British Columbia Ferry Services Inc.

Application to the

British Columbia Ferries Commissioner

Pursuant to

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

For the

Island Class Phase III and
Terminal Electrification Program ("IC3TEP")

October 10, 2023

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 $< >, inclusive of capital and operating funds and interest during construction ("IDC"), in the Island Class Phase 3 & Terminal Electrification Program ("IC3TEP" or the "Program"). The Program will construct and deliver into service four plug-in hybrid Island class vessels capable of operating exclusively in battery-electric mode. The new vessels will be deployed on the routes connecting Nanaimo Harbour and Gabriola Island (Route 19 – two vessels) and Campbell River and Quadra Island (Route 23 – two vessels), with corresponding electrical upgrades for rapid charging from ashore made to the four terminals on these routes.

The introduction of the new vessels on Routes 19 and 23 will free up existing vessels for deployment elsewhere. BC Ferries has seen a rebound in traffic levels since the downturn during the COVID-19 pandemic and Fiscal 2023 saw the highest total vehicle traffic in the Company's 63-year history. System capacity is constrained such that current and modelled future forecast demand cannot be addressed with existing assets. These deployments will help to address the system capacity issues on the routes connecting Vesuvius Bay and Crofton (Route 6), Denman Island and Hornby Island (Route 22), and Quadra Island and Cortes Island (Route 24), while providing needed refit relief to enable continuing operations year-round.

In addition, the vessels currently operating on Routes 22 and 24 are approaching the end of their useful operating lives, and their continued service presents increasing challenges in terms of vessel maintenance and reliability. The Program will enable the Company to continue ongoing fleet renewal and to pursue operational resilience through the strategic aim of operating a limited number of classes of identical, standardized and interoperable vessels.

The Company is also committed to environmental sustainability and to implementing solutions in support of carbon reduction targets. The delivery of new electrified vessels provides an opportunity to implement "zero emissions" operations on Routes 19 and 23 through electrification, allowing the vessels to operate continually on clean, renewable hydro electricity.

IC3TEP will therefore enable BC Ferries to improve service delivery to coastal communities and to take meaningful steps towards system decarbonisation. The delivery of new, fully electrified Island class vessels is reasonable, prudent and in the public interest as evidenced by strong support from coastal communities and other stakeholders. This Program aligns with BC Ferries' strategic goals to deliver much-needed capacity increases on numerous routes, to continue fleet renewal and standardization, and to provide coastal communities with reliable, clean and more sustainable transportation.

Section 1 – Introduction

1.1 Application Purpose and Overview

Section 55 (2) of the Act requires BC Ferries to obtain the approval of the British Columbia Ferries Commissioner (the "Commissioner") before incurring a major capital expenditure. Under section 55 (5), a major capital expenditure is defined as one that:

> *"…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 23-02, dated July 19, 2023,[1] the Commissioner determined that for the purposes of section 55 (5) of the Act:

> *1. Any capital expenditure for any new vessel or mid-life upgrade to a vessel ("Vessel Expenditure") is a major capital expenditure if the expenditure exceeds $50 million inclusive of vessel related component programs and interest during construction;*
>
> *2. Any capital expenditure for new terminals and terminal upgrades, ("Terminal Expenditure") is a major capital expenditure if the expenditure exceeds $40 million, inclusive of terminal related component programs and interest during construction;*
>
> *…*
>
> *5. In the case where a single project ("Project") planned by a ferry operator includes capital expenditures of a type referenced in more than one of paragraphs (1) to (4) above, the entire capital expenditure for the Project will be a major capital expenditure if any of the Vessel Expenditure, Terminal Expenditure, IT Expenditure or Other Expenditure exceeds the applicable threshold;*
>
> *6. When estimating the amount of a planned capital expenditure for purposes of this Order, a ferry operator may exclude the amount of any third party contributions;*
>
> *…*

As the Program's budget exceeds the capital thresholds as defined by Order 23-02, it constitutes a major capital expenditure. BC Ferries therefore seeks the approval of the Commissioner, in accordance with section 55 (2) of the Act, for a major capital expenditure for the Program of up to $< >inclusive of IDC, or a managed budget of $< >, excluding any third party contributions including from the governments of Canada and British Columbia.

[1] British Columbia Ferry Commission, *Order 23-02: In the Matter of Section 55 and Section 67 of the Coastal Ferry Act, and Establishment of the Criteria for a Major Capital Expenditure*, July 19, 2023.

1.2 Carbon Reduction Investment Account

By Order 22-01, the Commissioner authorized the Company to create the Carbon Reduction Investment Account ("CRIA") in support of funding infrastructure investments identified in the *Clean Futures Plan* and to progress GHG emission reduction projects.[2] In accordance with that order, the Company will be submitting a separate plan to the Commissioner for the use of funds from the CRIA in support of the Program.

1.3 Cost Assumptions

BC Ferries notes that the legislative requirement to seek pre-approval of the proposed capital expenditure for the Program necessitates the submission of this Application prior to certain terminal and vessel design elements being finalized, and prior to finalization of main procurement contracts. There is a risk that certain cost assumptions that BC Ferries has made in this Application may require subsequent amendment, with a commensurate change in the projected capital expenditure for the Program. To mitigate the risk of future amendments, the total Program budget includes a margin of contingency reflective of current assumptions.

1.4 Organization of Application

This Application is organized as follows:

- Section 1: Introduction
- Section 2: Program Overview and Rationale
- Section 3: Budget, Financial Analysis and Risk Review
- Section 4: Program Impacts and Benefits
- Section 5: Stakeholder and First Nations Engagement
- Section 6: Project Governance, Procurement and Implementation
- Section 7: Conclusion

The Commissioner has provided BC Ferries with a set of submission requirements to assist in the determination that the proposed capital expenditure meets the requirements for approval of a major capital expenditure under section 55 of the Act.[3] A sectional cross-reference between this filing and those submission requirements may be found in Appendix 'A'.

[2] British Columbia Ferry Commission, *Order 22-01: In the Matter of Monetization of Carbon Credits to Fund Clean Futures Initiatives Proposed by British Columbia Ferry Services Inc.*, April 21, 2022.
[3] British Columbia Ferry Commission, *Guidelines for British Columbia Ferry Services Inc. for Applications under Section 55 of the Coastal Ferry Act*, July 19, 2023.

Section 2 – Program Overview & Rationale

2.1 Background

BC Ferries provides ferry services on the west coast of British Columbia in accordance with the requirements of the Coastal Ferry Services Contract between the Company and the Province of British Columbia (the "Contract"). The Company provides frequent year-round marine transportation service currently with 38 vessels operating on 25 routes out of 47 terminals spread over 1,600 kilometres of coastline. In the fiscal year ending March 31, 2023, BC Ferries carried 9.4 million vehicles and 21.6 million passengers on 86,835 round trips, representing a five percent increase in vehicle traffic from pre-pandemic levels.

The Company has a vision of being trusted and valued, and its mission is to connect communities and customers to the people and places important in their lives. Integral to this, BC Ferries understands its responsibility to act in the public interest by providing safe, reliable, efficient, affordable and sustainable marine transportation, as well as its important role in maintaining the quality of life of people who live, work, and visit British Columbia. BC Ferries is a significant contributor to the provincial economy, an enabler of commerce for coastal communities, and a vital connection upon which coastal communities rely.

2.2 Program Elements

2.2.1 Program Overview

IC3TEP encompasses two distinct but related projects that will deliver increased capacity while accelerating BC Ferries' transition to more sustainable operations.

First, IC3TEP will introduce four additional Island class ships to BC Ferries' fleet as a continuation of the successful Island class shipbuilding program. This project builds upon the corporate strategies presented in the *Fleet Master Plan*, namely the consolidation of vessel classes and fleet standardization and interoperability, which serve to enhance overall operational efficiency and cost-effective service. The new ships will be functionally identical to the existing Island class vessels, with modifications to improve efficiency, reduce maintenance costs and enable full battery-electric service. The Company plans to operate the new vessels in full battery-electric mode on Routes 19 and 23, which will enable it to address capacity constraints and fleet resilience by moving the existing vessels from those routes to Route 6 (two vessels), Route 24 (one vessel) and refit relief (one vessel). This in turn will enable further vessel redeployments to address capacity shortfalls on Route 22, while creating possibilities for improvements to the route connecting Swartz Bay with Fulford Harbour (Route 4), with additional options to alleviate pressures on certain other routes. Appendix 'B' includes a map showing the routes that will be impacted by this Program, as well as routes on which Island class vessels already operate;

section 2.4.3 provides a further background with respect to the deployment rationale for these vessels.

Second, IC3TEP will deliver electrical infrastructure modifications at the terminals servicing Routes 19 and 23 to install a rapid charging system and upgrade BC Hydro's distribution system to supply the terminals with the necessary electricity to recharge electrified Island class vessels.

2.2.2 Island Class Vessels

The Island class ferries are BC Ferries' modern standardized minor class vessels, and first entered service in 2020. Each has a capacity of 47 automobile equivalents ("AEQ")[4] and up to 400 passengers and crew, with limited but adequate amenities and ancillary services. These open deck, double ended ferries are highly efficient vessels currently operating in diesel-electric hybrid mode, although the ships were designed with space allocated onboard to allow for future upgrades for full plug in battery-electric operation. In this context, battery-electric operation refers to recharging onboard batteries from shore-based electrical power sources and allowing the ships to operate without need of their onboard diesel engines.

Currently six Island class vessels are in service. The Commissioner has previously reviewed and approved the Company's two applications under section 55 (2) of the Act for the proposed major capital expenditures that resulted in the construction of these six vessels in two phases ("Previous Applications"):

- *A Major Capital Expenditure for Two Minor Class Vessels Proposed by British Columbia Ferry* Services *Inc. Pursuant to Section 55 (2) of the Coastal Ferry Act* (Orders 17-01 and 17-01A) ("Phase 1"); and
- *Section 55(2) of the Coastal Ferry Act and a Major Capital Expenditure for Four Island Class Vessels and one Salish Class Vessel proposed by British Columbia Ferry Services Inc.* (Orders 19-02, 19-02A and 19-02B) ("Phase 2").

Further details regarding the Island class vessels may be found in the Previous Applications. The current Program represents the third phase of Island class vessel procurement ("Phase 3").

In its previous applications, BC Ferries discussed the Island class vessels' hybrid diesel-electric propulsion and the potential for all-electric propulsion as the technology permitted and the necessary electrical infrastructure was in place to support it. The construction of the four new vessels will entail necessary modifications to the parent design of the original six Island vessels to allow the vessels to operate in full battery-electric mode, including larger energy storage system (i.e., battery size increased from 800 to 2,000 kilowatt hour; "kWh"), auxiliary systems to support the larger battery, and additional connections to the vessel's electrical systems to

[4] An automobile equivalent (AEQ) represents the amount of vessel capacity occupied by a particular vehicle type, expressed as the number of under height vehicles it displaces (e.g., a bus which displaces three under height vehicles – or cars – would have an AEQ of three).

enable a rapid recharge from ashore. Other than these modifications, the new vessels will be functionally identical to the six Island class ships already in BC Ferries' fleet, with only a limited set of modifications to the parent design. The modifications will improve upon the efficiency and maintainability of the original vessel design, while preserving the key principles of 'identicality' and interoperability. The set of changes will constitute a "Phase 3 Model" of the Island vessel design.

The new vessels will be able to operate as plug-in hybrid vessels with the ability to recharge from shore-based electrical power supply; however, they will retain onboard diesel engines in order to allow them to operate on other routes, or on occasions when they are unable to recharge their batteries from shore-based electrical energy because of equipment malfunction, power failure ashore, operational constraints or other reasons.

2.2.3 Terminal Electrification Infrastructure

On January 6, 2023 the Commissioner issued Order 23-01,[5] confirming the Company's application under section 55(1) of the Act that the proposed capital expenditure for preparatory work for modifications to terminal infrastructure on Routes 19 and 23 in anticipation of Island class electrification was reasonably required. Further to that application, the following preparatory work has been completed or is in progress:

- A design contract has been executed with an engineering consultant to prepare preliminary engineering designs of the terminal infrastructure. This work is expected to be complete in December 2023.
- BC Hydro has been engaged and a design deposit provided to enable them to continue their design and planning processes. Their work is expected to be complete at the end of 2024.

The Company now proposes to modify the four terminals on Routes 19 and 23 to enable plug-in electric operation for the Island class vessels operating at those locations. Infrastructure upgrades will include:

- BC Hydro distribution upgrades to provide adequate additional electrical capacity to the terminals to facilitate routine vessel charging;
- New electrical rooms with switch gear and transformers to safely transform (i.e., change voltage) the electrical supply to meet the vessel charging supply requirements;
- New electrical cabling and conduit to bring the power to the berth;

[5] British Columbia Ferry Commission, *Order 23-01: In the Matter of Section 55(1) of the Coastal Ferry Act, and Capital Expenditures for Preparatory Work for Modifications to Terminal Infrastructure in Anticipation of Island Class Electrification Proposed by British Columbia Ferry Services Inc.*, January 6, 2023.

- Civil work and marine platforms as required to suit the terminal infrastructure and provide a standard interface to charge vessels in the berth; and
- Vessel charging equipment.

2.3 External Funding

The Company is seeking external funding to help offset the capital costs of implementing electrification upgrades. BC Ferries so far has identified and secured three sources of external funding:

1. < >
2. < >
3. BC Ferries is eligible for interconnection contributions valued at approximately $< >from BC Hydro that will offset some of the capital cost of the electrical infrastructure upgrades.

In total, the Company expects to receive approximately $< > in external funds to help offset the costs of the Program. The external funding sources are discussed further in section 3.2.4.

2.4 Program Rationale

The Program will address the following issues with respect to the current and future operations:

2.4.1 System Capacity and Resilience

BC Ferries has conducted analysis showing that the current and future demands on Routes 4, 6, 22 and 24 cannot be accommodated by the capacity of the Company's current vessels. On these routes, the demand for travel, and particularly for vehicle traffic, frequently exceeds the capacity of the ferry service. This capacity shortfall occurs primarily in peak travel months, but also exists at specific times of day throughout the year because minor route[6] travel is largely directional, serving local communities with a high proportion of non-discretionary travellers. As demand increasingly exceeds capacity, adverse impacts occur for customers and BC Ferries' operations, including more sailing delays, an increased number of sailing overloads and missed sailings, and longer overall travel time for customers, which in turn puts pressure on customer service, terminal facilities and local infrastructure. See Appendix 'C' for a further discussion.

In addition, a refit relief vessel is needed in order to allow for uninterrupted service on routes served by BC Ferries' minor vessels, including the six Island class vessels already in-service. Under IC3TEP, a redeployed Island class vessel will support refit relief and vessel resilience across the minor routes, potentially enabling the further progression of the Island class

[6] Routes designated as "minor" are specified in Schedule A to the Contract, and are sometimes referred to as "inter-island routes."

electrification program. Including the relief vessel, BC Ferries will operate a total of 10 Island class vessels and will be interoperable and able to provide a seamless experience to island communities when they are exchanged.

2.4.2 Fleet Renewal

The vessels in BC Ferries' fleet range in age from two to 59 years old. Vessel longevity is supported through an ongoing maintenance, repair and refit program, but as ships age their maintenance naturally must be increased to ensure continued reliability, resulting in greater challenges in sustaining service. BC Ferries aims continually to retire older vessels and renew them before they can become detrimental to safe, efficient and reliable operations. At the same time, as part of the strategic *Fleet Master Plan*, the Company aims to implement a limited number of classes of identical and interoperable vessels that will provide the benefits of standardization and commonality, as well as flexibility inherent in a fleet that will be scalable to serve the diverse needs of various service areas. See section 4.2 for a further discussion on standardization and innovation.

The vessels currently operating on Routes 6, 22 and 24 are between 40 and 55 years of age, and their continued service could present increasing challenges to reliability and maintainability. There are many factors that influence the useful life of a ship, including:

- Metal fatigue;
- Corrosion of hull structure and shipboard systems;
- General wear and degradation of the shipboard propulsion, electrical and auxiliary systems;
- Equipment obsolescence;
- Progressive unsuitability for service, in cases when speed, size, carrying capacity, or accessibility requirements for service may have changed since the vessel was designed and built;
- Evolving corporate standards, including for safety and environmental sustainability; and
- Evolving national and international regulations and standards for operations, maintenance and environmental compliance.

To proactively manage the risk of aging vessels, the Company aims to remove older vessels from service before they become unsupportable, and while the opportunity for non-emergency replacement exists. The Company plans, as a result of this Program, to redeploy or retire a number of BC Ferries vessels ("Legacy Vessels"):

- *Quadra Queen II* and *Tachek* will be retired from service once the new Island class vessels are available. Refer to Appendices 'D' and 'E' respectively for additional information about these vessels;
- *Kahloke* will be removed from year-round service but will be retained as a seasonal refit relief ship. Refer to Appendix 'F' for additional information about this vessel;
- *Quinitsa* will be redeployed until it is eventually replaced and retired in the mid 2030s; and
- *Quinsam* will be redeployed as a relief vessel with further service opportunities.

Vessel deployments are discussed further in the next section.

2.4.3 Deployment Overview

BC Ferries' experience is that operational performance and customer satisfaction decreases as seasonal available vehicle capacity dips below 30 percent on the inter-island routes, where community travel is largely for non-discretionary reasons and directional based on time of day. A system capacity assessment prepared for the Company's Performance Term Six ("PT6") submission[7] identified that service on some inter-island routes is maximized at today's service levels and asset availability, and that further increases in demand cannot be supported (see also Appendix 'C'). However, if the Company is able to increase capacity on routes with high utilization and improve customers' ability to travel at the times they want to travel, previous experience suggests that BC Ferries will see an increase in overall volumes travelling. For example, in the short period immediately following the introduction of two-ship service on Route 19 in fiscal 2023, the Company saw:

- A 14 percent increase in AEQs carried while increasing the vessel's vehicle capacity provided by 19 percent;
- An 18 percent year-round improvement in On Time Performance ("OTP");
- A 32 percent improvement in OTP between 2021 and 2022 during July and August; and
- A nine percent reduction in overloaded sailings year over year.

Similarly:

- When a Salish class vessel was first introduced on Route 9, the route experienced a 13 percent *increase* in traffic demand with the additional 15 percent of vehicle capacity provided by the scaling of service to meet the seasonal and day of week demand.

[7] British Columbia Ferry Services Inc., *Performance Term Six Submission*, September 30, 2022.

- Within the approximately eight months following the *Quinsam* introduction on Route 6, there was a 0.2 percent increase in AEQs carried but the additional vehicle capacity improved customers' ability to travel on preferred sailing by reducing overloaded sailings by nine percent.

Many factors influence traffic growth and it can be difficult to estimate latent demand. Nonetheless, the Company expects that the four new Island vessels will allow BC Ferries to capitalize on the continuity inherent in a series shipbuilding program by enabling flexibility in fleet deployment and providing needed refit relief to enable continuing operations year-round, while meeting all service delivery obligations under the Contract. The Company plans the following deployments:

Routes 19 and 23 – Vancouver Island (Nanaimo Harbour) to Gabriola Island (Descanso Bay); Vancouver Island (Campbell River) to Quadra Island (Quathiaski Cove) – Each Two Island Class Vessels

The four new Island class vessels to be constructed in the Program will be deployed on Routes 19 and 23 where they will be able to operate in full battery-electric mode, enabling BC Ferries to redeploy the four existing Island class vessels currently serving these routes.

Route 6 – Vancouver Island (Crofton) to Salt Spring Island (Vesuvius) – Two Island Class Vessels

Two of the existing Island class vessels (47 AEQ each) serving Routes 19 and 23 will be moved to Route 6. Customers will see the two vessels in place of the current *Quinsam* (63 AEQ). This will increase the daily minimum round trips on the route from 12 to 20 and the daily vehicle capacity by over 20 percent. Notably, the two ship service will enable BC Ferries to match vehicle demand with capacity at key times of the day.

The berths and trestles at Crofton and Vesuvius are at end of life and will be replaced in advance of deploying the two Island class vessels. (This end of life berth replacement project is separate from the Program.) The berth replacement project will bring infrastructure up to the Company's current standard with consequential increase to the load limit of the terminal structures to highway legal levels (63,500 kgs) for vehicles traveling to the island on this route, which with increased frequency of vessel service, could result in an increase of commercial vehicle activity on the route.

Based on previous experience where capacity has been added to routes, the Company estimates that Route 6 could see a further increase of demand, above the PT6 forecast, of between a zero to five percent in vehicles (+13,500) and three percent in passengers (+15,000), equivalent to about $320 thousand in incremental revenues per annum.

The *Quinsam*, which currently services this route, will be redeployed to support relief for sheltered waters rated inter-island routes as well as seasonal supplementary service.

Route 24 – Quadra Island (Heriot Bay) to Cortes Island (Whaletown) – One Island Class Vessel

Both a growth in demand and future projected growth suggest that Route 24 requires additional seasonal capacity to meet the travel needs of the community. Service on this route will be enhanced by the replacement of the *Tachek* (26 AEQ) with an Island class vessel (moved from Routes 19 or 23), increasing vessel capacity by 80 percent.

The route currently operates with one crew on a 12 hour day and the berth infrastructure, which is nearing end of life, is limited to T-class vessel operations. These factors limit BC Ferries' ability to make substantial improvements without investment in the berths (that project will be separate from this Program.) By increasing the size of vessel, the forecast peak season available capacity increases from six percent with the *Tachek* to 48 percent with the introduction of the Island class vessel.

The Company expects that the overall travel experience for the Cortes Island community will be greatly improved with the increased frequency of service on Route 23 (supported by two Island class vessels) plus the increase in available capacity on Route 24 with one Island class vessel. Based on previous experience, the Company estimates this additional capacity on Route 24 would result in a zero percent to five percent growth in vehicle traffic (+3,500) in PT6, equivalent to approximately $70 thousand per annum.

Route 22 – Denman Island (Gravelly Bay) to Hornby Island (Shingle Spit) – Quinitsa

Route 22 has the lowest seasonal available capacity in the peak season of any route in the coastal ferry system. This pressure was exacerbated when, in November 2021, for regulatory reasons the capacity of the *Kahloke* (the main vessel serving the route) was reduced from 88 to 80 tons.

The travel experience on Route 22 will be significantly enhanced with the redeployment of the current relief vessel *Quinitsa* (44 AEQ) to replace the *Kahloke* (21 AEQ) on the route which will double vehicle capacity. The *Quinitsa* was already deployed to the route as a trial for summer 2023, and preliminary statistics for July show that compared to the same month for the previous year, more total vehicles travelled, with fewer overloaded sailings and less shuttle service. A more detailed review will be completed in the fall of 2023.

Route 4 – Vancouver Island (Swartz Bay) to Salt Spring Island (Fulford Harbour)

Route 4 has seen a steady growth in demand, especially during the peak season. The Company is trialling a short-term enhancement of peak season daily round trips, but further service enhancements are limited by the vessels and resources available.

The *Quinsam* (63 AEQ) is currently on Route 6 but will be available with the introduction of two Island class vessels on that route. During the remaining years of service life, the *Quinsam* could potentially provide supplemental seasonal service on Route 4 service to enhance the service provided by the *Skeena Queen* (91 AEQ) and support the provision of relief in the off-season on various sheltered waters inter-island routes.

Relief Vessel – One Island Class Vessel

One of the four existing Island class vessels from Routes 19 or 23 will be redeployed to support refit relief across the inter-island routes, replacing the retiring relief vessel *Quadra Queen II*. This will allow BC Ferries to operate 10 Island class vessels and provide coastal communities with a seamless experience when vessels are replaced on routes – specifically addressing refit relief requirements for Routes 6, 18 (Powell River to Texada Island), 19 (Nanaimo Harbour to Gabriola Island), 23, 24 and 25 (Port McNeill – Malcom Island – Cormorant Island).

The *Kahloke* (21 AEQ) will also remain available for refit relief until completion of berth upgrades in the early to mid 2030's to allow relief with Island class vessels on Routes 20 and 22.

Overview of Deployment Scenario for the Service Enhancement Options

<table>
<tr><th>Route</th><th>Route</th><th>F24</th><th>F25</th><th>F26</th><th>F27</th><th>F28</th><th>F29</th><th>F30</th><th>F31</th><th>F32</th><th>F33</th><th>F34</th><th>F35</th><th>F36</th></tr>
<tr><td rowspan="2">4</td><td>YR</td><td colspan="13">Skeena Queen</td></tr>
<tr><td>Peak^</td><td colspan="5">Skeena Qn to provide additional RT's</td><td colspan="7">Quinsam provide seasonal supplemental service</td><td>TBD#</td></tr>
<tr><td>6</td><td>YR</td><td colspan="5">Quinsam</td><td colspan="8">2 x Island Class</td></tr>
<tr><td>19</td><td>YR</td><td colspan="5">2 x Island Class - Hybrid Operation</td><td colspan="8">2 x Island Class - Full Electric Operation</td></tr>
<tr><td rowspan="2">21</td><td>YR</td><td colspan="13">Baynes Sound Connector*</td></tr>
<tr><td>Peak^</td><td colspan="11">Kahloke (supplement in peak only)</td><td colspan="2">TBD*</td></tr>
<tr><td rowspan="2">22</td><td rowspan="2">As noted</td><td colspan="5">Kahloke (OP only)</td><td colspan="6" rowspan="2">Quinitsa (YR)</td><td rowspan="2">land Class (Y</td></tr>
<tr><td colspan="5">Quinitsa (Peak only)</td></tr>
<tr><td>23</td><td>YR</td><td colspan="5">2 x Island Class - Hybrid Operation</td><td colspan="8">2 x Island Class - Full Electric Operation</td></tr>
<tr><td rowspan="2">24</td><td>YR</td><td colspan="5">Tachek</td><td colspan="8" rowspan="2">Island Class</td></tr>
<tr><td>Peak^</td><td colspan="5">Tachek (+1 RT Peak)</td></tr>
</table>

Original Deployment | Short term service enhancements | Increased Capacity

^ Peak season is Last Wednesday in June to Labour day

Longer term service on Route 4 is linked to the replacement of the Queen of Capilano, Queen of Cumberland and Skeena Queen (F37-F42)

* Assessment of 2 ship service on Rte 21 to occur fall 2023 to determine future of BSC expansion project

2.4.4. Climate Change Mitigation

The Company is committed to reducing its emissions of GHGs by at least 27 percent by 2030 compared to 2008, which aligns with the province's CleanBC 2030 target for the transportation sector.

In support of this, the Program will enable BC Ferries to replace some of its legacy carbon-intensive fossil fuel vessels with ones that use clean and renewable energy, while also enabling the full electrification of the two high frequency Routes 19 and 23. Although the Program will result in more and larger vessels being introduced into BC Ferries' fleet, the benefits of electrification will result in a net reduction in total GHG emissions and other environmental benefits.

Additional details can be found in section 4.3.

2.5 Capital Planning

2.5.1 Program Approval

For the reasons described above, BC Ferries' Management has supported and prioritized the Program as an important strategic initiative within the overall capital portfolio, and on August 23, 2023, the Company's Board of Directors approved the Program with a total budget of $< > inclusive of $< > of IDC. These budgeted amounts reflect one-time forecast Program expenditures, both capital and operating. They are inclusive of contingency but are before expected partial offsets from external funding and the application of funding from the CRIA. BC Ferries' expectation of external funding in support of the Program was acknowledged as part of the Board's approval and Management is required to regularly report to the Capital Projects Committee of the Board on the amount of external funding forecast and / or received.

As part of the Board's approval, management was further authorized to:

- Submit an application to the Commissioner pursuant to section 55 of the Act for approval of the Program;
- Seek the Commissioner's approval to draw upon the CRIA and apply the proceeds to the Program; and
- Proceed with the Program after successful section 55 application, or after satisfying any conditions precedent for the performance of the Program that the Commissioner imposes in relation to the application.

2.5.2 Program Budget in Relation to the Approved Capital Plan and Performance Term Six Submission

In general, the net cost impact of the Program (inclusive of external funding and expected application of the CRIA) is consistent with the 12-year capital plan that was approved by the

Board of Directors in June 2023 and as reflected in the most recent PT6 supplemental submission to the Commissioner.

As a detailed business case for the Program was prepared over the last year, cost estimates and external funding assumptions have been regularly revisited. < >

Relative to the August 2023 PT6 Six Supplemental Filing, the Program budget before funding is unchanged. Direct allocation of external funding has been refined and the updated net capital cost is included within this Application. Program post-implementation costs have been updated since the August 2023 Supplemental Filing for PT6.

2.5.3 Program Deferral Options

The potential to delay or defer the Program and the associated financial and non-financial implications are discussed in section 3.

Section 3 – Budget, Financial Analysis and Risk Review

3.1 Options Overview

In developing the business case for this Program, BC Ferries evaluated a number of potential solutions to address the operational issues described above, including challenges with system capacity and resiliency, and fleet renewal. See Appendix 'G' for a further discussion of preliminary options that were considered to achieve increased system capacity and advance Island class electrification.

The Company settled on two options as part of its detailed business case review: one option is the "Status Quo," and the other is constructing four electrified Island class ferries with corresponding terminal upgrades on Routes 19 and 23 (recommended option). These are described further below.

3.1.1 Option 0 – Status Quo

This option envisions operating existing vessels on currently assigned routes until their projected end-of life, at which time new vessels would be built as "fully electric" and terminals would be upgraded for electric operation. The electrification of vessels and terminals (on Routes 19 and 23) would occur when the Legacy Vessels eventually were replaced. It is anticipated the work to implement the Program would be delayed until the 2030s with all scope delivered by fiscal 2035, by which point the Legacy Vessels are assumed to have reached their end of life.

The status quo option is viable only in the short term, because the Legacy Vessels must be replaced at some point due to their age. In the meantime, this option:

- Does not address system resiliency and the risk of continuing service disruptions experienced on these routes caused by a lack of vessel capacity and equipment break-downs more prevalent in aging ships. In addition, the Legacy Vessels would not provide sufficient capacity to carry projected vehicle / passenger traffic on identified routes, and would not enable flexibility in the deployment of vessels including as refit relief;
- Would not lead to early Island class electrification, such that GHG emissions reduction on Routes 19 and 23 will not occur until the mid 2030s; and
- Introduces a significant delay in the overall Island class build program, since new vessels would not be introduced until the mid 2030s. The delayed build of these vessels would prevent BC Ferries from achieving vessel identicality and standardization due to the approximate ten year gap in the build program. < >

The Status Quo option is not recommended.

3.1.2 Option 1 – Four new Island class vessels and upgrades to the terminals on Routes 19 and 23

This option includes the construction and delivery into service of four additional electrified Island class vessels, materially identical to existing Island class vessels apart from minor alterations intended to improve efficiency and maintainability. This option also includes completing BC Hydro service upgrades, and electrical infrastructure upgrades at the four terminals on Routes 19 and 23 to supply necessary electricity to power the plug-in hybrid vessels and implement rapid shore-to-ship recharging systems. The work to implement the Program would commence immediately, with all scope anticipated to be delivered by 2027.

The Company supports this option as it would best serve BC Ferries' strategic and operational needs, while meeting Contract requirements and customer expectations.

3.2 Program Budget and Assumed Funding Opportunities

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3.2.1 Basis of Estimate: Vessel Construction Budget

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3.2.2 Basis of Estimate: Terminal Electrification Budget

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3.2.3 Basis of Estimate: Program Contingency

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3.2.4 External Funding Opportunities

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3.2.5 Internal Funding - Carbon Reduction Investment Account ("CRIA")

The CRIA was established in accordance with Order 22-01 and is funded through the sale of carbon credits generated through activities such as offsetting diesel consumption from operations with liquefied natural gas ("LNG") for the Salish and Spirit class vessels, and shore power electricity generation. The CRIA's revenues are to be used to fund investment in carbon-reducing infrastructure initiatives identified in the *Clean Futures Plan*, and to progress GHG emission reduction initiatives.

Plan for Use of CRIA

Concurrent to this Application, the Company has submitted a plan to the Commissioner for approval for the use of CRIA funds for IC3TEP.

Specifically, BC Ferries intends to draw on funds available in the CRIA to help offset the Company's capital obligations under the electrification portions of the Program, estimated to be approximately $< >

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The Company has assumed for the purposes of this financial analysis that it will apply to extend the CRIA after its initial five year term and that a similar amount from the CRIA will be available to Option 0. The net present value analysis ("NPV") with and without CRIA for both options can be found in section 3.4.

3.3 Operating Costs, Maintenance Costs, Revenues and Milestone Upgrade Costs

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3.3.1 Operating Costs Estimates

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3.3.2 Maintenance Cost Estimates

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3.3.3 Revenue

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3.3.4 Vessel Service Life Milestone Upgrade Costs

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3.4 Comparison of Viable Options

The Company conducted an analysis of the financial and non-financial impacts of the two identified viable options. As noted above, the difference between the two options is primarily the timing of their implementation, which is approximately eight years apart. As such, the estimates developed for the financial analysis are similar and derived from a common set of assumptions.

Program Expenditure and Net Present Value Analysis

The table below summarizes the total Program budget estimate (upfront capital and operating expenditures) and a 50-year NPV for each option:

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Factoring in assumed funding from the CRIA, the NPV for recommended Option 1 is approximately $< > less favorable than the status quo (Option 0). Key factors driving this difference in NPV include:

- Investment cash flows for Option 0 are greater, but have a lower NPV impact when discounted back at a rate of seven percent;
- Ongoing financial benefits from Option 1 (electrification savings and incremental revenue) are more than offset by incremental operating costs; and
- The deferred investments in Option 0 result in assumed residual values on terminal and vessel assets at the end of the NPV period.

However, while Option 1 has a greater negative NPV than Option 0, the Company believes that the advantages presented in this Application with respect to Option 1 continue to support it as the preferred option.

Notes to Analysis

1. IDC costs are not included in the managed budget but will form part of the final capitalized cost of the Program per International Financial Reporting Standards ("IFRS"). They are estimated for each option to reflect approximate financing costs on outstanding cumulative cash flows until respective assets are recognized as available for use per IFRS.

2. BC Ferries does not anticipate a need for borrowing specifically for this Project and will finance it in line with all capital projects using cash flow from operations, draws on its credit facility, issuing bonds in the capital markets and / or accessing external debt funding arrangements. The total of $< > in external funding opportunities is included in the NPV analysis and the details can be found in section 3.2.4.

3. A discount rate of seven percent was used for the NPV analysis. Other discount rates have been sensitivity tested in the financial analysis. A lower discount rate negatively impacts the NPV for both options as it increases the value of future projected dis-benefits; however, it narrows the NPV difference between the two options. < >

Sensitivity Analysis

As several key assumptions are susceptible to change / volatility, sensitivity tests were undertaken to demonstrate how changes in assumptions would impact the NPV. Sensitivity tests were performed on the discount rate, incremental operating costs to accommodate longer operational hours, vessel hull efficiency (i.e., less fuel consumption), additional federal CFR program funding, the monetized value of the BC Carbon Credit, the anticipated provincial carbon credit duration, inflation rate, and achievable percentage of electric service. Details can be found in Appendix 'I'.

3.5 Electrification Specific Analysis for Routes 19 and 23

Separate from the primary financial analysis surrounding Option 0 and Option 1, BC Ferries also conducted a specific financial analysis to examine the NPV of a status quo ultra low sulphur diesel ("ULSD") scenario with the alternatives of an all-electric or renewable diesel ("RD") operation on Routes 19 and 23. Of note, electrification requires significant incremental investment while ULSD or RD operations do not. The analysis was based on a 20-year lifecycle, in alignment with the assumed useful life of terminal electrical infrastructure.

The following table summarizes the results of the analysis before any application of CRIA funding:

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The status quo ULSD scenario has an NPV of zero with the electrification and RD NPV results reflecting incrementally to the ULSD scenario. Before CRIA funding is applied, the results show that electrification is relatively close to ULSD over the 20-year lifecycle with an NPV of -$< >. When compared to RD, electrification is financially preferable (electrification with a NPV of -$< > versus RD of -$< >). This financial analysis is dependent on forecasts for future energy prices for electricity, ULSD and RD that are all uncertain. As identified in the table below, a sensitivity analysis was performed for the electrification scenario examining the impact of applying CRIA funding and increasing the assumed inflation on electricity pricing:

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3.6 Price Cap Implications of Preferred Option

BC Ferries' submission to the Commissioner for price-cap-setting purposes for PT6 was submitted in September 2022, followed by supplemental filings in March and August 2023. For this Program, the August 2023 supplemental filing included a $< > capital placeholder and $< > of forecast funding for a net capital outlay of $< > million. Program cash flows are planned to occur in Performance Term 5 and PT6, which reflects a scope consistent with recommended Option 1.

Upon Program completion, with all other things held constant, BC Ferries' analysis indicates an increase of 0.07 percent per annum to the required average annual regulated tariff revenue over 48 years from fiscal 2025 through fiscal 2073. Starting in PT6 through fiscal 2032 (the end of Performance Term 7) an annual price cap increase of approximately 0.37 percent will be required. Following fiscal 2032, and for the remaining life of the Island class Phase 3 assets through fiscal 2073, price cap needs will increase by approximately 0.09 percent per annum as post-implementation operating costs persist.

3.7 Risk Review

IC3TEP is a complex program of activities; however, the overall risk associated with implementing this work is not considered to be unusually high for the Company. For the ship construction project, it is noteworthy that the Company has already designed, built and delivered six Island class vessels successfully and – in so doing – has identified and mitigated a great many risks. For the infrastructure upgrades, although the specific context of electrification is new for BC Ferries, the work of overseeing and implementing marine structure construction and uplands facilities development is very familiar to the Company.

Nonetheless, the Company undertook a comprehensive evaluation of risks for both the shipbuilding and terminal construction elements of the Program. Its vessel and terminal construction risk registers were developed with input from internal stakeholders experienced in the execution of similar projects, as well as with guidance from Colliers Project Leaders, a project management consultancy. The risk registers include estimates of the likelihood of risk occurrence, with low, expected and high cost impacts for each risk, as well as schedule impacts. < >

The detailed risk registers are included in Appendix 'L'. The key Program risks are discussed in more general terms below.

3.7.1 Key Program Risks

Budget Estimate Uncertainty

There are three main scope packages for the Program: the construction of the new vessels, the construction of the terminal infrastructure, and the off-site upgrades required by BC Hydro to deliver the required power. As with any project, each scope package is subject to a degree of uncertainty with respect to the lump sum construction contract pricing that will be received. For the three scope packages, this uncertainty is driven by several factors, including:

- Imprecision in the Company's current budget estimates, expressed as the plus and minus accuracy of the various line items. The actual pricing may fall at the high or low end of the accuracy range (assuming the accuracy ranges are correct);
- The risk that the uncertainty ranges are not correct and either over-estimate or under-estimate the true costs;
- The impact of foreign currency exposure;
- The impact of inflation on the pricing; and
- The impact of unusual market conditions, which is not reflected in the estimate accuracy ranges.

BC Ferries' engineering design and cost estimates have been developed for each scope package to mitigate the uncertainty. < >

Construction Risk

Both the shipbuilding and the terminal infrastructure projects have construction-related risks that are standard to the two industries. The type and scale of construction is not considered unusual, but the Company recognizes that some manageable risks such as weather delays, unforeseen ground conditions, and some design updates realized and captured through a regimented Engineering Change Request process are likely to occur. The risk registers developed for the two projects have itemized the main risks and quantified the contingency expected to be sufficient for the risks.

The Company will partially mitigate the risk by selecting qualified and experienced contractors to deliver the scope of work, by allowing schedule contingencies to account for delays, and by including contingency amounts to account for arising issues during implementation. The Company will also partially transfer the construction risk to contractors through fixed price contracts that will establish contractually-enforceable deliverables with damages payable to BC Ferries for non-performance.

Schedule Delays

There are many discrete risks that could result in schedule delays to the vessel and terminal portions of the Program. Since both components must be completed for the benefits of the Program to be realized, delays with either component will delay the overall Program. Examples of risks that could cause schedule delays include regulatory / permitting timeline delays, labour availability, supply chain issues and / or commissioning delays.

BC Ferries has developed the vessel and terminal schedules based on its experience with similar projects. < > In the event that there is a delay in the overall delivery schedule for one or more vessels, the expected benefits from the vessels will be delayed. The impact to operations will be mitigated by continuing operations with the currently deployed vessels, which would only require additional refit or life extensions in the event of an extreme delay in excess of 12 months.

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Similar to the construction risk, the Company intends to partially mitigate the risk by selecting experienced, qualified contractors, and by including contingencies for schedule and cost. The Company will also partially transfer the risk to contractors, with appropriate guarantees for schedule adherence.

First Nations Support

First Nations support will be required for permitting to be achieved efficiently, and to align with improved corporate relationships with First Nations in whose territories these terminals and ships operate. If this support takes longer than anticipated, the Program could be delayed.

The Company will seek First Nations support in accordance with the Company's Indigenous relations objectives. < >

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See section 5.2 for a further discussion of First Nations engagement.

Vessel Procurement

BC Ferries' fleet now includes six Island class vessels in its operations. While the cost of the new vessels will be significant, continuing the shipbuilding program at this time is considered lower overall risk in comparison to some other shipbuilding projects, as the capabilities of the vessel and the processes for construction, delivery and transition into service are all well-understood.

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< > Following the completion of a rigorous request for proposal ("RFP") process later this year, the Company will enter negotiations with the successful proponent and individual fixed price contracts will be signed for each of the vessels, and a separate contract for commissioning the shore charging interface.

Further, the risk of price inflation will be mitigated by receiving multiple bids and reviewing vessel construction contract price offers against global benchmarks from available shipbroker information. External experts, including shipbuilding contract lawyers, will support BC Ferries in negotiations to ensure an acceptable price point is achieved.

The risk of exchange rate fluctuation will be mitigated by asking RFP proponents to provide ship construction bids in both Canadian dollars and their preferred foreign currency, allowing BC Ferries the option to select the most favourable rates and to avoid further exchange rate mitigations by the contracted yard that would raise the overall contract price.

< > The rigorous review and screening of shipyards at the prequalification stage helps mitigate procurement risk by ensuring that shipyards selected for the RFP stage will be able to deliver vessels meeting BC Ferries' high quality standards.

COVID-19

The Company recognizes a resurgence of the COVID-19 pandemic could impact the Program depending on its severity and capability of the selected shipyard to mitigate it.

Based on previous experience, BC Ferries has allocated additional budget for potential incremental travel costs and subcontracted labour in the event that COVID-19 (or any pandemic) prevents its employees from travelling to or living near the successful shipyard. Potential schedule impact at the shipyard can be mitigated by additional health and safety measures, enabling construction work to continue on schedule and with minimal impacts. An appropriate schedule contingency is included in the overall vessel project plan.

Crew Readiness

The Company recognizes that there have been recent challenges with securing sufficient crews across various routes. The transition into service of two previously built Island class vessels was delayed by almost a year because of crew-related factors, including an increase in retirements and challenges with hiring and retaining licensed mariners.

The introduction of further Island class vessels to the BC Ferries' fleet, inclusive of the intended two-ship service on Route 6 and other vessel deployments, will require changes to current staffing and crewing. Although the risk of crewing challenges remain a concern, the BC Ferries human resources team has been engaged and informed of the approximate timelines and requirements for crewing the intended vessels. The planning and implementation of staffing, crewing and training strategies for these new ships will commence by calendar year-end.

Crew Readiness and employee engagement is discussed further in section 5.4.

Section 4 – Program Impacts and Benefits

The Company is committed to continued investment in the public interest in ensuring a safe, reliable, affordable and efficient ferry system for the future, and in maintaining the quality of life of people who live, work, and visit British Columbia. The Program – including the addition of four new vessels and electrification for Routes 19 and 23 – will result in valuable benefits that directly correspond to this commitment.

4.1 Customer and Community Centered

4.1.1 Meeting Community Needs

The Company anticipates that the introduction of four new Island class vessels, and the resulting redeployment or retirement of other vessels, will support customers and communities by helping to address existing adverse service impacts including sailing wait times and delays, sailing overloads and missed sailings. It will also mitigate traffic congestion at terminals, and provide greater travel certainty for local businesses and customers who rely on these routes for access to goods and services.

In addition, a new relief vessel will not only provide a seamless customer experience during vessel refits, it will also ensure more resilient service. The Program enables one Island class vessel to serve relief duties for planned refits, unexpected mechanical issues, and to support additional service at peak times or during times of need.

Various communities should observe improvements local to their terminals. For instance:

- Those living near the terminals in Crofton and Vesuvius (Route 6) are often impacted by traffic congestion during busy times, as vehicles block access to residents and local businesses, and make movement challenging for those looking to access the local marina and dock in Crofton. These neighbours will notice a reduction in traffic congestion and community disruption as the vessels move more people, more frequently, than previous vessels.

- Customers on Route 24 are often challenged by capacity on the first sailing of the day, and some customers will park a vehicle in the ferry line up the night before to hold a place in line. With the introduction of increased capacity, travel should become easier for customers on this route, eliminating the need to line up the night before a sailing, and reducing tensions in the community around this practice.

- By introducing quieter, all-electric Island class vessels onto Routes 19 and 23, those living close to the terminals in Nanaimo Harbour, Descanso Bay (Gabriola Island), and Quathiaski Cove (Quadra Island) will experience a noticeable reduction in noise, air pollution, and disruption from the vessels as they enter and leave dock. Currently,

emissions, vibration and noise from the vessels are the primary concerns heard from the terminals' nearby residents. Impacts are particularly noticed by those on Cameron Island near Nanaimo Harbour where vessels are home-ported because they are subject to additional disruption in the early morning and late evening hours. As vessels move in and out of dock in all locations multiple times each day, seven days a week, electric vessels will be a noticeable positive benefit to those most impacted by daily operations.

- Similarly, Crofton, Vesuvius and Heriot Bay terminals operate in close proximity to residential areas and local businesses. As with the introduction of the all-electric vessels, the introduction of diesel-hybrid vessels on these routes will represent a reduction in noise, emissions and disruption for communities near the terminals.

- The Company hopes that First Nations communities will also see a positive impact from the introduction of electric vessels, and believes the reduced impact of quieter, cleaner vessels on local waterways aligns with Nations' interests in protecting the health and productivity of the local marine environment.

4.1.2 Island Class Customer Experience

As described in the Previous Applications, the Island class vessels are designed to provide an enhanced customer experience compared to various Legacy Vessels. These features include:

- Increased vehicle capacity with more room between and around vehicles onboard;

- Easy on and off foot passenger flow with a large passenger accommodation space and customer amenities on the main deck;

- Dedicated bicycle space and storage allocated on the main car deck;

- Improved accessibility with wide walkways, sloped ramps, and an accessible washroom located within the passenger lounge on the main car deck;

- Wide (3.2m) commercial specific center lane for large commercial traffic;

- A dedicated pet area with seating, fresh water, heating and three differently sized kennels; and

- Quieter smoother running vessels.

4.1.3 Terminal Construction

The routes receiving the new and re-deployed Island class vessels will experience temporary disruptions as terminal and berth infrastructure is upgraded to support electrical charging, and to fit the Island class vessels. These impacts will be discussed with First Nations and the local

communities to ensure input into design where possible, and to mitigate the impacts of disruption to service and nearby neighbours.

4.2 Standardization and Innovation

The six Island class vessels that were recently built successfully began operations between 2020 and 2022. The Island class is now a proven vessel design for BC Ferries, and minor adaptations to that design as a result of the Program do not introduce innovative or untried concepts for shipbuilding or operations.

Continuing the shipbuilding program at this time with standardized Island class vessels will enable BC Ferries to maintain ongoing fleet renewal and will pursue the strategic aim of reducing the number of classes of vessels while increasing the degree of identicality, standardization and interoperability across the fleet. Standardization also results in lower through-life costs through reduced maintenance, training and inventory costs, as well as in greater operational efficiency when compared to a fleet of non-standardized assets.

4.2.1 Electrification on Routes 19 and 23

Island class electrification on Routes 19 and 23 does however include implementation of a new vessel electrification design and a rapid charging system that will integrate into existing BC Ferries' terminal infrastructure. This will include high power electrical equipment on shore, installation of an automated charge connection system and a connection receiver on the vessel.

The technologies required to electrify the Island class vessels and their associated terminals are new to BC Ferries, and the technology for shore-based recharge of such vessels remains relatively uncommon on the west coast of North America. While this may be the case, the technologies themselves have been proven in service in comparable applications in other parts of the world.[8] The innovative nature of the Program for BC Ferries is therefore linked primarily to the requirement to integrate those technologies aboard BC Ferries' own vessels and in existing terminals, and into the Company's own ferry operations.

In order to better understand the viability of electrification technology, the Company has conducted site visits to see battery-electric vessels in operation in other jurisdictions worldwide. Representatives of the Company's project and technical teams have conducted site visits to electric vessels in Norway, Denmark, Germany and the Netherlands, observing these ships in operation and consulting with numerous vessels' owners to understand the implications of battery electric operations. The Company has also conducted site visits at factories for different marine battery and charging system manufacturers to ensure that the technologies and

[8] Shipbroker's data shows that 83 car / passenger ferries and roll-on / roll-off freight and passenger vessels are currently on order worldwide, as of August 2023. Of these ships on order, at least 30 vessels (greater than 36 percent) are known to be under construction with battery-electric technology.

processes for electrification are understood to the greatest degree possible. The Company has also worked closely with BC Hydro to ensure that it can meet the power needs for electrified vessels (which can operate in diesel-electric mode during any periods when power is interrupted.)

4.2.2. Vessel to Berth Interface on Route 23 (Campbell River)

The Company aims to operate identical, standardized vessels from standardized berths in order to maximize interoperability within the fleet. This strategy has in many cases proven successful by enabling BC Ferries to maintain, or quickly restore, operations in the event of unforeseen technical issues in the overall system. For Route 23 at Campbell River, an issue of weather-related service cancellations that arise in particular environmental conditions was identified due to the interface between an Island class vessel and the berth. The issue results from the unique exposure of the Campbell River berth to seasonally prevailing winds and waves, and was reviewed by the Commissioner in June 2023.[9]

As IC3TEP will deliver vessels that will be effectively identical to those already in service, the Program itself will not resolve the previously reported vessel-terminal interface concerns at Campbell River. Instead, the Company expects that improvements on this issue will be delivered through alternative projects and initiatives, including those previously described in the Commissioner's review and most notably:

- The Company intends to adjust the loading apron at the berth to bring improvements. Work on the apron will begin in October 2023 and is expected to help with issues of roll and geometry of the vessel in the terminal berth; and
- Increased crew experience and familiarity with the vessels and their operation is expected to further improve consistency of service in adverse weather.

The Company will re-evaluate performance to determine the extent to which these initiatives, once implemented, have been successful. If the short term adjustments described above prove to be unsuccessful in improving service resilience on Route 23, the Company may consider an option to investigate design changes into the Phase 3 vessels that could dampen rolling in the berth. To support this, the Company will also conduct computer simulations and take full scale measurements – expected to be completed by January 2024 – to obtain a better insight into the ship performance in the berth and identify further measures to improve the reliability of service in heavy weather conditions. These changes could come at the expense of identicality and are not currently in scope for the Program, but could be negotiated if necessary as a shipyard change order during construction. Alternate measures, such as construction of a breakwater, may also

[9] British Columbia Ferry Commission, *Commissioners Probe - Route 23 Service Reliability, June 28, 2023*.

be considered as solutions that would not be part of the scope of the Program, and which could be implemented as a standalone project.

4.3 Environmental

Both coastal communities and BC Ferries customers are passionate about protecting the coastal environment and supporting clean economic and operational growth. As indicated in section 5, the Company has received generally positive feedback and support from numerous stakeholders about the expected benefits of Island class electrification and anticipated service enhancements.

4.3.1 BC Ferries *Clean Futures Plan*

Through the *Clean Futures Plan*, the Company is committed to reducing GHG emissions by at least 27 percent by 2030 compared to 2008, which aligns with the province's CleanBC's target for the transportation sector. The plan states: "it is our policy to continually seek among available energy sources the cleanest, lowest carbon-intensity option that can displace non-renewable diesel." Electrification of the Island class supports this objective.

The *Clean Futures Plan* identifies five areas of action that are key to BC Ferries achieving its 2030 GHG emissions target. The five areas of action are:

1. Renewable and Alternate Fuels;
2. Electrification;
3. Operational Efficiencies;
4. Advanced Technologies; and
5. Fleet Modernization.

IC3TEP falls within all five areas of action with electrification as the primary category. Full electrification refers to providing the infrastructure and vessels necessary to operate ships on Routes 19 and 23 in battery-electric mode as plug-in recharge-from-ashore vessels, powered by BC Hydro electricity.

4.3.2 Federal and Provincial Climate Change Goals

The Government of Canada is proposing to reach net zero emission by 2050, which will require the marine transportation sector to transition from fossil fuels to low carbon energy sources. The Program is an example of the transition the Government of Canada expects from the marine transportation sector because it proposes to displace conventional diesel with clean electricity.

As already noted, the Province's CleanBC plan sets a 40 percent overall target by 2030 (compared to 2007) and a sector-specific target of between 27 to 32 percent reduction (by 2030) for the transportation sector. Marine transportation is one of the main components

of the Province's "zero-emission vehicles strategy" with a focus on electrification, energy storage systems and renewable energy. BC Ferries total GHG emissions represents 18 percent of BC's domestic navigation activities within the transportation sector and nine percent of Canada's marine transportation sector emissions. Even though the emissions reduction potential of the Program is relatively small in comparison to the entire transportation sector in BC and Canada, the Program shows BC Ferries' support to both the Province and federal government towards achieving their climate change goals.

4.3.3 International Maritime Organization ("IMO")

In 2018, the IMO adopted a strategy to reduce vessel GHG emissions by 50 percent by 2050 (compared to 2008) and to reduce carbon intensity of international shipping. Progressive adoption of alternative energy such as electricity is one of the fundamental components of the strategy to reach long-term targets. The Program would not only support IMO's objectives, but would also contribute to a body of knowledge regarding vessel standardization and interoperability that are current barriers to wide-scale marine electrification.

4.3.4 Reduction in Energy Consumption

The adoption of battery-electric vessels on Routes 19 and 23 promotes reduced energy consumption by installing a more efficient battery-electric propulsion system. This is achieved through inherent component efficiency increases when comparing a battery electric propulsion system with a diesel hybrid electric system that primarily relies on a diesel generator. Using known data for actual equipment installed in the current Island class fleet, the Company estimates that diesel hybrid electric propulsion system efficiency is 33 percent while a battery electric vessel system efficiency is 75 percent.

4.3.5 GHG Environmental Impact Analysis

BC Ferries maintains a GHG inventory summarizing its GHGs emissions across its value chain, in support of Company-wide reporting, setting of GHG emissions reductions targets and tracking of progress against those targets.[10]

The GHGs emitted by Option 0 and Option 1 were calculated using emissions factors. An emissions factor is a representative value that is intended to relate the quantity of a pollutant emitted with an activity level associated with the emission of that pollutant. For example, the

[10] The province's Low Carbon Fuel Standard and carbon credit generation process utilizes the concept of carbon intensity of a fuel, which is not to be confused with the Company's GHG inventory, which tracks the Company's environmental impact. The carbon intensity of a fuel is the measure of GHG emissions associated with producing or consuming a fuel, expressed as grams of carbon dioxide equivalent per megajoule of energy in the fuel ("gCO2e/MJ"). The carbon intensity accounts for the GHGs emitted during the entire lifecycle of the fuel, including emissions from the production of the fuel and emissions associated with the energy and materials used within the fuel lifecycle. The carbon intensity of BC Hydro's electricity is 5.48 gCO2e/MJ compared to the Company's conventional diesel blend which has a calculated carbon intensity of 90.00 gCO2e/MJ. Please see section 3.5 for details on the financial analysis of electrification on routes 19 and 23.

emissions factor used to calculate the GHGs emitted per litre of diesel burned by a vessel is 2.67 kilograms of carbon dioxide equivalent ("CO2e") per litre of diesel. The emissions factor used to calculate the GHGs emitted per kilowatt hour of electricity used by a vessel is 0.00 kilograms of CO2e per kWh of electricity.[11]

Options Comparison in Total GHGs

Option 1 proposes that the four new vessels on Routes 19 and 23 be powered by electricity, that existing vessels be redeployed to other routes including 6 and 24, and that other vessels be retired. Overall, this will prevent approximately 6,300 tonnes of GHGs from being emitted each year, in comparison to the status quo (option 0):[12]

Comparing Total GHGs (expressed as tonnes of carbon dioxide equivalent or tCO2e)

Route	**Option 0: Status Quo:** Continue operating existing vessels and replace them in due course	**Option 1:** Four new vessels and vessel redeployments and retirements
Route 19	4,660	0
Route 23	4,480	0
Route 6	2,405	4,429
Route 24	1,649	2,462
Total	**13,193**	**6,891**

The difference between the two options – approximately six thousand tonnes of GHGs – is equivalent to two percent of the Company's direct emissions in fiscal 2023. Although two percent may seem small, it is a significant reduction in GHGs for the Company and is equivalent to the GHGs emitted from all its landside activities.[13] Assuming the Company's total GHG emissions in fiscal 2030 are similar to fiscal 2023 (approximately 329,000 tonnes of GHGs,) the Program will contribute eight percent towards the Company's efforts to meet the 2030 target of emitting no more than 249,000 tonnes of GHGs.

Due to the inability to accurately predict annual usage, GHG implications of specific relief vessels on various routes has not been presented separately in the analysis.

[11] Emissions factors are consistent with the IMOs 4th GHG Study and GHGenius.
[12] Emission estimates were calculated based on work completed by (S+T)2 Consultants Inc., December 29, 2022, as modified by BC Ferries on September 7, 2023.
[13] Landside activities include operations of terminals, offices, generated garbage, employee air and road travel and commercial services.

Options Comparison in GHG Intensity (expressed as kilograms of carbon dioxide equivalent per nautical mile or kgCO2e/nm)

In the shipping industry, GHG intensity is the measure of a ship's GHG emissions relative to a ship's travel over a certain distance. This metric is preferable to total GHGs as a measure of a vessel's environmental impact because it controls for periods of inactivity or changes in service levels.

Comparing GHG Intensity (expressed as kilograms of carbon dioxide equivalent per nautical mile or kgCO2e/nm)

Route	**Option 0: Status Quo:** Continue operating existing vessels and replace them in due course	**Option 1:** Four new vessels and vessel redeployments and retirements
Route 19	95	0
Route 23	184	0
Route 6	87	100
Route 24	58	86

Option 1 reduces the GHG intensity of Routes 19 and 23 to zero GHGs per nautical miles but increases the GHG intensity of Routes 6 and 24, as the Island class vessels operating on diesel will consume more fuel per nautical mile than the existing older vessels.

4.3.6 Other Environmental Benefits

A number of other environmental benefits in addition to reduced GHG emissions will be realized by operating as plug-in recharge-from-ashore vessels, including:

- Reduced criteria air contaminants such as NOx, SOx and PM;
- Reduced noise impacts on marine life and local communities due to quieter operations;[14] and
- Maintaining and potentially increasing the Company's current environmental certification level in the Green Marine program.

[14] BC Ferries is also actively reducing underwater radiated noise ("URN"), which will have a positive impact on whales and other marine animals in general and the southern resident killer whale population in particular. As reflected in the Company's *Long Term Underwater Noise Management Plan*, each new class of ships is generally quieter than the one before it. It is expected that IC3TEP will benefit marine animals, including underwater species, through operation of quieter, electrified vessels.

In addition, the environmental innovation achieved in this Program will serve as a potential precursor for other BC Ferries' vessels and future projects.

4.4 Fulfilling Contractual Obligations

BC Ferries anticipates that the Program will have a positive impact on its ability to deliver all services required under the Contract.

The Program delivers innovative solutions to increase capacity across several minor routes while accelerating BC Ferries' transition to more sustainable operations. This is consistent with the Contract's direction that "During each Performance Term, BC Ferries will look at innovative ways to deliver services that respond to the needs of the communities and customers it serves". It is also consistent with the Act, which indicates, "ferry operators are to be encouraged to be innovative and to minimize expenses without adversely affecting their safe compliance with core ferry services" and "ferry operators are to be encouraged to meet provincial greenhouse gas emission targets in their operations and when developing capital plans".[15]

In September 2020, the Province released a summary of feedback on its proposed Coastal Ferry Vision. Survey respondents expressed strong support for all four themes that emerged during the first phase of engagement, indicating that coastal ferry services should:

- Support efficient end-to-end travel of people and goods;
- Be equitable and accessible;
- Mitigate and be responsive to climate change; and
- Reflect the values of coastal communities.

IC3TEP supports these goals. It will help the province achieve its GHG emission targets and will support BC Ferries' ability to continue to meet or exceed core service levels, in alignment with the public interest.

4.5 Public Interest

The Program's benefits are described above. To summarize, IC3TEP will support the public interest in multiple ways including:

- Vessel electrification supports wider provincial and federal decarbonisation strategies, reduces noise and air-borne emissions providing 'cleaner air' benefits for communities and the environment. It contributes to the greening of the marine industry, which provides validation of new technologies (e.g., marine-application battery power) and

[15] See, respectively, the Coastal Ferry Services Contract, paragraph 1 under "Core Service Levels" in Appendix 1 of Schedule "A"; and section 38 (1) (d) and (a.1) of the *Coastal Ferry Act*.

presents opportunities for mariners to develop specialized workforce skills that will carry them into the future. The Company also believes it aligns with First Nations interests in protecting the health and productivity of the marine environment into the future;

- The new and re-deployed vessels will generate local jobs to support terminal construction activities, and to operate the vessels once in service;
- The Program supports travel certainty by creating a more resilient and reliable ferry service for all coastal communities serviced by the Island class vessels, with additional capacity and more frequent service that will be offered by the re-deployed vessels, and which will result in easier movement of critical goods and services to Island communities;
- As part of this, the benefits of standardization will grow as the Company reduces the number of classes of vessels and increases the commonality of the fleet through the use of standardized components, systems, procedures, design features and equipment selection; and
- The electrical interconnection upgrades required for this project may support future electricity load growth in surrounding areas, and potentially will improve the access to electricity in remote communities.

Section 5 – Stakeholder and First Nations Engagement

The Company is focused on engaging customers and communities on the type, scale and frequency of services they want to see. This means giving customers and communities a voice in the decisions that affect them most, and continually evaluating the services provided to ensure BC Ferries is offering a reliable, efficient and affordable experience that aligns with the needs of those who travel.

During preliminary outreach and engagement for the current work of Island class electrification, BC Ferries received over 40 letters of support from First Nations and stakeholder groups, including municipalities, Ferry Advisory Committees, chambers of commerce, environmental groups and educational institutions. This is a testament to the collective priority British Columbians place on protecting the environment through clean transportation initiatives. The letters of support, with an accompanying summary listing of the letters, are included in Appendix 'K'.

5.1 Stakeholder Engagement

In addition to the letters of support, the Company has received stakeholder feedback through Ferry Advisory Committee meetings, community drop-in sessions and other stakeholder meetings in support of both vessel electrification and the addition of Island class vessels on Routes 6 and 24.

With respect to Route 6, community feedback has been especially in favour of the deployment of two Island class vessels. The Salt Spring Island Ferry Advisory Committee ("FAC") has for many years supported additional vessel capacity and accelerated deployment of two vessels on Route 6. At the community level, over 2,000 people signed a petition entitled 'The Fix for Route 6,' which called for two-ship service to support growing ridership on the route. The petition was tabled by MLA Adam Olson in the BC Legislature.

Similarly, the FAC on Cortes Island has advocated for increased capacity and frequency on Route 24, which is experiencing growing ridership and challenges with long wait times, particularly during peak season. The FAC most recently brought this concern to their February 2023 meeting, noting that two-ship service between Campbell River and Quadra Island is driving increasing capacity needs for Cortes Island.

While the Company believes, based on letters of support and endorsement for Island class vessel electrification, that there is general public backing for the Program, some stakeholders have also expressed concerns related to Island class vessels electrification, as noted by the Commissioner in Order 23-01. These concerns were related to:

- Reasons / motivations for electrification;
- Risk of introducing new technology;

- Environmental and financial cost savings of electrification, both up-front investment and operating costs;
- Environmental impacts of electrifying the vessels including the percentage of emissions actually reduced and the disposal of batteries at end-of-life; and
- Impact on the electrical grid.

As observed in its *Clean Futures Plan*, the Company considers that climate change is a global problem and that it is the greatest challenge of our generation. This Program is being undertaken consistent with provincial policy directives related to emissions reduction. While battery-electric ferries are new to the BC Ferries fleet, there are numerous examples around the world of this technology operating successfully in similar environments. The anticipated environmental and financial costs and benefits are analyzed within this Application. BC Ferries calculates and reports emissions according to the GHG Protocol Corporate Accounting and Reporting Standard, and the analysis contained in this Application and infrastructure costs including required terminal charging infrastructure, operating and replacement costs, and the production and recycling / disposal of the batteries. Impacts to the electrical grid will be assessed by BC Hydro as outlined in this Application, and where required, the grid will be reinforced.

BC Ferries will attempt to meet stakeholder expectations, where possible, as the Program is implemented. Further engagement will continue once IC3TEP is funded and approved to proceed. The upcoming engagement will include refining the stakeholder register and engaging in more detailed discussions with interested stakeholders on benefits and impacts that will be realized from the Program. These impacts may include terminal upgrades and schedule changes required as the Island class ships come into service on new routes, including on Routes 6 and 24. The Company will ensure that transit, tourism, local businesses, commuters, and commercial goods and service providers will be among those consulted, and will continue working with all interested stakeholders to identify opportunities for collaboration.

5.2 First Nations Engagement

At the heart of First Nations engagement is BC Ferries' commitment to constructive and mutually respectful relationships with Indigenous peoples, based on reconciliation, enhanced collaboration and effective working partnerships. BC Ferries strives to involve Indigenous groups in the early stages of planning, project and program development where the interests of Indigenous peoples may be affected. Engagement on the Program will allow for an open forum of information exchange, and assist BC Ferries in addressing concerns and interests of First Nations. Engagement will further support greater involvement and collaboration with First Nations on areas of mutual benefit and economic opportunity and support the development of new partnerships.

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As IC3TEP progresses, BC Ferries will continue to engage with First Nations through a comprehensive engagement plan. < >

The First Nations expressing interest will be engaged based on their level of interest and preferences. BC Ferries aims to engage Nations as early as possible in projects, before licenses, permits or other formal processes require it. The Company aims to work with Nations to determine interests, needs, and processes appropriate and desired by each Nation so that project work can occur in a way that aligns with Nations' priorities and supports their continued growth < >

5.3 Provincial Government Engagement

BC Ferries has engaged representatives of the provincial government on a number of occasions to discuss the Program. < > BC Ferries has also provided extensive Program information to senior staff within the Ministry of Transportation and Infrastructure, EMLI, and the Ministry of Jobs, Economic Development and Innovation.

In general, provincial government and public service representatives have been receptive to the Program and its objectives, going so far as to support the implementation of the Program through such initiatives as < > described in section 3.2.4. They have also shown implicit support for the Program through revisions to the Contract that will see adjusted minimum required service levels on Route 24 following the introduction of an Island class vessel on that route.

5.4 Employee Engagement

The Company's workforce planning team works to conduct analysis alongside the Program team to determine workforce needs and timelines associated with recruitment and training. BC Ferries' initial analysis suggests that it will require additional crew as a result of new two-vessel service on Route 6 and various redeployments on other routes. As a result, recruitment will commence within appropriate timeframes to meet operational needs. Recruitment efforts include cross-Canada initiatives, as well as the introduction of qualified seafarers through the Transport Canada Reciprocal Agreement. Once resources are in place, blocks of training will be developed by scheduling and operational training staff within the Company to ensure that sufficient crew are trained and have completed any necessary courses prior to the vessels being put into operations.

At this time, formal union and employee notification has not occurred, but the Company will engage the union appropriately as work progresses to identify and understand future requirements.

Section 6 – Program Governance, Procurement and Implementation

6.1 Program Governance

The Program is being implemented in accordance with BC Ferries' strategic management processes, the *Strategic Plan 2021-2025*, and the *Fleet Master Plan* ("FMP"). The Program was initiated to meet objectives described in the FMP, in accordance with recommendations developed by the Company's Master Planning Working Group and endorsed by the Executive Leadership Team to ensure appropriate oversight of planning processes.

The Program will be divided into two separate but related projects: vessel construction and terminal electrification. Each project will be managed in accordance with BC Ferries' *Project Governance Framework* ("PGF"). This framework provides a disciplined approach for identifying, approving, managing, reporting and delivering projects. It defines key roles and provides principles and guidelines for project governance through the phases of the project / benefits lifecycle. The framework will help to ensure that both projects within IC3TEP meet BC Ferries' functional and business needs and will be delivered effectively and efficiently.

Although each project will have separate project managers and budgets, a single Program Manager will be assigned with responsibility to oversee the purpose and status of the projects within the Program. The Program structure will ensure vessel and terminal considerations are progressed coherently.

Program governance has been structured to avoid duplication and to ensure coordination between the discrete vessel and infrastructure Program elements. In support of this approach, one steering committee, chaired by the Program Manager and including both a Program Owner and executive Program Sponsor, will provide oversight to ensure successful delivery. The Program Steering Committee will review progress and provide guidance through regular meetings. Additional oversight and governance will include monthly internal corporate progress reports provided to the Company's Executive Leadership Team and Program Executive that describe financial status and key risks for each project, in addition to quarterly project update reports to the Board of Directors' Capital Projects Committee.

Change Management

BC Ferries' Board of Directors has approved the Program based upon anticipated scope, schedule and budget objectives that will managed by the respective project managers. Changes to the approved baseline, if any, will be described in Project Amendment Forms in accordance with the PGF, and material changes will be communicated to the Board in accordance with the resolutions passed.

The main contract with the shipyard will deliver a fixed scope at a predetermined schedule and cost, and will be approved by the President & CEO once Commissioner approvals are secured. BC Ferries will implement a change order management process in accordance with the terms of the standard shipbuilding contract, and all changes will be explained to the Steering Committee for transparency. Project managers will have authority to implement minor changes within a predefined expenditure limit, and without impacting contractual milestones. Change orders of greater value will be authorized by the Executive Director, Shipbuilding, or by the President & CEO depending upon value. As necessary, project contingency will be used to manage change orders in accordance with guidelines established in the PGF. Any use of contingency will be reported to the Board.

BC Ferries has also implemented a process to manage and ensure identicality among vessels. The Identicality Deviation Request ("IDR") process tracks any changes required on a vessel that would result in one vessel being delivered in a state that is not identical to other vessels in the class. Each IDR describes the rationale and impact for the change that results in non-identicality, and is authorized by either the Program Owner or the President & CEO before it is implemented.

6.2 Procurement

6.2.1 Procurement Process

The procurement activities for the vessel and terminal electrification projects under this Program will be managed under separate processes and contracts. As discussed in section 6.1, Program governance has been structured with a single Program Manager and one steering committee, enabling common oversight of procurement processes for both vessels and terminals.

Vessel Construction

The procurement process for the vessel construction will be similar in structure to what was performed for the procurement of earlier phases of Island class vessels, including a competitive process to identify the single shipyard that will offer best value for the Company, and with whom BC Ferries will sign contracts for each of the new vessels. The approach of running a competitive RFP is consistent with BC Ferries previous vessel procurement projects and has been proven to be successful.

The Phase 3 ships will be virtually identical to the first six Island class vessels, except for the addition of the electrification equipment, and minor modifications to enhance efficiency and maintainability. The technical specifications for these vessels are already available, and a detailed design for the vessel electrification was completed in the Spring of 2022. As a result, a complete package is readily available to support a shipyard RFP.

As noted in section 3.2.1, the Company's RFPQ process was completed in December 2022. As a result of that process, a number of shipyards were prequalified to provide offers to build the

Phase 3 vessels. < > Each of the prequalified shipyards was visited by a team of BC Ferries shipbuilding experts in the Spring 2023 to confirm their capabilities and verify each as viable proponents.

The Company intends to issue design-build-deliver contracts to a single shipyard for each of the four plug-in hybrid Island class vessels to be built. BC Ferries' use of design-build-deliver contracts centralizes responsibility and accountability for vessel delivery, transferring such risks as vessel performance and cost uncertainty to the shipyard and providing predictable outcomes for the Company.

The procurement RFP was released to the prequalified shipyards in September 2023. The use of an international RFP will ensure that the Company understands the true market price of the new vessels. The RFP will be active at the same time that this Application has been submitted, in order to reduce the timeframe between approval and contract, and to partially mitigate the risk of changes in shipyard pricing due to short validity periods in their price offers. Following RFP closure (and subject to approval by the Commissioner of this Application), BC Ferries will evaluate all responses and determine the single shipyard proponent offering the best overall value for the Company. Contracts will then be finalized and awarded and the vessels will be built and delivered to BC Ferries. The vessel delivery, either by semi-submersible vessel or on their own-keel, will be the responsibility of the shipyard, with the delivery method to be discussed and agreed prior to contract award.

Terminal Infrastructure Modifications

The terminal modifications portion of this Program will follow a typical procurement process for BC Ferries terminal projects. The Company expects to use a design-bid-build process, where full detailed design is to be completed and the construction scope(s) are then put out for public competitive construction bids.

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6.2.2 In-service Dates

The Program is expected to involve multiple assets that will be brought into service at differing times. In-service dates for the Program's vessel construction and terminal electrification infrastructure projects are anticipated as follows:

	Terminals	Vessels
Start Date[16]	December 2020	January 2022
Available for Use Date	December 2025	May 2027
Closeout Date	May 2026	November 2027

The following table summarizes anticipated major Program milestones. Following contract award and throughout implementation, dates will be tracked and updated as necessary, with progress and any changes reported regularly to the Program Steering Committee. < > This consideration will be addressed as part of the shipyard selection process.

Milestone Forecast: Island Class Phase 3 & Terminal Electrification Program	
Activity	**Timeframe**
Shipyard Design-Build RFP	September – November 2023
Section 55 Approval	November 2023
Shipyard Design-Build Contract	January 2024
Terminal Detail Design Complete	April 2024
Vessel Detail Design Complete	July 2024
Terminal Electrification Contract	July 2024
BC Hydro Design Work Complete	December 2024
Electrified Terminals Ready	December 2025
New Vessel Delivery in Victoria	Island Class 7: July 2026 Island Class 8: September 2026 Island Class 9: November 2026 Island Class 10: January 2027
New Vessels In Service	Island Class 7: November 2026 Island Class 8: January 2027 Island Class 9: March 2027 Island Class 10: May 2027
Program Closed	November 2027

The schedules developed by the terminal and vessel project managers show that, in general, the shipbuilding program is expected to take longer than the terminal construction work. Critical milestones for terminal work, including completion of terminal detail design, completion of BC Hydro upgrades, or contract award for terminal development, will be monitored and

[16] Work for both of the projects has already started. For the terminals project, pre-implementation work began in late 2020 with preliminary concept studies, and has now moved to include basic design work. Detailed design for the terminals is now underway. For the vessels project, work began in early 2022 to investigate potential design changes to the Island class, including revisions to the underwater hull form.

controlled by the terminal project manager; however, delays in achieving these milestones can be largely mitigated by the fact that electrified vessels will not be expected to arrive on these routes until later dates. In the unlikely event that the vessels are delivered before the terminal electrification upgrades have been completed, the vessels will be able to enter service operating on their diesel engines until the terminal infrastructure upgrades are completed.

The key milestones for the vessel project are primarily linked to the shipyard design-build contract, which the Company intends to sign by January 2024. This critical milestone will have a tremendous impact on the rest of the Program because it will establish the actual dates for vessel delivery based upon the capabilities of the shipyard selected to do the work.

The anticipated shipbuilding contract will include essential milestone events on fixed dates that must be achieved, and which will be contractually enforceable through damages payable to BC Ferries in the event of delays. Milestone events will include such key activities as keel laying, vessel launch, vessel acceptance and guaranteed dates for delivery in Canada of each vessel.

For the combined terminal and vessel Program, a delay to the overall in-service dates will push back the date at which BC Ferries will start to accrue benefits from the Program, including Island class electrification and vessel redeployments. Both the terminal and vessel projects must be completed before the significant environmental and ongoing financial benefits of electrification will be realized. < >

See section 3.7.1 for a discussion of the risks associated with schedule delays.

6.3 Permits and Approvals

The new terminal infrastructure at the four proposed locations will require permits and approvals from various municipalities and government agencies. Once the designs are completed and the construction schedule is finalized, the project team will approach the agencies to work through each approval process. See section 3.7.1 for a discussion of the risks associated with permitting.

Section 7 - Conclusion

In accordance with section 55(2) of the Act, BC Ferries respectfully requests the Commissioner's approval for a major capital expenditure for the Island Class Phase 3 and Terminal Electrification Program with a managed budget of $< >, or $< > inclusive of IDC. The managed budget consists of $< > in BC Ferries' Capital funds and $< > in operating funds.

BC Ferries submits that this Program expenditure is reasonable, affordable, prudent and consistent with the Company's 12-year capital plan and the Contract. The Program is in the public interest as it will support coastal ferry service remains safe, reliable and affordable. By ensuring the Company pays market price for the vessels and by taking advantage of funding opportunities, it could not reasonably be considered excessive. Through vessel standardization and the careful assignment of vessels, it shows a wise use of resources that will enable the Company to meet or exceed its obligations under the Contract. In addition, it supports community expectations and Company aspirations to increase much needed capacity on several inter island routes, and to continue fleet renewal by replacing assets nearing their end of life. The Program will also advance BC Ferries' sustainability goals by decarbonizing two routes, providing clean and more environmentally sustainable marine transportation to and from coastal communities in BC.

Appendix 'A' – Section 55 Question Cross-Reference

The following itemizes responses to questions in "*Guidelines for British Columbia Ferry Services Inc. For Applications under Section 55 of the Coastal Ferry Act*" dated July 19, 2023.

Commissioner Determinations

IC3TEP: Commissioner Determinations	Response Location
a. Is the proposed project reasonably required?	*Section 2.2*
b. Does the proposed capital expenditure demonstrate good judgment, based on wisdom, experience and good sense?	*Section 2.4*
i) Does the proposed capital expenditure indicate a wise use of resources?	*Section 2.4.3*
ii) Does the proposed capital expenditure show due consideration for the future?	*Section 2.4*
iii) Has it been demonstrated that the proposed capital expenditure would not reasonably be considered excessive?	*Section 2.4*
c. Does the proposed capital expenditure provide good value, at a moderate and fair price? Is it affordable i.e., how does the project impact price caps in the current performance term and beyond?	*Section 2.5.2 & 3.6*
d. Is the proposed capital expenditure provided for in a board approved capital plan? i) Is the total cost different in any respect from what was approved in the most recent capital plan?	*Section 2.5.1 & 2.5.2*
ii) Is the total cost different in any respect from what was indicated in the BC Ferries' last submission to	*Section 3.6*

IC3TEP: Commissioner Determinations	Response Location
the Commissioner for price cap setting purposes?	
iii) Does the scope of the proposed capital expenditure differ in any respect from what was approved in the most recent capital plan approved by the Board?	*Section 2.5.1 & 2.5.2*
e. Is the proposed capital expenditure consistent with the current Coastal Ferry Services Contract?	*Section 4.4*
f. Is the proposed capital expenditure consistent with any government long term vision for the future of coastal ferry services?	*Section 4.4*
g. Is the proposed capital expenditure in the public interest? Specifically, does the capital expenditure ensure, or enhance, a ferry service that remains safe, reliable and affordable?	*Section 4.5*
h. Does the capital expenditure contribute to reduction in GHG emissions?	*Section 4.3.5*

Project Overview and Rationale

Demonstrate why the capital expenditure is necessary and why it is prioritised at this time and that the project aligns with the long-term vision and capital plan for the ferry system.

IC3TEP: Section 55 Question	Response Location
1. Overview of the proposed project	
a. Provide a summary of the project including the individual elements.	*Section 2.2*
2. Project Rationale	
a. Describe the reason(s) for the project and what issues, opportunities and/or deficiencies it will address.	*Section 2.4*
b. Describe how the project is prioritized in relation to other capital projects.	*Section 2.5.1*

IC3TEP: Section 55 Question	Response Location
c. Detail the consequences of delaying or not completing the project.	*This is Option 0; section 3.1.1*
d. Demonstrate that the project is consistent with the most current long-term capital plan established by BC Ferries.	*Section 2.5*
e. Demonstrate that the project has Board approval.	*Section 2.5.1*
f. Describe how the project is consistent with the current Coastal Ferry Services Contract and the provincial vision for coastal ferry services.	*Section 4.4*
3. Options	
a. Describe a full range of options and in doing so, explain:	*Section 3.1 & 3.4*
i. If the need can be met without a new capital spend;	*Section 3.1.1*
ii. If the existing asset can be better utilized or managed to reduce or limit the capital spend; or	*Section 2.4.3 & Appendix 'C'*
iii. If the need can be fully or partially met in an alternative way	*This is Option 0; section 3.1.1*
b. Demonstrate that all viable options have been considered.	*Section 3.1 & Appendix 'G'*

Options Analysis

Demonstrate that a thorough analysis of the financial impacts and well as non-financial impacts, such as customer service, environmental and social impacts, quantified where possible, of each of the options has been undertaken to clearly demonstrate the reasons for the preferred option.

IC3TEP: Section 55 Question	Response Location
1. Financial Analysis	
a. Capital cost estimates by year.	*Appendix 'H' & Supplemental Information*
b. Incremental (or reduced) operating costs by year.	*Section 3.3*
c. Incremental (or reduced) revenues by year.	*Section 3.3.3*
d. Details of how capital and operating cost estimates and revenue estimates were developed.	*Section 3.3*
e. Details of how the contingency amounts were developed.	*Section 3.2*
f. A net present value (NPV) analysis on a lifecycle basis comparing the options	*Appendix 'I'*
g. Details of the rationale for the discount rate.	*Appendix 'I'*
h. Sensitivity analysis of key drivers as applicable, e.g., discount rate, inflation rate, capital expenditures, operating costs and revenues.	*Appendix 'I'*
i. Total project budget for the preferred option including IDC, contingency and risk premium.	*Section 3.2*
2. Risk Analysis	
a. Details on the risk assessment approach. Demonstrating how the risk analysis has been incorporated into the capital cost estimates.	*Section 3.7*
b. Risk identification and mitigation including the following elements: i. A risk register with mitigation identifies in managing significant risks. ii. Risks organized by stages of the project: planning, procurement, execution and post execution.	*Section 3.7 & Appendix 'L'*

IC3TEP: Section 55 Question	Response Location
iii. Risk quantification based in the likelihood and consequence of the risk occurring. iv. Assessment of how risks are retained, shared and transferred contractually. v. The quantified risks, as appropriate, should be mapped onto the contingency budget.	
3. Customer impact:	
a. An analysis of how the proposed project will impact customers, now and in the future. i. Vehicles ii. Foot passengers iii. Cyclists iv. Individuals with limited mobility and other accommodation needs v. Commercials traffic	*Section 4.1.1*
b. Impact on servicing future demand.	*Section 2.4.1*
4. Innovation and Standardization impacts:	
a. Details of any innovative or untried concepts and associated benefits and risks.	*Section 3.7, 4.2 & Appendix 'L'*
b. Details of any new technologies included in the proposal.	*Section 2.2 & 3.2.3*
c. Where applicable, details of how the proposal contributes to standardization of assets.	*Section 4.2*
5. Environmental impacts:	
a. Demonstrate how the options align with BC Ferries' Clean Futures Plan.	*Section 2.4.4 & 4.3.1*
b. If applicable, provide details of alignment with federal and provincial climate change mitigation and adaptation goals.	*Section 4.3.2*
c. Describe how each of the options achieve: i. Reduction in GHG emissions ii. Reduction in energy consumption	*Section 4.3.3, 4.3.4 & 4.3.5*
d. Where applicable, describe mitigation measures to minimize any environmental effects.	*Section 4.3.6*

IC3TEP: Section 55 Question	Response Location
6. Social/Community impacts	
a. Where applicable, describe how the options will impact directly affected communities and First Nations.	*Section 5.2*
b. Describe mitigation measures to minimize any potential impact to communities and First Nations.	*Section 5.2*
7. Public interest	
a. Describe how the project is in the public interest.	*Section 4.5*

Stakeholder Engagement

Demonstrate that thorough and genuine engagement was undertaken with stakeholders affected by the project.

IC3TEP: Section 55 Question	Response Location
1. Details of engagement with stakeholders that are affected by the proposed capital expenditure. Example of stakeholders, depending on the project: a. Employees b. Ferry Advisory Committees c. Local affected communities d. Customers e. Local First nations f. Transit authorities g. Commercial transportation and good suppliers h. Tourism associations	*Section 5*
2. Describe whether the provincial government has been apprised of or consulted on the proposed project.	*Section 5.3*

Project Governance, Procurement and Implementation

Demonstrate that there is an appropriate project governance process and oversight in place for procurement and implementation of the project.

IC3TEP: Section 55 Question	Response Location
1. Details of the procurement process including a rationale for why the particular methodology was selected.	*Section 6.2.1*
2. Details of project governance and oversight structure, reporting procedures and implementation monitoring. Where applicable, include performance measures to monitor that the project meets its objectives.	*Section 6.1*
3. In-Service Date	*Section 6.2.2*
a. Provide details of the impact on current operations.	*N/A*
b. Provide the anticipated date on which the asset or project will come into service.	*Section 6.2.2*
c. Provide information on the confidence of the in-service date and any consequences of delay.	*Section 6.2.2*
d. Provide details of the contingency plans should the project be delayed.	*Section 6.2.2*

Appendix 'B' – Affected Minor Routes

The following routes and terminals currently have Island class vessels in operation:

- Route 18: Powell River / Texada Island;
- Route 19: Nanaimo Harbour / Gabriola Island;
- Route 23: Campbell River / Quadra Island; and
- Route 25: Port McNeill / Alert Bay / Sointula.

The following routes and terminals will be affected by the Program:

- Route 6: Crofton / Salt Spring Island;
- Route 19: Nanaimo Harbour / Gabriola Island;
- Route 22: Denman Island / Hornby Island;
- Route 23: Campbell River / Quadra Island; and
- Route 24: Quadra Island / Cortes Island.

The Company could augment capacity for the following route by vessel redeployment made possible by the Program:

- Route 4: Swartz Bay / Salt Spring Island

Additional routes and terminals will eventually be served by Island class vessels, as described in BC Ferries' *Fleet Master Plan*.

Appendix 'C' – System Capacity Review

In anticipation of its Performance Term Six submission, the Company conducted a system capacity assessment to forecast PT6 traffic demand.[17] The system capacity assessment showed that service on some inter-island routes is maximized at today's service levels and that further increases in demand cannot be supported with existing assets. BC Ferries operates a number of inter-island routes around Vancouver Island on which capacity is constrained, as shown in the map below:

Capacity Constraints on Inter-Island BC Ferries Routes

BC Ferries' experience on inter-island routes is that operational performance and customer satisfaction decrease as available seasonal capacity dips below 30 percent overall. This is in part because demand is not spread equally across the day, and the majority of the travel demand occurs within an approximate 10 – 12 hour window each day, concentrating and exacerbating the capacity problem. Although the very early morning and very late evening sailings are important connections for island communities, they tend to have higher available capacity / lower utilization. Constraints are therefore not only seasonal, but can also occur year round at certain times of day. In short, service demands cannot be

[17] As part of ongoing planning efforts to inform asset deployment and replacement decisions, BC Ferries conducts studies of route-specific needs, assessing a number of key metrics: available capacity, on time performance, fleet reliability, overloaded sailings (passengers and vehicles), Experience™ Card usage, and customer feedback and service considerations. Available capacity is a key indicator of customer satisfaction and is the focus of such system assessments.

met by the capacity of the Company's existing vessels and this leads to operational and customer service challenges including:

- Overloaded and missed sailings (i.e., vehicles and / or passengers unable to load due to full vessels and are left behind);
- Delayed sailings (i.e., vessels falling behind the posted schedule);
- Longer overall travel time for customers who must arrive earlier, or wait for the next available vessel sailing; and
- Pressure on community and terminal infrastructure, since in most of the smaller island terminals there is insufficient holding capacity to support waiting passengers and vehicles.

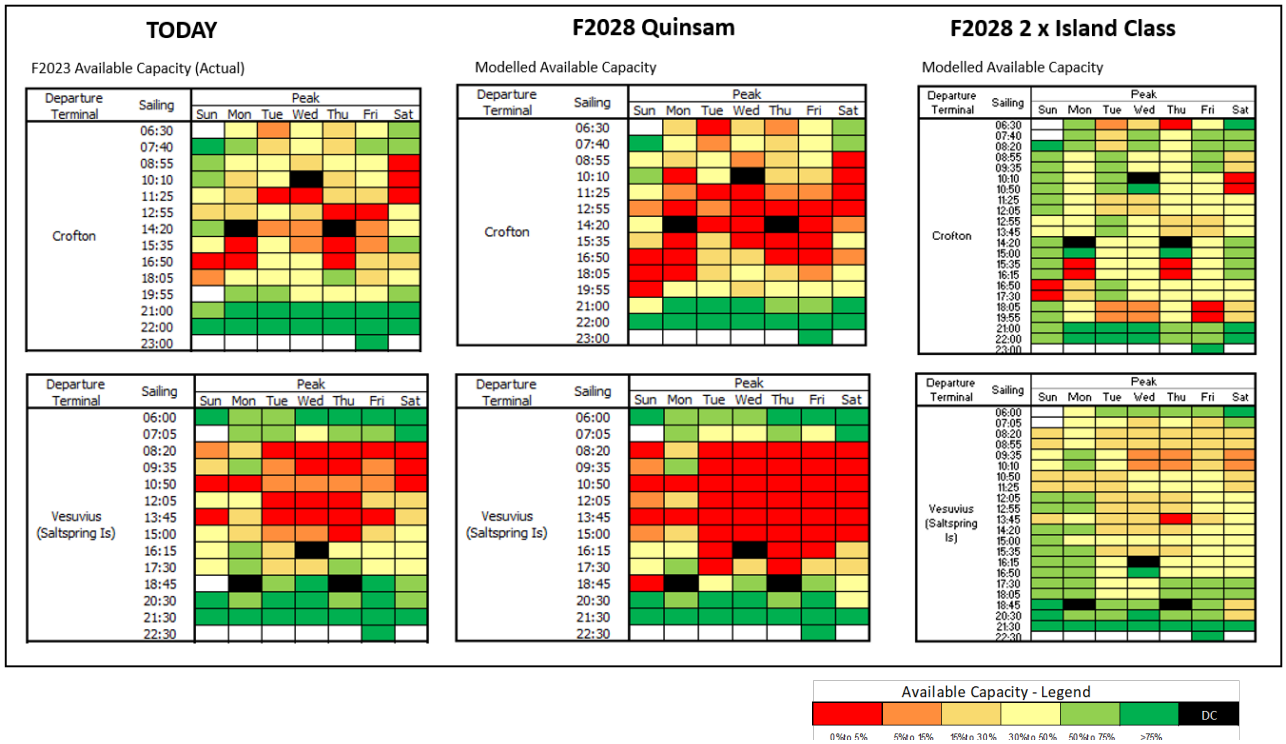
The Program aims to directly resolve the constrained capacity challenges on Routes 6, 22 and 24, with an opportunity to provide seasonal enhancement on Route 4. In particular, the Company's traffic demand analysis confirms that the procurement of Island class vessels will be sufficient to meet the current and forecast traffic on Routes 6 and 24, and the redeployment of the *Quinitsa* year-round will provide sufficient capacity to meet the current and forecast traffic on Route 22.[18]

Details specific to each route affected by the Program are provided below:

Route 6 – Vancouver Island (Crofton) to Salt Spring Island (Vesuvius)

The issue of constrained capacity on Route 6 is demonstrated in the following 'heat map,' which illustrates current and future available vessel capacity based on departure time and terminal for a sample week in the peak season:

[18] The route specific analysis and the heat maps discussed in this Appendix are aligned with the traffic growth projections that BC Ferries developed for the Performance Term 6 submission. These system wide traffic forecasts have been reviewed independently by InterVISTAS as well as the Commissioner's consultant Deloitte (see Appendix 'J').



The heat map shows that two-ship service on Route 6 provides a viable means to address capacity shortfalls, and particularly time-of-day capacity demands that cannot be met by a single larger vessel. In addition to a direct increase of ~20 percent in capacity[19] on the route that will meet both current and forecast future peak demand, additional benefits of two-ship service are expected to include:

- Addressing customers' preference of frequency rather than capacity on commuter routes, including:
    - More scheduled sailings providing flexibility with shorter wait times;
    - More commuter sailings, with more capacity provided specifically at peak travel hours when needed, and with fewer sailings at either end of the day;
    - Greater foot passenger capacity and crossing frequency which supports transit usage;
- Ability to provide transportation service in the event of a breakdown of one vessel;
- Improved OTP with a reduction in overloaded sailings;
- Flexibility to adjust service levels to meet changing demand; and

[19] Capacity in this context is expressed in terms of number of AEQ-crossings per year.

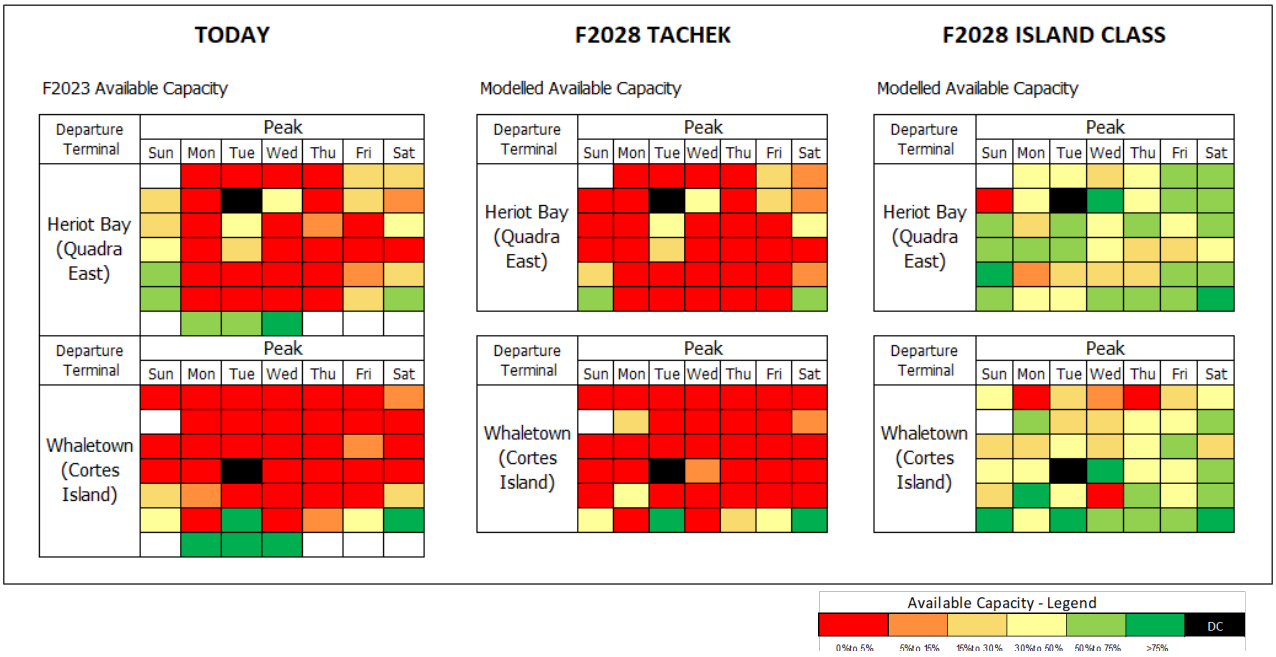
- Through more frequent sailings, allowing traffic to be marshalled in smaller 'surges' with less impact on community infrastructure, and with smaller, more efficient vessel discharges into communities.

The Company believes that service on Route 6 with two Island class vessels would be sufficient to carry forecast demand for the foreseeable future:

- Based on a review of the daily loaded AEQs on Route 6 in fiscal 2023, two Island class vessels would carry the per sailing traffic volumes (without a sailing wait) 97 percent of the time in peak season and 99 percent of the time year-round.
- BC Ferries' traffic forecasts suggests that traffic growth on Route 6 will be approximately 0.3 to 0.5 percent annually. In fiscal years 2028 (in-service date) and 2039 (10 years post in-service date) the percentage of sailings where the traffic volumes would be carried by an Island class vessel ranges between 94 to 96 percent in the peak season and 97 to 98 percent year-round.
- Further, if growth exceeds the forecast, capacity can be added through additional sailings of the second Island class vessel.

Route 24 – Quadra Island (Heriot Bay) to Cortes Island (Whaletown)

The issue of reduced available capacity is illustrated in the heat map below:



The numerous consecutive sailings at full capacity underscores the significance of the capacity problem on Route 24. With the replacement of the *Tachek* (26 AEQ) by an Island class vessel (47 AEQ), capacity

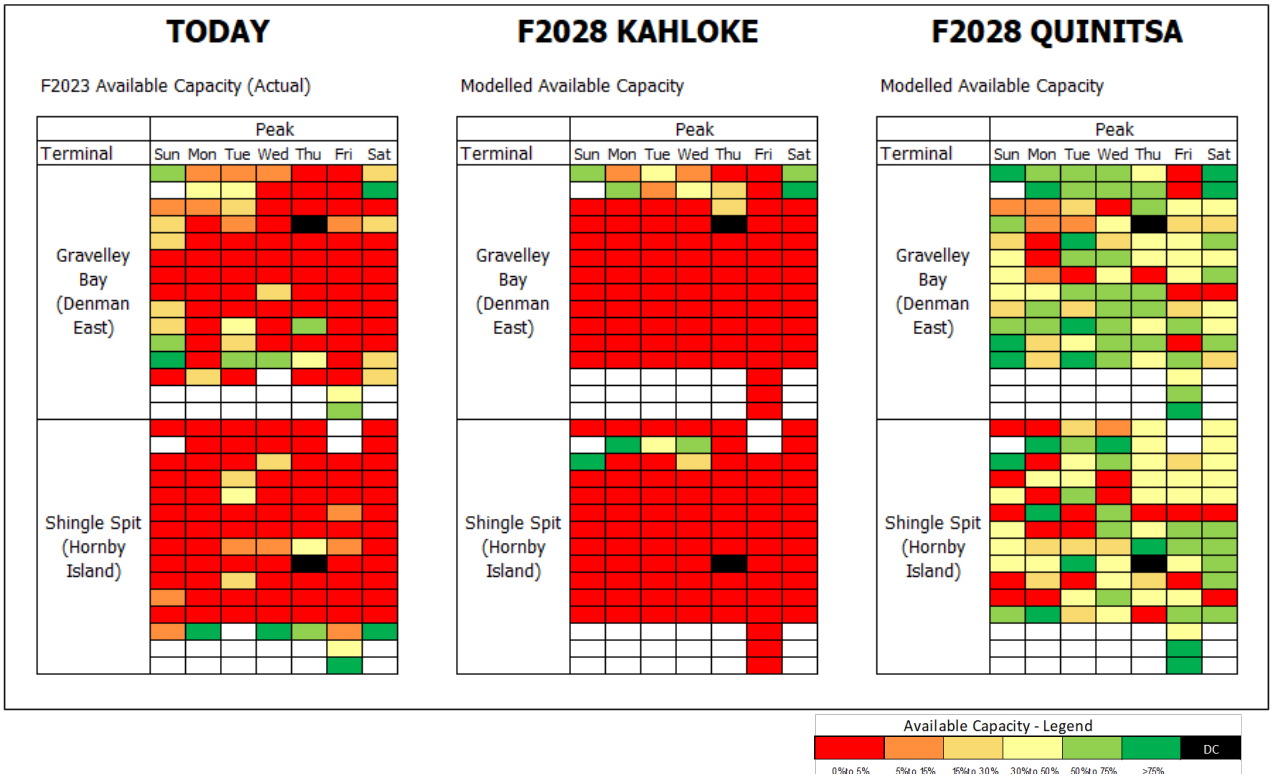
on the route would be increased by ~70 percent, while allowing the Company to address the current and future demand with one fewer round-trip per day (in peak from seven to six round trips).

The Company believes that an Island class vessel would be sufficient to carry forecast demand on Route 24 for the foreseeable future:

- Based on a review of the daily loaded AEQs on Route 24 in fiscal 2023, an Island class vessel would carry the per sailing traffic volumes (without a sailing wait) 99 percent of the time in both the peak season and year-round.
- BC Ferries' traffic forecasts suggests that traffic growth on Route 24 will be approximately 0.5 to 0.78 percent annually. In fiscal years 2028 (in-service date) and 2039 (10 years post in-service date) the percentage sailings where the traffic volumes would be carried by an Island class vessel is 98 percent in the peak and 99 percent year-round.

Route 22 – Denman Island (Gravelly Bay) to Hornby Island (Shingle Spit)

Although the Program will not deliver a new Island class vessel for Route 22, it will enable redeployment of existing vessels. The relief vessel *Quinitsa* (44 AEQ), which currently serves Route 22 only during the peak season, will be deployed year-round on the route, replacing the *Kahloke* (21 AEQ). This will double the capacity on the route and improve travel for larger commercial vehicles during the off-peak season. The following heat map shows the issue of reduced capacity on Route 22 and how it is addressed with the *Quinitsa*:



The Company believes that the *Quinitsa* will be sufficient to carry forecast traffic demand on Route 22 for the foreseeable future:

- Based on a review of the daily loaded AEQ on Route 22 in fiscal 2023, the *Quinitsa* would carry the per sailing traffic volumes (without a sailing wait) 95 percent of the time in the peak and 98 percent of the time year-round.

- BC Ferries' traffic forecasts suggests that traffic growth on Route 22 will be approximately -0.22 to 0.5 percent annually. In fiscal years 2028 (in-service date) and 2039 (10 years post in-service date) the percentage of times per sailing the traffic volumes would be carried by the *Quinitsa* is 95 percent in the peak and 98 percent year-round.

Route 4 – Vancouver Island (Swartz Bay) to Salt Spring Island (Fulford Harbour)

Similar to Routes 6, 22 and 24, Route 4 also experiences periods throughout the week, and particularly during the peak summer season, when demand for travel exceeds available capacity. While the Company has not made a final determination as to cost and feasibility, it is noted that the new Island class vessels will present an opportunity to redeploy a vessel seasonally to address the challenges of peak season demand on Route 4. Specifically, this route potentially could be enhanced with seasonal deployment of the *Quinsam* (63 AEQ) to supplement the service already provided by the *Skeena Queen* (91 AEQ).

Of note, while both Routes 4 and 6 provide service between Vancouver Island and Salt Spring Island, because the demand on both routes is high at similar times of the day, it is not expected that a service enhancement on Route 6 would alleviate the capacity constraints on Route 4.

Appendix 'D' – *Quadra Queen II* History

The *Quadra Queen II* was built by Allied Shipbuilders Ltd. in Vancouver in 1969, and first entered service on the route connecting Campbell River and Quadra Island (Route 23). By 1980, peak season demand on the route was so high that the *Tachek* was added to supplement the service provided by the *Quadra Queen II*. In the early 1990's, the *Quadra Queen II* was redeployed onto the route connecting Port McNeill with Alert Bay and Sointula (Route 25) where it remained until 2020 when it was replaced by the *Island Aurora*. The *Quadra Queen II* now serves as a refit relief vessel for a number of inter-island routes.

The *Quadra Queen II* is a T-Class vessel (with *Tenaka*, retired in 2015, and the *Tachek*). It has been extensively modified since construction and in 2010-2011, it underwent an extensive 15-year life extension project that included a number of condition based engineering upgrades, regulatory work to address minimum safe manning requirements and performance upgrades.

Some of the vessel's major milestones are set out below:

Year	Milestone
1969	Vessel Launched
1969	Entered service across Discovery Passage between Quathiaski Cove on Quadra Island and Campbell River on Vancouver Island
1976	Buoyancy pods were added to the Quadra Queen II
1980	*Quadra Queen II* re-engined from Ruston-Hornsby to Caterpillar
Early 1990's	Redeployed to service Route 25 Port McNeill, Alert Bay, Sointula
2011	Life Extension Project
2020 - Present	Redeployed to refit relief role with the introduction of the Island Aurora on Route 25

Vessel Operating Characteristics

The operating characteristics and the on-board amenities of the *Quadra Queen II* are summarized below:

Quadra Queen II	
Overall Length:	49.61m (162.8')
Maximum Displacement:	819 tonnes
Car Capacity (AEQ):	26
Passenger & Crew Capacity (maximum):	150
Maximum Speed:	12.0 knots
Horsepower:	1,710
Amenities:	Accessible car deck lounge with washrooms, passenger lounge with washrooms & vending

Vessel Reliability

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 that the vessel's service reliability is progressively decreasing despite significant capital and maintenance expenditures. This is an indication that the vessel is near the end of service life.

Fiscal Year	Sailings* Cancelled for Mechanical Reasons	# of Sailings Provided
2020	48	2,093
2021	9	3,869
2022	2	671
2023	2	1,711

* A 'sailing' represents a ferry transit from one terminal to another, as opposed to a 'round trip,' which generally means a full route circuit returning to the terminal of origin.

Maintenance and Capital Costs

The table following summarizes historic and forecast refit and maintenance expenditures and capital projects undertaken in respect of the *Quadra Queen II*. The last major upgrade of the *Quadra Queen II* was completed in fiscal 2011. This will enable the vessel to operate through fiscal 2027. At its planned retirement date, the *Quadra Queen II* will be 58 years old.

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Appendix 'E' – *Tachek* History

The *Tachek* (formerly *Texada Queen*) is a T-class vessel. It was built by Vancouver Shipyards Ltd. in 1969 and commenced service between Powell River and Texada Island (Route 18) later that same year. In 2011 -2012, it underwent an extensive 15-year life extension project that included a number of condition based engineering upgrades, regulatory work to address Minimum Safe Manning requirements and performance upgrades. Since July 2014, the *Tachek* has sailed on Route 24.

Some of the vessel's major milestones are set out below:

Year	Milestone
1969	Vessel launched
1969	Began service as *Texada Queen* between Powell River and Texada Island (Route 18)
1977	Renamed to *Tachek*, continued service on Route 18
1979	Redeployed to support refit relief
1980-1990	In addition to refit relief, provided seasonal supplemental service between Quadra Island and Campbell River (Route 23)
2011	Fitted with a sewage holding tank system to comply with *Canada Shipping Act*
2012-2013	Life Extension
2014- Present	Redeployed to replace the retiring *Tenaka* to provide service between Quadra Island and Cortes Island (Route 24)

Vessel Operating Characteristics

The operating characteristics and the on-board amenities of the *Tachek* are summarized below:

Tachek	
Overall Length:	49.53m (162.5')
Maximum Displacement:	772 tonnes
Car Capacity (AEQ):	26
Passenger & Crew Capacity (maximum):	150
Maximum Speed:	12.8 knots
Horsepower:	1,706
Amenities:	Passenger Lounge with washrooms & vending

Vessel Reliability

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 that the vessel's service reliability is progressively decreasing

despite significant capital and maintenance expenditures. This is an indication that the vessel is near the end of service life.

Fiscal Year	Sailings Cancelled for Mechanical Reasons	# of Sailings Provided
2020	2	1,048
2021	0	4,270
2022	32	3,587
2023	2	2,645

Maintenance and Capital Costs

The table following summarizes historic and forecast refit and maintenance expenditures and capital projects undertaken in respect of the *Tachek*. The last major upgrade of the *Tachek* was completed in fiscal 2013. This will enable the vessel to operate through fiscal 2029. At its planned retirement date, the *Tachek* will be 60 years old.

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Appendix 'F' – *Kahloke* History

The *Kahloke* was built by Vancouver Shipyards Ltd. in North Vancouver in 1973 and is one of three sister ships (the others are *Klitsa* and *Kwuna*). The *Kahloke* has spent most of its life providing service to the Chemainus, Thetis, Penelakut, Denman and Hornby island communities, seasonally moving between routes to meet demand.

Some of the vessel's major milestones are set out below:

Year	Milestone
1973	Vessel launched
1973	Entered service between Nanaimo Harbour and Gabriola Island (Route 19)
1978	Redeployed to Route 21 between Denman Island and Vancouver Island
1983	Added capacity in summer between Denman and Hornby Islands (Route 22) and annually returned to Chemainus, Thetis Island and Penelakut Island (Route 20) for the winter
2009	Redeployed to Route 22 year-round
2021	Light ship survey results implemented reducing *Kahloke* weight capacity
2023 - present	Began summer service between Denman Island and Buckley Bay supplementing the *Baynes Sound Connector* and will return to Route 22 for remainder of year

Vessel Operating Characteristics

The operating characteristics and the on-board amenities of the *Kahloke* are summarized below.

Kahloke	
Overall Length:	54.71m (179.5')
Maximum Displacement:	496 tonnes
Car Capacity (AEQ):	21
Passenger & Crew Capacity (maximum):	200
Maximum Speed:	10.0 knots
Horsepower:	800
Amenities:	Accessible car deck lounge with washrooms

Vessel Reliability

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 that the vessel's service reliability is progressively decreasing despite significant capital and maintenance expenditures. This is an indication that the vessel is near the end of service life.

Fiscal Year	Sailings Cancelled for Mechanical Reasons	# of Sailings Provided
2020	0	2,133
2021	40	7,706
2022	10	9,210
2023	20	9,296

Maintenance and Capital Costs

The table following summarizes historic and forecast refit and maintenance expenditures and capital projects undertaken in respect of the *Kahloke*. The *Kahloke* has not undergone a life extension or major overhaul like the *Quadra Queen II* or *Tachek*, though a significant refit occurred in fiscal 2013 and another is scheduled for fiscal 2026. This will enable the vessel to operate through fiscal 2033. At its planned retirement date, the *Kahloke* will be 60 years old.

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Appendix 'G' – Preliminary Options Consideration

During 2020-2023, a variety of possible solutions were considered to achieve increased system capacity and advance Island class electrification. These various analyses provided enough supporting information to enable BC Ferries to identify the necessary scope and options that would be more thoroughly evaluated in a detailed business case. Some of this preliminary work is described at high level below:

1-Ship or 2-Ship Service on Route 6

During winter 2022-23, BC Ferries evaluated vessel replacement options for Route 6, focused on the type of service that would best address the identified capacity constraints and meet the current and future needs of the Salt Spring Island community. In particular, the Company considered whether the route should have one single larger 100 AEQ ferry (Shuttle class vessel,[20]) which would maintain the current round trip frequency, or two smaller Island class vessels (47 AEQ), which would operate with increased frequency during certain times of the day.

The Shuttle class concept was conceived to be optimized for sheltered short distance routes. For these types of routes, it is important to understand the frequency at which sailings are provided during peak demand periods, and the length of operational day inclusive of lower demand periods in the early morning and late evening. Like Routes 19 and 23 prior to the introduction of two ship service, Route 6 is challenged to meet traffic demand during peak travel periods, resulting in an increase in overloaded sailings at certain times of day, and excess capacity at other times. However, because the Shuttle class could provide a significant increase in overall capacity on each crossing, it was evaluated as a possible candidate concept to meet the service requirements on Route 6.

The capital cost to procure a single Shuttle class vessel is expected to be lower than the cost for two Island class vessels. The total capital cost saving for one Shuttle compared to two Island class vessels was estimated in January 2023 to be approximately $< >. Additionally, the annual operating costs for a single larger vessel can be expected to be less than for two Island class vessels: in January 2023, a 50-year NPV analysis for the two options indicated a difference of approximately $< > in favour of the single Shuttle class vessel. However, despite the more favourable financial implications, it was determined that the Shuttle class option would not achieve the Company's objectives as discussed below.

For many reasons, the review showed that the Shuttle class is not an ideal solution for Route 6. Previous analysis conducted for Routes 19 and 23 indicated that vehicle and throughput modelling of a 100 AEQ Shuttle class vessel would require more turnaround time in berth for loading / unloading passengers and vehicles. The longer time would incur consequential changes to important sailing times and

[20] For a description of the notional Shuttle class vessel, see BC Ferries' November 2018 section 55.2 application to the Commissioner: *A Major Capital Expenditure for Four Island Class Vessels and one Salish Class Vessel proposed by British Columbia Ferry Services Inc.* (Orders 19-02, 19-02A and 19-02B).

frequencies, specifically the morning commute, morning school run, afternoon school run and evening commute. These sailing times are aligned to residents' employment and school hours and are of particular importance to the users, and would be challenged by single vessel operating with fewer overall trips. Even with terminal infrastructure investment, due to the size of the vessels and the increased in-port time required to fully load and discharge, it is likely that a Shuttle class vessel on Route 6 would necessitate adverse schedule modifications to attempt to address peak sailing demand across the day. These schedule modifications would increase time between some sailings and potentially impact specific time of day sailings that are of particular importance to the island community.

Other challenges with the Shuttle class option for Route 6 are related to shore-based infrastructure, both in BC Ferries' terminals and in local communities. A larger vessel would introduce a requirement for greater terminal holding capacity to accommodate the vehicle traffic waiting to board a 100 AEQ vessel, incurring a significant terminal investment. Additional investment would be required to accommodate the loading and unloading demands for a 100 AEQ vessel. Similarly, the constraints of limited infrastructure and larger vessel off-loads would negatively impact local community infrastructure, particularly in Vesuvius. Local road infrastructure is not sized or suited to manage a large volume discharge of a 100 AEQ vessel, inevitably resulting in severe traffic congestion and dissatisfaction in the local community.

On short routes such as 6, 19 and 23, communities have indicated a strong preference for a high frequency of service during peak periods as opposed to more capacity at lower frequency. Deploying two Island class vessels to Route 6 would therefore introduce benefits seen as important to the community and the Company, including:

- Providing sufficient capacity to meet current and forecast peak season traffic demand;
- Enabling an increase in scheduled sailing frequency and flexibility, resulting not only in an increase in annual capacity provided but also addressing customer preference for frequency over capacity on commuter routes;
- Allowing for more commuter sailings, with more capacity provided during peak travel hours when needed, and fewer sailings at either end of the day, better matching available capacity with demand set by customer travel patterns;
- Providing for greater foot passenger capacity and frequency of service which supports transit usage;
- Improving customer satisfaction and reduce anxiety associated with lining up and missed sailings;
- Continuing to provide ferry service in the event of a breakdown of one of the vessels; and

- Contributing to the Company's objectives of fleet standardization by enabling flexibility and scalability in vessel scheduling, and a consistent service offering, even during refits.

In addition to the above, the Company expects to be able to build off the success and lessons learned from the introduction of two Island class vessel service on Routes 19 and 23.

BC Ferries therefore decided that a single, larger Shuttle class vessel would not achieve the Company's strategic or operational objectives. In considering the larger Shuttle class vessel, BC Ferries determined that it would likely be unsuccessful in operations due to impacts on community infrastructure and possible risk to schedule adherence and service standards. For this reason the option of a Shuttle class vessel was not supported as viable option and did not form part of the final options analysis conducted in the detailed business case.

Electrification of Routes

BC Ferries already operates the Island class vessels successfully on four routes (18, 19, 23 and 25) using a diesel-electric hybrid configuration from the currently available berths. In 2020, the Company considered a plan to electrify these vessels; however, the capital costs of electrification were significant and were not included in BC Ferries capital plan at the time. Accordingly, the Company determined that electrification could not proceed without significant external funding, such as through a government grant. Throughout 2021 the Company attempted to secure a sizeable financial grant from the Government of Canada, but ultimately was not successful.

As a result, in 2022, the Company reviewed whether to electrify all four of these routes, or to focus initially on a smaller number of routes to enable electrification to proceed at a reduced scope and with reduced capital costs. The analysis compared the cost impacts and benefits of electrifying two, three or four of the existing Island class routes. The table below compares capital costs and GHG reduction for the different options:[21]

Option	**Modify Four Vessels**	**Modify Five Vessels**	**Modify Six Vessels**
Routes	19, 23	18, 19 and 23	18, 29, 23 and 25
# ships / # terminals	4 / 4	5 / 6	6 / 9
Approximate capital cost	$< >	$< >	$< >
GHG saving (tCO_2e / year)	10,015	12,341	16,051
Capital cost / tCO_2e saved / year)	$< >	$< >	$< >

[21] The data in this table varies from details given in section 4.3.5. In 2022, the Company analysis only took into consideration the GHG savings associated with the vessels on those routes that would need to be modified for electrification. The analysis did not consider the GHG impacts associated with deployment and service changes to other routes potentially impacted by the modification options.

The analysis showed that electrifying all four of the original routes was too expensive given constraints on available capital. The analysis also showed that the routes with two ships would achieve a better return (i.e., reduced GHG emissions and fuel savings) on the investment (i.e., the cost of modifying vessels and terminals for all-electric operation.)

It was therefore determined that taking a phased approach, with electrification of only two routes at this time, would be a strategic step to achieve carbon reduction goals, reduce operating costs, and provide clean and more sustainable transportation to and from coastal communities. From this analysis, the Company determined that electrifying Routes 19 and 23 only should be included in the scope of the Program.

Building or Modifying Vessels for Electrification

BC Ferries originally considered modifying the existing Island class vessels for full electrification rather than building fully electrified new vessels with the necessary onboard systems for recharging from ashore. However, the construction of four new Island class vessels would enable BC Ferries to acquire fully electrified vessels as part of the build program more easily than by modifying the existing vessels. Accordingly, in December 2022 and January 2023 the Company compared the options of modifying four existing vessels ("Mod 4") against including electrification systems when building four vessels ("Build 4").

The comparison showed that the cost-per-vessel premium for electrification during a build program is significantly lower for the Build 4 option. Additionally, no suitable relief vessel is presently available to allow BC Ferries to take Island class vessels out of service to implement modifications needed for the Mod 4 option. In order to proceed with Mod 4, BC Ferries would need to reactivate the *Mayne Queen* at significant cost and risk, or delay the Mod 4 option until a relief vessel was built. In either instance, the NPV for the Mod 4 option would be adversely impacted by the present unavailability of suitable relief vessels.

In addition, assuming that new Island class vessels will be approved for construction, it is possible to include integration of the electrified vessels to the shore-based charging station in the scope of Build 4 shipbuilding contracts. By including such integration work in the shipbuilding contract, the Company would adhere to industry best practice by drawing upon the expertise of shipyards and transferring the technical risk of the first of class of electrification to them.

The Company therefore concluded that the Build 4 option is the lowest risk and likely lowest cost overall to achieve the goal of having four electrified Island class vessels available for operation on Routes 19 and 23.

BC Ferries would still have six existing Island class vessels that could be modified for all-electric (recharge from ashore) operations from electrified terminals. The Company intends to further investigate such modifications, drawing upon lessons learned from the IC3TEP.

Appendix 'J' - Independent Validation of Traffic Forecasting Approach and Results

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28 September 2022

Jill Sharland
Interim CEO and Chief Financial Officer
BC Ferry Services Inc.
Suite 500 – 1321 Blanchard Street
Victoria, BC V8W 0B7

Dear Ms. Sharland:

Review of Forecasts Approach for BCFS traffic for Performance Term Six

This letter is in response to your request to review and comment on the general approach being used by BC Ferry Services Inc. (BCFS) to forecast ferry vehicular and passenger traffic for the upcoming Performance Term Six (PT6) Price Cap Review.

Qualifications

Inter*VISTAS* Consulting Inc. is a transportation and tourism consultancy based in Vancouver. We have produced traffic forecasts for a range of transport infrastructure including ferries, airports, maritime, rail and parking. Inter*VISTAS* produced traffic forecasts previously for BCFS, including for Performance Term Three and reviewed the forecasts produced internally by BCFS for Performance Term Four and Performance Term Five. The firm has also produced traffic forecasts for ferry systems in the U.S. and UK.

The review was conducted by Ian Kincaid, Senior Vice President, Forecasting and Economics and Jody Kositsky, Senior Director. Both have worked on the previous forecasting projects for BCFS.

Review of Methodology

The forecasting challenge for BCFS is the same being faced by all transportation modes, and many industries around the world – how to forecast recovery and the future trend following the COVID-19 pandemic. This is not an easy task, as the traffic impacts from the pandemic have been unlike any impacts seen before. While in the past forecasts may have been produced in the context of relatively stable market conditions, the PT6 forecast faces the challenge of pent-up demand, incomplete recovery, and unknown long-term

impacts. Recognizing this difficulty, BCFS chose to utilize a two-step approach, which is a sensible method under the circumstances.

For the short-term fiscal years (FY23-FY24),[1] BCFS focused on developing a baseline for recovery out of the COVID-19 pandemic, focusing on both traffic types and route specific trends pre- and post-COVID. This approach for the short-term is similarly to that used for traffic and demand forecasting in other sectors, such as forecasting air traffic demand. The impact of the pandemic itself and government restrictions mean that the "normal" relationship between traffic and economic drivers has been disrupted and conventional methods are not effective or instructive. Instead, a reasoned approach for traffic development as been applied based on the recovery trend to date and projections for economic recovery in the short term. The assumptions regarding the traffic performance in FY23 and FY24 are plausible, reflecting likely continued recovery, and impacts from a slowing economy (given the higher inflationary situation in Canada).

For the longer-term forecast (the long-range forecast FY25-FY36),[2] BCFS utilized an ordinary least squares (OLS) econometric model to estimate the relationship between traffic and various drivers of traffic demand. This analysis is based on pre-COVID data from January 2001 to January 2020 (monthly data was used). The selected explanatory variables represent a credible mix of drivers of ferry traffic related to fares, gas prices, employment, tourism, house prices and one-off factors (public holidays, extreme weather, Olympics, etc.). Separate analysis was conducted for individual routes or groups of routes and for types of traffic (vehicle passengers, foot passengers, private vehicles). The results of this econometric analysis was then used to forecast future demand over the next 15 years. For some smaller routes/traffic groups, trend analysis was used rather than econometric analysis.

The BCFS forecast report does note an issue with the "endogeneity" of the price and traffic variables (as has been the case for previous forecasts). Endogeneity indicates that the forecasted traffic level is jointly determined with price. This is a well-known issue/problem/challenge in econometric analysis and receives much attention in the classroom and in academic discussions. Regression methods such as OLS (which was used here) may theoretically result in biased coefficients. The BCFS report acknowledges this issue (which was also present in the PT4 and PT5 forecasts) but notes that in practice this could not be addressed for a number of legitimate reasons. One method tested was to use an econometric method know as 2 stage least squares (2SLS), can be used to address this issue, however BCFS was not able to estimate a plausible and robust model due to a common difficultly with the method. As noted by BCFS, fares throughout the sample period were largely determined by the regulator and not tied directly to traffic demand (and therefore, to some degree, can be considered exogenous).

While the PT4 and PT5 forecasts utilized different methodologies than PT6, those forecasts were being used for different purposes, with a focus on short term forecasts that would be more applicable to quarterly revenue projection use. In addition, those forecasts did not have to account for the previously mentioned unprecedented traffic impacts from COVID-19. For PT6,

[1] This covers the remainder of Performance Term Five.
[2] This covers all of Performance Term Six, and 10 years beyond.

BCFS is utilizing Ordinary Least Squares (OLS), which is a commonly used forecasting methodology (and has been used by BCFS in the past). It is a methodology that is better suited to the long-term forecast requested for PT6.

In sum, we find that the methodology used by BCFS for its PT6 forecast is acceptable, commonly used by industry and academic econometricians/statisticians, and suitable for the BCFS case where traffic is still recovering from the impacts of the COVID-19 pandemic, and a more long-term forecast is needed.

Review of the Results

The estimation of the model is well documented by BCFS. They thoroughly discuss the model and provide background information on trends in the key traffic influencers, as well as the impact of the COVID-19 pandemic on traffic. They also document well the forecasts of the key explanatory variables, including retail gas prices, employment, tourism, and housing prices. BCFS provided a clear and broad insight into the key economic and demographic drivers of traffic, considering multiple variables to estimate key drivers (such as the impact of tourism flows versus using exchange rates).

The econometric approach for the long-term forecasts fundamentally assumes that relationship between the drivers of traffic (the explanatory variables) and ferry traffic is broadly unchanged by the pandemic in the long term. We agree with this approach, given the traffic recovery seen to date and observe that this is in line with the forecasting assumptions made in other sectors.

An appropriate set of statistical tests on the estimated models has been conducted. The statistical tests indicate that the models explain historical traffic effectively and the selected explanatory variables are significant to traffic development. In addition, the direction and size of the estimated parameters are plausible. For example, the parameter on fares indicates that traffic is responsive to price, albeit with an inelastic response (an increase or decrease in price would lead to a lower percent increase or decrease in demand). This is consistent with the results from the previous forecasts, as well as other transportation modes.

The resulting forecasts themselves seem reasonable.

- BCFS constructed core traffic forecasts for each of the routes, and presented the results for the major route groups as well as the whole system. The forecasts are split into two components; the near-term remainder of Performance Term Five (based on assumptions on pandemic recovery) and the PT6 forecasts. The method used to align the two forecast periods is also reasonable, with documentation of the issues for some routes that impact only a small portion of traffic in the system.
- Vehicle traffic is overall expected to grow at a higher rate than passenger traffic for the system as whole. The explanation provided by BCFS for this (the slow recovery of bus passengers and competition from other modes) is reasonable, and the forecast is in line with previous forecasts of slow and steady growth.
- The forecast for the Major Routes shows flat passenger traffic but slow and steady private vehicle growth. The explanation provided by BCFS for this (the slow recovery of

bus passengers and competition from other modes) is reasonable, and the forecast is in line with previous forecasts of slow and steady growth for the major routes.

- For the remainder of the routes, a slow and steady to flat passenger and vehicle traffic growth is expected. This is reasonable for the mix of remaining routes, which will be driven largely by tourism and movements in population size.

As noted previously, for some smaller routes, BCFS used a trend analysis. The use of a long-term trend analysis is a reasonable approach considering the modelling challenges for routes with limited traffic levels and service levels. For these routes, the relationship between the key traffic drivers and demand are more difficult to model due to both data availability and limited data points.

To summarise, we find the model results to be reasonable and well documented.

Sincerely,

Jody Kositsky
Senior Director
Inter*VISTAS* Consulting Inc.

Appendix 'K' – Stakeholder Support

The following organizations provided letters to BC Ferries in 2020 and 2021, indicating their preliminary support for electrification of the Island class vessels:

Municipalities and Regional Districts

- Capital Regional District
- Nanaimo Regional District
- Island Trust Council
- Regional District Mount Waddington – Electoral District A
- qathet Regional District
- qathet Texada Regional Electoral District
- City of Nanaimo
- City of Campbell River
- City of Powell River
- Village of Alert Bay

First Nations

- We Wai Kai First Nation
- Wei Wai Kum First Nation
- 'Namgis First Nation
- Tla'amin Nation

Ferry Advisory Committees

- Alert Bay, Sointula, Port McNeill – Route 25
- Powell River, Texada Island – Route 18
- Nanaimo, Gabriola Island – Route 19
- Campbell River, Cortes Island – Route 23
- Vesuvius Bay, Crofton (Salt Spring Island) – Route 6
- Quadra Island, Cortes Island – Route 24
- Chemainus, Thetis Island, Penelakut Island - Route 20
- Denman Island, Hornby Island – Route 22

Business

- Corvus Energy
- Ralmax Group of Companies (Point Hope Shipyard)

Non-Government Organizations

- Green Marine
- Ocean Networks Canada
- WWF-Canada

Training Institutions

- British Columbia Institute of Technology (BCIT)
- Camosun College
- Simon Fraser University (SFU)

Industry Associations

- Vancouver Island Economic Alliance (VIEA)
- South Island Prosperity Partnership (SIPP)
- Association of British Columbia Marine Industries (ABCMI)
- Victoria Chamber of Commerce
- Parksville Chamber of Commerce
- Qualicum Chamber of Commerce
- Westshore Chamber of Commerce
- Discovery Islands Chamber of Commerce
- Tourism Vancouver Island
- Parksville Qualicum Tourism Association
- Innovation Norway
- Salt Spring Community Energy Society
- Transition Salt Spring

Port Authorities

- Nanaimo Port Authority
- Vancouver Fraser Port Authority
- Victoria Harbour Authority