British Columbia Ferry Services Inc.

Application to the
British Columbia Ferries Commissioner

Pursuant to
Section 55 (2) of the *Coastal Ferry Act*

For
New Minor Class Vessels – Routes 18 and 25

January 3, 2017

Note: In this copy of the Application information of a confidential and commercially sensitive nature has been redacted.

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Executive Summary

British Columbia Ferry Services Inc. ("BC Ferries" or the "Company") proposes to invest in the procurement of two new minor class vessels which will enable the retirement of the *North Island Princess* (built in 1958) and the *Howe Sound Queen* (built in 1964) in 2019 (the "Project").

BC Ferries plans to deploy the first new minor class vessel on the route connecting Powell River and Texada Island ("Route 18") as a direct replacement for the *North Island Princess*; the other will be deployed on the route connecting Port McNeill, Sointula and Alert Bay ("Route 25") in place of the *Quadra Queen II*, which will be redeployed as refit relief in place of the *Quinitsa*. In turn, the *Quinitsa* will be redeployed to the route connecting Crofton and Vesuvius ("Route 6"), thereby enabling the retirement of the *Howe Sound Queen*. No changes to the current service levels or schedules on Routes 18 and 25 are expected as a result of the proposed vessel deployments. As the *Quinitsa* is a smaller vessel than the *Howe Sound Queen*, which it will replace, an additional daily round trip will be added to the schedule for Route 6 to augment the capacity provided on that route.

This Project represents the next phase in BC Ferries' move towards greater standardization of its fleet. Research and global best practice demonstrates that transportation fleets composed of highly common assets and supported by robust operating practices, have lower operating costs and higher reliability than mixed fleets. The three Coastal class vessels, built in 2007 / 2008, were the first highly standardized ships procured by BC Ferries as a series-build. This was followed by the Salish class, BC Ferries' three new intermediate sized vessels, which are expected to be brought into service in 2017. Further steps towards the realization of the benefits of standardization are now proposed through the procurement of a series-built, new class of minor vessels.

The minor class will be the new smallest class of vessel in BC Ferries' fleet, and will collapse what are today four classes, encompassing a total of eight vessels, into a single class. The first phase involves acquisition of two minor class vessels (the subject of this filing); a further four vessels of the same class would be built within ten years in a second phase, with a further two vessels in a subsequent phase. BC Ferries believes that the potential benefits of proceeding with a series build program for the minor class vessels are significant, and will result in enhanced operational safety and cost savings that will help to keep fares affordable.

The minor class vessel is envisaged to be a relatively simple ship with limited amenities and ancillary services. The vessel will have vehicle capacity of 44 automobile equivalents ("AEQ")[1] and carry a

[1] One AEQ is 6.1 metres long and 2.6 metres wide.

complement of up to 300 passenger and crew. It will be capable of operating on a number of the Minor Routes, which primarily serve the Northern and Southern Gulf Islands and the Northern Sunshine Coast, and its proposed size was determined through a review of the forecast sailing demand for each of the routes on which it could potentially operate.

The Project reflects BC Ferries commitment to environmental stewardship. The minor class vessel will initially operate on ultra-low sulphur content diesel fuel, with stored energy (battery) capability installed to provide the ship's service power. The stored energy capability will be expandable for possible "zero-emission" operation (i.e. battery usage for the ship's full power requirement, including propulsion) in the future, when and where the infrastructure and business case warrants.

As noted, the acquisition of the first two minor class vessels will enable the retirements of the *North Island Princess* and the *Howe Sound Queen,* which at their planned retirement dates in 2019, will be 61 and 55 years old, respectively. Even with regular maintenance, refit, and dry-docking, service reliability issues are prevalent with these vessels, and they are costly assets to keep in operation. While the option of life extending the vessels for a further ten years of service has been considered, the age and overall condition of the vessels are such that a life extension is not viewed as a prudent investment for either of the vessels. Though similar in cost on a net present value ("NPV") basis to the option of purchasing two new minor class vessels, the option to life extend the *North Island Princess* and the *Howe Sound Queen* is considered much higher risk in terms of ensuring continuity of safe, reliable service. Further, BC Ferries believes that the modest cost differential between the two options potentially will be greater in favour of the minor class vessel replacement option as pricing for the new vessels is confirmed through the contract negotiation phase, and the benefits from operating and maintaining common assets are realized over the life cycle of the vessels.

The Company has in place rigorous processes to identify, monitor and address the risks of the Project. The Project follows the successful earlier phases of the Company's vessel replacement program and incorporates best practices and lessons learned from these previous phases.

BC Ferries has undertaken extensive analysis in support of the Project. The Company believes that the Project is reasonable, affordable, and prudent. The planned expenditure will help ensure that service across the ferry system remains safe and reliable for many years to come, and will enable further advances in operational efficiency, which will moderate upward pressure on fares across the coastal ferry system.

Section 1 – Introduction

1.1 Application Overview

BC Ferries submits this Application pursuant to section 55 (2) of the *Coastal Ferry Act* ("CFA") and British Columbia Ferry Commission Order 12-04, dated September 30, 2012.

The *2012 Coastal Ferry Amendment Act*, which came into effect on June 25, 2012, amended section 55 of the CFA to require a ferry operator to first obtain the British Columbia Ferries Commissioner's ("Commissioner") approval before incurring a major capital expenditure (section 55 (2)). A major capital expenditure is defined in section 55 (5) of the CFA as one which:

> "…meets the criteria (a) established by the Commissioner from time to time, and (b) most recently provided by the Commissioner to the ferry operator".

By Order 12-04, dated September 30, 2012, the Commissioner determined that for the purposes of section 55 (2) of the CFA, a major capital expenditure includes:

> "any capital expenditure which exceeds $30 million, inclusive of component programs and interest during construction, and irrespective of the level of expenditure, any new vessel or terminal, and any vessel life extension which extends the life of the vessel by more than five years."

BC Ferries proposes to procure two new minor class vessels, each of which would have vehicle capacity of 44 AEQ and carry a complement of up to 300 passengers and crew. These vessels would be the first of a series of new standardized minor class vessels and would serve on Routes 18 and 25. Their acquisition would enable the retirement of the *North Island Princess* and the *Howe Sound Queen,* which at their planned retirement dates, will be 61 and 55 years old, respectively.

The Project was included in the Company's 12-year capital plan (for fiscal years 2015 through 2026) submitted to the Commissioner for performance term four (April 1, 2016 – March 31, 2020) ("PT4").

Pursuant to Order 12-04, the Project constitutes a major capital expenditure. By this Application, BC Ferries seeks the approval of the Commissioner, in accordance with section 55 (2) of the CFA, for major capital expenditures for the Project of up to $<> million, inclusive

of interest during construction ("IDC"), and supplemental Project expenditures of up to $<> million, for total Project expenditures of up to $<> million.

BC Ferries submits that the total expenditure for the Project, as described in this Application, is reasonable, affordable and prudent and consistent with the Coastal Ferry Services Contract between the Company and the Province of British Columbia.

BC Ferries notes that the legislative requirement to seek pre-approval of the proposed capital expenditure for the Project necessitates the submission of this Application prior to certain design elements of this vessel replacement project being finalized. BC Ferries' intent is to pursue a design-build contract with a shipyard to be selected through a formal Request for Proposal ("RFP") process, which is now underway. With some design elements yet to be finalized through the procurement process, there is a risk that certain assumptions BC Ferries has made in this Application may require subsequent amendment, with a commensurate change in the projected capital expenditures for the vessel replacements.

1.2 Organization of Application

This Application is organized as follows:

- Section 2 describes the Company's fleet renewal strategy and the contribution the proposed minor class vessels will make in advancing the corporate objective of fleet standardization and the associated efficiencies that will be realized.

- Section 3 describes the Project, including the reasons why the *North Island Princess* and the *Howe Sound Queen* need to be replaced, and the analysis that has been undertaken to develop the recommended replacement strategy for the vessels.

- Section 4 provides an assessment of the vessel replacement options that have been considered, together with a recommended option and the expected impact on the price caps should that option be approved.

- Section 5 addresses matters related to procurement, timeline and risk mitigation strategies for the Project.

Section 2 – Fleet Renewal Strategy

2.1 Overview

BC Ferries is an independent company providing ferry services on the west coast of British Columbia. The Company provides frequent year-round transportation service with 34 vessels operating on 24 routes out of 47 terminals spread over 1,600 kilometres of coastline. In the year ended March 31, 2016 ("Fiscal 2016"), BC Ferries carried 8.1 million vehicles and 20.7 million passengers on over 170,000 sailings.

BC Ferries' operations are among the largest and most complex of ferry systems in the world; its fleet, however, is among the oldest. The Company delivers service in accordance with the requirements of the Coastal Ferry Services Contract. BC Ferries commenced a substantial program to renew its fleet in 2004. In the five year period to 2009, BC Ferries acquired seven new vessels, of which three were deployed on the Major Routes, comprising the three routes connecting Greater Vancouver with mid and southern Vancouver Island plus the route connecting Horseshoe Bay and Langdale, two were deployed on the Northern Routes, which serve the coastal communities north of Port Hardy, and two were deployed on the Minor Routes, which primarily serve the Northern and Southern Gulf Islands and the Northern Sunshine Coast. In 2014, three new intermediate sized ferries (Salish class) were procured for service on the Southern Gulf Island routes and the route connecting Powell River and Comox ("Route 17"). These vessels are expected to be in service in summer 2017. A new cable ferry integrated system was also introduced into service on the route connecting Denman Island and Buckley Bay in 2016.

To ensure continued ability to deliver safe, reliable and cost-effective service that meets the requirements of the Coastal Ferry Services Contract as they currently exist, BC Ferries will need to replace (or life-extend) a further ten vessels over the next ten years. The process of fleet replacement will include a transition from a fleet of many unique vessels to one that has vessels with high physical and operational commonality. The next phase in this is the proposed replacements of the *North Island Princess* and the *Howe Sound Queen*, which are the subject of this Application.

All new vessel designs will emphasize safety, environmental stewardship, efficiency, standardization and customer experience. The Company's corporate strategic drivers provide a foundation for the objectives underlying the fleet renewal program:

i. Operational Excellence

- Achieve a high-quality customer experience while supporting fare affordability;
- Achieve deployment flexibility within the service area; and,
- Promote interoperability within the fleet.

ii. Financial Sustainability

- Design vessels with the lowest practicable operating and life cycle cost through the optimization of fuel consumption and labour costs;
- Assess program-build opportunities for prudent and sustainable fleet investments; and,
- Achieve standardization across vessels, including components, procedures and equipment.

iii. Employee Engagement

- Ensure safe, efficient and productive vessel working conditions.

iv. Environmental and Social Governance

- Balance the needs of the service and the Company's impact on the environment; and,
- Consider the differing needs of local communities.

v. Innovation and Continuous Improvement

- Optimize life cycle costs and seek improved operational efficiency; and,
- Build vessels for a long life to extract maximum value and flexibility.

These objectives are fundamental to the approach proposed for the new minor class vessels, and specifically the replacements of the *North Island Princess* and the *Howe Sound Queen.*

2.2 Standardization

A key objective of BC Ferries' fleet renewal program, and the proposed acquisition of the two minor class vessels as set out in this Application, is to achieve capital and operating cost savings and efficiencies through an overall class and standardization strategy.

BC Ferries' research shows that reducing the degree of fleet diversity brings significant potential benefits. Standardization contributes positively to safe operations through enhanced employee familiarity with the assets. Through standardization, there is a prospect of significant savings in asset acquisition and other capital costs as efficiencies are realized through a series build program. Improved operational efficiencies are expected, including those realized through lower crew training costs as a result of standardized bridge, engine room and accommodation layouts, and lower maintenance and inventory costs through more commonality or standardization of parts and critical spares. Standardization enables greater consistency of service and service expectations across routes, as replacement vessels are more likely to be identical and provide an identical service level to the community. Higher customer and community satisfaction will result. Standardization enhances interoperability across a variety of routes, lowering re-deployment costs such as training, management effort, technical support and berth fits. Greater flexibility in scheduling can be realized through standardization, since assets can be better managed if the capabilities are the same. Further, standardization helps ensure seamless and efficient emergency deployments in cases of unforeseen fleet operational issues. Taken together, these factors will enable the Company to make further advances in efficient and effective service delivery, which will help to keep fares affordable going forward.

Standardization and interoperability of vessels and terminals were recognized as desirable policy objectives to optimize the efficiency of the fleet and to achieve cost savings in the Commissioner's report of January 24, 2012 entitled *Review of the Coastal Ferry Act* (the "2012 Commissioner Report"). As well, the results of the public opinion poll conducted as part of the provincial government's 2012 community consultation process on coastal ferries found that 59 percent of respondents strongly agreed and 24 percent of respondents somewhat agreed (for a total of 83 percent of respondents in agreement) with the concept of standardizing vessels and docks to allow flexibility to switch ferries and crews between routes. The move towards greater standardization of the fleet and terminals has also been recognized by the Province in its long term vision for coastal ferry service as helping to ensure an affordable, efficient and sustainable system which protects basic service to coastal communities for future generations.

2.2.1 Coastal Class Vessels

BC Ferries Coastal Class vessels were designed and built as a series of three highly standardized vessels in 2007 / 2008. Although built before standardization policies were enshrined into BC Ferries' vessel replacement plans, these ships represented a conscious strategic step to introduce the benefits of standardization for crew, training, logistics, maintenance, inventory and operations. The ships currently operate on the routes connecting Swartz Bay with Tsawwassen, Departure Bay with Horseshoe Bay and Duke Point with Tsawwassen, and could also operate on the route connecting Langdale with Horseshoe Bay.

2.2.2 Salish Class Vessels

BC Ferries' commitment to greater standardization is reflected in its fleet and terminal network master planning processes. Like the Coastal class, the Salish class, are standardized vessels procured as a series build. The 107-metre Salish class vessels are designed on a common platform and will carry 144 AEQ and up to 600 passengers and crew. There are two car decks, and each ferry has a service speed of 15.5 knots and is certified for Near Coastal Voyages, Class 2. The vessels are dual-fuel capable and operate on liquefied natural gas ("LNG"). All three vessels are expected to be in service for the summer of 2017. The *Salish Orca* will replace the *Queen of Burnaby* on Route 17, while the *Salish Eagle* will replace the *Queen of Nanaimo* on the Tsawwassen – Southern Gulf Islands route ("Route 9"). The *Salish Raven* will provide service to the Southern Gulf Islands in addition to providing refit relief for other vessels, primarily on Route 9 and Route 17, as well as the route connecting Earls Cove with Saltery Bay ("Route 7"). In addition to Routes 7, 9 and 17, this class of vessels could also potentially be utilized on Routes 4, 5, 6, and 19[2], and could also be used to provide additional capacity on the Major Routes. This class of vessels will potentially be used as future replacements for the *Bowen Queen*, the *Mayne Queen*, the *Powell River Queen*, and eventually, the *Quinsam*, the *Queen of Capilano* and the *Queen of Cumberland*.

2.2.3 Minor Class Vessels

The new minor class is proposed as the next class of standardized vessel BC Ferries will procure as a series build. The minor class will be the new smallest class of vessel in the BC Ferries fleet, and will collapse what are today four classes (K class[3], T class[4], *North Island*

[2] Route 4 connects Swartz Bay with Salt Spring Island; Route 5 connects Swartz Bay with the Outer Gulf Islands; Route 6 connects Crofton with Salt Spring Island; and Route 19 connects Nanaimo Harbour with Gabriola Island.
[3] The K class comprises the *Klitsa, Kahloke, Kuper* and *Kwuna.*
[4] The T class comprises the *Tachek* and *Quadra Queen II*

Princess class[5] and *Howe Sound Queen* class[6]*)*, encompassing a total of eight vessels, into a single class. BC Ferries' vision is to build two minor class vessels in the first phase enabling the retirement of the *North Island Princess* and the *Howe Sound Queen*, with four vessels of the same class to be built within ten years in a second phase, replacing the *Kahloke*, *Klitsa*, *Quadra Queen II*, and *Tachek*. The replacements of the *Kuper* and the *Kwuna* would occur in a later phase.

The minor class vessels will be identical and will be capable of operating on all routes classified as Sheltered Waters or Near Coastal Class 2.

Public and Stakeholder Engagement

For several years, BC Ferries has engaged with the public about replacement vessels through the Ferry Advisory Committee process. BC Ferries is planning for at least two rounds of direct engagement with the public, the BC Ferry and Marine Workers' Union and employees on the routes receiving, or closely affected by, the two new minor class vessels proposed in this Application. A key focus of these sessions is to obtain input on the broad attributes of a new minor class vessel in such areas as amenities, comfort, ride qualities, and accessibility. Further information on BC Ferries' public and stakeholder engagement process for the Project is provided in Appendix E.

Vessel Capacity

The minor class vessels will have a vehicle capacity of 44 AEQs and will carry a complement of up to 300 passengers and crew. The vessel size was determined based on a review of the forecast sailing demand for each of the routes on which this class of vessel could potentially operate. This analysis identified that the service area with the highest traffic demand was Route 18 and, in support of the procurement and operating benefits of a standardized fleet, capacity sufficient to carry the forecast traffic on this route set the initial threshold of maximum size needed for the new minor class.

Vessel Characteristics

The minor class vessel is envisaged to be a relatively simple vessel with limited amenities and ancillary services. These vessels are essentially "like for like" replacements for the vessels they will replace, but include innovative features which, among other things, are expected to serve to

[5] Single ship class
[6] Single ship class

minimize crew levels. The key characteristics of the minor class vessel are highlighted below. Table 3-B in section 3 provides further information.

- Vessel Design

  Key design features of the minor class vessels are as follows:

  - Double-ended hull with open deck configuration incorporating high bulwarks and enclosed ends, allowing for carriage of scheduled dangerous cargo, and for ease of fuelling operations on deck;
  - Single roll-on/roll-off vehicle deck of at least 270 lane-metres of minimum lane width of 2.6 metres allowing unimpeded traffic flow;
  - Inclusive of at least one truck lane of 3.2 metres in width;
  - All vehicle lanes to have a clear height of 4.75 metres over them;
  - Capable of carrying a normal complement of 150 (passengers and crew) with the capability to expand to a complement of 300;
  - Compatible with BC Ferries' standardized berth interface and capable of loading/unloading at either end in any of the Company's standardized berths;
  - Vehicle deck laid out for ease of loading/ discharge so that the vessel is capable of achieving desired in-dock times;
  - Seakeeping suitable for winter transit in coastal British Columbia without excessive motion, spray ingress, or deck immersion issues;
  - Service speed of 14 knots; and
  - All systems designed for low energy consumption and cleanest practical environmental performance.

- Fuel

  The minor class vessels will operate on ultra-low sulphur diesel. BC Ferries conducted an analysis to determine whether it is feasible to fit the new vessels with dual-fuel/LNG

propulsion. The Company was assisted by 3GA Marine Ltd., which was retained to produce engine options and fuel consumption estimates for the analysis. In addition, FortisBC was consulted to determine the feasibility and cost of LNG delivery for each vessel location. Factors such as incremental capital cost, feasibility and cost of delivery of the LNG to the home ports, fuel consumption, engine technology, and economies of scale were taken into account. The analysis found that fitting the minor class vessels with dual fuel/LNG propulsion is not logistically or financially feasible for the reasons summarized below:

- The low horsepower rating of the engines required for this small vessel precludes any inherently safe class-approved gas or dual-fuel engines as they are not on the market or commercially viable at this point. Simply put, engine manufacturers for the marine environment are not manufacturing LNG engines and associated systems at this low power rating that meet BC Ferries' safety standards.

- Based on the current LNG technology:

  - The estimated incremental capital cost for LNG propulsion (presuming availability of a suitable engine) would be high as a proportion of the overall cost of this vessel due to the simplicity of design and size of the vessel;

  - The fuel consumption volumes on the Minor Routes would be too low to justify the incremental investment needed for LNG propulsion (even if the engines were commercially available, which they are not) in terms of the cost difference between LNG and diesel; and

  - Consequently, the payback period for the required investments to operate using LNG would exceed the envisaged 45 year life of the vessels.

- Significant logistical challenges exist to deliver LNG to some of the minor vessel homeports.

The technical statement of operating requirements issued to shipyards as part of the RFP for the Project referenced diesel propulsion; however, shipyards were invited to propose alternative propulsion plant configurations that included stored energy (batteries) as a

means of providing power during peak demand and thus saving fuel. The stored energy alternative was based on BC Ferries' experience with the *Tachek* which, since 2014, has employed a hybrid system involving diesel propulsion and batteries to provide the ship's service power. This is considered an appropriate technology for the minor class, as the power demand and operational profile is on a scale where batteries can cost-effectively supplement diesel power.

The shipyards responded with various options, of which the following configuration has been selected by BC Ferries for the contract design:

- Diesel-electric power generation using two generator sets;
- A redundant DC-power main electrical bus employing AC/DC conversion technology for power consumers; and
- Stored energy (batteries) feeding the main DC-bus to provide running power reserve, and with expandable capacity such that the battery bank could be expanded in the future to provide the full ship's power requirement (including propulsion).

This configuration was selected on the basis that it is sufficiently supportable on the Minor Routes, is flexible in operating configuration over the variety of Minor Route profiles, and can eventually be configured for "zero-emission" operation (full battery usage).

Battery technology is rapidly evolving and the cost per kilowatt hour reduces annually as this technology achieves wider use in the transportation and industrial sectors. BC Ferries' intention is to phase in the battery storage capability for the minor class vessels from an initial limited installation intended to provide reserve power to the two main generators and offset peak demand, and moving to an expanded stored energy capability when conditions warrant, on a route-by-route basis. To achieve full battery operation cost-effectively will require the development of some shore infrastructure in the form of rapid charging installations at the berth and an interface with BC Hydro. Discussions with BC Hydro in regard to this matter are underway.

- Crew Accommodation

With a view to minimizing operating costs and optimizing crewing considerations, BC Ferries reviewed the viability of outfitting the minor class vessels with crew

accommodations and operating the vessels as live aboard. The present intent is that the minor class vessels will not be outfitted for live aboard crew accommodations. The Company's analysis suggests that, at this time, live aboard operations for the minor class will not provide a financial payback and may be more costly, without commensurate improvement in the provision of service. Outfitting the vessels without live aboard crew accommodations allows for the vessels to be designed for a volume at or below the threshold of 1,000 gross registered tonnes; a vessel of greater volume may require incremental crew and potentially have higher operating costs, in addition to possibly adding more regulatory complexity to the operations and maintenance of the vessels.

- Passenger Accommodations and Amenities

  The vessels will have a passenger lounge arrangement accessible from the main vehicle deck that complies with current accessibility requirements, arranged without a need for passenger elevators. Foot passenger access to the lounge(s) will be configured to interface with passenger walkways on BC Ferries' standardized berths. The vessels will have basic ancillary services, such as vending machines, consistent with other routes served by vessels of this size. The vessels will adhere to BC Ferries' interior design standard, which aims to provide a reasonable level of passenger comfort to support customer satisfaction and revenue generation, while also meeting the following criteria:

  - Durable;
  - Commuter friendly;
  - Easily cleanable; and
  - Low life cycle cost.

- Branding

  BC Ferries' brand identity is one of the many ways the Company is known and recognized in the communities it serves and throughout the world. The minor class vessels will be branded similar to other BC Ferries vessels. In general, BC Ferries' vessels are painted white and carry the BC Ferries logo and, in most cases, the funnel wave graphic on port and starboard sides. All vessels also carry a blue stripe in addition to carrying the vessel name and Port of Registry.

Environment

To further the Company's objective of minimizing its environmental footprint, the minor class vessels will:

- Operate with ultra-low sulphur content diesel fuel;
- Incorporate low friction hull coating to reduce fuel consumption;
- Have no overboard discharge of black/grey water; all disposed of ashore in accordance with environmental policies;
- Revert to shore power connection during layovers and after daily operational service;
- Be designed to minimize waterborne and interior noise and vibration; and
- Have stored energy capability installed to initially offset diesel consumption and emissions with the intent to fully offset diesel generator use with an expanded battery system, for possible "zero-emission" operation, when/where the infrastructure and business case warrants.

Summary

In summary, BC Ferries believes that the potential benefits of proceeding with a series build program for the minor class vessels are significant and will result in enhanced operational safety and cost savings that will have a positive impact in terms of helping to keep fares affordable. In particular, a common class of vessels should enable lower capital costs through a series build program, lower crew training costs through standardization of bridge, engine room and accommodation layouts, and lower maintenance costs through standardization of components. Operational safety should be enhanced as a greater percentage of employees in the fleet operate across fewer classes of vessels. As well, benefits will be realized through greater ease and efficiency in redeploying specific vessels across multiple routes if unforeseen circumstances arise or if the service needs change over time. The envisaged size and configuration of the minor class vessels is intended to ensure that all regulatory, operating and Coastal Ferry Services Contract requirements will be met effectively, efficiently and in a manner that demonstrates the Company's commitment to strong environmental stewardship, and that the customer experience will continue to be positive.

Section 3 – Project Description

3.1 Vessel Replacements

At this time, BC Ferries proposes to procure, under a shipyard design-build process, the first two vessels of the series of standardized minor class vessels. These vessels would enable the retirement of the *North Island Princess* and the *Howe Sound Queen,* both of which are near the end of their service lives and are scheduled for retirement in fiscal 2020.

The timeline for the Project is described in section 5.2.3 and reflects the age and condition of the *North Island Princess* and the *Howe Sound Queen* and the need to retire and replace them expeditiously in order to minimize service disruptions and ensure continuity of service. The target in-service dates for the two new minor class vessels are set out below. The vessels would be expected to be delivered at least three months in advance of the in-service dates to enable crew training and other activities necessary to ensure their successful deployment.

- *North Island Princess* replacement (for service on Route 18) – May 2019
- *Howe Sound Queen* replacement (for service on Route 25) – September 2019

3.2 History and Condition of Current Vessels

The *North Island Princess* and the *Howe Sound Queen* were built in 1958 and 1964, and at their planned retirement dates, the vessels will be 61 and 55 years old, respectively. Even with regular maintenance, refit, and dry-docking, service reliability issues are prevalent with *North Island Princess* and *Howe Sound Queen,* and they are costly assets to keep in operation. The age and overall condition of the vessels are such that a life extension is not considered a prudent investment for either of the vessels. This view is supported by BC Ferries' assessments of the condition of the vessels and by Lloyd's Register Canada, which was contracted by BC Ferries in 2015 to provide independent verification. The findings are discussed further below.

3.2.1 Condition of *North Island Princess*

Having been in service with BC Ferries and its predecessors for over 59 years, the *North Island Princess* is the longest serving vessel in BC Ferries' fleet. While the vessel operates safely and in compliance with all regulatory requirements, she is at the end of her useful service life as evidenced by obsolescence, escalation of costs pertaining to maintenance/refits and service reliability issues.

The *North Island Princess* entered service as a new vessel in 1958 and was converted to a larger catamaran configuration in 1971. The vessel underwent a life extension program in 2003, including re-engining, which was designed to enable the vessel to operate for a further ten years, until 2013. In subsequent refits to the life extension in 2003, the *North Island Princess* has had further unforeseen engineering repairs well above what would have normally been expected at refit, which is evidence that the vessel is at the end of her useful service life. A further life extension is not considered economically viable or technically prudent, due to the overall material state of the vessel and the obsolescence of the majority of systems.

The issues to support this conclusion are as follows:

- The vessel hull has had extensive steel repairs to keep the vessel in operation. With 59 years of service, the hull is beyond the designed service life of 45 years.

- The vessel was re-engined in 2003 with MTU 2000 series engines with an expected life of 80,000 to 100,000 operating hours. With the vessel operating for approximately 5,500 hours annually, the engines will have accumulated over 93,000 operating hours at her retirement in fiscal 2020. There have been reliability issues with the engines that suggest that the engines are very near the end of their design life.

- The vessel's electrical and electronic systems are dated and are increasingly difficult to support. In addition, while still meeting all safety requirements, the lifesaving arrangements are less modern and efficient than the other vessels in the system that have been fitted with slide evacuation systems. Furthermore, relatively little was done to passenger and crew amenities, particularly when compared with other vessels such as the *Quadra Queen II* and the *Tachek*.

- The vessel contains asbestos and some abatement has been effected to ensure that the vessel meets all safety and health requirements. However, it becomes ever more difficult to conduct repairs and maintenance when the potential for asbestos exists.

- A vessel condition survey was conducted by ABS Consulting in 2002 which documents that the vessel condition, at that time, was not ideal for the then-proposed life extension. This report further indicated that substantial refit effort was required in 2002 to permit continued safe service beyond 2003, and up to 2017. Significant maintenance effort continues to be planned and executed to keep the vessel in class, and fully operational, until its proposed replacement in fiscal 2020.

- The vessel refits since 2003 have had unanticipated scope additions due to the diminishing overall material state of the vessel.

3.2.2 Condition of *Howe Sound Queen*

The *Howe Sound Queen* was built in 1964 and has been in service with BC Ferries since 1971. While the vessel operates safely and in compliance with all regulatory requirements, she is at the end of her useful service life as evidenced by obsolescence, escalating maintenance and refit costs, and service reliability issues.

In 2007, the *Howe Sound Queen* received major safety and comfort upgrades. Any further life extension or upgrade is not considered economically viable or technically prudent, due to the overall material state of the vessel and the obsolescence of the majority of systems.

The issues to support this conclusion are as follows:

- The vessel hull has had extensive steel repairs in order to keep her in operation. Steel sections added in 1988 to reinforce the keel need to be assessed and wasted portions renewed.

- The main engines and auxiliary machinery is out of date and needs to be renewed with current industry standards.

- The majority of the electrical systems are out of date and need to be replaced due to obsolescence and higher lead time/price of replacement parts. This includes the generators, main switchboards, batteries and UPS. Additionally, several lengths of electrical cable are in a state of deterioration, and issues related to the electrical systems need to be addressed (e.g. ventilation, stowage, ground fault detection etc.)

- The vessel contains lead paint and asbestos and the scope of abatement adds to the complexity and cost of any intrusive life extension program.

- A vessel condition survey conducted in 2003 by ABS Consulting noted that substantial steel renewal is required.

3.2.3 Summary

Historical information on the *North Island Princess* and the *Howe Sound Queen*, including maintenance and refit expenditures and capital investments since 2005, together with projections of such expenditures and investments through fiscal 2020, as well as further data on historical service disruptions due to mechanical issues, is provided in Appendices A and B.

While there is no regulatory requirement to retire the vessels, as most systems and materials fitted to these particular vessels are regulated to the original regulations applicable to the ships (so called "grandfathering"), there are significant existing gaps in these vessels as compared to modern safety and fleet standards. Conversely, the new vessels will meet the latest most modern standards and requirements, and reduce regulatory risk.

A life extension project to address all items identified by Lloyd's Register Canada (both regulatory and condition-based issues) would be intrusive to the point where only the bare hull would be retained. While this strategy has been employed by BC Ferries successfully on other vessels, the scope required for these ships is on a scale that the economics favour replacement. If a major upgrade or a life extension of the vessels is carried out without sufficient scope or scale, there is significant risk to service continuity due to non-functional machinery or environmental, safety and/or regulatory issues. A new vessel built to the latest regulatory requirements and Transport Canada and classification society standards will mitigate the risks identified in the Lloyd's Register Canada vessel condition assessment reports in meeting all current and projected safety, environmental and contractual requirements.

3.3 Vessel Deployments

3.3.1 Overview

BC Ferries proposes to deploy one new minor class vessel on Route 18 as a direct replacement for the *North Island Princess*; the other will be deployed on Route 25 in place of the *Quadra Queen II*, which will be redeployed as refit relief in place of the *Quinitsa*. In turn, the *Quinitsa* will be redeployed to Route 6, thereby enabling the retirement of the *Howe Sound Queen*. The vessel deployment strategy is summarized in Table 3-A. No changes to the current service levels or schedules on Routes 18 and 25 are expected to be required in order to implement the strategy successfully. As the *Quinitsa* is a smaller vessel than the *Howe Sound Queen*, which it will replace, an additional daily round trip will be added to the schedule for Route 6 to augment the capacity provided on that route.

Table 3-A: Vessel Deployment Strategy

Route	Current Vessel Deployments	Proposed Vessel Deployments
Regular Service		
6	*Howe Sound Queen* – 52 AEQ	*Quinitsa* - 44 AEQ
18	*North Island Princess* - 38 AEQ	New Minor Class Vessel - 44 AEQ
25	*Quadra Queen II* - 26 AEQ	New Minor Class Vessel - 44 AEQ
Refit Relief		
6	*Bowen Queen*	*Bowen Queen / Skeena Queen*
18	*Tachek /Quadra Queen II /Quinitsa* via multiple redeployments	*Quadra Queen II*
25	*Quinitsa or Bowen Queen*	*Quadra Queen II*

Table 3-B below sets out the operational characteristics of the *North Island Princess* and the *Quadra Queen II* as compared to the minor class vessels which BC Ferries proposes will replace them on Routes 18 and 25.

Table 3-B: Summary of Operating Characteristics for Route 18 and Route 25 Current and Replacement Vessels

Specification	*North Island Princess* (Route 18 Current Vessel)	*Quadra Queen II* (Route 25 Current Vessel)	Minor Class (Route 18 and 25 Replacement Vessels)
Voyage Classification	Near Coastal Class 2	Near Coastal Class 2	Near Coastal Class 2
Maximum Length	61.04m	49.61m	85m Standard Hull; TBD (through design-build process)
Draught	3.3m	2.67m	3.5m Standard Hull; TBD (through design-build process)
Service Speed	10.0 knots	12.5 knots	14.0 knots
Propulsion	2x Geared Diesel FPP	2x Geared Diesel FPP	To be defined in design and build process
Fuel Consumption (Transit Service Speed)	22 l/n.mi.	23 l/n.mi.	To be defined in design and build process
Vehicle Capacity	38 AEQ	26 AEQ	44 AEQ
Commercial Vehicle Height (maximum)	4.2m	4.26m	4.75m
Crew Licences and Passengers	Crew/Passengers A: 7/143 = 150	Crew/Passengers A: 7/143 = 150	Crew/Passengers [Standard Hull] A: 8/292=300 B: 7/143 = 150
Passenger Decks	Overhead / 1 Deck	Overhead / 1 Deck	Main Deck / 1 Deck; external sun deck with solarium
Passenger Facilities	Passenger lounge with washrooms and vending; access to passenger area is via stairs only	Passenger lounge, vending machines, accessible washrooms	TBD; accessible main lounge on car deck, accessible washroom, pet area
Flexibility of Use on Alternative Routes	Sheltered Waters or Near Coastal Class 2 routes with BC Ferries' standardized minor/ intermediate berth configuration	Sheltered Waters or Near Coastal Class 2 routes with BC Ferries' standardized minor/ intermediate berth configuration	Sheltered Waters or Near Coastal Class 2 routes with BC Ferries' standardized minor/ intermediate berth configuration

Table 3-C below sets out the operational characteristics of the *Howe Sound Queen* as compared to the *Quinitsa*, which will replace her on Route 6.

Table 3-C: Summary of Operating Characteristics for Route 6 Current and Replacement Vessel

Specification	***Howe Sound Queen*** **(Current Vessel)**	***Quinitsa*** **(Replacement Vessel)**
Voyage Classification	Sheltered Waters	Sheltered Waters
Maximum Length	74.40m	77.59m
Draught	3.28m	2.35
Service Speed	10.0 knots	9.75 knots
Propulsion	2x Geared Diesel FPP	4x Diesel w/ 4 x RAD
Fuel Consumption (Transit Service Speed)	14.5 l/ n.mi.	28.15 l/n.mi.
Vehicle Capacity	52 AEQ	44 AEQ
Commercial Vehicle Height (maximum)	4.6m	4.57m
Crew Licences and Passengers	Crew/Passengers A: 8/292 = 300 B: 7/143 = 150	Crew/Passengers A: 6/294 = 300
Passenger Decks	Overhead / 1 Decks	4x main deck passenger lounges
Passenger Facilities	Overhead passenger lounge, deck waiting room, washrooms, vending machines	Accessible car deck lounge, accessible washrooms
Flexibility of Use on Alternative Routes	Sheltered Waters routes with BC Ferries' standardized minor/ intermediate berth configuration	Sheltered Waters routes with BC Ferries' standardized minor/ intermediate berth configuration

In developing the vessel deployment strategy, the intent was to identify a service model that would have the potential to generate operational efficiencies, while appropriately addressing the travel demands of BC Ferries' customers and ensuring the service level requirements of the Coastal Ferry Services Contract are met.

Deploying the new minor class vessels to Routes 18 and 25 will provide sufficient capacity to meet current and forecast peak season traffic demand on these routes (see section 3.3.2). New standardized minor class vessels built to the latest regulatory requirements, and Transport Canada and classification society standards, are considered the most cost-effective and efficient option to ensure the Company's continued ability to meet service requirements on these routes now and into the future.

Efficiencies, savings and a more optimal fleet utilization will also be realized through the vessel redeployments enabled by the Project.

Intrinsic in the path to fleet standardization is the effective use and optimization of the vessels that remain a part of the fleet until their future replacement. To this end, the deployment of the *Quinitsa* from a relief vessel role to regular service on Route 6 is based on the optimal service area for the *Quinitsa* until retirement.

As refit relief, the *Quadra Queen II* is better suited than the *Quinitsa* to the operational demands of the many routes to be served, both in terms of required capacity to meet traffic demand and the ability to operate in various sea state conditions. With respect to Route 25, specifically, while the sea state on that route is deemed Sheltered Waters, it has weather and tidal conditions that put the service at routine risk of cancellation when the *Quinitsa* is deployed as the relief vessel. In addition, to compensate for the slower speed of the *Quinitsa*, the schedule adjustment required for Route 25 falls short of the core service levels of the Coastal Ferry Services Contract; cannot accommodate dangerous cargo sailings; and significantly disrupts or lengthens the operating service.

The size and operating characteristics of the *Quinitsa* make it a suitable vessel to replace the *Howe Sound Queen* on Route 6. In addition to the *Quinitsa's* service speed meeting the needs of the route, the vessel:

- Is appropriate to the sea state on the route;
- Does not have the deadweight limits of the *Howe Sound Queen*;
- Has an open deck which enables efficient loading; and
- Is of a capacity which aligns with the route's holding compounds.

In addition, capacity carried on the route can be increased by changing the *Quinitsa's* sailing frequency – an option unavailable on Route 25. As discussed in section 3.3.2, deploying the *Quinitsa* on Route 6 with an additional round trip per day will provide sufficient capacity to meet current and forecast peak season traffic demand for this route.

3.3.2 Traffic Demand Analysis

Traffic analysis conducted by BC Ferries confirms that the minor class will be of sufficient capacity to meet the current and forecast traffic on Route 18 and Route 25, and that the *Quinitsa* will be of sufficient capacity to meet the current and forecast traffic on Route 6.

For the analysis of traffic demand, BC Ferries developed high and low traffic annual growth projections for Routes 6, 18, and 25 looking out 20 to 25 years. For each route, the forecasts took into consideration historical traffic trends, local population and economic statistics, and previous long run forecasts conducted by BC Ferries for each route. In addition to these factors, BC Ferries has observed that there is currently a positive structural shift in traffic that the Company believes is driven by increases in domestic travel due to the US/Canadian dollar exchange rate, lower gas prices and improving local economic conditions. In the analysis, this structural shift was assumed to continue to evolve over the next one to three years and the impacts were added on top of the historical traffic trends. Following the maturation of this structural shift, traffic growth is forecast to taper off and with only modest growth (route dependent) associated with local population and economic growth. BC Ferries' forecasts have been reviewed independently by Urban Futures Inc., which has found the forecast methodology to be suitable and the forecast results to be reasonable (see Appendix D).

North Island Princess Replacement Capacity

Traffic analysis conducted by BC Ferries confirms that a minor class vessel will be of sufficient capacity to meet the current and forecast traffic on Route 18.

Based on a review of the daily loaded AEQ on Route 18 in fiscal 2016, a minor class vessel with vehicle capacity of 44 AEQ, as proposed, would carry the per sailing traffic volumes (without a sailing wait) 97 percent of the time year-round. BC Ferries' traffic forecast suggests that traffic growth on Route 18 will in the order of 0.43 to 0.44 percent annually over the next 15 years. In fiscal years 2020 and 2030, the percentage of times per sailing traffic volumes would be carried by a vessel with 44 AEQ capacity (without a sailing wait) ranges from 95 to 96 percent. These findings are summarized in Table 3-D and suggest that a minor class vessel would be sufficient to carry forecast demand on Route 18 for the foreseeable future. Further, if growth exceeds the high growth forecast, capacity can be added through additional sailings. In fiscal 2016,

Route 18 carried 86,684 AEQ; with the current Route 18 service levels, the minor class vessel will provide annual capacity of 247,632 AEQ.

Table 3-D: Route 18 - Percentage of Times All Vehicle Traffic is Carried per Sailing, Year Round*

		Fiscal 2016	Fiscal 2020 (in-service)	Fiscal 2030 (10 years from in-service)
Operating - 44 AEQ Minor Class Vessel				
Current Traffic		97%		
Forecast Traffic:				
High per annum traffic growth rate	**0.44%**		96%	95%
Low per annum traffic growth rate	**0.43%**		96%	95%

* The Coastal Ferry Services Contract requires a minimum of 2,814 round trips or 5,628 sailings per year on Route 18. One percent represents approximately 56 sailings.

Quadra Queen II Replacement Capacity

Traffic analysis conducted by BC Ferries confirms that a minor class vessel will be of sufficient capacity to meet the current and forecast traffic on Route 25.

Based on a review of the daily loaded AEQ on Route 25 by port in fiscal 2016, a minor class vessel with vehicle capacity of 44 AEQ, as proposed, would carry the per sailing traffic volumes (without a sailing wait) 99 percent of the time year-round. BC Ferries' traffic forecast suggests that traffic growth on Route 25 will range, on average, from a low of 0.19 percent to a high of 0.69 percent annually over the next 15 years. In fiscal years 2020 and 2030, the percentage of times per sailing traffic volumes would be carried by a vessel with 44 AEQ capacity (without a sailing wait) under each of the low and high traffic growth rates (as projected by BC Ferries) remains at 99. These findings are summarized in Table 3-E and suggest that a minor class vessel would be sufficient to carry forecast demand on Route 25 for the foreseeable future. Further, if growth exceeds the high growth forecast, capacity can be added through additional sailings. In fiscal 2016, Route 25 carried 93,174 AEQ; with the current Route 25 service levels, the minor class vessel will provide annual capacity of 348,568 AEQ.

Table 3-E: Route 25 - Percentage of Times All Vehicle Traffic is Carried per Sailing, Year Round*

		Fiscal 2016	Fiscal 2020 (in-service)	Fiscal 2030 (10 years from in-service)
Operating - 44 AEQ Minor Class Vessel				
Current Traffic		99%		
Forecast Traffic:				
High per annum traffic growth rate	**0.69%**		99%	99%
Low per annum traffic growth rate	**0.19%**		99%	99%

* The Coastal Ferry Services Contract requires a minimum of 3,961 round trips or 7,922 sailings per year on Route 25. One percent represents approximately 79 sailings.

Howe Sound Queen Replacement Capacity

Traffic analysis conducted by BC Ferries confirms that the *Quinitsa* will be of sufficient capacity to meet the current and forecast traffic on Route 6.

Based on a review of the daily loaded AEQ on Route 6 in fiscal 2016, a vessel with vehicle capacity of 44 AEQ would carry the per sailing traffic volumes (without a sailing wait) 84 percent of the time year-round. BC Ferries' traffic forecast suggests that traffic growth on Route 6 will range, on average, from a low of 0.37 percent to a high of 0.62 percent annually over the next 15 years. The percentage of times per sailing traffic volumes would be carried by a vessel with 44 AEQ capacity (without a sailing wait) year round in fiscal 2020, when the *Quinitsa* would be introduced to Route 6, and ten years in the future, under each of the low and high traffic growth rates (as projected by BC Ferries) ranges from 78 to 83. These findings are summarized in Table 3-F and suggest that the *Quinitsa* would be sufficient to carry forecast demand on Route 6 for the foreseeable future. In fiscal 2016, Route 6 carried 252,716 AEQ; with the current Route 6 service levels, the *Quinitsa* will provide annual capacity of 390,808 AEQ[7]. Further, to accommodate current demand and future growth, capacity can be added through additional sailings. Table 3-G summarizes the impact on capacity utilization of deploying the *Quinitsa* on Route 6 under the current schedule, as well as with the additional daily round trip, as planned.

[7] This capacity is before adding one additional round trip per day to offset the lower daily AEQ capacity from operating the *Quinitsa* as opposed to the larger *Howe Sound Queen*.

Table 3-F: Route 6 - Percentage of Times All Vehicle Traffic is carried per sailing, Year Round*

		Fiscal 2016	Fiscal 2020 (in-service)	Fiscal 2030 (10 years from in-service)
Operating - 44 AEQ *Quinitsa*				
Current Traffic		84%		
Forecast Traffic:				
High per annum traffic growth rate	**0.62%**		82%	78%
Low per annum traffic growth rate	**0.37%**		83%	80%

* The Coastal Ferry Services Contract requires a minimum of 4,441 round trips or 8,882 sailings per year on Route 6. One percent represents approximately 89 sailings.

Table 3-G: Route 6 – Capacity Utilization (Based on Fiscal 2016 Traffic Levels)

Vessel and Service Levels	Round Trips	Sailings	Capacity Provided (AEQs)	Fiscal 2016 AEQs Carried	Capacity Utilization
52 AEQ Howe Sound Queen Coastal Ferry Services Contract Minimum Service Levels	4,441	8,882	461,864	252,716	55%
44 AEQ Quinitsa Coastal Ferry Services Contract Minimum Service Levels	4,441	8,882	390,808	252,716	65%
44 AEQ Quinitsa Coastal Ferry Services Contract Minimum Service Levels plus One Extra Round Trip Daily	4,806	9,612	422,928	252,716	60%

3.3.5 Demand Management System

The Company's Fare Flexibility and Digital Experience Initiative ("Initiative") includes consideration of a new demand management system which could, once implemented, further improve overall AEQ capacity utilization on the routes to which it is applied. At this time, in accordance with Order 15-01, implementation of the Initiative is envisaged for only those routes that currently accept vehicle reservations and, thereby, excludes Routes 6, 18 and 25. Accordingly, no impact on capacity utilization from the Initiative on the Project is envisaged, which would affect the determination of the optimal size of the replacement vessels.

3.4 Summary

BC Ferries is of the view that the age and condition of the *North Island Princess* and the *Howe Sound Queen* are such that it is prudent to replace them, and that vessels of the size and characteristics of the proposed minor class will appropriately meet the traffic demand and service level requirements of Routes 18 and 25 to which they will be assigned. In addition, the Company believes it is prudent to redeploy the *Quinitsa* to Route 6 in place of the *Howe Sound Queen*, in that the characteristics of the vessel are suitable to the route and the redeployment enables the effective use of the vessel until its future replacement. The foregoing vessel deployments enable the redeployment of the *Quadra Queen II* as refit relief, which is considered an efficient and cost-effective option to meet the operational demands of the many routes it will serve in that capacity.

Section 4 – Analysis of Options

4.1 Options Analysed

Two options are presented for the replacement of the *North Island Princess* and the *Howe Sound Queen*:

- Option 1: Life Extend Existing Vessels for Ten Years and Replace
- Option 2: Replace with Two Minor Class Vessels

4.2 Key Cost Assumptions

Capital and Operating Costs

The vessel construction cost estimates for the replacement vessels in the options presented have been derived from the proposals received in response to the RFP for the Project, and reflect the high end of the spectrum of pricing received. A contingency was added to account for uncertainty of shipyard selection, negotiations, foreign exchange risk, change orders during construction, and unidentified spares requirements. Pricing is subject to change as contract negotiations proceed and design specifications are confirmed.

Other capital and operating Project costs were estimated based on the project for the three Salish class vessels, adjusted to reflect differences between the projects in areas such as number of vessels constructed, vessel size, crew size, and propulsion system.

Crew Complement

The financial analysis assumes a crew size of seven, which is based on BC Ferries' analysis of minimum safe manning levels set by Transport Canada for other vessels. The final determination on minimum crew size rests with Transport Canada, and will reflect the final design of the vessel.

Terminal Upgrades

It is assumed that no berth or terminal infrastructure upgrades beyond those that would be undertaken in the normal course of business would be required to deploy the replacement vessels.

Terminal renewal and upgrade projects are being completed as part of the Company's infrastructure renewal with a standardized berth design, such that the berths will meet the needs of future vessels being built under the Company's fleet renewal and standardized class strategy.

Depending on the final design of the minor class vessels, there is a potential, however, that minor marine structure modifications may be required at Blubber Bay (Texada Island) on Route 18. The capital cost associated with any such required work would be incremental to the Project cost set out in this Application.

Federal Funding Support

The Company has applied for funding for the replacement vessels under the New Building Canada Fund. However, as no decision has been made by the federal government on the application, the analysis includes no federal funding support for the Project.

Fuel Price

The fiscal 2018 set fuel price of $0.933 per litre has been applied to estimated fuel consumption.

Inflationary Factor and Discount Rate

An annual escalation for inflation of 2 percent has been applied to all capital and operating costs.

A discount rate of 7 percent is used for the NPV analysis.

4.3 Option 1: Life Extend Existing Vessels for Ten Years and Replace

This option involves upgrading the *North Island Princess* and the *Howe Sound Queen* to enable the vessels to operate a further ten years to fiscal 2030, at which time the vessels would be retired and replaced with new minor class vessels.

The work required to upgrade the *North Island Princess* and the *Howe Sound Queen* for a possible further ten years of service, and the estimated costs to complete this work, have been estimated by BC Ferries' engineers using condition assessment reports conducted by Lloyd's Register Canada.

BC Ferries has undertaken three projects in the past decade to life extend a vessel by ten or more years. These projects are listed in Table 4-A and have informed BC Ferries' cost estimates for this option of the Application. Life extensions of the *North Island Princess* and the *Howe*

Sound Queen are expected to have a higher cost and elevated risk due to their being significantly older than the other vessels for which life extensions have been undertaken. The *North Island Princess* and the *Howe Sound Queen* would be 61 and 55 years old, respectively, at life extension; ages similar to the post-life extension retirement ages of the vessels listed below.

Table 4-A: Vessel Life Extensions (+Ten Years) Undertaken Since Fiscal 2006

	Tachek	***Quadra Queen II***	***Queen of Nanaimo***
Fiscal Year	2014	2012	2006
Age at Life-Extension	45 years	43 years	42 years
Age at Planned Retirement	60 years	60 years	53 years

The scope for the life extension of the two vessels would include replacement or renewal of many of the ships' systems, as listed below, at an estimated cost of at least $<> million for each vessel. It is important to note that the cost estimate includes a very high degree of uncertainty, particularly with regard to asbestos and lead-based paint abatement and steel renewals. As such, the cost estimate is considered conservative.

North Island Princess* and *Howe Sound Queen

Life Extension Scope

- Engineering, Drawings and Approvals
- Blast and Paint Hull, Decks, Voids and Machinery Spaces
- Asbestos Abatement
- Steel Renewal
- Replace Main Engines, Gear Boxes and Alternators
- Renew Propeller Hubs and Blades
- Install New Main and Emergency Switchboards
- Replace Electrical Cabling
- Safety Upgrades
- Replace All Fire Doors
- Upgrade Bridge Controls and Instrumentation
- Replace Sprinkler System, Fire and Bilge Pump and all Piping
- Upgrade Ventilation and Heating

As stated above, extending the lives of the *North Island Princess* and the *Howe Sound Queen* beyond ten years is not considered technically viable due to the age and condition of the vessels. These same factors suggest that despite an investment in the life extension of these vessels, there remains a significant risk of premature asset failure, such that a full incremental ten years of service life may not, in fact, be realized through this option.

Total Project costs for this option are set out below:

Option 1: Life Extend Existing Vessels for Ten Years and Replace

Total Project Cost (including IDC):	$ <> Million
45-Year NPV:	-$236.2 Million

This option has modestly higher costs on an NPV basis than the alternative option of replacing the vessels now. It is also considered the highest risk in terms of ensuring service continuity. As noted above, there is a significant risk that a full ten years of incremental service may not be realized through the life extension project. Further, this option will delay progress towards the goal of a class strategy and overall fleet standardization, which affords the opportunity for more efficient and effective fleet deployment, along with safer operations.

4.4 Option 2: Replace with Two Minor Class Vessels

This option involves the procurement of two minor class vessels in fiscal 2020, each of which will have a vehicle carrying capacity of 44 AEQ. As described above, one new minor class vessel would be deployed on Route 18 as a direct replacement for the *North Island Princess*; the other would be deployed on Route 25 in place of the *Quadra Queen II,* which would be redeployed as refit relief in place of the *Quinitsa.* In turn, the *Quinitsa* would be redeployed to Route 6, thereby enabling the retirement of the *Howe Sound Queen*.

Deploying the new minor class vessels to Routes 18 and 25 would ensure sufficient capacity to meet current and forecast peak season traffic demand on these routes.

This option is less costly than the alternative option of life extending the existing vessels, and contributes to the objectives of fleet standardization and inter-operability, which will enable the Company to make further advances in efficient and effective service delivery.

Total Project costs for this option are set out below:

Option 2: Replace with Two Minor Class Vessels	
Total Project Cost (including IDC):	$ <> Million
45-Year NPV:	-$235.1 Million

4.5 Financial Summary of Options

The results of the financial analyses are summarized in Table 4-B below.

Table 4-B: Project Cost and NPV Summary of Options

	Total Project Cost (including IDC)	**45-Year NPV**
Option 1: Life Extend Existing Vessels for Ten Years and Replace	$<> M	-$236.2 M
Option 2: Replace with Two Minor Class Vessels	$<> M	-$235.1 M

4.6 Preferred Option

Option 2, involving the replacement of the *North Island Princess* and the *Howe Sound Queen* with two minor class vessels, is preferred by BC Ferries. This option contributes most strongly to the objectives of fleet standardization and interoperability and, as such, has the greatest potential to generate efficiencies. Life extension of the two vessels (Option 1) is more costly than the alternative of replacing the vessels now, and given the age and condition of the vessels, includes a risk of premature asset failure and a consequential risk of service disruption.

While the NPV analyses points to a modest cost differential between the two options, BC Ferries believes that the differential could be greater in favour of the minor class vessel replacement option (Option 2). The Company has been conservative in both its pricing for the new vessels and in the estimation of the benefits to be realized from standardizing the vessels. With respect to the latter, BC Ferries believes that it will realize additional efficiencies in terms of procuring, operating, and maintaining common assets. While the financial analysis reflects expected benefits of procuring common assets related to such things as vessel design,

construction and outfitting, inventory, project management, travel, and training development, it does not include all of the benefits from operating and maintaining common assets that are expected to be realized over the life cycle of the vessels. Many of those benefits are difficult to isolate and estimate, and are dependent on future vessel replacements and deployments, not all of which have yet been determined. In addition, the NPV analysis does not entirely reflect the higher risk inherent with life extending aged vessels in Option 1. It is possible that higher capital and operating costs would be incurred under Option 1 due, for example, to premature asset failure, which would widen the cost differential further in favour of the preferred option.

4.7 Price Cap Implications of Preferred Option

Reflective of the proposed timeline to replace the *North Island Princess* and the *Howe Sound Queen* with new minor class vessels in fiscal 2020, BC Ferries has analyzed the forward-looking impact of the options presented in the Application on future price caps. BC Ferries used the project assumptions as included in the PT4 price cap forecast model ("PT4 model") as the baseline for this comparison. The analysis extends through performance term seven, ending March 31, 2032 ("PT7"), in order to include the impact of the new minor class vessels that would replace the life extended vessels in the case of Option 1.

Compared to the PT4 capital plan, the Project (Option 2) has a slightly lower capital cost and a later schedule for the *North Island Princess* replacement vessel, and significantly lower capital cost and an earlier schedule for the *Howe Sound Queen* replacement vessel. In total, the Project capital cost is approximately $<> million less than the PT4 capital plan.

With respect to operating costs, the Project is expected to have higher fuel costs than assumed in the PT4 model, primarily due to the expected diesel consumption of the *Quinitsa* when it replaces the *Howe Sound Queen* on Route 6. The PT4 model assumed that an intermediate vessel with LNG propulsion would replace the *Howe Sound Queen*.

In summary, the Project results in a baseline decrease in the price cap of approximately 0.05 percent per annum through PT7 from that forecast in the PT4 model. As a result, the Project can be expected to have a small but favorable impact on price caps over the 45-year lifecycle of the two minor class vessels, which will contribute to reducing upward pressure on fares. This compares to a baseline increase in the price cap of 0.02 percent per annum for Option 1.

As described in section 4.6, when compared to Option 1, the Project is modestly favourable on a NPV basis, which supports the favorable impact on price caps over its lifecycle. However, the lifecycle cost comparison does not entirely reflect the higher risk inherent with life extending

aged vessels. It is possible that higher capital and operating costs would be incurred under Option 1, which would widen the differential in price cap implications further in favour of the Project over Option 1

4.8 Scenarios for Reducing Capital Expenditures

BC Ferries believes that the proposed capital expenditure for the two minor class vessels is reasonable and prudent. An underlying premise of the replacement strategy for the *Howe Sound Queen* is the reduction in capital expenditure arising from her replacement with a minor class vessel as opposed to an intermediate class vessel, which had been envisaged in the PT4 capital plan. This strategy generates capital cost savings for the Project in the order of 50 percent as a result of the difference in cost between building the two classes of vessels. There are no other obvious opportunities to reduce the proposed capital expenditure without a significant impact on the scope of the Project.

BC Ferries considered opportunities to reduce capital costs by a further 10 or 20 percent.

To achieve further capital cost savings in the order of 10 percent, substantial scope change and instrumental reductions would be required. While it may be possible to achieve some upfront capital cost savings through specifying less costly shipboard equipment (e.g. main engines, thrusters, navigation equipment, etc.), this is not considered a prudent approach as it would negatively impact the Company's move toward fleet standardization, with a commensurate reduction in efficiencies, and an increased risk regarding vessel reliability. Some savings in capital costs could also be realized through reducing shipboard amenities, such as eliminating the upper passenger viewing and deck area; however, this would negatively affect the customer experience, which could, in turn, affect traffic demand and revenue. Both of the aforementioned capital cost saving measures are expected to have a significant detrimental impact on the vessels' through-life reliability and the customer experience, and are not, therefore, recommended.

Capital cost savings in the order of 20 percent would not be achievable.

Section 5– Procurement and Risk

5.1 Procurement Options

There are two basic options to procure the proposed minor class replacement vessels – purchase them used or new. Both options have been considered by BC Ferries and are summarized below. BC Ferries proposes to procure new vessels to replace the *North Island Princess* and the *Howe Sound Queen.*

5.1.1 Acquire Used Vessels

While the majority of BC Ferries' vessels have been built and acquired new, a number of used vessels have been purchased for the fleet. In some cases the decision has proven to be a wise investment (e.g. *Kuper*), while in other cases the investment has not been as successful (e.g. *Queen of Chilliwack*).

A key objective of BC Ferries' fleet renewal program, and the proposed acquisition of the minor class vessels as set out in this Application, is to achieve capital and operating cost savings and efficiencies through a strategy of vessel standardization. In most cases, the used market does not provide the opportunity to purchase multiple ships with a common platform or a common standard. Accordingly, in considering the acquisition of a used vessel, any possible savings in acquisition cost must necessarily be weighed against the possible higher operating costs associated with deployment of a vessel that is unique to the fleet. This matter is discussed more fully below.

There are many factors to consider in assessing the viability of a used vessel. Key factors are as follows:

- Commercial Compatibility

  The ability of the vessel to meet the traffic and customer needs. This includes speed, vehicle and passenger carrying capacity, passenger accommodations and other amenities.

- Physical Compatibility

  Important factors include the age and physical condition of the vessel. Consistent with worldwide practice, BC Ferries also requires vessels to have been built and maintained to international classification standard. Consideration also must be given to the vessel's

compatibility with BC Ferries' standardized berth design and, in particular, whether its length, beam, draft, freeboard and deck configuration fit the Company's terminals and docks, and/or whether modifications would be required. Further considerations include the compatibility of the vessel's electrical system with North American requirements and the availability of spare parts.

- Regulatory Compatibility

  Transport Canada regulations with respect to Canadian-operated vessels are very stringent. Transport Canada applies 'new ship' regulations to any used vessel that enters domestic service in Canada, with some consideration of the age of the vessel. Accordingly, foreign vessels will require modification to meet these regulations. Transport Canada regulations apply to all matters related to the safe operation of vessels, including emergency evacuation, stability, firefighting systems and crew levels. An additional concern is related to the approval of equipment and materials; Transport Canada has very restrictive policies concerning acceptance of certificates from other jurisdictions.

- Fleet Compatibility and Standardization

  The ability to cost-effectively redeploy a vessel across routes (referred to as 'inter-operability') is important to ensuring consistency of service and operating costs. It is a principal objective underlying the Company's vessel replacement strategy. Ideally, vessels should be able to operate effectively and efficiently on different routes in order to provide supplemental service during peak periods, refits and emergencies.

  Conversely, non-standard vessels do not necessarily offer this same level of compatibility and can create inconsistencies in service, crew size and vessel capacity that may generate higher operating and maintenance costs and scheduling challenges.

  BC Ferries is renewing its fleet with an overall class strategy and standardization of vessels. Procurement of used vessels is generally for one or at most two vessels. In order to achieve standardization of the same vessels for multiple ship replacements, buying used would most likely not allow for achieving this key criterion.

In general, the purchase price of a used vessel is substantially less than the price of acquiring a new vessel. However, purchase price is just one factor when considering the suitability of a used vessel. All vessels will require some modification to enable them to operate successfully as part of BC Ferries' fleet. Any foreign purchase (even if formerly Canadian flagged) must comply with the convention for the Safety of Life at Sea (SOLAS) and Transport Canada

regulations. Vessels older than ten years must be brought into compliance with the regulations in force ten years previous to the date the vessel enters into Canadian registry, while vessels newer than ten years must be brought into compliance with the current regulations for newly constructed vessels (i.e. no "grandfathering"). The cost of these modifications, together with the imposition of import duty on the purchase price plus any modifications and/or refit work performed off-shore, must be considered.

Beyond the capital costs, all the operating costs must also be considered (e.g. fuel, crew and maintenance). BC Ferries' experience with recent used vessel acquisitions, such as the *Northern Adventure*, has been that operating costs have been higher than what would have been experienced with a vessel designed specifically for the service. As well, required modifications to the vessel to meet service requirements and standards of passenger comfort have added incremental cost.

BC Ferries actively monitors the market for used vessels. Several international ship brokers routinely advise BC Ferries of used vessels available for purchase and, in the past 24 months, have brought forward approximately 25 used vessels for the Company's consideration. All were reviewed, but none were determined to meet the requirements for the replacements of the *North Island Princess* and the *Howe Sound Queen* due, for example, to their age or capacity. Further, consistent with the Commissioner's views as expressed in the 2012 Commissioner Report, the Company views the objective of fleet standardization as an important means of reducing costs and enhancing efficiency, and acquisition of new vessels is considered to best meet this objective. BC Ferries will, however, continue to monitor the used vessel market until such time as an order for these new vessels is placed.

5.1.2 Acquire New Vessels

Procurement of new vessels allows for greater certainty that all regulatory, operating and contractual requirements will be met within the Project scope and cost. In the case of the replacements for the *North Island Princess* and the *Howe Sound Queen*, the intent is to enter into a design-build contract with a single shipyard to construct the two vessels. As noted above, the Company may possibly extend this build program beyond these two vessels to include future replacement vessels, all with a common platform. The benefits of a build program such as this are discussed in prior sections of this Application, and include potentially lower capital costs arising from series build programs, lower crew training costs through standardization of bridge, engine room and accommodation layouts, and lower maintenance costs through standardization of components.

5.2 Procurement Process

5.2.1 Project Governance

The Company has in place a vessel replacement program for all new vessel building projects. The vessel replacement program reports through the Engineering Department and draws on expertise across the Company, as well as from external subject matter experts. The procurement of the *North Island Princess* and the *Howe Sound Queen* replacement vessels will be undertaken under the auspices of this program, with contract award subject to the approval of the Executive Management Committee and the Board of Directors.

5.2.2 Vessel Acquisition

BC Ferries has structured the procurement process for the Project as follows:

- Request for Expressions of Interest ("RFEOI")

  An RFEOI for the design and construction of the two proposed minor class vessels was issued to leading shipyards in Canada and around the world in late March, 2016. Principal among the objectives of the RFEOI was to identify shipyard interest and available capacity to undertake the proposed Project within the timeframe envisaged. Responses were received from 28 shipyards and design firms that expressed interest in participating in the tendering process and, of those, 12 shipyards were short-listed to proceed to the RFP stage.

- Request for Proposal

  A RFP was issued in late July 2016 to the 12 shipyards short-listed from the RFEOI process. The RFP closed in October 2016 and proposals were received from four shipyards. All proposals are compliant with the terms of the RFP and meet the in-service timeframe of fiscal 2020 for the two vessels. An internal BC Ferries team comprised of senior technical and operational staff has evaluated the proposals and a short list of two preferred shipyards has been selected. Discussions are underway with the two short-listed shipyards, with the objective of signing of a letter of intent in early 2017 to contract with a single preferred shipyard. Subject to the approval of this Application, the next stage in the vessel procurement process would be the execution of a shipyard contract with the selected proponent.

5.2.3 Timeline

North Island Princess replacement:

Contract Award	Construction		Delivery, Training, Integration	In-Service
	Start	Finish		
February 2017	July 2017	December 2018	January 2019 – April 2019	May 2019

Howe Sound Queen replacement:

Contract Award	Construction		Delivery, Training, Integration	In-Service
	Start	Finish		
February 2017	November 2017	April 2019	May 2019 – August 2019	September 2019

5.3 Consequences of In-service Delays

Delays in the in-service dates for the replacements of the *North Island Princess* and the *Howe Sound Queen* significantly increase the possibility of service disruptions due to the following factors:

- The longer the vessels operate, the higher the risk of unforeseen operational issues and serviceability;
- Critical spares availability, original equipment manufacturer knowledge and supportability for these aged vessels are already at levels that may compromise service reliability; and
- Vessel long-range maintenance plans have been "glidesloped" for the planned in-service dates of the new vessels, and extensions to these plans could result in reduced vessel reliability and operational availability, without significant investment to achieve a very short life extension.

Although not fully quantifiable in either financial or engineering terms, a key consideration is that there is a greater likelihood of a service disruption, and the potential consequences of any such disruption become much more significant the longer these vessels remain in service.

5.4 Risk Identification and Mitigation

An overview of the key risks to the Project, together with planned mitigation strategies is provided below. The risk mitigation strategies for the latter phases of the Project will receive enhanced focus as the Project proceeds.

It is important to note that the Project follows the first highly-successful phases of the Company's vessel replacement program and incorporates best practices and lessons learned from those phases. This in and of itself serves to mitigate risk in that the Company is implementing processes and procedures that have been tested and proven successful in the recent past.

5.4.1 Financial Risks

Price Escalation

As indicated in section 4.2, the pricing for the Project is based on the proposals received in October 2016 in response to the RFP and is conservative in that it reflects the high end of the spectrum of pricing received. The Company has included a contingency in the Project budget to address unforeseen cost pressures, including shipyard prices that might exceed current estimates. This will mitigate against potential cost escalation that may occur during the contracting process as a direct result of scope finalization and specific equipment selection. In the event that negotiated pricing rises from that received through the RFP process, a supplemental Application to the Commissioner may be required. Depending on the magnitude of the cost variance, scope changes to the Project may also need to be considered.

Currency

BC Ferries has specified in the RFP that the contract is to be negotiated to a fixed firm price in Canadian dollars, and the four proposals received have been submitted on that basis.

Affordability

Affordability is defined as the ability of BC Ferries to undertake the Project while adhering to its debt covenants. The Company has in place a financing plan (see below) that ensures that the capital expenditures can be accommodated within the constraints of its key lending agreements. The analysis of the Project on a total cost of ownership basis ensures that affordability is considered based on the full life cycle costs of the Project.

Financing

BC Ferries plans to finance the Project with cash flow from operations, draws on its credit facility and/or through the issuance of bonds in the capital markets.

BC Ferries' long-term financing instruments are secured through a Capital Markets Platform. This platform is capable of accommodating a variety of corporate debt instruments and borrowings ranking equally, including term bank debt, revolving bank lines of credit, publicly- issued and privately-placed debt securities, commercial paper, medium-term notes and interest rate and currency swaps and other hedging instruments.

Detailed documentation associated with the Capital Markets Platform can be viewed online through the System for Electronic Document Analysis and Retrieval (SEDAR) at www.sedar.com or on BC Ferries' website at www.bcferries.com/about/investors.

5.4.2 Design Risks

The RFP envisages that key risks, including vessel design, will be fully assumed contractually by the selected shipyard. To ensure that the vessels enable BC Ferries to meet its contractual service level requirements, BC Ferries included in the RFP, a statement of operating requirements and technical statement of operating requirements that set out the minimum functional and technical requirements, and operating performance targets and amenities that must be satisfied in the final design and construction of the vessels.

BC Ferries has followed the same approach in the earlier phases of the Company's vessel replacement program. The approach has been successful as reflected in the high quality of the vessels acquired and in the costs of acquisition having in all cases been at or below budget. As these vessels are the first of a possible series build program, BC Ferries' present intent is to seek ultimate design rights for these vessels. This would enable further competitive processes to build subsequent minor class vessels, with a tested design, should BC Ferries determine that this is the most cost effective approach for future acquisitions.

Additionally, lessons learned from the procurement processes for the Salish class and Spirit class mid-life upgrade projects have been incorporated into the design and build documentation included in the RFP for the minor class vessels to BC Ferries' advantage. As well, the RFP baseline design documents for the top two proponents are being further refined with each proponent to improve precision and reduce overall design risk, while ensuring full design risk rests with the respective proponent.

5.4.3 Timeline Risks

The timeline for the Project (see section 5.2.3) reflects the need to replace the *North Island Princess* and the *Howe Sound Queen* expeditiously due to their age and condition. As indicated, all respondents to the RFP indicated that the proposed in-service timeframe for the two minor class vessels can be met, assuming a contract can be finalized by early 2017. Any delay in the Project timeline would put the Company at risk in terms of not being able to meet its service level requirements under the Coastal Ferry Services Contract. As well, a delay could result in significant operational implications (see section 5.3).

5.4.4 Construction and Delivery Risks

Project Management

As indicated, the intent is to enter into a design-build contract, which will transfer construction risk to the shipyard. However, even under a design-build contract, the construction phase of any project brings with it potential risks to cost, quality and timeline, arising from improper procedure development, lack of clear authority for change orders, inadequate project reporting, assimilation / compromise of project team members or accidents caused by negligence of team members. Once the final shipyard is selected through the RFP process, a shipyard-specific project management strategy will be developed, including staffing, reporting and monitoring to address these risks. This will include finalization of a change order process to reduce the risk of design changes being made by BC Ferries personnel without a clear understanding of the impact of those changes, thereby potentially increasing costs or creating delays in the Project.

Cost Escalation

BC Ferries has received four fixed-price proposals from shipyards in response to the RFP, in Canadian dollars. An adequate budget contingency, as proposed, will serve to mitigate the risk of unforeseen increases in other costs that may arise through the construction phase.

Performance Risk

The sea trials component of the construction phase of the Project will allow BC Ferries prior to delivery, to operate the vessels and assess whether they will meet the operating performance criteria as set out in the contract. At this stage, remedies in the event that performance is not satisfactory would be available. The first vessel of the class will be extensively trialed to ensure it meets all the contractual requirements, and this should allow for appropriate adjustments to it as well as the follow-on vessel.

Insurance

At various stages during construction, BC Ferries will provide payments to the shipyard. These funds are at risk if an incident occurs before delivery that causes significant damage to the vessel. The RFP responses identify insurance terms proposed by the shipyard for the vessels during construction and delivery. This allows the Company to consider the amount of coverage and coverage terms relative to the Company's desire to mitigate this risk.

Delivery

The shipyards have provided delivery options for the vessels in their RFP responses. These have been assessed by BC Ferries from a risk perspective in terms of costs and likelihood of damage or loss and the provision of appropriate insurance coverage. BC Ferries' present intent is to use the heavy lift option of delivery for both vessels.

5.4.5 Operational and Deployment Risks

Defects

The initial deployment of a new vessel generally involves a break-in period, during which defects are remedied to optimize operating performance, and the systems settle into normal extended daily operation. The sea trials process described above will serve to mitigate the risk of serious defects at delivery. In addition, traditional warranties will form part of the overall shipyard contract. Typically, this warranty will cover all major components, hull and superstructure and major operating systems for two years after acceptance. This should allow the vessels to enter service and reach steady operational state with the majority of the risk and liability still remaining with the shipyard.

Crew Levels

Minimum crew levels for the vessels will be determined and set by Transport Canada. Design requirements in the RFP focus on an efficient ship design with key safety systems in order to achieve a minimum crew size. BC Ferries will work with Transport Canada to the extent possible to obtain early notification of the minimum safe manning levels for the vessels; however, a final decision by Transport Canada will not be made until the vessels have been delivered and the regulatory testing is completed.

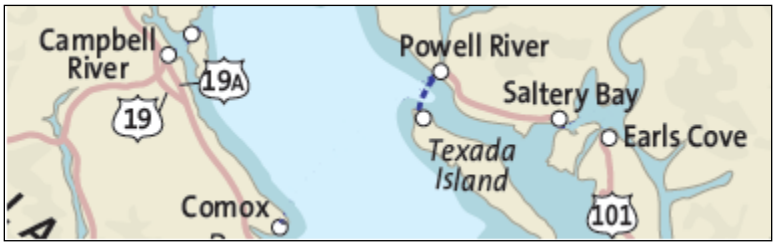
Training

Once the ships are delivered, BC Ferries will need to train the crews prior to deployment of the vessels. A program will be developed in advance of vessel delivery to ensure appropriate training is provided. Crew training costs form part of the Project budget. An extensive process to monitor and actively address all deployment issues will be required. These strategies will receive enhanced focus as the Project moves closer to the deployment phase.

Conclusion

BC Ferries respectfully requests the Commissioner's approval for major capital expenditures for the New Minor Class Vessels – Routes 18 and 25 Project of up to $<> million, inclusive of IDC, and supplemental Project expenditures of up to $<> million, for total Project expenditures of up to $<> million. BC Ferries submits that these expenditures are reasonable, affordable and prudent and consistent with the Company's PT4 capital plan and the Coastal Ferry Services Contract. Through efficiencies to be realized through the redeployment of existing vessels, the Company has been able to reduce the planned level of capital expenditures for the Project from that envisaged in the PT4 capital plan, while maintaining the ability to deliver safe, quality and reliable service that will continue to meet the requirements of the Coastal Ferry Services Contract. The proposed expenditures support vessel acquisitions that embrace design objectives such fleet standardization, environmental stewardship, and customer experience, while enabling the Company to make further advances in efficient and effective service delivery that will help to keep fares affordable going forward.

Appendix A: Route 18 and *North Island Princess* History



Car ferry service for the Northern Sunshine Coast has been provided since the mid-1950s when private-sector interests operated small vessels serving the area. As the provincial highway system developed, especially northward on the lower Sunshine Coast and on the eastern shore of Vancouver Island, pressure grew to supply ferry service to connect the existing communities. In 1958, the *Island Princess* was launched by Allied Builders Ltd. in Vancouver. Commissioned by Coast Ferries, the then single hulled ferry was built to service communities north of Kelsey Bay. Experimental runs between Powell River, Comox and Texada Island took place for a short time in 1961.

The *Island Princess* served the North Island for 11 years under Coast Ferries, before the company was bought by B.C. Ferries in 1969. The inability of the *Island Princess* to handle large trucks and its overall small size propelled B.C. Ferries to take significant action in 1971. The ferry was lengthened and widened out of water (by conversion to a catamaran hull) at the Burrard Dry-dock in North Vancouver to accommodate approximately 15 more vehicles and 50 more passengers.

In 1974, the *Island Princess* was renamed the *North Island Princess*, as the Peninsular Oriental Steam Navigation Company (P&O) petitioned B.C. Ferries to change the name. The P&O had recently bought a cruise ship named the *"Island Princess"* which was already on the British registry. B.C. Ferries had agreed to the name change if the P&O would donate some artefacts and a model of the cruise ship to the Maritime Museum of British Columbia.

Three years after the name change, the route the *North Island Princess* had been sailing on from Kelsey Bay (Sayward) to Port McNeill was transferred to the British Columbia Ministry of Transportation and Highways. The completion of the Island Highway had made the route unnecessary and the *North Island Princess* made its last sailing on that route on February 28, 1979. The ferry was reassigned to Route 18, connecting Powell River and Texada Island. In her first 20 years of service, the *North Island Princess* was instrumental in opening up the North Island to business, people and motor vehicles.

A summary of the historic capacity of the vessel is set out below.

Years	Vessel	Capacity
1958 – 1971	*Island Princess*	22 AEQ/ 100 passengers
1971 – 1974	*Island Princess*	38 AEQ/ 150 passengers
1974 – Present	*North Island Princess*	38 AEQ/ 150 passengers

Current Operating Characteristics

The current operating characteristics and the on-board amenities of the *North Island Princess* are summarized below.

North Island Princess	
Overall Length	61.04m (200.3')
Maximum Displacement	804 tonnes
Vehicle Capacity	38 AEQ
Passenger Capacity	143
Crew size	7
Maximum Speed	10.0 knots
Horsepower	1,609
Amenities	Passenger lounge with washrooms and vending; access to passenger area is via stairs only

The *North Island Princess* currently operates on the same schedule year round, with seven to eight departures from each side of Route 18. The ship is based (home ported) at Blubber Bay (Texada Island) meaning the maximum length of a same-day return journey is longer for travelers originating on the Texada side than for travelers originating on the Powell River side. Key service characteristics of the route are described below.

Route 18 Service Characteristics	
Route distance	4.7 nautical miles
Crossing time	35 minutes
Minimum hours of operation*	9-10 hours
Minimum round trips per day	6-7
Minimum round trips per year	2,814

** Hours of operation are defined by the time from the first departure at the start of the day to the last departure of the day, from the same terminal on the same route.*

Capacity Utilization

The average vehicle utilized capacity on Route 18 in the off-peak and peak seasons is set out below.

Route 18

Average Vehicle Utilized Capacity based on Fiscal 2016 traffic volumes and 38 AEQ Vessel Capacity

Terminal (Dep)	Round Trip	Off Peak							Peak						
		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Blubber Bay (Texada Island)	1	18.3%	27.2%	27.4%	26.3%	28.8%	27.6%	22.9%	22.0%	33.4%	36.6%	33.1%	36.1%	30.7%	28.6%
	2	37.0%	48.2%	67.4%	56.2%	57.3%	44.1%	66.1%	52.3%	66.6%	79.6%	68.8%	78.9%	56.1%	70.9%
	3	39.3%	78.9%	82.3%	76.8%	89.9%	64.0%	56.9%	60.5%	89.7%	93.3%	89.2%	97.2%	80.7%	58.1%
	4	46.5%	62.7%	79.3%	70.9%	81.5%	61.9%	45.5%	76.7%	78.9%	87.5%	60.6%	81.1%	68.6%	48.8%
	5	23.8%	59.4%	80.3%	DC	89.5%	74.1%	22.9%	44.0%	74.4%	74.5%	DC	87.2%	85.2%	24.8%
	6	14.2%	32.6%	48.6%	57.7%	53.0%	43.2%	10.8%	26.2%	41.6%	63.0%	72.7%	59.9%	50.0%	20.5%
	7	4.0%	11.7%	16.9%	19.2%	21.9%	12.4%	6.2%	9.4%	18.9%	17.8%	12.4%	28.1%	12.0%	8.0%
	8		3.5%	4.4%	7.1%	5.3%	6.6%			14.2%	9.3%	7.9%	4.3%	7.3%	
Powell River (Westview)	1	16.4%	35.1%	33.5%	37.3%	47.3%	33.0%	19.5%	15.6%	31.9%	35.3%	31.2%	34.2%	25.7%	13.8%
	2	17.8%	31.1%	50.1%	34.1%	49.1%	33.4%	21.9%	40.0%	29.1%	42.1%	33.4%	49.3%	39.6%	36.0%
	3	41.4%	30.7%	39.8%	DC	41.9%	34.2%	66.1%	58.0%	45.3%	67.1%	DC	70.3%	59.4%	86.5%
	4	38.7%	66.2%	73.2%	74.3%	73.8%	59.8%	59.5%	50.4%	78.4%	93.7%	89.0%	99.3%	96.1%	79.9%
	5	32.8%	73.9%	92.2%	85.1%	90.2%	69.6%	31.5%	31.5%	81.1%	94.9%	93.1%	99.2%	88.4%	31.3%
	6	10.9%	57.3%	72.9%	50.5%	70.7%	62.9%	11.2%	9.8%	67.6%	78.9%	74.4%	81.7%	86.0%	9.8%
	7	13.3%	19.2%	24.9%	19.0%	23.3%	22.3%	19.2%	12.2%	17.7%	28.7%	19.1%	41.3%	35.4%	24.0%
	8		13.2%	21.1%	20.8%	25.2%	17.5%			13.9%	14.6%	17.2%	33.3%	31.3%	

<10% | 10%<20% | 20%<40% | 40%<60% | 60%<80% | 80%<100% | >100%

DC Dangerous Cargo Sailing

Vessel Reliability

Due to her vintage, the *North Island Princess* is difficult, time-consuming and expensive to maintain, and the risks of unanticipated machinery failure are higher than would be true with newer vessels. The table below shows the recent history of the vessel's mechanical incidents which have resulted in sailing delays or cancellations. While the vessel operates safely and in compliance with regulatory requirements, it is evident from the data presented that there are service reliability issues despite significant capital and maintenance expenditures.

***North Island Princess*: History of Recorded Mechanical Incidents**							
Fiscal	All Mechanical Incidents	Mechanical Incidents that impacted service	# of Sailings	# of Delays	% Delays (per sailing leg)	# of Cancels	% Cancels (per sailing leg)
2009	12	7	7,278	44	0.60%	26	0.36%
2010	4	4	6,676	4	0.06%	7	0.10%
2011	5	8	7,244	56	0.77%	6	0.08%
2012	13	12	5,734	28	0.49%	79	1.38%
2013	9	10	7,250	7	0.10%	20	0.28%
2014	12	9	6,009	4	0.07%	16	0.27%
2015	7	8	4,950	16	0.32%	12	0.24%
2016	5	3	5,582	5	0.09%	2	0.04%
Average	8	8	6,340	21	0.31%	21	0.34%

Maintenance and Capital Costs

In 2003, the *North Island Princess* underwent an extensive life extension project that involved re-engining and a new propulsion train, extensive steel renewal, installation of a fixed fire-fighting ($C0_2$) system and upgrades to structural fire protection, and modernization of lifesaving equipment. The objective of the project was to extend the vessel life for at least ten years.

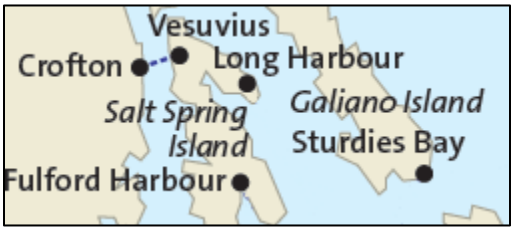
The last major upgrade of the *North Island Princess* was completed in fiscal 2015. This will enable the vessel to operate through fiscal 2017. Another refit is planned in fiscal 2018 to ensure the vessel operates until her planned retirement date of fiscal 2020. At her planned retirement date, the *North Island Princess* will be 61 years old.

The table following summarizes historic and forecast refit and maintenance expenditures and capital projects for the *North Island Princess* for the period fiscal 2005 - 2020.

North Island Princess

Maintenance and Capital Costs	Actual												Forecast			
($ millions)	(Fiscal)												(Fiscal)			
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
North Island Princess																
Refit		3.8	0.1			1.3		2.1		0.04	2.2			2.0		
(including Major Overhaul & Inspections)																
Vessel Maintenance	0.9	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.4	0.2	0.2	0.3	0.3	0.3	0.2
Projects																
Generator Replacement		0.2														
Carbon Dioxide System Replacement								0.2								
Replace Generator												0.1				
	0.9	4.2	0.3	0.3	0.2	1.5	0.2	2.6	0.3	0.44	2.4	0.3	0.3	2.3	0.3	0.2

Appendix B: Route 6 and *Howe Sound Queen* History



The *Howe Sound Queen* was launched in 1964 as the *Napoleon L*. and when bought by BC Ferries in 1971, was refitted and renamed the *Howe Sound Queen*. It is the only ferry in the fleet that was built in Canada, but outside of British Columbia. (Marine Industries - Sorel, Quebec).

Years	Vessel	Capacity
1964 – 1971	*Napoleon L.*	52 AEQ/ 150 passengers
1971 – 1974	*Howe Sound Queen*	52 AEQ/ 150 passengers
1974 – Present	*Howe Sound Queen*	52 AEQ/ 150 passengers

Current Operating Characteristics

The current operating characteristics of the *Howe Sound Queen* and the onboard amenities are summarized below:

	Howe Sound Queen
Overall Length	74.40 m (244')
Maximum Displacement	921 tonnes
Vehicle Capacity	52 AEQ
Passenger Capacity	292
Crew	7-8
Maximum Speed	10.0 knots
Horsepower	1,609
Amenities	Overhead passenger lounge, deck waiting room, washrooms, vending machines

The *Howe Sound Queen* currently operates two schedules; one for the peak season and one for the off peak season, with a minimum of 10 to 12 departures from each side of Route 6. The ship is based (home ported) at Vesuvius (Salt Spring Island), meaning the maximum length of a same-day return journey is longer for travelers originating on the Salt Spring side than for travelers originating on the Crofton side. Key service characteristics of the route are described below.

Route 6 Service Characteristics	
Route distance	2.8 nautical miles
Crossing time	20 minutes
Minimum hours of operation*	10-12 hours
Minimum round trips per day	10-12
Minimum round trips per year	4,441

** Hours of operation are defined by the time from the first departure at the start of the day to the last departure of the day, from the same terminal on the same route.*

Capacity Utilization

The average vehicle utilized capacity on Route 6 in the off-peak and peak seasons is set out below.

Route 6

Average Vehicle Utilized Capacity based on Fiscal 2016 traffic volumes and 52 AEQ Vessel Capacity

Terminal (Dep)	Round Trip	Off Peak							Peak						
		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Crofton	1	25.0%	22.1%	37.9%	26.2%	37.2%	71.4%	45.3%	28.6%	29.3%	49.4%	32.9%	45.0%	74.0%	38.9%
	2	25.5%	57.9%	69.0%	63.7%	63.6%	47.0%	48.0%	62.5%	55.0%	70.2%	70.2%	71.2%	56.9%	71.5%
	3	40.8%	49.1%	61.3%	60.6%	65.0%	32.8%	61.3%	31.3%	61.4%	75.9%	74.4%	72.8%	41.9%	92.4%
	4	37.9%	DC	39.1%	DC	DC	42.3%	39.7%	40.5%	DC	52.3%	DC	DC	50.7%	87.5%
	5	42.4%	57.0%	39.1%	67.2%	64.2%	41.1%	53.4%	49.5%	69.5%	51.3%	76.3%	75.9%	62.7%	81.9%
	6	72.7%	37.7%	42.0%	41.6%	45.8%	53.8%	79.6%	52.1%	50.5%	54.0%	61.3%	57.9%	65.6%	69.1%
	7	69.6%	45.0%	48.0%	59.9%	55.6%	66.0%	70.7%	52.5%	57.9%	55.4%	57.9%	57.3%	71.3%	54.9%
	8	60.5%	55.9%	66.7%	63.6%	76.3%	75.6%	64.3%	69.1%	58.7%	69.6%	73.4%	68.3%	95.1%	65.7%
	9	45.6%	61.4%	72.8%	77.3%	79.7%	79.8%	49.5%	76.9%	69.4%	76.4%	82.6%	85.6%	91.2%	64.6%
	10	17.9%	64.3%	70.1%	73.7%	74.6%	66.1%	18.0%	71.8%	70.6%	83.7%	85.3%	82.4%	87.6%	59.0%
	11	7.1%	46.3%	55.2%	55.9%	53.2%	47.6%	13.5%	57.1%	58.2%	67.3%	65.8%	72.9%	72.1%	48.0%
	12		36.7%	32.8%	37.3%	36.0%	21.6%		27.2%	50.3%	50.7%	50.1%	59.6%	37.5%	27.2%
	13		17.3%	18.9%	19.1%	24.1%	17.4%		12.9%	26.5%	31.1%	35.1%	32.3%	19.0%	14.6%
Vesuvius (Saltspring Is)	1	32.0%	18.5%	17.2%	11.9%	15.8%	43.7%	47.2%	41.8%	15.2%	18.9%	13.8%	19.5%	42.0%	31.5%
	2	69.1%	35.8%	34.6%	40.0%	33.9%	63.7%	97.3%	54.8%	38.7%	40.7%	41.3%	35.6%	65.5%	50.5%
	3	72.6%	53.5%	69.1%	67.5%	66.1%	92.1%	92.9%	83.5%	60.7%	80.9%	73.7%	74.3%	96.4%	81.0%
	4	74.4%	89.2%	95.4%	95.5%	94.0%	90.4%	87.0%	84.1%	92.0%	97.6%	96.7%	98.3%	94.9%	89.4%
	5	46.2%	85.4%	96.3%	93.7%	91.7%	77.3%	53.5%	73.9%	90.9%	100.0%	96.7%	99.1%	82.3%	70.6%
	6	54.5%	65.1%	77.3%	74.3%	80.3%	73.5%	58.4%	66.3%	85.1%	89.8%	87.5%	91.6%	86.1%	70.2%
	7	35.0%	55.3%	69.4%	67.2%	65.5%	59.0%	41.7%	59.5%	80.6%	80.2%	76.3%	91.3%	76.5%	61.7%
	8	25.8%	DC	62.4%	56.1%	DC	58.6%	39.0%	62.5%	DC	70.1%	64.1%	DC	78.5%	83.6%
	9	20.8%	72.4%	58.9%	57.7%	86.5%	54.0%	20.3%	60.4%	89.6%	83.3%	83.3%	97.9%	74.9%	88.7%
	10	14.3%	42.7%	45.6%	DC	57.3%	38.8%	13.0%	48.8%	56.4%	62.1%	DC	80.1%	50.3%	75.2%
	11	5.1%	27.0%	29.8%	50.8%	31.4%	18.1%	6.1%	35.2%	42.4%	51.8%	80.9%	60.1%	30.2%	48.8%
	12		12.5%	14.2%	12.3%	16.3%	9.1%		25.9%	26.5%	25.3%	26.9%	26.5%	19.5%	34.1%
	13		9.0%	8.3%	10.3%	10.4%	4.6%		9.6%	17.9%	17.3%	16.3%	18.1%	8.0%	16.3%

<10% | 10%<20% | 20%<40% | 40%<60% | 60%<80% | 80%<100% | >100%

DC Dangerous Cargo Sailing

Vessel Reliability

Due to her vintage, the *Howe Sound Queen* is challenging and expensive to maintain, and the risks of unanticipated machinery failure are higher than would be true with newer vessels. The table below shows the recent history of the vessel's mechanical incidents which have resulted in sailing delays or cancellations. While the vessel operates safely and in compliance with regulatory requirements, it is evident from the data presented that there are service reliability issues despite significant capital and maintenance expenditures. This is an indication that the vessel is near the end of her service life.

***Howe Sound Queen*: History of Recorded Mechanical Incidents**							
Fiscal	All Mechanical Incidents	Mechanical Incidents that impacted service	# of Sailings	# of Delays	% Delays (per sailing leg)	# of Cancels	% Cancels (per sailing leg)
2009	12	8	10,052	40	0.40%	15	0.15%
2010	18	7	10,064	23	0.23%	4	0.04%
2011	18	7	10,044	25	0.25%	8	0.08%
2012	3	2	8,029	5	0.06%		0.00%
2013	13	7	9,050	22	0.24%	2	0.02%
2014	17	14	10,073	27	0.27%	13	0.13%
2015	14	7	9,022	34	0.38%	2	0.02%
2016	14	5	7,878	20	0.25%		0.00%
Average	14	7	9,277	25	0.26%	7	0.06%

Maintenance and Capital Costs

The vessel has been re-built/modernized several times over its operating life. In 2004 it was re-engined and fitted with a modern marine evacuation system. In 2007, the passenger accommodations were updated and accessibility improved, but with a very limited asbestos abatement program.

An extensive refit of the vessel was undertaken in fiscal 2016 to enable the vessel to continue in service through fiscal 2019. At her planned retirement date of fiscal 2020, the *Howe Sound Queen* will be 55 years old.

The table following summarizes historic and forecast refit and maintenance expenditures and capital projects for the Howe Sound Queen for the period fiscal 2005 - 2020.

Howe Sound Queen

Maintenance and Capital Costs	Actual												Forecast			
($ millions)	(Fiscal)												(Fiscal)			
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Howe Sound Queen																
Refit	1.1			1.8				2.9				2.3				
(including Major Overhaul & Inspections)																
Vessel Maintenance	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.5	0.4	0.4	0.3
Projects																
Propulsion System	0.5															
Safety and Comfort Upgrades			0.3	3	0.02											
Various Upgrades								0.3								
	1.8	0.2	0.5	5	0.22	0.2	0.2	3.4	0.3	0.3	0.3	2.6	0.5	0.4	0.4	0.3

Appendix C: Customer Feedback

The attached report provides an overview of feedback from customers specific to Route 18 and the *North Island Princess,* as well as Route 6 and the *Howe Sound Queen,* for the period fiscal 2010 - 2016.

Overview of Customer Feedback

Fiscal	Total Comments	Category: Northern Islands / Southern Gulf Islands	Route / Vessel Specific: Texada – Powell River / *North Island Princess*	Route / Vessel Specific: Crofton – Vesuvius / *Howe Sound Queen*
2010	6,014	231 / 460	14	31
2011	9,260	362 / 724	30	49
2012	8,351	616 / 673	128	52
2013	7,653	333 / 503	47	54
2014	8,273	511 / 714	100	43
2015	7,319	632 / 658	98	43
2016	7,371	604 / 757	65	41

Route 18 and *North Island Princess*

Category	Details
Delays	• Ongoing sailing delays due to vessel reliability • Texada Island residents consistently late for school/appointments
Frequency of Sailings	• Increase volume of sailings, especially on days with dangerous goods sailings
Making Connections	• Inconsistency in vessel reliability causes customers issues when trying to make connection from Powell River to Comox
Vessel Substitution & New Ships	• Customers not happy with water taxi substation when *North Island Princess* is unexpectedly out of service
Cancellations	• Cancellations always contentious and customer inquiries and refund requests increase

Route 6 and *Howe Sound Queen*

Category	Details
Delays	• Island residents not pleased with late arrival and departure on Route 6 • Delays cause sailings to overlap, thus creating overloaded sailings
Vessel Safety/Security	• Customers concerned that passengers do not have a safe and comfortable area to situate themselves during crossings • Lounges and washrooms consistently closed due to age and condition
Vessel Substitution & New Ships	• Replacement vessel for *Howe Sound Queen* out of service periods (both planned and unplanned) not adequate
Cancellations	• Cancellations always contentious and customer inquiries and refund requests increase

Appendix D: Independent Validation of Traffic Forecasting Approach and Results

Urban Future Inc.'s letter dated November 14, 2016, confirming BC Ferries' traffic forecast methodology and results for Routes 6, 18 and 25, is attached.

URBAN FUTURES
Strategic Visions to Manage Change

Memorandum

Date: 14 November 2016
For: David Hendry
Director, Strategic Planning
BC Ferry Services Inc.
Suite 500 – 1321 Blanshard Street, Victoria, BC V8W 0B7
From: Andrew Ramlo, Executive Director, Urban Futures Incorporated
Re: Forecasting Approach for BC Ferry Services Inc. Small-Area Traffic Estimates

1 Background

This letter is in response to a request by BC Ferry Services Inc. ("BCFS") for Urban Futures Incorporated ("Urban Futures") to review and comment on the general approach currently being used by BCFS to estimate future ferry traffic volumes as part of the Section 55 Submission for the replacement of two minor-class vessels for routes 6, 18, and 25. Comments have been provided for two aspects: *a)* the methodology used by BCFS to develop the estimates; and *b)* the results derived from the application of that methodology. Before commenting on the methodology or results, however, some background will provide a better context to the comments that follow.

In 2008, Urban Futures was retained by BCFS to develop long-range projections (to 2031) of ferry passenger volumes for 20 destination communities in south-western British Columbia as part of BCFS's strategic infrastructure planning. Given the relevance of the local population in generating ferry passenger traffic for these smaller routes, a demographically-based approach to projecting future passenger volumes was used. The 2008 series of projections was then updated by Urban Futures in 2012 to incorporate more recent traffic volume data, 2011 small-area Census population data, and BC Stats' latest long-range demographic projections for Local Health Areas.

2 Methodological Review

The trip volume estimates developed for routes 6, 18, and 25 for the Section 55 Submission are reasonable in both their approach and consideration. The general approach relies on historical trends in annual rates of change in total traffic volumes on each route. These trends are adjusted for a short-term period of higher growth rates that are currently being seen due to structural factors relating to the value of the Canadian dollar, gasoline prices, and improvement in local and provincial economic conditions. After this period of short-term structural shift (1-3 years), traffic volume growth rates for each route taper over the medium- and longer-terms to reflect expected rates of change in the size of local resident populations.

While a more detailed approach might consider additional elements such as historical and projected changes to per capita trip volume ratios for each route, more recent data from the Census on local resident populations will not be available until May 2017. Similarly, while BC Stats will provide updates to Local Health Area population projections in 2016 and 2017, they will not likely reflect actual Census counts until after the release of the final Census data sets in November 2017. As such, the methodology is suitable for its intended use.

3 Review of the Results

Based on the described methodology as outlined above and Census information available at this time, the results for each route are reasonable, with traffic growth rates for each route reflecting currently observed short-term volume increases, while acknowledging that longer-term changes will largely be driven by patterns of underlying population growth.

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URBAN FUTURES
Strategic Research to Manage Change

While neither local population estimates nor per capita ridership ratios are used as inputs to develop the current route volume projections for the Section 55 Submission, the latter can be derived from the output provided by BCFS and used to further consider the reasonableness of the current volume projections. For example, when considered against the Powell River Local Health Area population, Route 18's per capita ridership averaged 14.4 trips per annum over the 1997 to 2015 period. The current high projection for this route would see per capita trip ratios increase marginally in the short term (to 12.8 trips per resident), before slowly falling back to 11.7 trips per resident by 2041, while the low volume scenario would see per capita trips fall to 10.9 trips per resident by 2041. Outside of the period of short-term structural changes (1-3 years), each of these scenarios would indicate a decline in the number of trips per resident over the longer term of the projection horizon. **Table 1 illustrates historical and future volume estimates for each route relative to base populations and per capita ridership.**

Table 1

	Route 6		Route 18		Route 25	
	2015	2040	2015	2040	2015	2040
Route Population*	15,454	18,420	19,652	23,472	11,802	13,925
Traffic-Front Loaded - High	696,100	811,800	245,409	273,597	319,135	378,485
Traffic-Front Loaded - Low	696,100	763,354	245,409	256,372	319,135	334,684
2015 Per Capita Ridership	45.0		12.5		27.0	
Per Capita Ridership - FLH		44.1		11.7		27.2
Per Capita Ridership - FLL		41.4		10.9		24.0

**BC Stats PEOPLE 2015 Local Health Area Projections*

One final note should be made in regard to comparing BCFS's current estimates for the Section 55 Submission to those made by Urban Futures in 2008 and 2012. In the time since Urban Futures' projections were developed, significant changes to the population outlooks relevant to many of BCFS's smaller routes have been made by BC Stats. For example, for Route 18, the 2012 population estimates for the Powell River Local Health Area from BC Stats projected a two percent decline in population between 2015 and 2036; current (2015) estimates for the same Local Health Area from BC Stats project a 17 percent increase in population for the same period. As such, an updated population-based projection for this route would differ fundamentally from what was compiled in 2012. That said, further to comments made about the general methodology used for the most recent estimates, the next 12 months will see new data become available from the Census that will allow for a better assessment of recent resident population changes and a re-basing of the population estimates for many of BCFS's smaller routes.

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Appendix E: Public and Stakeholder Engagement

The minor class vessel is a relatively small and simple vessel with few amenities and services. These vessels are essentially “like for like” replacements for the vessels which will be retired. The introduction of the proposed two new minor class vessels requires no change to fares, service levels or schedules and as such, the most common areas of public concern (service levels, schedules, fares and amenities) are expected to be largely absent from this Project. Nevertheless, given the central role ferries often play in the community, it is important the public be engaged during the planning of the new vessels.

For several years, BC Ferries has engaged with the public about replacement vessels via the Ferry Advisory Committee (“FAC”) process. FAC meetings are open to the public and advertised in advance. New vessels for Route 18 (Powell River - Texada Island), Route 22 (Denman Island - Hornby Island), Route 24 (Quadra Island – Cortes Island) and Route 25 (Port McNeill – Sointula - Alert Bay) have been a recurring item of discussion with the FACs responsible for those routes. In September 2016, a dedicated discussion was held with the FACs to discuss more specific details of the minor class vessels. As part of this call, the FACs were consulted for their ideas on how additional engagements should be approached.

BC Ferries is planning at least two rounds of direct engagement with the public, the BC Ferry and Marine Workers’ Union (the "union") and employees on the routes receiving, or closely affected by, the two new minor class vessels. The first round occurred in fall 2016 in conjunction with scheduled FAC meetings (Cortes Island and Port McNeill) and in dedicated public meetings in early December 2016 (Texada Island and Sointula/Alert Bay). BC Ferries sought input on the broad attributes of a new minor vessel in such areas as amenities, comfort, ride qualities, and accessibility. The public, union and employees were invited to submit feedback at the meetings and via a dedicated e-mail address. The e-mail submission address will remain open and active through the end of the second round of engagement in 2017. To date, most feedback has been cautiously positive that the preliminary attributes of the proposed vessel meet community needs.

BC Ferries estimates the second round of engagement will take place in the summer of 2017 after a shipyard has been selected and preliminary design is available for discussion. The public, union and employees will be asked to comment on such areas as lounge configuration, amenities, car deck arrangement, accessibility and tourism features. All comments will be considered as the design is finalized prior to the start of construction.

Appendix F: Index of BC Ferries' Responses to Section 55 Guidelines

Project Description

a) Describe the proposal for the capital expenditure and provide a comparison to the capital currently in use, in terms, for example, of size, capacity and staff and/or crew requirements.	*See sections 1.1, 2.2.3 and 3*
b) In the case of a new vessel, has an independent marine surveyor provided a condition assessment of the current vessel and is that assessment factored into the business case supporting the requested capital expenditure?	*See sections 3.2 and 4.3*
c) Is there a regulatory driver for the proposed capital expenditure?	*See section 3.2*
d) Provide information on the operating costs of the vessel, terminal, information technology or other capital asset to be replaced and/or to be upgraded, covering the most recent three year period, including the current year.	*See Supplemental Information*
e) Compare the annual maintenance costs of the existing capital asset with those expected for the replacement and explain any significant variances.	*See Supplemental Information*
f) Have there been service disruptions due to inadequacy of the existing capital asset?	*See Appendices A and B*
g) If age of the existing capital asset is a factor, what is the estimate of future costs of continuing its use?	*See section 4.3*
h) Have there been complaints from the public, or other stakeholders about the existing capital asset?	*See Appendix C*
i) Provide an estimate of the total capital costs associated with the proposed investment?	*See section 4.4*
j) How was the cost estimate derived? Entirely with BC Ferries' staff or was there an external review?	*See section 4.2*
k) In the case of a new vessel was the international ship broking industry contacted to determine if there are existing vessels available for purchase that may, with adaptation, be appropriate?	*See section 5.1.1*

l) Provide an estimate of the incremental capital costs to provide "ancillary services," including catering and retail concessions, and provide estimates of the incremental operating costs to provide the ancillary services and the incremental revenue expected to be generated from those services.	*Not applicable (No ancillary services are to be provided)*
m) In the case of a new vessel, demonstrate on a lifecycle cost or present value basis that the decision to build a new vessel versus the cost of acquiring a second-hand vessel, if applicable, is a net benefit. Include sensitivity analysis in case of cost overruns.	*See section 4*
n) Does the proposal include significant features that are innovative or untried?	*See section 2.2.3*
o) Is there an allowance in the estimate for inflation from the date of acceptance of a proposal to the completion date (escalation clause)?	*See section 4.2*
p) Are financing costs included in the cost estimate between first payment to the supplier and the in-service date?	*Yes*
q) Compare the operating costs of the existing capital asset with those expected for the replacement, to include, in the case of vessels, fuel costs, crew costs and depreciation.	*See Supplemental Information*
r) Does BC Ferries intend to capitalize any of its own internal costs with respect to the capital expenditure?	*Yes, in accordance with BC Ferries' financial policies and International Financial Reporting Standards*
s) Identify any parts of the capital expenditure that are to be provided by BC Ferries or its subsidiaries.	*Project management responsibilities will rest with BC Ferries*
t) In the case of vessels, if tenders are to be sought from foreign shipbuilders, what is the applicability of custom tariffs on importation of the vessels?	*Custom tariffs do not apply to importation of newly constructed vessels, but would apply to the importation of a used vessel*
u) In the case of vessels, will BC Ferries require the contracting shipyard to bear the design and construction risk?	*See section 5.4*

Timing and In-service Date

a)	For new or replacement vessels what is the expected in-service or deployment date and how was it derived?	*See section 5.2.3*
b)	Were potential builders, for example shipyards, contacted to determine if the proposed date is reasonable?	*See section 5.2.2*
c)	What are the consequences of a delay in the in-service or deployment date?	*See section 5.3*

Does the Proposed Capital Expenditure Demonstrate Good Judgment, Based on Wisdom, Experience and Good Sense?

i)	Why is the proposed capital expenditure required now, and what are the consequences of any delay?	*See sections 3.2 and 5.3*
ii)	How has this capital expenditure project been prioritized relative to other capital expenditure projects within the long term capital plan?	*This project is of a high priority based on the condition of the assets being replaced and the need to ensure ongoing continuity of service on Routes 18 and 25*
iii)	What sources of expertise and experience have been relied upon in deciding to proceed with this capital expenditure?	*In support of BC Ferries staff, the following key external experts have been engaged to provide advice in respect of the proposed project:* • *Lloyd's Register Canada (Vessel Condition Assessments)* • *3GA Marine Ltd. (LNG/Propulsion)* • *Urban Futures Inc. (Traffic Forecast Validation)*
iv)	Provide detail on completed and/or planned consultations, in particular with the provincial government or other stakeholders.	*See Appendix E*
v)	What are the procurement cost risks and how will they be mitigated?	*See section 5.4*

vi)	What are the consequences or the alternatives if the application is rejected?	*There are no obvious alternatives to the two options presented in this Application. If both of the options are rejected, BC Ferries may not be able to serve Routes 18 and 25, which would place the Company in default under the Coastal Ferry Services Contract.*

Wise Use of Resources

i)	Can an existing vessel be reassigned instead?	*The Project involves redeployment of the Quadra Queen II and Quintsa; BC Ferries has no spare vessel to reassign to avoid the need to replace the Howe Sound Queen or North Island Princess*
ii)	For shorter routes, were non-vessel options considered, such as a fixed link?	*Yes, but there are no other obvious non-vessel options. A fixed link option would be cost prohibitive*
iii)	Were non-vehicle vessels (e.g. passenger only ferries, barges, other) or a mix of vessel types considered?	*Yes, but projected requirements indicate that roll-on/roll-off passenger ferries will be required for the foreseeable future.*
iv)	Has a used vessel option been considered?	*See section 5.1.1*
v)	How does the vessel align with the concept of standardization of the fleet?	*See section 2.2.3*
vi)	Would investments in technology, such as an expanded reservation system, better IT systems or a yield management program allow for a smaller sized vessel?	*See section 3.3.5*

Showing Due Consideration for the Future

i)	How does the proposed new vessel contribute to overall fleet flexibility?	*See section 2.2.3*
ii)	What new technologies or innovations will be incorporated, and why are they considered necessary?	*See section 2.2.3*
iii)	Will there be provision for a conversion to an alternative to marine diesel engines, such as LNG?	*See section 2.2.3*
iv)	Is dual fuel capability planned and if so provide the rationale?	*See section 2.2.3*
v)	Will the new or replacement vessel be appropriate if the ratio of vehicle to foot passenger traffic changes in future?	*See section 3.3.2*
vi)	Is vessel capacity sufficient to meet current and projected future demand?	*See section 3.3.2*
vii)	What is the estimated impact of the proposed capital expenditure on future price caps assuming no change in non-passenger related revenues?	*See section 4.7*

Not Excessive

i)	What passenger amenities will be provided, and why are they considered appropriate for the intended use of this vessel?	*See section 2.2.3*
ii)	Do any of the proposed passenger amenities require crewing levels to be higher than what is required by Transport Canada regulations?	*No*
iii)	Is the vessel the right size and how has the capacity requirement been determined?	*See section 2.2.3 and 3*
iv)	Describe the objectives of BC Ferries' design standards for passenger accommodations for vessels of similar size and scope. Will the passenger accommodations for the replacement vessel deviate from these standards? If so, what is the rationale for the deviation and what impact, if any, will it have on the capital and operating costs of the vessel?	*See section 2.2.3*

v)	Will the application of logos or other BC Ferries' brand images to the vessel be consistent with BC Ferries' current practice for similar vessels? If not, how will it differ and what will be the effect on capital costs?	*See section 2.2.3*
vi)	What would have to be sacrificed to reduce total costs by 10%, and by 20%?	*See section 4.8*
vii)	Does vessel design or expected operating speed have any impact on labour costs?	*See section 3.3.1 and 5.4.5*
viii)	Are engines sized for efficient operations, fuel consumption and ability to recover schedule?	*See section 2.2.3 and 3.3*

Demonstrating Good Value at a Fair, Moderate Price

i)	For new vessels what alternatives were considered? Provide the rationale (cost or otherwise) for why the alternatives were not accepted.	*See sections 3 and 4*
ii)	Has the business case been built on a full life cycle costing basis?	*Yes, see section 4*
iii)	How fuel efficient will the new vessels(s) be?	*See section 2.2.3 and 3.3 (to be determined through design-build process)*
iv)	Will the new or replacement vessel have any impact on efficient use of labour?	*See section 5.4.5*
v)	Are the operating costs reasonable?	*See Supplemental Information*
vi)	How do the operating costs compare with the vessel being replaced?	*See Supplemental Information*
vii)	Is there any expected impact on revenue?	*See Supplemental Information*
viii)	Will crew training and certification activities be in excess of that required to meet regulatory requirements? If so, explain the rationale for this approach and whether it will result in incremental operating costs.	*No, crew training and certifications will be sufficient to meet regulatory requirements. Operational training will also be provided to meet service reliability goals.*

Coastal Ferry Services Contract

i)	Is the proposed capital expenditure consistent with the current Coastal Ferry Services Contract?	*See section 2.1 and 3.3*

Long Term Vision for Coastal Ferry Services in British Columbia

i)	How does the proposed expenditure support the government approved long term vision for the future of coastal ferry services?	*See section 2.2*