

**Queens Bay Residents Association Review and Comment
on the
Balfour Ferry Terminal Relocation Project – Technical Feasibility Study**

General Comments

This is a limited review (July 31, 2016) of the Balfour Ferry Terminal Relocation Project – Technical Feasibility Study (SNC study) prepared by SNC-Lavalin, dated March, 2016. Throughout the review, references to “Queens Bay terminal” or “Queens Bay site” are meant to indicate the proposed Queens Bay North location.

The SNC study presents an incomplete picture of the relative costs and benefits of the two primary options under consideration. In particular, a number of potentially costly components associated with relocation to the proposed Queens Bay site have not been considered or appear to have been based on the most favorable assumptions. Conversely, potential options that could support improving and retaining the Balfour terminal have been dismissed or ignored. Throughout the report there are significant gaps in information critical to an assessment of feasibility and major components of the project have not been individually costed. Ultimately these limitations cast significant doubt on the recommendations provided.

At best, the SNC study is a 'scoping study' rather than a 'feasibility study' since it only claims a cost confidence level of +/- 25% as compared to the +/-10% which is standard practice in major project consultation for industrial development. Some professional opinions have indicated that the cost of developing the Queens Bay site could easily be more than 100% greater. Sensitivity analyses, which are standard practice in estimating the effect of changes to imprecise variables affecting the cost or feasibility of a project, are entirely lacking. The absence of detailed reporting in terms of environmental and socio-economic impacts, First Nations interests, geotechnical issues and associated detailed cost modeling, render the study potentially misleading and contrary to professional standards.

The evaluative section of the SNC study is largely subjective and exhibits considerable bias toward the preferred option of relocation to the Queens Bay site.

In short, the SNC study is clearly inadequate as an objective decision-making tool regarding potential relocation of the Balfour Ferry Terminal.

Relocation to Queens Bay site - key technical feasibility concerns

Fill materials

The Balfour Ferry Relocation Project study makes no mention of sources for the fill and coarse rock required to construct the proposed Queens Bay site.

Please indicate the estimated volumes of fill and rock required for the project and from where they would be obtained. We would also like to know the estimated cost for this component of the project.

Slope Stability

It is well known that the slopes above Highway 31 at the proposed intersection are highly unstable. There have been several slope failure events that have deposited material

across the highway. Most of these events have initiated from points at mid-slope and above. Their size appears to have been well correlated with high runoff from snow melt conditions much further up slope coupled with extended rainfall events. Currently there are tension cracks up to 1 ft. in width and areas of noticeable vertical displacement on and above the slope.

A number of local geotechnical professionals with long experience in slope stability issues have observed this site over the years, particularly following slope failure events. Their comments indicate that it would require extensive mitigation measures to stabilize the slope. Additionally, they have noted that the area of instability extends northward at least to the end of proposed terminal site and southward as much as 2 km from the proposed intersection. This road segment is clearly signed by MOTI as being a "slide area."

It is also noteworthy that there is unregulated water usage on the lands up slope from the proposed site. Local knowledge and the historical record indicate that there have been several slope failure events associated with local water usage. These events include a landslide in the 1920's near the lakeshore in the area of the proposed terminal resulting in fatalities.

In addition there is crown and private forest land that could be subject to harvesting, thus increasing the water yield at these slopes.

The proposed design at this location includes an 8 m. high cut at the toe of the slope and construction of a retaining wall. At best, this represents a minimal measure of hazard mitigation. A typical slope failure at this location would easily overrun the retaining wall and reach the highway, if not further.

Given that climate change projections indicate both a higher frequency and magnitude of local rain-on-snow events, we are concerned that the project design will not sufficiently control the existing hazard, much less potential future levels of hazard, and may actually exacerbate them. The consequences could include a significant threat to public safety and disruption to the transportation system.

The feasibility study should include sufficient geotechnical analysis to ensure that current and future risk can be fully mitigated. We would like to know the potential full cost for this component of the project.

Dredging Queens Bay site

What is the planned area and volume of material requiring dredging from Kootenay Lake to permit berthing? Where will this material be spoiled? What measures will be in place to mitigate the production of suspended sediments that could affect drinking water sources in Queens Bay and Balfour? What is known about the site conditions? What will this component of the project cost in the worst case (bedrock) conditions?

Highway 31 upgrades

1. The section of Highway 31 between Balfour and the proposed Queens Bay site is inadequate for an increased level of traffic. In particular, the intersection with Green Rd is presently unsafe for vehicles entering from or exiting toward Balfour. There are no bicycle lanes to accommodate the present and possibly increased bicycle touring traffic headed to and from Nelson. The segment between Queens Bay Rd and the proposed terminal site (approximately 2 km) has minimal shoulders and several tight radius turns

with reduced sight lines. Due to the high concentration of recreational properties along the lakeside, there is significant seasonal congestion with many parked vehicles and pedestrians alongside the highway.

Given the diversion of ferry-bound traffic past Balfour onto this section of highway, there will be an increased risk to public safety. When asked about this issue, MOTI staff and consultants indicated that the road met highway standards and no improvements were planned.

We feel that it is imprudent to ignore this issue and that the SNC study must consider the associated challenges and costs of upgrading the road.

2. Northbound traffic entering the Highway 31 from the proposed terminal will be climbing on a sustained 5% grade after traveling 50 m. The proposed merging lane, which ends approximately 125m. from the point where acceleration could commence for heavier and slower vehicles, may prove to be insufficient for such vehicles to attain necessary speed. The result would be increased hazard in merging with through traffic and an impediment to the free flow of traffic on a sustained grade. The SNC study should consider the necessity of substantially lengthening the acceleration lane and include the additional cost.

3. The intersection in Queens Bay must be able to safely handle frequent 8-axle log trucks and some long wheelbase transport trucks including B-trains. The turning radius northbound does not appear to be sufficient to accommodate these units and the southbound left turn onto the access road may present challenges for some vehicles. The SNC study should consider the adequacy of the present design for all forms of traffic, possibly increasing the throat length of the intersection, and easing the geometry of the intersection. These additional costs, including an increased area of fill, should be reflected in the overall cost for this component of the project.

4. Given the 4 km sustained downhill grade with sections between 5% and 6% near the terminal, what safety measures would be put in place to ensure that heavily loaded southbound transport vehicles proceeding through the proposed intersection in Queens Bay can decelerate safely to avoid slow moving vehicles entering or leaving the terminal? Would a run out lane be required and what would it cost?

Effect on regional commercial traffic patterns

A professional transportation analyst has indicated that by substantially reducing the sailing time between Balfour and Kootenay Bay, some fraction of the heavy commercial traffic that presently uses Highway 3 via Kootenay Pass will choose the Highway 3A route. The exact proportion is uncertain, but it is known that many units on that route are contractors for whom the cost of fuel to cross Kootenay Pass is a significant consideration. It is reasonable to expect noticeable impacts on the Highway 3A infrastructure, usability and public safety from this shift in demand, which may require remediation and investment.

A sensitivity analysis on this aspect of regional transportation planning is an essential tool in determining the feasibility of the proposed terminal relocation.

Wind and wave action at Queens Bay berthing site

Despite presenting some largely unrelated data, the SNC study indirectly acknowledges the lack of credible information regarding wind and wave intensity at the proposed

Queens Bay terminal berthing site. Local knowledge is clear that southeast winds can be strong and sustained, with substantial wave heights. Current ferry operations on some occasions have deviated from their usual route in mid-passage to mitigate the effects of a strong beam sea. The Queens Bay site is exposed to those same winds and waves.

The Queens Bay site is also exposed to strong south to southwest winds emerging from the West Arm. These winds are usually associated with intense convective storm cells moving easterly to northeasterly and have occurred at greater frequency and higher intensity in recent years. Due to the funneling effect of the West Arm, these winds can achieve impressively high peak velocities at lake level. The low lying terrain at Balfour together with a nearly 3 km fetch across open water allow for development of significant wave heights in the northern portion of Queens Bay.

Absent any actual site data, there is a reasonable likelihood that one or both of these wind/wave orientations could provide unacceptable impacts on vessels and marine structures at the Queens Bay site. Mitigation of these impacts would imply the necessity for breakwater structures at a substantially increased cost to the project. Without further local data, gathered over a multi-year period, it is impossible to accurately assess the true feasibility and cost of using the Queens Bay site.

Backup Vessel

The SNC study makes no mention of the need for an alternate vessel for periods during which the MV Osprey is not available for service. Much of the benefit of relocating the terminal to Queens Bay depends on the assumption that a single ferry would provide acceptable reliable service, while a second ferry would be needed at Balfour. The idea of operating with only one ferry and without sufficient backup has an intuitive level of discomfort.

The concept of using a motorized barge is presented in the Discussion Guide, but no parameters or costs are included. Discussions with MOTI and consulting staff at the June 15 Open House indicated that capacity might be around 30 vehicles and that the vessel would be designed to be utilized on various inland ferry routes where a backup vessel would be required. No estimated costs were provided.

A valid feasibility study for relocating the terminal to Queens Bay and retirement of the MV Balfour must provide full design parameters and costs for a backup vessel. These parameters should include:

- the capacity for standard vehicles, large/heavy transport and passengers,
- return trip transit time, and
- mobilization delay if the MV Osprey were disabled and the backup vessel is not located in Kootenay Lake.

Some professionals in marine transportation and economics have indicated that nothing less than a fully outfitted mid-sized ferry would be sufficient as a backup vessel for the Osprey. In that case, any financial advantage in relocating the terminal to Queens Bay would be greatly reduced or eliminated.

Please see section on **Balfour Ferry – Solutions/Options** for further discussion of this option.

Decommissioning and Remediation of Balfour Terminal

The SNC study specifically excludes the costs associated with decommissioning the

Balfour terminal, remediation of residual hazards and restoration of the site. These actions would be required if the terminal is relocated and the costs must be included in the comparative evaluation.

Fuel storage

The SNC study makes no mention of fuel storage and handling considerations at the Queens Bay site.

Relocation to Queens Bay site - key environmental concerns

Impacts on water quality in Queens Bay

The quality of water in Queens Bay has a high level of importance. It is the direct source of potable water for approximately 45 households located along the shoreline and is the only source for residents and businesses located in the Balfour townsite. In addition, the beaches along the shoreline are well used for swimming and other aquatic recreational activities. Notably, due to the relative shallowness and the slow circulation of waters in the bay, it is one of the warmest sites for swimming in Kootenay Lake and enjoys high levels of use from all over the region. Lastly, Queens Bay supports fish habitat for a number of species including red-listed Burbot (*Lota lota*) and White Sturgeon (*Acipenser transmontanus*).

It is clearly evident that there would be significant impacts on water quality in Queens Bay due to the proposed relocation of the ferry terminal. During the proposed construction phase alone, the placement of 90,000 m³ of fill would introduce significant amounts of suspended sediments that are likely to affect the quality of water throughout the bay. The water systems used by residents have not been designed to handle high sediment loading and may be unusable for extended periods during construction.

Depending on the nature of the fill materials, there may be the longer term potential for deleterious leachates being released into the water. During operations, it is reasonable to expect that there will be petroleum-based materials introduced into the lake from vessel bilges, accidental spills, vehicle leakage onboard and from parking lot runoff. These materials would likely persist in the waters of Queens Bay for extended periods due to the slow circulation and low flushing effect.

What physical and limnological studies have been undertaken to identify the circulatory patterns in the waters of Queens Bay and to quantify the effects of these potential hazards? What studies have been undertaken to determine the impact of sediments and water quality on critical fish habitat? What measures will be taken to protect water users from sediment and pollutant contamination? What are the potential costs of mitigation of water quality impacts? How will the evaluative model account for a reduction of the present level of water quality?

Sewage treatment and discharged wastewater

The SNC study recommends that the sewage generated at both the terminal and onboard the vessel be treated in a land-based facility and discharged into a drain field. The location for these components appears to be near the ramp area of the terminal compound. This area of the site is presently a seepage wetland that would rapidly introduce the effluent into the lake waters of Queens Bay which, as previously mentioned, has a very low capability for flushing and dilution. As there is the potential for impacts to water quality, a valid study would include detailed professional

investigation of this issue.

The Foreshore Inventory and Mapping (2010) report produced for the Kootenay Lake Partnership indicated that wetlands are not common along the foreshore of the N/S arms of Kootenay Lake comprising only 2.4% of the shoreline length. It is quite possible that preservation of the wetland area has a much higher ecological value than its utility in being filled and used as a wastewater dump.

Species at Risk

The shoreline in Queens Bay has been identified as likely habitat for the red-listed Western Skink (*Eumeces skiltonianus*). There have been reported “convincing” historical sightings in Queens Bay (Dulisse, Columbia Basin Western Skink Inventory and Assessment: 2005 Results). There have also been several reported current sightings in nearby areas.

There are many anecdotal reports of a Burbot (*Lota lota*) fishery in Queens Bay as recently as the 1970's. This red-listed species is considered locally extirpated, but reintroduction efforts have been recently carried out. It is essential to determine what impacts this project could have on existing or potential habitat and the effect on Burbot restoration activities.

Balfour Ferry Terminal - issues clarification

Vehicle storage compound capacity

It is understood that occasionally the level of traffic seeking to board the Kootenay Lake Ferry at Balfour exceeds the capacity of the vehicle holding compound. The data presented for August 1-7, 2012 indicates that excess demand occurred for 10 out of the 105 sailings that week. However, of those excess demand sailings only 5 exceeded capacity by more than 10 AEU's. The study also indicates that a review and analysis was done for years where vehicle data at Balfour was available and periods were identified where demand exceeded compound capacity.

What does the data indicate about the frequency, volume and trend of excess demand over the years? Without further data, one can assume that the sample week reported is a worst case condition that occurs only rarely.

Required dredging

It is understood that for a limited number of days during periods where the level of Kootenay Lake is lowered, the Osprey incurs abrasive damage to its hull. It is also understood that the channel presents some navigational challenges and that dredging of the channel would provide a reasonable remedy for these issues.

The SNC study cites Canadian Coast Guard concerns regarding the channel depth. What investigations has the CCG undertaken over time and what were the results and the specific concerns?

It is not clear that dredging would be required on a continuing basis. No data is presented on how channel depth and configuration has changed over time nor on past actions to improve channel conditions. Without this information and a site-specific technical analysis of the mechanism by which changes to the channel occur, it is only speculative that recurring dredging would be required in any relevant time frame.

Forecast traffic growth

The SNC study uses regional population growth as an indicator of future demand for the Kootenay Lake Ferry service. However, the evidence shows that highway traffic volumes have remained flat or declining even as the regional population has grown. The study claims that this is a temporary discrepancy due to economic factors.

As the primary issue is the ability to service peak demand, the analysis must look at the components and underlying factors within that demand. It is clear that there is a baseline demand, which increases in the summer months and is linked to the regional population. It is also understood that peaks occur in relation to special local events that may or may not continue into the future. However, much of the peak demand during July and August is driven by tourism travel from outside of the region.

Among the major factors that influence tourism travel are the state of various other regional economies, the price of fuel and the US/CAD exchange rate. As we have seen lately, these are not easily predicted, especially over the long term. Some professional opinion holds that traffic forecasting beyond a 20 year horizon is entirely unrealistic and even within the 10 -20 year time frame it is highly suspect.

While it is prudent to consider a potential increase in demand when designing a new facility, it is entirely reasonable to assume only a very modest increase in current demand and fully explore solutions using the current facility. (see comment in **Balfour Ferry - Solutions/Options**)

Recreational boating conflicts in the West Arm

It is understood that there is a significant presence of recreational boating that occurs along the route of the ferry as it enters and traverses the West Arm. Anecdotal evidence, presumably from the ferry operator, suggests that the volume is increasing. Other reports from businesses serving the fishing, tourism and recreational boating communities indicate a decline in activity.

While it is acknowledged that there is a potential safety risk in the confined waters of the West Arm, there is no record of an accident involving one of the ferries and recreational boat traffic.

If any hard data exists on trends in the level of boating activity or actual record of incidents along the area in question, that information should be made available and only then considered as part the study.

Measures which provide education to the recreational boating community on marine navigation right of way rules coupled with penalties for unsafe actions could effectively reduce risks. Commercial and public marine transport and recreational vessels successfully operate in close proximity at many locations throughout the world, including BC and eastern Canada. There will always be risk.

Balfour Ferry Terminal - Solutions/Options

Mid-sized Ferry option

The configuration and utilization of a backup vessel for the Osprey offers opportunities to rectify some existing imbalances in service capability.

For much of the Winter schedule from Balfour, the Osprey is operating with substantial excess capacity. If the service is to be offered from a relocated terminal in Queens Bay on an hourly schedule as indicated in the SNC study, there would be many sailings with minimal demand. This would not be cost-effective and is entirely unrealistic.

Utilizing a 60 car vessel during these slack periods would permit adequate service from Balfour on the current Winter schedule. During periods of anticipated increased demand, the larger Osprey could provide service, and during peak season, the two vessels would provide service on the current Summer schedule. With a new shallower draft vessel, this configuration could address channel depth issues, extend the service life of the Osprey and, given the use of modern technologies, be considerably more cost-effective.

The cost of a second ferry was estimated in the SNC study to be \$30 million. However the MV Columbia was built in Nakusp in 2012 at a contract price of \$26.5 million. It was commissioned in 2014 and provides a 30 minute crossing service on the Upper Arrow Lakes with a capacity of 80 cars and 250 passengers. This would suggest that a somewhat smaller second ferry for the Kootenay Lake route could cost considerably less than estimated in the study. In addition, modern technologies could provide reduction in operating costs.

Increasing the vehicle holding compound capacity/improving traffic flows

There are realistic and cost effective opportunities available in Balfour to increase the vehicle holding compound capacity and improve traffic flow in and around the terminal area, thus supporting the Balfour Ferry Terminal as a viable option into the future.

Among these are:

1. The Crown right of way on the north side of Highways 3A/31 opposite the Balfour terminal has a width of ~70 m. from center line along ~300 m. of highway. This area could be reconfigured by excavating into the favorable slope and building a retainer wall on the uphill side. Optimal utilization of this area would likely require reconfiguration of the Upper Balfour Rd intersection with Highway 31, which has long been regarded as unsafe. It would also require relocation of utility lines. Possible benefits would include:
 - provision of a westbound left turn lane into the terminal parking area
 - realignment of the highway to improve intersection configuration and traffic flow
 - a possible increase in vehicle storage capacity in the terminal
2. Portions of private lots adjacent to the west of the present terminal area could be purchased and utilized to increase the available area and improve the configuration of the terminal.
3. Unused MOTI lands near the intersection of Busk Rd and Highway 31 could be used as additional off-site parking.

Creative planning of an expanded and reconfigured terminal could easily result in substantially increased vehicle storage capacity, improved public amenities and efficient traffic flows.

The Balfour Business Coalition has invested considerable effort in envisioning a smart, workable plan for the future of the Balfour Ferry Terminal. Details are available at <https://www.facebook.com/choosebalfour/posts/285155638498627:0>

Socio-economic impacts of relocating terminal to Queens Bay

The SNC study purports to include an analysis of the “Community / Stakeholder Impact,”

however the aspects considered are extremely limited and entirely inadequate for a valid feasibility study of relocating the terminal to Queens Bay. In fact, Section 1.5.5 Results of the Qualitative Review does not even mention this component of evaluation. The Site Evaluation Matrix – Grading Results does provide a scoring for it, but appears to apply only to “Highway Traffic and Highway Intersection and Queuing Area, marine.”

The study provides no indication of the level of support from local stakeholders for relocation of the terminal. However, at the Open House held on 15 June, 2016 there was strong evidence of significantly greater opposition than support. In the Qualitative Review there were only two substantive statements set out with regard to stakeholder impacts:

- Some stakeholders (businesses) would be impacted if the Balfour Terminal was relocated.
- Some stakeholders would be less impacted.
- Residences from Queens Bay South would experience an increase in highway traffic levels from eastbound vehicles, and a decrease in highway traffic levels from westbound traffic going to the ferry.

Quite clearly there are significant impacts on the local stakeholders and wider community that are not being adequately considered.

Balfour will endure a significant economic impact if the ferry terminal is relocated to the Queens Bay site. All the businesses near the present terminal will be affected and many will close. Annual revenue losses could be in the range of \$7 – 8 million with as many as 60 - 80 jobs lost.

In addition, commercial property values are forecast to decline and while some residential property values may increase, the potential for economic growth will be greatly reduced. These impacts will not be offset at a relocated terminal in Queens Bay due to the limitations of the site and the lack of suitable properties nearby.

The loss of services in Balfour would also have an impact on the traveling public that presently uses that location as a transportation hub and as a local service center.

The residents of both the lakeshore and townsite of Queens Bay will also be impacted by the both the construction of a new terminal and the air, noise and light pollution associated with ferry operations and increased traffic.

The statement from the SNC study cited above regarding highway traffic on lakeshore residences fails to recognize the absolute increase in traffic traveling both directions between a proposed terminal in Queens Bay and Balfour. In addition, there will be a significant increase in the number of commercial transport vehicles using that section of highway. Given that many of the residences are located in close proximity to the highway, there will be serious impacts on both quality of life and public safety.

Many lakeshore residents and the residents and businesses in the Balfour townsite would experience impacts on the quality of their drinking water during the construction phase and possibly over the long term.

The proposed site for the terminal in Queens Bay is one of a very few publicly accessible lakeshore areas on Kootenay Lake between Nelson and Kaslo. Due to the relatively warm waters, it is well used for swimming and is a recreation site for many local and regional residents as well as tourists.

Tourism is obviously an essential component of the local and regional economy. However, it appears that transportation economists value efficiency over the experience of travel. The Kootenay Lake Ferry crossing is often reported as a particularly memorable part of traveling through the Kootenays and eliminating delays and the associated uncertainty would undoubtedly enhance that experience. On the other hand, dramatically shortening the sailing time may well have unintended consequences on the flow of tourists. A sensitivity analysis on this issue would be essential in determining impacts on tourism.

Site Evaluation Process

The site evaluation process employed in the study is highly subjective. While the general criteria provide a reasonable range of factors for consideration, the Safety criterion is misused in this evaluation as it is a relative factor rather than absolute. There are clearly many tradeoffs between safety, efficiency and cost.

The components actually considered within each criterion are highly selective and incomplete. Many included components are based on unsupported assumptions while other critical considerations are entirely ignored. Examples include:

- the lack of useful wind/wave data for Queens Bay site (affecting Safety and Financial criteria)
- failure to consider the need for an appropriate backup vessel (Safety, Service, Financial)
- failure to consider necessary Highway 31 upgrades (Safety, Financial, Stakeholder Impacts)
- impacts on water quality at Queens Bay site (Environmental, Financial, Stakeholder Impacts)
- economic impacts on both Balfour and Queens Bay communities (Financial, Stakeholder Impacts)

In addition, possible options that could provide solutions to problems identified with the Balfour terminal were dismissed or ignored such as:

- the availability of private lands that could be acquired for expanding the terminal area
- widening the highway on existing right of way opposite the terminal

The weighting of these criteria in the evaluation is also completely arbitrary. While the open-ended criterion of Safety is important, there is no rationale for it to be assigned a 40% weighting. In addition, one could easily argue that gains in Service should not be equivalent to Community/Stakeholder Impacts or Environmental Impacts.

Lastly, the assignment of site specific values for each criterion is arbitrary and subject to the various distortions and omissions identified above. For example, what is the rationale for:

- the determination that the Community/Stakeholder Impacts would be equivalent between retaining an improved terminal in Balfour and relocating to Queens Bay?
- assigning a Sewage grade of 5 in Balfour and 9 in Queens Bay?
- the determination that, even with all possible improvements in Balfour, the

Service and Safety criteria would be graded at half of the value of those assigned to Queens Bay?

It is difficult to view the Site Evaluation Process as anything other than a biased exercise in subjective judgment as opposed to an objective decision tool.

In conclusion, the Queens Bay Residents Association is committed to engaging with the MOTI in a collaborative process seeking to:

- clarify the present challenges to the Kootenay Lake ferry service and explore a range of solutions,
- identify and address information gaps,
- determine the full costs, impacts and benefits of various options, and
- undertake an evaluative process that is comprehensive, transparent and demonstrably objective.

This will inevitably involve further public consultation with the broader community, which is essential to ensure an acceptable and durable solution.