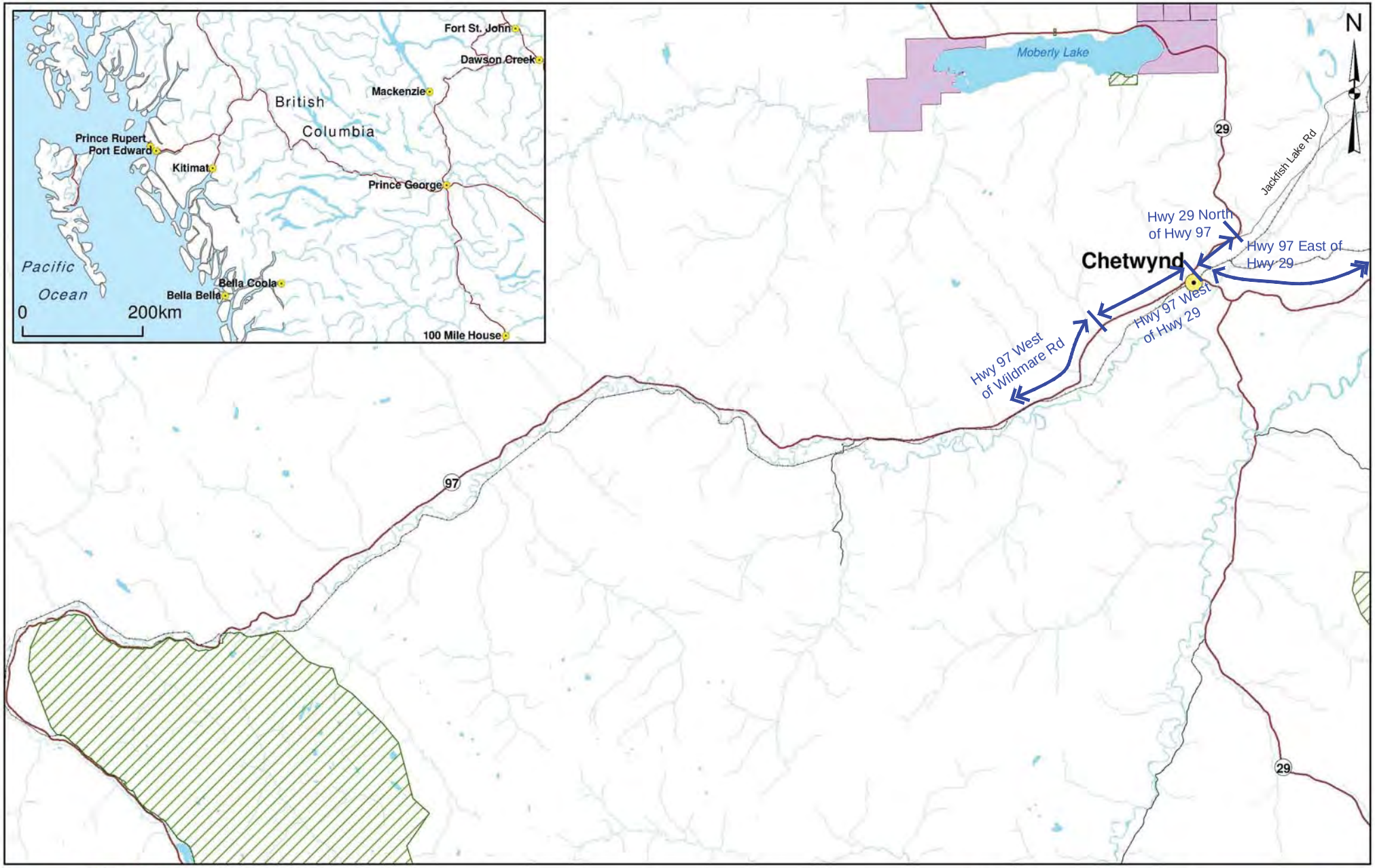

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Segment

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:315,000

0 8 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Segment
Highway 97 South

FIGURE A-3

DATE	Nov 1, 2012	DWG NO	1016-C14-A6099-26	v0

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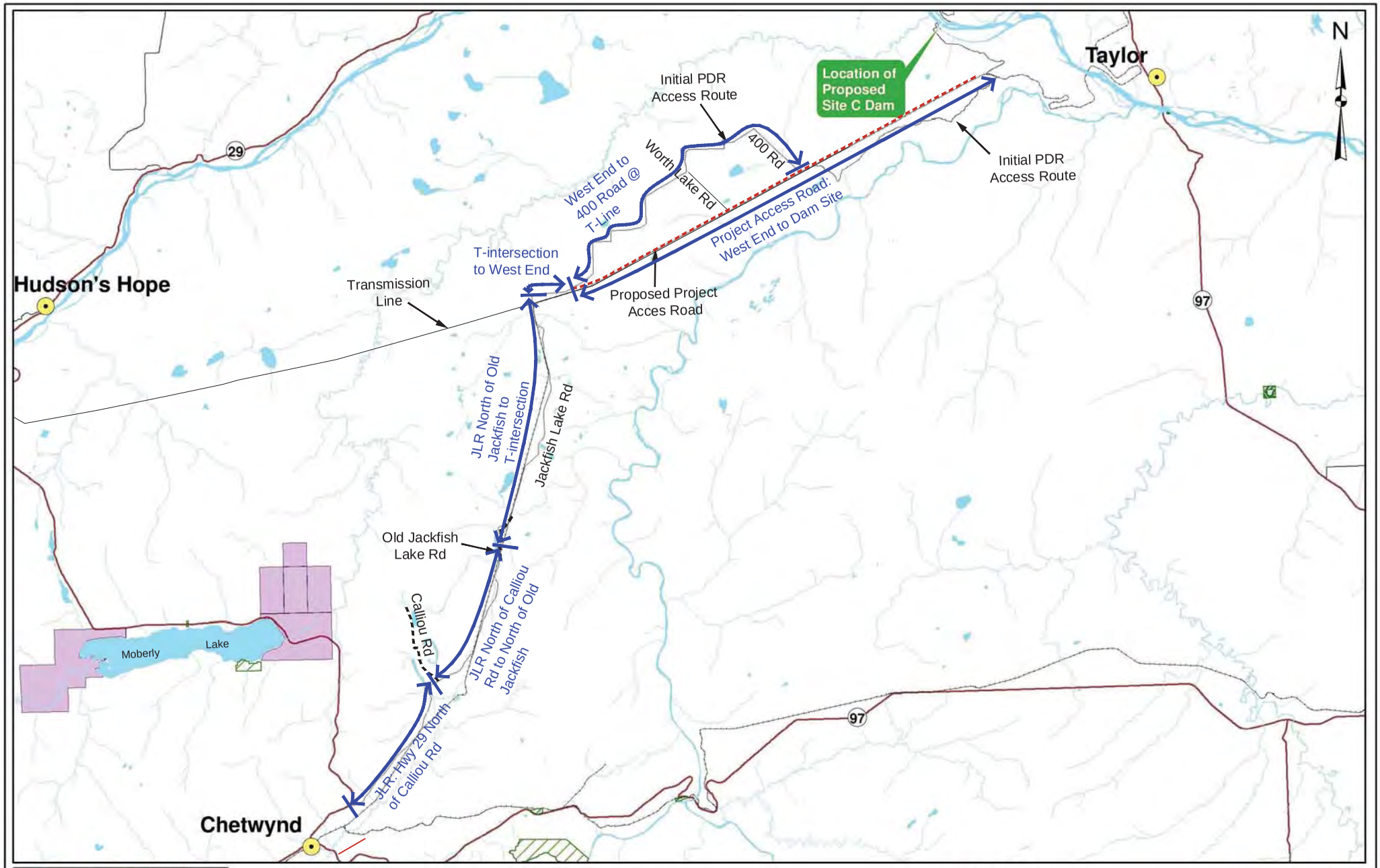

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Segment

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:350,000

0 10 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Segments
Jackfish Lake Road

FIGURE A-4

DATE	Nov 1, 2012	DWG NO	1016-C14-A6099-27	v0

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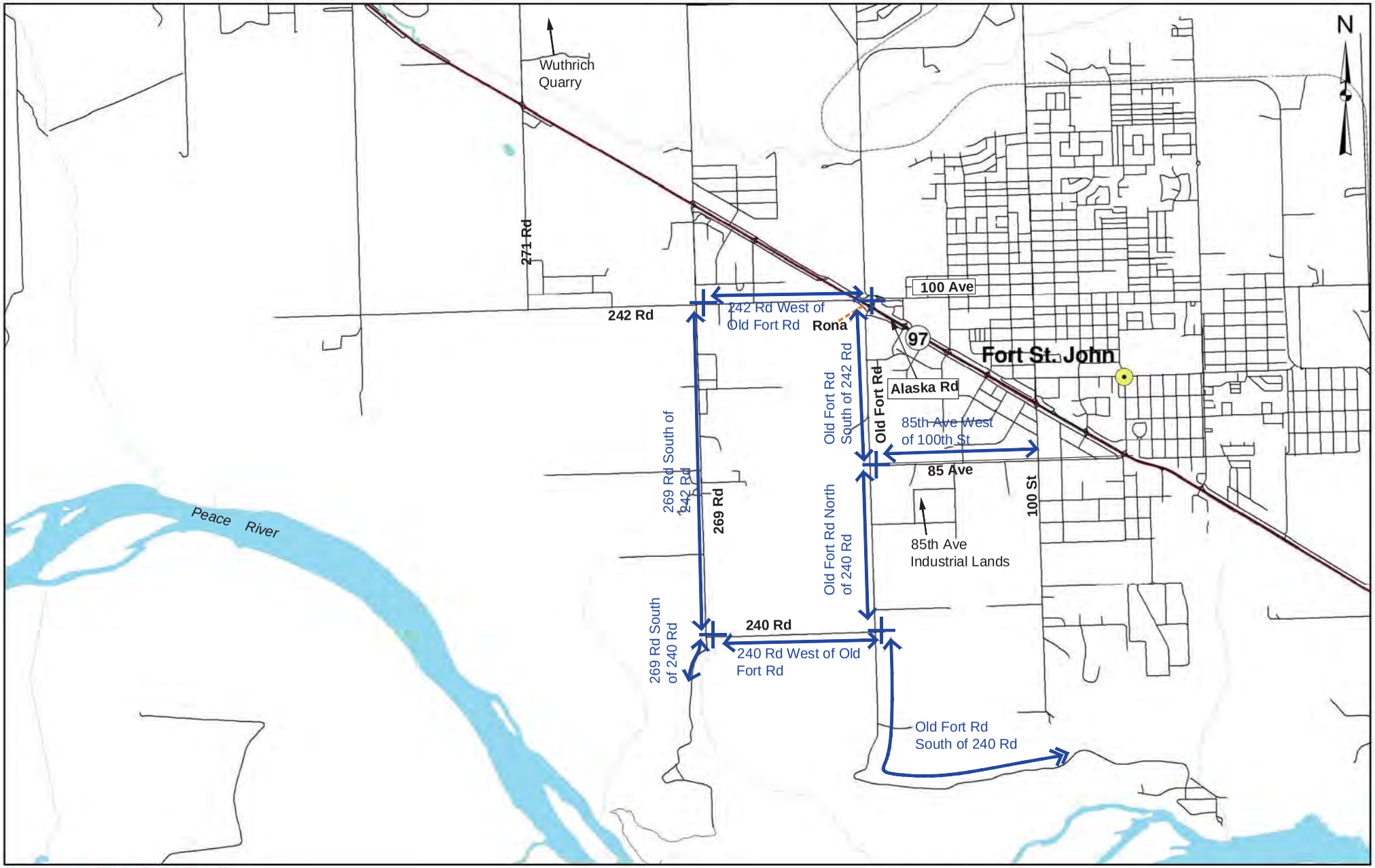
Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification.



Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Segment

Legend

- Road
- Highway
- Railway
- Protected Areas, Provincial Parks, Regional Parks and Ecological Reserves.
- Indian Reserve

1:50,000

0 1.4 Km

SITE C CLEAN ENERGY PROJECT

TETRA TECH BC hydro

Project Traffic Analysis
Segment
North Bank Roads

FIGURE A-5

DATE	Nov 1, 2012	DWG NO	1016-C14-A6099-28	v0

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Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification.

APPENDIX B: TRAFFIC FORECAST DETAILS: HIGHWAY 29

2-Way Daily and Yearly Volume Calculations
Canyon Drive
Background Traffic: Expected Growth

Year	Average Daily		Yearly (x M)			
	Annual	Summer	Background Traffic			
	(veh/day)	(veh/day)	Pass	LT	HT	Total
2010	995	1424	0.28	0.04	0.04	0.36
2011	1012	1449	0.28	0.04	0.04	0.37
2012	1029	1473	0.28	0.05	0.05	0.38
2013	1046	1498	0.29	0.05	0.05	0.38
2014	1063	1522	0.29	0.05	0.05	0.39
2015	1080	1547	0.30	0.05	0.05	0.39
2016	1097	1571	0.30	0.05	0.05	0.40
2017	1114	1596	0.31	0.05	0.05	0.41
2018	1132	1620	0.31	0.05	0.05	0.41
2019	1149	1645	0.32	0.05	0.05	0.42
2020	1166	1669	0.32	0.05	0.05	0.43
2021	1183	1693	0.33	0.05	0.05	0.43
2022	1200	1718	0.33	0.05	0.05	0.44
2023	1217	1742	0.34	0.05	0.05	0.44
2024	1234	1767	0.34	0.05	0.05	0.45
2025	1251	1791	0.35	0.05	0.06	0.46
2026	1268	1816	0.35	0.06	0.06	0.46
2027	1285	1840	0.36	0.06	0.06	0.47
2028	1303	1865	0.36	0.06	0.06	0.48
2029	1320	1889	0.37	0.06	0.06	0.48
2030	1337	1914	0.37	0.06	0.06	0.49
2031	1354	1938	0.37	0.06	0.06	0.49
2032	1371	1963	0.38	0.06	0.06	0.50
2033	1388	1987	0.38	0.06	0.06	0.51
2034	1405	2012	0.39	0.06	0.06	0.51
2035	1422	2036	0.39	0.06	0.06	0.52
Total			8.70	1.38	1.39	11.47

Legend:

Pass	Passenger Vehicles	
LT	Light Trucks	Rigid 2- 4-axle Heavy Goods Vehicle
HT	Heavy Trucks	Tractor / Trailer Units

2-Way Yearly Volumes: By Component and Classified
Canyon Drive
All Sources: Expected Growth

Year	Total Yearly Traffic (x M)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	0.363	0.000	0.000	0.000	0.363	0.28	0.04	0.04	0.36
2011	0.369	0.000	0.000	0.000	0.369	0.28	0.04	0.04	0.37
2012	0.376	0.000	0.000	0.000	0.376	0.28	0.05	0.05	0.38
2013	0.382	0.000	0.000	0.000	0.382	0.29	0.05	0.05	0.38
2014	0.388	0.000	0.000	0.000	0.388	0.29	0.05	0.05	0.39
2015	0.394	0.000	0.000	0.000	0.394	0.30	0.05	0.05	0.39
2016	0.401	0.005	0.000	0.000	0.405	0.30	0.05	0.05	0.41
2017	0.407	0.005	0.000	0.000	0.412	0.31	0.05	0.05	0.41
2018	0.413	0.019	0.000	0.000	0.432	0.31	0.05	0.07	0.43
2019	0.419	0.027	0.000	0.000	0.446	0.32	0.05	0.08	0.45
2020	0.425	0.017	0.000	0.000	0.443	0.32	0.05	0.07	0.44
2021	0.432	0.000	0.000	0.000	0.432	0.33	0.05	0.05	0.43
2022	0.438	0.000	0.000	0.000	0.438	0.33	0.05	0.05	0.44
2023	0.444	0.000	0.000	0.000	0.444	0.34	0.05	0.05	0.44
2024	0.450	0.000	0.000	0.000	0.450	0.34	0.05	0.05	0.45
2025	0.457	0.000	0.000	0.000	0.457	0.35	0.05	0.06	0.46
2026	0.463	0.000	0.000	0.000	0.463	0.35	0.06	0.06	0.46
2027	0.469	0.000	0.000	0.000	0.469	0.36	0.06	0.06	0.47
2028	0.475	0.000	0.000	0.000	0.475	0.36	0.06	0.06	0.48
2029	0.482	0.000	0.000	0.000	0.482	0.37	0.06	0.06	0.48
2030	0.488	0.000	0.000	0.000	0.488	0.37	0.06	0.06	0.49
2031	0.494	0.000	0.000	0.000	0.494	0.37	0.06	0.06	0.49
2032	0.500	0.000	0.000	0.000	0.500	0.38	0.06	0.06	0.50
2033	0.507	0.000	0.000	0.000	0.507	0.38	0.06	0.06	0.51
2034	0.513	0.000	0.000	0.000	0.513	0.39	0.06	0.06	0.51
2035	0.519	0.000	0.000	0.000	0.519	0.39	0.06	0.06	0.52
Total	11.47	0.074	0.00	0.00	11.54	8.70	1.38	1.46	11.54

Classification

Source	Vehicle Type			
	%Pass	%LT	%HT	Total
Background	76%	12%	12%	100%
JLR Extension	5%	0%	95%	100%
Hwy 29 RA	5%	0%	95%	100%
Clearing	5%	0%	95%	100%
Trans Line	75%	16%	9%	100%
Workforce	100%	0%	0%	100%

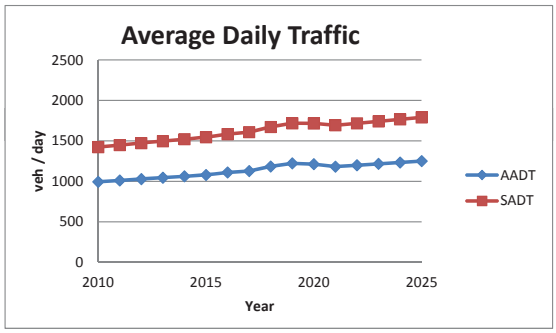
2-Way Average Daily Volumes: By Component and Classified
Canyon Drive
All Sources: Expected Growth

Year	Average Daily Traffic (veh/day)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	995	0	0	0	995	755	119	121	995
2011	1012	0	0	0	1012	767	122	123	1012
2012	1029	0	0	0	1029	780	124	125	1029
2013	1046	0	0	0	1046	793	126	127	1046
2014	1063	0	0	0	1063	806	128	129	1063
2015	1080	0	0	0	1080	819	130	131	1080
2016	1097	14	0	0	1111	833	132	146	1111
2017	1114	14	0	0	1128	846	134	148	1128
2018	1132	53	0	0	1184	861	136	188	1184
2019	1149	74	0	0	1223	875	138	210	1223
2020	1166	48	0	0	1214	887	140	187	1214
2021	1183	0	0	0	1183	897	142	144	1183
2022	1200	0	0	0	1200	910	144	146	1200
2023	1217	0	0	0	1217	923	146	148	1217
2024	1234	0	0	0	1234	936	148	150	1234
2025	1251	0	0	0	1251	949	150	152	1251
2026	1268	0	0	0	1268	962	152	154	1268
2027	1285	0	0	0	1285	975	154	156	1285
2028	1303	0	0	0	1303	988	156	158	1303
2029	1320	0	0	0	1320	1001	158	160	1320
2030	1337	0	0	0	1337	1014	161	162	1337
2031	1354	0	0	0	1354	1027	163	164	1354
2032	1371	0	0	0	1371	1040	165	166	1371
2033	1388	0	0	0	1388	1053	167	169	1388
2034	1405	0	0	0	1405	1066	169	171	1405
2035	1422	0	0	0	1422	1079	171	173	1422
Site C:									
Peak Yr	1149	74	0	0	1223	875	138	210	1223
8-Yr Avg.	1140	25	0	0	1165	866	137	162	1165

Average Daily Traffic Volumes and Daily Patterns
Canyon Drive
All Sources: Expected Growth

Year	Daily		Environmental Req.	
	AADT (veh / day)	SADT (veh / day)	10PM - 7AM	7AM - 10PM
2010	995	1424	125	870
2011	1012	1449	127	885
2012	1029	1473	129	900
2013	1046	1498	131	915
2014	1063	1522	133	930
2015	1080	1547	135	945
2016	1111	1585	138	973
2017	1128	1609	140	988
2018	1184	1673	142	1043
2019	1223	1719	144	1079
2020	1214	1717	146	1067
2021	1183	1693	148	1035
2022	1200	1718	150	1050
2023	1217	1742	153	1064
2024	1234	1767	155	1079
2025	1251	1791	157	1094
2026	1268	1816	159	1109
2027	1285	1840	161	1124
2028	1303	1865	163	1139
2029	1320	1889	165	1154
2030	1337	1914	168	1169
2031	1354	1938	170	1184
2032	1371	1963	172	1199
2033	1388	1987	174	1214
2034	1405	2012	176	1229
2035	1422	2036	178	1244
Site C:				
Peak Yr	1223	1719	144	1079
8-Yr Avg.	1165	1658	143	1022

Peak Hour Factor: 10%
Directional Split: 58%



2-Way Daily and Yearly Volume Calculations
Hwy 29 N of Canyon
Background Traffic: Expected Growth

Year	Average Daily		Yearly (x M)			
	Annual	Summer	Background Traffic			
	(veh/day)	(veh/day)	Pass	LT	HT	Total
2010	1093	1565	0.30	0.05	0.05	0.40
2011	1112	1592	0.31	0.05	0.05	0.41
2012	1131	1619	0.31	0.05	0.05	0.41
2013	1149	1645	0.32	0.05	0.05	0.42
2014	1168	1672	0.32	0.05	0.05	0.43
2015	1187	1699	0.33	0.05	0.05	0.43
2016	1206	1726	0.33	0.05	0.05	0.44
2017	1224	1753	0.34	0.05	0.05	0.45
2018	1243	1780	0.34	0.05	0.06	0.45
2019	1262	1807	0.35	0.06	0.06	0.46
2020	1281	1834	0.35	0.06	0.06	0.47
2021	1300	1861	0.36	0.06	0.06	0.47
2022	1318	1887	0.36	0.06	0.06	0.48
2023	1337	1914	0.37	0.06	0.06	0.49
2024	1356	1941	0.38	0.06	0.06	0.49
2025	1375	1968	0.38	0.06	0.06	0.50
2026	1393	1995	0.39	0.06	0.06	0.51
2027	1412	2022	0.39	0.06	0.06	0.52
2028	1431	2049	0.40	0.06	0.06	0.52
2029	1450	2076	0.40	0.06	0.06	0.53
2030	1469	2103	0.41	0.06	0.07	0.54
2031	1487	2129	0.41	0.07	0.07	0.54
2032	1506	2156	0.42	0.07	0.07	0.55
2033	1525	2183	0.42	0.07	0.07	0.56
2034	1544	2210	0.43	0.07	0.07	0.56
2035	1562	2237	0.43	0.07	0.07	0.57
Total			9.56	1.51	1.53	12.60

Legend:

Pass	Passenger Vehicles	
LT	Light Trucks	Rigid 2- 4-axle Heavy Goods Vehicle
HT	Heavy Trucks	Tractor / Trailer Units

2-Way Yearly Volumes: By Component and Classified
Hwy 29 N of Canyon
All Sources: Expected Growth

Year	Total Yearly Traffic (x M)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	0.399	0.000	0.000	0.000	0.399	0.30	0.05	0.05	0.40
2011	0.406	0.000	0.000	0.000	0.406	0.31	0.05	0.05	0.41
2012	0.413	0.000	0.000	0.000	0.413	0.31	0.05	0.05	0.41
2013	0.419	0.000	0.000	0.000	0.419	0.32	0.05	0.05	0.42
2014	0.426	0.000	0.000	0.001	0.428	0.32	0.05	0.05	0.43
2015	0.433	0.000	0.000	0.004	0.437	0.33	0.05	0.05	0.44
2016	0.440	0.005	0.000	0.005	0.450	0.34	0.05	0.06	0.45
2017	0.447	0.005	0.000	0.005	0.457	0.34	0.05	0.06	0.46
2018	0.454	0.019	0.000	0.006	0.479	0.35	0.05	0.07	0.48
2019	0.461	0.027	0.000	0.010	0.497	0.36	0.06	0.08	0.50
2020	0.467	0.017	0.000	0.009	0.494	0.36	0.06	0.07	0.49
2021	0.474	0.000	0.000	0.006	0.480	0.37	0.06	0.06	0.48
2022	0.481	0.000	0.000	0.002	0.483	0.37	0.06	0.06	0.48
2023	0.488	0.000	0.000	0.000	0.488	0.37	0.06	0.06	0.49
2024	0.495	0.000	0.000	0.000	0.495	0.38	0.06	0.06	0.49
2025	0.502	0.000	0.000	0.000	0.502	0.38	0.06	0.06	0.50
2026	0.509	0.000	0.000	0.000	0.509	0.39	0.06	0.06	0.51
2027	0.515	0.000	0.000	0.000	0.515	0.39	0.06	0.06	0.52
2028	0.522	0.000	0.000	0.000	0.522	0.40	0.06	0.06	0.52
2029	0.529	0.000	0.000	0.000	0.529	0.40	0.06	0.06	0.53
2030	0.536	0.000	0.000	0.000	0.536	0.41	0.06	0.07	0.54
2031	0.543	0.000	0.000	0.000	0.543	0.41	0.07	0.07	0.54
2032	0.550	0.000	0.000	0.000	0.550	0.42	0.07	0.07	0.55
2033	0.557	0.000	0.000	0.000	0.557	0.42	0.07	0.07	0.56
2034	0.563	0.000	0.000	0.000	0.563	0.43	0.07	0.07	0.56
2035	0.570	0.000	0.000	0.000	0.570	0.43	0.07	0.07	0.57
Total	12.60	0.074	0.00	0.05	12.72	9.61	1.51	1.60	12.72

Classification

Source	Vehicle Type			
	%Pass	%LT	%HT	Total
Background	76%	12%	12%	100%
JLR Extension	5%	0%	95%	100%
Hwy 29 RA	5%	0%	95%	100%
Clearing	5%	0%	95%	100%
Trans Line	75%	16%	9%	100%
Workforce	100%	0%	0%	100%

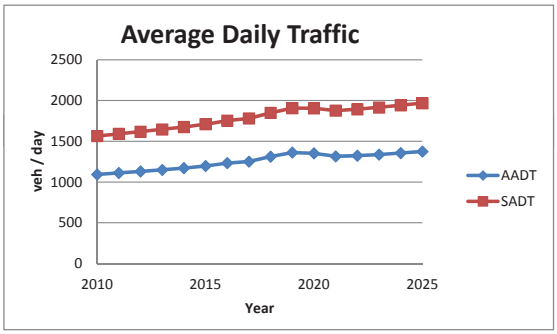
2-Way Average Daily Volumes: By Component and Classified
Hwy 29 N of Canyon
All Sources: Expected Growth

Year	Average Daily Traffic (veh/day)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	1093	0	0	0	1093	829	131	133	1093
2011	1112	0	0	0	1112	843	134	135	1112
2012	1131	0	0	0	1131	857	136	137	1131
2013	1149	0	0	0	1149	872	138	140	1149
2014	1168	0	0	3	1171	889	140	142	1171
2015	1187	0	0	10	1197	911	143	144	1197
2016	1206	14	0	14	1233	929	145	159	1233
2017	1224	14	0	14	1252	943	147	162	1252
2018	1243	53	0	16	1313	962	149	201	1313
2019	1262	74	0	26	1362	987	152	224	1362
2020	1281	48	0	24	1352	998	154	201	1352
2021	1300	0	0	16	1316	1002	156	158	1316
2022	1318	0	0	6	1324	1006	158	160	1324
2023	1337	0	0	0	1337	1014	161	162	1337
2024	1356	0	0	0	1356	1028	163	165	1356
2025	1375	0	0	0	1375	1043	165	167	1375
2026	1393	0	0	0	1393	1057	167	169	1393
2027	1412	0	0	0	1412	1071	170	171	1412
2028	1431	0	0	0	1431	1085	172	174	1431
2029	1450	0	0	0	1450	1100	174	176	1450
2030	1469	0	0	0	1469	1114	176	178	1469
2031	1487	0	0	0	1487	1128	179	181	1487
2032	1506	0	0	0	1506	1142	181	183	1506
2033	1525	0	0	0	1525	1157	183	185	1525
2034	1544	0	0	0	1544	1171	185	187	1544
2035	1562	0	0	0	1562	1185	188	190	1562
Site C:									
Peak Yr	1262	74	0	26	1362	987	152	224	1362
8-Yr Avg.	1253	25	0	16	1294	967	150	176	1294

Average Daily Traffic Volumes and Daily Patterns
Hwy 29 N of Canyon
All Sources: Expected Growth

Year	Daily		Environmental Req.	
	AADT (veh / day)	SADT (veh / day)	10PM - 7AM	7AM - 10PM
2010	1093	1565	137	956
2011	1112	1592	139	972
2012	1131	1619	142	989
2013	1149	1645	144	1005
2014	1171	1676	146	1025
2015	1197	1710	149	1048
2016	1233	1754	151	1082
2017	1252	1780	153	1098
2018	1313	1849	156	1157
2019	1362	1907	158	1204
2020	1352	1905	161	1192
2021	1316	1877	163	1153
2022	1324	1893	165	1159
2023	1337	1914	168	1169
2024	1356	1941	170	1186
2025	1375	1968	172	1202
2026	1393	1995	175	1219
2027	1412	2022	177	1235
2028	1431	2049	179	1252
2029	1450	2076	182	1268
2030	1469	2103	184	1284
2031	1487	2129	186	1301
2032	1506	2156	189	1317
2033	1525	2183	191	1334
2034	1544	2210	194	1350
2035	1562	2237	196	1367
Site C:				
Peak Yr	1362	1907	158	1204
8-Yr Avg.	1294	1834	157	1137

Peak Hour Factor: 10%
Directional Split: 58%



2-Way Daily and Yearly Volume Calculations
Clarke Ave.
Background Traffic: Expected Growth

Year	Average Daily		Yearly (x M)			
	Annual	Summer	Background Traffic			
	(veh/day)	(veh/day)	Pass	LT	HT	Total
2010	712	1020	0.20	0.03	0.03	0.26
2011	724	1037	0.21	0.03	0.03	0.26
2012	737	1055	0.21	0.03	0.03	0.27
2013	749	1072	0.21	0.03	0.03	0.27
2014	761	1090	0.22	0.03	0.03	0.28
2015	773	1107	0.22	0.03	0.03	0.28
2016	786	1125	0.23	0.03	0.03	0.29
2017	798	1142	0.23	0.03	0.03	0.29
2018	810	1160	0.23	0.03	0.03	0.30
2019	822	1177	0.24	0.03	0.03	0.30
2020	835	1195	0.24	0.04	0.03	0.30
2021	847	1212	0.24	0.04	0.03	0.31
2022	859	1230	0.25	0.04	0.03	0.31
2023	871	1248	0.25	0.04	0.03	0.32
2024	884	1265	0.25	0.04	0.03	0.32
2025	896	1283	0.26	0.04	0.03	0.33
2026	908	1300	0.26	0.04	0.03	0.33
2027	920	1318	0.26	0.04	0.03	0.34
2028	933	1335	0.27	0.04	0.03	0.34
2029	945	1353	0.27	0.04	0.03	0.34
2030	957	1370	0.27	0.04	0.03	0.35
2031	969	1388	0.28	0.04	0.03	0.35
2032	981	1405	0.28	0.04	0.04	0.36
2033	994	1423	0.29	0.04	0.04	0.36
2034	1006	1440	0.29	0.04	0.04	0.37
2035	1018	1458	0.29	0.04	0.04	0.37
Total			6.45	0.95	0.81	8.21

Legend:

Pass	Passenger Vehicles	
LT	Light Trucks	Rigid 2- 4-axle Heavy Goods Vehicle
HT	Heavy Trucks	Tractor / Trailer Units

2-Way Yearly Volumes: By Component and Classified
Clarke Ave.
All Sources: Expected Growth

Year	Total Yearly Traffic (x M)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	0.260	0.000	0.000	0.000	0.260	0.20	0.03	0.03	0.26
2011	0.264	0.000	0.000	0.000	0.264	0.21	0.03	0.03	0.26
2012	0.269	0.000	0.000	0.000	0.269	0.21	0.03	0.03	0.27
2013	0.273	0.000	0.000	0.000	0.273	0.21	0.03	0.03	0.27
2014	0.278	0.000	0.000	0.000	0.278	0.22	0.03	0.03	0.28
2015	0.282	0.000	0.000	0.000	0.282	0.22	0.03	0.03	0.28
2016	0.287	0.000	0.000	0.000	0.287	0.23	0.03	0.03	0.29
2017	0.291	0.000	0.000	0.000	0.291	0.23	0.03	0.03	0.29
2018	0.296	0.000	0.000	0.000	0.296	0.23	0.03	0.03	0.30
2019	0.300	0.010	0.000	0.000	0.310	0.24	0.03	0.04	0.31
2020	0.305	0.010	0.000	0.000	0.315	0.24	0.04	0.04	0.31
2021	0.309	0.000	0.000	0.000	0.309	0.24	0.04	0.03	0.31
2022	0.314	0.000	0.000	0.000	0.314	0.25	0.04	0.03	0.31
2023	0.318	0.000	0.000	0.000	0.318	0.25	0.04	0.03	0.32
2024	0.323	0.000	0.000	0.000	0.323	0.25	0.04	0.03	0.32
2025	0.327	0.000	0.000	0.000	0.327	0.26	0.04	0.03	0.33
2026	0.331	0.000	0.000	0.000	0.331	0.26	0.04	0.03	0.33
2027	0.336	0.000	0.000	0.000	0.336	0.26	0.04	0.03	0.34
2028	0.340	0.000	0.000	0.000	0.340	0.27	0.04	0.03	0.34
2029	0.345	0.000	0.000	0.000	0.345	0.27	0.04	0.03	0.34
2030	0.349	0.000	0.000	0.000	0.349	0.27	0.04	0.03	0.35
2031	0.354	0.000	0.000	0.000	0.354	0.28	0.04	0.03	0.35
2032	0.358	0.000	0.000	0.000	0.358	0.28	0.04	0.04	0.36
2033	0.363	0.000	0.000	0.000	0.363	0.29	0.04	0.04	0.36
2034	0.367	0.000	0.000	0.000	0.367	0.29	0.04	0.04	0.37
2035	0.372	0.000	0.000	0.000	0.372	0.29	0.04	0.04	0.37
Total	8.21	0.020	0.00	0.00	8.23	6.45	0.95	0.83	8.23

Classification

Source	Vehicle Type			
	%Pass	%LT	%HT	Total
Background	79%	12%	10%	100%
JLR Extension	5%	0%	95%	100%
Hwy 29 RA	5%	0%	95%	100%
Clearing	5%	0%	95%	100%
Trans Line	75%	16%	9%	100%
Workforce	100%	0%	0%	100%

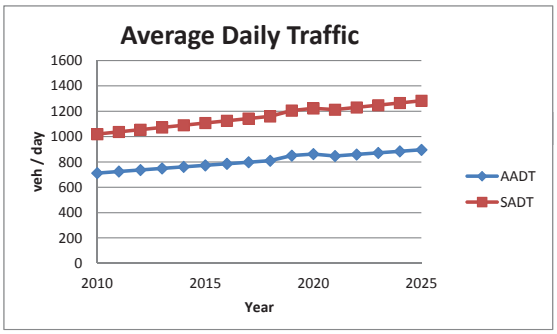
2-Way Average Daily Volumes: By Component and Classified
Clarke Ave.
All Sources: Expected Growth

Year	Average Daily Traffic (veh/day)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	712	0	0	0	712	560	82	70	712
2011	724	0	0	0	724	569	84	72	724
2012	737	0	0	0	737	579	85	73	737
2013	749	0	0	0	749	589	86	74	749
2014	761	0	0	0	761	598	88	75	761
2015	773	0	0	0	773	608	89	76	773
2016	786	0	0	0	786	617	91	78	786
2017	798	0	0	0	798	627	92	79	798
2018	810	0	0	0	810	637	93	80	810
2019	822	28	0	0	850	648	95	108	850
2020	835	28	0	0	863	657	96	109	863
2021	847	0	0	0	847	666	98	84	847
2022	859	0	0	0	859	675	99	85	859
2023	871	0	0	0	871	685	101	86	871
2024	884	0	0	0	884	694	102	87	884
2025	896	0	0	0	896	704	103	88	896
2026	908	0	0	0	908	714	105	90	908
2027	920	0	0	0	920	723	106	91	920
2028	933	0	0	0	933	733	108	92	933
2029	945	0	0	0	945	742	109	93	945
2030	957	0	0	0	957	752	110	95	957
2031	969	0	0	0	969	762	112	96	969
2032	981	0	0	0	981	771	113	97	981
2033	994	0	0	0	994	781	115	98	994
2034	1006	0	0	0	1006	791	116	99	1006
2035	1018	0	0	0	1018	800	117	101	1018
Site C:									
Peak Yr	835	28	0	0	863	657	96	109	863
8-Yr Avg.	816	7	0	0	823	642	94	87	823

Average Daily Traffic Volumes and Daily Patterns
Clarke Ave.
All Sources: Expected Growth

Year	Daily		Environmental Req.	
	AADT (veh / day)	SADT (veh / day)	10PM - 7AM	7AM - 10PM
2010	712	1020	89	623
2011	724	1037	91	634
2012	737	1055	92	644
2013	749	1072	94	655
2014	761	1090	95	666
2015	773	1107	97	676
2016	786	1125	98	687
2017	798	1142	100	698
2018	810	1160	102	709
2019	850	1205	103	747
2020	863	1223	105	758
2021	847	1212	106	741
2022	859	1230	108	751
2023	871	1248	109	762
2024	884	1265	111	773
2025	896	1283	112	784
2026	908	1300	114	794
2027	920	1318	115	805
2028	933	1335	117	816
2029	945	1353	118	826
2030	957	1370	120	837
2031	969	1388	121	848
2032	981	1405	123	858
2033	994	1423	125	869
2034	1006	1440	126	880
2035	1018	1458	128	891
Site C:				
Peak Yr	863	1223	105	758
8-Yr Avg.	823	1176	102	721

Peak Hour Factor: 10%
Directional Split: 58%



2-Way Daily and Yearly Volume Calculations
West of Lynx Creek Realignment
Background Traffic: Expected Growth

Year	Average Daily		Yearly (x M)			
	Annual	Summer	Background Traffic			
	(veh/day)	(veh/day)	Pass	LT	HT	Total
2010	699	1001	0.19	0.03	0.03	0.26
2011	711	1018	0.20	0.03	0.03	0.26
2012	723	1035	0.20	0.03	0.03	0.26
2013	735	1053	0.20	0.03	0.03	0.27
2014	747	1070	0.21	0.03	0.03	0.27
2015	759	1087	0.21	0.03	0.03	0.28
2016	771	1104	0.21	0.03	0.03	0.28
2017	783	1121	0.22	0.03	0.03	0.29
2018	795	1139	0.22	0.03	0.04	0.29
2019	807	1156	0.22	0.04	0.04	0.29
2020	819	1173	0.23	0.04	0.04	0.30
2021	831	1190	0.23	0.04	0.04	0.30
2022	843	1207	0.23	0.04	0.04	0.31
2023	855	1225	0.24	0.04	0.04	0.31
2024	867	1242	0.24	0.04	0.04	0.32
2025	879	1259	0.24	0.04	0.04	0.32
2026	891	1276	0.25	0.04	0.04	0.33
2027	903	1293	0.25	0.04	0.04	0.33
2028	915	1311	0.25	0.04	0.04	0.33
2029	927	1328	0.26	0.04	0.04	0.34
2030	939	1345	0.26	0.04	0.04	0.34
2031	951	1362	0.26	0.04	0.04	0.35
2032	963	1379	0.27	0.04	0.04	0.35
2033	975	1397	0.27	0.04	0.04	0.36
2034	987	1414	0.27	0.04	0.04	0.36
2035	999	1431	0.28	0.04	0.04	0.36
Total			6.11	0.97	0.98	8.06

Legend:

Pass	Passenger Vehicles	
LT	Light Trucks	Rigid 2- 4-axle Heavy Goods Vehicle
HT	Heavy Trucks	Tractor / Trailer Units

2-Way Yearly Volumes: By Component and Classified
West of Lynx Creek Realignment
All Sources: Expected Growth

Year	Total Yearly Traffic (x M)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	0.255	0.000	0.000	0.000	0.255	0.19	0.03	0.03	0.26
2011	0.260	0.000	0.000	0.000	0.260	0.20	0.03	0.03	0.26
2012	0.264	0.000	0.000	0.000	0.264	0.20	0.03	0.03	0.26
2013	0.268	0.000	0.000	0.000	0.268	0.20	0.03	0.03	0.27
2014	0.273	0.000	0.000	0.001	0.274	0.21	0.03	0.03	0.27
2015	0.277	0.000	0.000	0.004	0.281	0.21	0.03	0.03	0.28
2016	0.281	0.005	0.000	0.005	0.292	0.22	0.03	0.04	0.29
2017	0.286	0.005	0.000	0.005	0.296	0.22	0.03	0.04	0.30
2018	0.290	0.019	0.000	0.006	0.316	0.23	0.03	0.05	0.32
2019	0.295	0.017	0.000	0.010	0.321	0.23	0.04	0.05	0.32
2020	0.299	0.007	0.000	0.009	0.315	0.24	0.04	0.04	0.31
2021	0.303	0.000	0.000	0.006	0.309	0.24	0.04	0.04	0.31
2022	0.308	0.000	0.000	0.002	0.310	0.24	0.04	0.04	0.31
2023	0.312	0.000	0.000	0.000	0.312	0.24	0.04	0.04	0.31
2024	0.317	0.000	0.000	0.000	0.317	0.24	0.04	0.04	0.32
2025	0.321	0.000	0.000	0.000	0.321	0.24	0.04	0.04	0.32
2026	0.325	0.000	0.000	0.000	0.325	0.25	0.04	0.04	0.33
2027	0.330	0.000	0.000	0.000	0.330	0.25	0.04	0.04	0.33
2028	0.334	0.000	0.000	0.000	0.334	0.25	0.04	0.04	0.33
2029	0.338	0.000	0.000	0.000	0.338	0.26	0.04	0.04	0.34
2030	0.343	0.000	0.000	0.000	0.343	0.26	0.04	0.04	0.34
2031	0.347	0.000	0.000	0.000	0.347	0.26	0.04	0.04	0.35
2032	0.352	0.000	0.000	0.000	0.352	0.27	0.04	0.04	0.35
2033	0.356	0.000	0.000	0.000	0.356	0.27	0.04	0.04	0.36
2034	0.360	0.000	0.000	0.000	0.360	0.27	0.04	0.04	0.36
2035	0.365	0.000	0.000	0.000	0.365	0.28	0.04	0.04	0.36
Total	8.06	0.053	0.00	0.05	8.16	6.16	0.97	1.03	8.16

Classification

Source	Vehicle Type			
	%Pass	%LT	%HT	Total
Background	76%	12%	12%	100%
JLR Extension	5%	0%	95%	100%
Hwy 29 RA	5%	0%	95%	100%
Clearing	5%	0%	95%	100%
Trans Line	75%	16%	9%	100%
Workforce	100%	0%	0%	100%

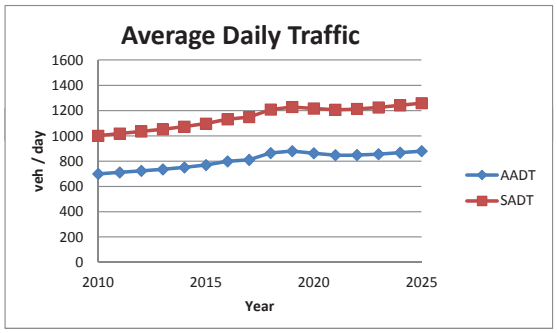
2-Way Average Daily Volumes: By Component and Classified
West of Lynx Creek Realignment
All Sources: Expected Growth

Year	Average Daily Traffic (veh/day)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	699	0	0	0	699	530	84	85	699
2011	711	0	0	0	711	539	85	86	711
2012	723	0	0	0	723	548	87	88	723
2013	735	0	0	0	735	558	88	89	735
2014	747	0	0	3	750	570	90	91	750
2015	759	0	0	10	770	586	91	92	770
2016	771	14	0	14	799	600	93	107	799
2017	783	14	0	14	810	608	94	108	810
2018	795	53	0	16	865	622	96	147	865
2019	807	46	0	26	880	641	97	142	880
2020	819	20	0	24	863	646	98	118	863
2021	831	0	0	16	848	647	100	101	848
2022	843	0	0	6	849	645	101	102	849
2023	855	0	0	0	855	649	103	104	855
2024	867	0	0	0	867	658	104	105	867
2025	879	0	0	0	879	667	106	107	879
2026	891	0	0	0	891	676	107	108	891
2027	903	0	0	0	903	685	108	110	903
2028	915	0	0	0	915	694	110	111	915
2029	927	0	0	0	927	703	111	113	927
2030	939	0	0	0	939	712	113	114	939
2031	951	0	0	0	951	722	114	116	951
2032	963	0	0	0	963	731	116	117	963
2033	975	0	0	0	975	740	117	118	975
2034	987	0	0	0	987	749	119	120	987
2035	999	0	0	0	999	758	120	121	999
Site C:									
Peak Yr	807	46	0	26	880	641	97	142	880
8-Yr Avg.	801	18	0	16	835	624	96	115	835

Average Daily Traffic Volumes and Daily Patterns
West of Lynx Creek Realignment
All Sources: Expected Growth

Year	Daily		Environmental Req.	
	AADT (veh / day)	SADT (veh / day)	10PM - 7AM	7AM - 10PM
2010	699	1001	88	611
2011	711	1018	89	622
2012	723	1035	91	632
2013	735	1053	92	643
2014	750	1073	94	657
2015	770	1097	95	674
2016	799	1132	97	702
2017	810	1149	98	712
2018	865	1208	100	765
2019	880	1228	101	779
2020	863	1217	103	760
2021	848	1206	104	743
2022	849	1213	106	743
2023	855	1225	107	748
2024	867	1242	109	759
2025	879	1259	110	769
2026	891	1276	112	780
2027	903	1293	113	790
2028	915	1311	115	801
2029	927	1328	116	811
2030	939	1345	118	822
2031	951	1362	119	832
2032	963	1379	121	843
2033	975	1397	122	853
2034	987	1414	124	864
2035	999	1431	125	874
Site C:				
Peak Yr	865	1208	100	765
8-Yr Avg.	835	1181	100	735

Peak Hour Factor: 10%
Directional Split: 58%



2-Way Daily and Yearly Volume Calculations
East of Lynx Creek Realignment
Background Traffic: Expected Growth

Year	Average Daily		Yearly (x M)			
	Annual	Summer	Background Traffic			
	(veh/day)	(veh/day)	Pass	LT	HT	Total
2010	699	1001	0.19	0.03	0.03	0.26
2011	711	1018	0.20	0.03	0.03	0.26
2012	723	1035	0.20	0.03	0.03	0.26
2013	735	1053	0.20	0.03	0.03	0.27
2014	747	1070	0.21	0.03	0.03	0.27
2015	759	1087	0.21	0.03	0.03	0.28
2016	771	1104	0.21	0.03	0.03	0.28
2017	783	1121	0.22	0.03	0.03	0.29
2018	795	1139	0.22	0.03	0.04	0.29
2019	807	1156	0.22	0.04	0.04	0.29
2020	819	1173	0.23	0.04	0.04	0.30
2021	831	1190	0.23	0.04	0.04	0.30
2022	843	1207	0.23	0.04	0.04	0.31
2023	855	1225	0.24	0.04	0.04	0.31
2024	867	1242	0.24	0.04	0.04	0.32
2025	879	1259	0.24	0.04	0.04	0.32
2026	891	1276	0.25	0.04	0.04	0.33
2027	903	1293	0.25	0.04	0.04	0.33
2028	915	1311	0.25	0.04	0.04	0.33
2029	927	1328	0.26	0.04	0.04	0.34
2030	939	1345	0.26	0.04	0.04	0.34
2031	951	1362	0.26	0.04	0.04	0.35
2032	963	1379	0.27	0.04	0.04	0.35
2033	975	1397	0.27	0.04	0.04	0.36
2034	987	1414	0.27	0.04	0.04	0.36
2035	999	1431	0.28	0.04	0.04	0.36
Total			6.11	0.97	0.98	8.06

Legend:

Pass	Passenger Vehicles	
LT	Light Trucks	Rigid 2- 4-axle Heavy Goods Vehicle
HT	Heavy Trucks	Tractor / Trailer Units

2-Way Yearly Volumes: By Component and Classified
East of Lynx Creek Realignment
All Sources: Expected Growth

Year	Total Yearly Traffic (x M)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	0.255	0.000	0.000	0.000	0.255	0.19	0.03	0.03	0.26
2011	0.260	0.000	0.000	0.000	0.260	0.20	0.03	0.03	0.26
2012	0.264	0.000	0.000	0.000	0.264	0.20	0.03	0.03	0.26
2013	0.268	0.000	0.000	0.000	0.268	0.20	0.03	0.03	0.27
2014	0.273	0.000	0.000	0.001	0.274	0.21	0.03	0.03	0.27
2015	0.277	0.000	0.000	0.004	0.281	0.21	0.03	0.03	0.28
2016	0.281	0.005	0.000	0.005	0.292	0.22	0.03	0.04	0.29
2017	0.286	0.005	0.000	0.005	0.296	0.22	0.03	0.04	0.30
2018	0.290	0.012	0.000	0.006	0.309	0.23	0.03	0.05	0.31
2019	0.295	0.010	0.000	0.010	0.314	0.23	0.04	0.05	0.31
2020	0.299	0.000	0.000	0.009	0.308	0.24	0.04	0.04	0.31
2021	0.303	0.000	0.000	0.006	0.309	0.24	0.04	0.04	0.31
2022	0.308	0.000	0.000	0.002	0.310	0.24	0.04	0.04	0.31
2023	0.312	0.000	0.000	0.000	0.312	0.24	0.04	0.04	0.31
2024	0.317	0.000	0.000	0.000	0.317	0.24	0.04	0.04	0.32
2025	0.321	0.000	0.000	0.000	0.321	0.24	0.04	0.04	0.32
2026	0.325	0.000	0.000	0.000	0.325	0.25	0.04	0.04	0.33
2027	0.330	0.000	0.000	0.000	0.330	0.25	0.04	0.04	0.33
2028	0.334	0.000	0.000	0.000	0.334	0.25	0.04	0.04	0.33
2029	0.338	0.000	0.000	0.000	0.338	0.26	0.04	0.04	0.34
2030	0.343	0.000	0.000	0.000	0.343	0.26	0.04	0.04	0.34
2031	0.347	0.000	0.000	0.000	0.347	0.26	0.04	0.04	0.35
2032	0.352	0.000	0.000	0.000	0.352	0.27	0.04	0.04	0.35
2033	0.356	0.000	0.000	0.000	0.356	0.27	0.04	0.04	0.36
2034	0.360	0.000	0.000	0.000	0.360	0.27	0.04	0.04	0.36
2035	0.365	0.000	0.000	0.000	0.365	0.28	0.04	0.04	0.36
Total	8.06	0.032	0.00	0.05	8.14	6.16	0.97	1.01	8.14

Classification

Source	Vehicle Type			
	%Pass	%LT	%HT	Total
Background	76%	12%	12%	100%
JLR Extension	5%	0%	95%	100%
Hwy 29 RA	5%	0%	95%	100%
Clearing	5%	0%	95%	100%
Trans Line	75%	16%	9%	100%
Workforce	100%	0%	0%	100%

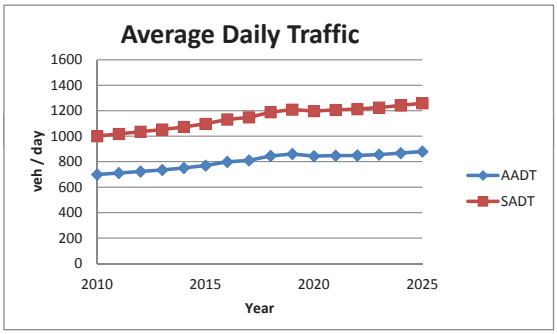
2-Way Average Daily Volumes: By Component and Classified
East of Lynx Creek Realignment
All Sources: Expected Growth

Year	Average Daily Traffic (veh/day)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	699	0	0	0	699	530	84	85	699
2011	711	0	0	0	711	539	85	86	711
2012	723	0	0	0	723	548	87	88	723
2013	735	0	0	0	735	558	88	89	735
2014	747	0	0	3	750	570	90	91	750
2015	759	0	0	10	770	586	91	92	770
2016	771	14	0	14	799	600	93	107	799
2017	783	14	0	14	810	608	94	108	810
2018	795	34	0	16	845	621	96	128	845
2019	807	27	0	26	860	640	97	124	860
2020	819	1	0	24	844	645	98	100	844
2021	831	0	0	16	848	647	100	101	848
2022	843	0	0	6	849	645	101	102	849
2023	855	0	0	0	855	649	103	104	855
2024	867	0	0	0	867	658	104	105	867
2025	879	0	0	0	879	667	106	107	879
2026	891	0	0	0	891	676	107	108	891
2027	903	0	0	0	903	685	108	110	903
2028	915	0	0	0	915	694	110	111	915
2029	927	0	0	0	927	703	111	113	927
2030	939	0	0	0	939	712	113	114	939
2031	951	0	0	0	951	722	114	116	951
2032	963	0	0	0	963	731	116	117	963
2033	975	0	0	0	975	740	117	118	975
2034	987	0	0	0	987	749	119	120	987
2035	999	0	0	0	999	758	120	121	999
Site C:									
Peak Yr	807	27	0	26	860	640	97	124	860
8-Yr Avg.	801	11	0	16	828	624	96	108	828

Average Daily Traffic Volumes and Daily Patterns
East of Lynx Creek Realignment
All Sources: Expected Growth

Year	Daily		Environmental Req.	
	AADT (veh / day)	SADT (veh / day)	10PM - 7AM	7AM - 10PM
2010	699	1001	88	611
2011	711	1018	89	622
2012	723	1035	91	632
2013	735	1053	92	643
2014	750	1073	94	657
2015	770	1097	95	674
2016	799	1132	97	702
2017	810	1149	98	712
2018	845	1189	100	746
2019	860	1209	101	759
2020	844	1197	103	741
2021	848	1206	104	743
2022	849	1213	106	743
2023	855	1225	107	748
2024	867	1242	109	759
2025	879	1259	110	769
2026	891	1276	112	780
2027	903	1293	113	790
2028	915	1311	115	801
2029	927	1328	116	811
2030	939	1345	118	822
2031	951	1362	119	832
2032	963	1379	121	843
2033	975	1397	122	853
2034	987	1414	124	864
2035	999	1431	125	874
Site C:				
Peak Yr	845	1189	100	746
8-Yr Avg.	828	1174	100	728

Peak Hour Factor: 10%
Directional Split: 58%



2-Way Daily and Yearly Volume Calculations
East of Farrell Creek Realignment
Background Traffic: Expected Growth

Year	Average Daily		Yearly (x M)			
	Annual	Summer	Background Traffic			
	(veh/day)	(veh/day)	Pass	LT	HT	Total
2010	735	1053	0.21	0.03	0.03	0.27
2011	748	1071	0.21	0.03	0.03	0.27
2012	761	1089	0.22	0.03	0.03	0.28
2013	773	1107	0.22	0.03	0.03	0.28
2014	786	1125	0.23	0.03	0.03	0.29
2015	798	1143	0.23	0.03	0.03	0.29
2016	811	1161	0.23	0.03	0.03	0.30
2017	824	1179	0.24	0.03	0.03	0.30
2018	836	1197	0.24	0.04	0.03	0.31
2019	849	1216	0.24	0.04	0.03	0.31
2020	862	1234	0.25	0.04	0.03	0.31
2021	874	1252	0.25	0.04	0.03	0.32
2022	887	1270	0.25	0.04	0.03	0.32
2023	900	1288	0.26	0.04	0.03	0.33
2024	912	1306	0.26	0.04	0.03	0.33
2025	925	1324	0.27	0.04	0.03	0.34
2026	937	1342	0.27	0.04	0.03	0.34
2027	950	1360	0.27	0.04	0.03	0.35
2028	963	1378	0.28	0.04	0.03	0.35
2029	975	1396	0.28	0.04	0.04	0.36
2030	988	1415	0.28	0.04	0.04	0.36
2031	1001	1433	0.29	0.04	0.04	0.37
2032	1013	1451	0.29	0.04	0.04	0.37
2033	1026	1469	0.29	0.04	0.04	0.37
2034	1039	1487	0.30	0.04	0.04	0.38
2035	1051	1505	0.30	0.04	0.04	0.38
Total			6.66	0.98	0.84	8.48

Legend:

Pass	Passenger Vehicles	
LT	Light Trucks	Rigid 2- 4-axle Heavy Goods Vehicle
HT	Heavy Trucks	Tractor / Trailer Units

2-Way Yearly Volumes: By Component and Classified
East of Farrell Creek Realignment
All Sources: Expected Growth

Year	Total Yearly Traffic (x M)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	0.268	0.000	0.000	0.000	0.268	0.21	0.03	0.03	0.27
2011	0.273	0.000	0.000	0.000	0.273	0.21	0.03	0.03	0.27
2012	0.278	0.000	0.000	0.000	0.278	0.22	0.03	0.03	0.28
2013	0.282	0.000	0.000	0.000	0.282	0.22	0.03	0.03	0.28
2014	0.287	0.000	0.000	0.001	0.288	0.23	0.03	0.03	0.29
2015	0.291	0.000	0.000	0.004	0.295	0.23	0.03	0.03	0.30
2016	0.296	0.005	0.000	0.005	0.306	0.24	0.03	0.03	0.31
2017	0.301	0.005	0.000	0.005	0.311	0.24	0.03	0.03	0.31
2018	0.305	0.009	0.000	0.006	0.320	0.25	0.04	0.04	0.32
2019	0.310	0.008	0.000	0.010	0.328	0.25	0.04	0.04	0.33
2020	0.314	0.000	0.000	0.009	0.323	0.26	0.04	0.03	0.32
2021	0.319	0.000	0.000	0.006	0.325	0.26	0.04	0.03	0.33
2022	0.324	0.000	0.000	0.002	0.326	0.26	0.04	0.03	0.33
2023	0.328	0.000	0.000	0.000	0.328	0.26	0.04	0.03	0.33
2024	0.333	0.000	0.000	0.000	0.333	0.26	0.04	0.03	0.33
2025	0.338	0.000	0.000	0.000	0.338	0.27	0.04	0.03	0.34
2026	0.342	0.000	0.000	0.000	0.342	0.27	0.04	0.03	0.34
2027	0.347	0.000	0.000	0.000	0.347	0.27	0.04	0.03	0.35
2028	0.351	0.000	0.000	0.000	0.351	0.28	0.04	0.03	0.35
2029	0.356	0.000	0.000	0.000	0.356	0.28	0.04	0.04	0.36
2030	0.361	0.000	0.000	0.000	0.361	0.28	0.04	0.04	0.36
2031	0.365	0.000	0.000	0.000	0.365	0.29	0.04	0.04	0.37
2032	0.370	0.000	0.000	0.000	0.370	0.29	0.04	0.04	0.37
2033	0.374	0.000	0.000	0.000	0.374	0.29	0.04	0.04	0.37
2034	0.379	0.000	0.000	0.000	0.379	0.30	0.04	0.04	0.38
2035	0.384	0.000	0.000	0.000	0.384	0.30	0.04	0.04	0.38
Total	8.48	0.027	0.00	0.05	8.55	6.71	0.98	0.86	8.55

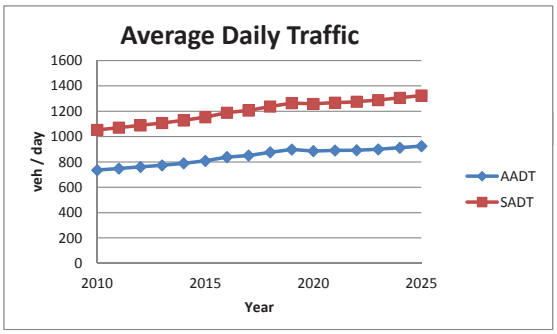
Classification

Source	Vehicle Type			
	%Pass	%LT	%HT	Total
Background	79%	12%	10%	100%
JLR Extension	5%	0%	95%	100%
Hwy 29 RA	5%	0%	95%	100%
Clearing	5%	0%	95%	100%
Trans Line	75%	16%	9%	100%
Workforce	100%	0%	0%	100%

2-Way Average Daily Volumes: By Component and Classified
East of Farrell Creek Realignment
All Sources: Expected Growth

Year	Average Daily Traffic (veh/day)					Traffic Type			
	Background	Hwy 29 RA	Clearing	Workforce	Total	Passenger	LT	HT	Total
2010	735	0	0	0	735	578	85	73	735
2011	748	0	0	0	748	588	86	74	748
2012	761	0	0	0	761	598	88	75	761
2013	773	0	0	0	773	608	89	76	773
2014	786	0	0	3	789	621	91	78	789
2015	798	0	0	10	809	638	92	79	809
2016	811	14	0	14	839	652	94	93	839
2017	824	14	0	14	851	662	95	94	851
2018	836	23	0	16	876	675	96	105	876
2019	849	23	0	26	898	695	98	106	898
2020	862	1	0	24	886	701	99	86	886
2021	874	0	0	16	891	703	101	86	891
2022	887	0	0	6	893	703	102	88	893
2023	900	0	0	0	900	707	104	89	900
2024	912	0	0	0	912	717	105	90	912
2025	925	0	0	0	925	727	107	91	925
2026	937	0	0	0	937	737	108	93	937
2027	950	0	0	0	950	747	110	94	950
2028	963	0	0	0	963	757	111	95	963
2029	975	0	0	0	975	766	113	96	975
2030	988	0	0	0	988	776	114	98	988
2031	1001	0	0	0	1001	786	115	99	1001
2032	1013	0	0	0	1013	796	117	100	1013
2033	1026	0	0	0	1026	806	118	101	1026
2034	1039	0	0	0	1039	816	120	103	1039
2035	1051	0	0	0	1051	826	121	104	1051
Site C:									
Peak Yr	849	23	0	26	898	695	98	106	898
8-Yr Avg.	843	9	0	16	868	678	97	92	868

Average Daily Traffic Volumes and Daily Patterns
East of Farrell Creek Realignment
All Sources: Expected Growth

Year	Daily		Environmental Req.	
	AADT (veh / day)	SADT (veh / day)	10PM - 7AM	7AM - 10PM
2010	735	1053	92	643
2011	748	1071	94	654
2012	761	1089	95	665
2013	773	1107	97	676
2014	789	1128	99	691
2015	809	1154	100	709
2016	839	1189	102	737
2017	851	1207	103	748
2018	876	1237	105	771
2019	898	1265	106	792
2020	886	1258	108	778
2021	891	1268	110	781
2022	893	1275	111	781
2023	900	1288	113	787
2024	912	1306	114	798
2025	925	1324	116	809
2026	937	1342	118	820
2027	950	1360	119	831
2028	963	1378	121	842
2029	975	1396	122	853
2030	988	1415	124	864
2031	1001	1433	125	875
2032	1013	1451	127	886
2033	1026	1469	129	897
2034	1039	1487	130	908
2035	1051	1505	132	919
Site C:				
Peak Yr	898	1265	106	792
8-Yr Avg.	868	1232	106	762

Peak Hour Factor: 10%
Directional Split: 58%