



BRITISH COLUMBIA
FERRY COMMISSION
ORDER NUMBER: 14-03

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IN THE MATTER OF

A Major Capital Expenditure for
Mid-Life Upgrades to the Spirit Class Vessels
Proposed by British Columbia Ferry Services Inc
Pursuant to Section 55 (2) of the *Coastal Ferry Act*

BEFORE: Gordon Macatee, BC Ferries Commissioner
Sheldon Stoilen, BC Ferries Deputy Commissioner

ORDER

WHEREAS:

- A. On September 22, 2014, British Columbia Ferry Services Inc. (“BC Ferries”) submitted an application (the “Application”) under section 55(2) of the *Coastal Ferry Act* (the “Act”) seeking the commissioner’s approval of the proposed major capital expenditures for the mid-life upgrade projects (“Mid-Life Upgrades”) for the two Spirit Class Vessels, the Spirit of British Columbia and the Spirit of Vancouver Island, that both operate on Route 1 (Tsawwassen to Swartz Bay);
- B. BC Ferries states in the Application that with the Mid-Life Upgrades it “plans to upgrade the S Class vessels to convert the propulsion systems to dual fuel technology to enable the vessels to operate on lower-cost liquefied natural gas (“LNG”); implement modifications which are expected to reduce fuel consumption and increase ancillary revenue from catering and retail services; renew end-of-life systems; and address regulatory requirements, in the absence of which the vessels will not be able to continue to operate. Through resulting lower fuel and maintenance

costs and enhanced revenue from ancillary services, this Project will reduce the pressure on fares across the coastal ferry system”;

C. Section 55 of the Act governs the commissioner’s consideration of capital deployment and major capital expenditures of ferry operators as follows:

- (1) Subject to subsections (2) to (5), before deploying capital assets on, or incurring capital expenditures in connection with, a designated ferry route or terminal, the ferry operator may apply to the commissioner and the commissioner must, within one month after the application, declare whether the capital assets proposed to be deployed on, or the capital expenditures proposed to be incurred in connection with, the designated ferry route or terminal are reasonably required;
- (2) A ferry operator must not incur a major capital expenditure without first obtaining the commissioner's approval of the expenditure;
- (3) A ferry operator may apply to the commissioner for approval of a proposed major capital expenditure and the commissioner must respond to the application within 2 months after its receipt by the commissioner;
- (4) The commissioner may approve a proposed major capital expenditure if the proposed major capital expenditure is:
 - a) reasonable,
 - b) prudent, and
 - c) consistent with:
 - (i) the current Coastal Ferry Services Contract, and
 - (ii) any long term capital plan established by the ferry operator;
- (5) For the purposes of this section, a capital expenditure of a ferry operator is a major capital expenditure if it meets the criteria:
 - a) established from time to time by the commissioner, and
 - b) most recently provided by the commissioner to the ferry operator;

- D. Pursuant to section 55(5) of the Act, the commissioner established the criteria of a major capital expenditure by issuing Order 12-04 dated September 30, 2012 which defines a major capital expenditure as any capital expenditure which exceeds \$30 million, inclusive of component programs and interest during construction, and irrespective of the level of expenditure, any new vessel or terminal and any vessel life extension which extends the life of the vessel more than five years;
- E. Upon receipt of the Application, the commissioner issued a public notice in relevant media inviting comments or submissions regarding BC Ferries' proposed major capital expenditures for the Mid-Life Upgrades to the Spirit Class vessels;
- F. The commissioner and the deputy commissioner (the "commissioners") have reviewed and considered the Application, together with the report prepared for the commissioners by qualified independent consultants and the comments received from the public;
- G. The commissioners have summarized their findings and reasons in the attached Review;
- H. The commissioners are satisfied that:
- a) Both the Spirit of British Columbia and the Spirit of Vancouver Island are nearing their mid-lives and the proposed Mid-Life Upgrades for both vessels, including the conversion of the propulsion system to dual fuel technology to enable the vessels to operate on lower-cost LNG, are appropriate;
 - b) BC Ferries has carefully weighed and considered a number of factors and procurement risks involved in the upgrade project for the Spirit Class vessels and subject to addressing the specific concerns of commercial users, has developed appropriate mitigation strategies to ensure it can meet its obligations for Route 1 under the Coastal Ferry Services Contract;

- I. The commissioners find the major capital expenditure proposed in the Application to be:
- a) reasonable,
 - b) prudent, and
 - c) consistent with:
 - (i) the current Coastal Ferry Services Contract, and
 - (ii) the long term capital plan established by the ferry operator.

NOW THEREFORE pursuant to Section 55 of the *Coastal Ferry Act* the commissioner orders as follows:

1. The proposed major capital expenditure for the Mid-Life Upgrades for the two Spirit Class vessels, as generally described in the Application, is approved subject to the following conditions:
 - a) The maximum amount of the major capital expenditure for the Mid-Life Upgrades to the Spirit Class vessels is set at the total amount for all work packages combined as stated in the Application which will be confirmed by a separate confidential order to BC Ferries. The maximum amount will remain confidential until completion of the procurement process;
 - b) Prior to signing a final contract with a shipyard for Mid-Life Upgrades, BC Ferries must:
 - (i) satisfy the commissioners that the scope of Mid-Life Upgrades is as generally described in the Application and the total cost of all the work packages combined does not exceed the maximum amount approved by the confidential order referred to in paragraph 1(a) above;
 - (ii) confirm that there has been no substantial change to the scope of any of the work packages and that the business rationale justifying each work package has not substantially changed in terms of net present value and payback periods;
 - (iii) satisfy the commissioners that the company has a contingency plan which addresses the concerns of commercial ferry users in the event of a potential delay in the re-entry of service of the vessels.

DATED at Victoria, in the Province of British Columbia, this 24th day of November 2014.

BY ORDER

A handwritten signature in black ink, appearing to read "Gordon Macatee". The signature is fluid and cursive, with a large initial 'G' and a long, sweeping tail.

Gordon Macatee
BC Ferries Commissioner

A handwritten signature in black ink, appearing to read "S. Stoilen". The signature is cursive and somewhat compact, with a large initial 'S'.

Sheldon Stoilen
BC Ferries Deputy Commissioner



Review of BC Ferries' Application for
A Major Capital Expenditure for
Mid-Life Upgrades to the Spirit Class Vessels

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Review of BC Ferries' Application for Approval of a Major Capital Expenditure for Mid-Life Upgrades to the Spirit Class Vessels

Background

On September 22, 2014, British Columbia Ferry Services Inc. ("BC Ferries") submitted an application (the "Application") under section 55(2) of the *Coastal Ferry Act* (the "Act") seeking the commissioner's approval of the proposed major capital expenditures for the mid-life upgrade projects for the two Spirit Class Vessels, the Spirit of British Columbia and the Spirit of Vancouver Island that both operate on Route 1 (Tsawwassen to Swartz Bay). Prior to this Application for approval of a major capital expenditure the commissioner had provided BC Ferries with Guidelines for Section 55 applications which set out the requirements that ferry operators would be required to meet in submitting applications under this section.

Statutory Framework

In accordance with the Act the commissioner regulates ferry operators by determining price caps for each performance term, approving major capital expenditures and monitoring the ferry operator's performance under the Coastal Ferry Services Contract. In determining price caps, the commissioner includes those capital expenditures that are determined to be reasonable, including major capital expenditures that have been approved by the commissioner. The relevant sections of the Act in considering this Application are as follows:

Commissioner to consider capital deployment and expenditures

Section 55 “(1) Subject to subsections (2) to (5), before deploying capital assets on, or incurring capital expenditures in connection with, a designated ferry route or terminal, the ferry operator may apply to the commissioner and the

commissioner must, within one month after the application, declare whether the capital assets proposed to be deployed on, or the capital expenditures proposed to be incurred in connection with, the designated ferry route or terminal are reasonably required.

- (2) A ferry operator must not incur a major capital expenditure without first obtaining the commissioner's approval of the expenditure.
- (3) A ferry operator may apply to the commissioner for approval of a proposed major capital expenditure and the commissioner must respond to the application within 2 months after its receipt by the commissioner.
- (4) The commissioner may approve a proposed major capital expenditure if the proposed major capital expenditure is
 - a) reasonable,
 - b) prudent, and
 - c) consistent with
 - (i) the current Coastal Ferry Services Contract, and
 - (ii) any long term capital plan established by the ferry operator.
- (5) For the purposes of this section, a capital expenditure of a ferry operator is a major capital expenditure if it meets the criteria
 - (a) established from time to time by the commissioner, and
 - (b) most recently provided by the commissioner to the ferry operator;

Pursuant to subsection 55(5) of the Act the commissioner established the criteria of a major capital expenditure by issuing Order 12-04 dated September 30, 2012 which defines a major capital expenditure as any capital expenditure which exceeds \$30 million, and irrespective of the level of expenditure, any new vessel or terminal and any vessel life extension which extends the life of the vessel more than five years.

The commissioner has also published a document titled "Guidelines for British Columbia Ferry Services Inc. Respecting Applications under Section 55 of the *Coastal Ferry Act*" which sets out the information the commissioner requires from BC Ferries when it makes an application under

section 55 of the Act (the "Guidelines"). The Guidelines include definitions of "Reasonable" and "Prudent" that the commissioners will use as a guide in applying the requirements of section 55.

The Act contains a confidentiality provision. Section 54 provides:

Obligation to keep information confidential

Section 54. "Despite any obligation imposed on the commissioner under this Act to obtain, maintain or make available information or records, the commissioner, every deputy commissioner, every employee of the commissioner and every inspector must not disclose or be compelled to disclose any information or record that is obtained in, or that comes to the person's knowledge during, the course of the administration of this Act or the course of any inspection authorized under this Act, unless and only to the extent that such disclosure is consistent with the *Freedom of Information and Protection of Privacy Act*".

The sections of the *Freedom of Information and Protection of Privacy Act* ("FOIPPA") that are relevant to this Application are sections 17 and 21. Section 17 of FOIPPA states in part:

Disclosure harmful to the financial or economic interests of a public body

17(1) "The head of a public body may refuse to disclose to an applicant information the disclosure of which could reasonably be expected to harm the financial or economic interests of a public body or the government of British Columbia or the ability of that government to manage the economy, including the following information:

- (a) trade secrets of a public body or the government of British Columbia;
- (b) financial, commercial, scientific or technical information that belongs to a public body or to the government of British Columbia and that has, or is reasonably likely to have, monetary value;
- (c) plans that relate to the management of personnel of or the administration of a public body and that have not yet been implemented or made public;
- (d) information the disclosure of which could reasonably be expected to result in the premature disclosure of a proposal or project or in undue financial loss or gain to a third party;

(e) information about negotiations carried on by or for a public body or the government of British Columbia;

(f) information the disclosure of which could reasonably be expected to harm the negotiating position of a public body or the government of British Columbia.”

Section 21 of FOIPPA states in part:

Disclosure harmful to business interests of a third party

21(1) “The head of a public body must refuse to disclose to an applicant information:

(a) that would reveal:

(i) trade secrets of a third party, or

(ii) commercial, financial, labour relations, scientific or technical information of or about a third party,

(b) that is supplied, implicitly or explicitly, in confidence, and

(c) the disclosure of which could reasonably be expected to:

(i) harm significantly the competitive position or interfere significantly with the negotiating position of the third party,

(ii) result in similar information no longer being supplied to the public body when it is in the public interest that similar information continue to be supplied,

(iii) result in undue financial loss or gain to any person or organization, or

(iv) reveal information supplied to, or the report of, an arbitrator, mediator, labour relations officer or other person or body appointed to resolve or inquire into a labour relations dispute.”

Summary of the Application

BC Ferries supplied a number of documents with its Application. Opinions from outside technical experts were appended to the Application, which contained inspection reports on the

condition of the Spirit Class vessels, financial analyses of various options to life-extend and the conversion to dual fuel technology enabling the vessels to use LNG fuel.

The Application as submitted to the commissioner included the major capital expenditures for the Mid-Life Upgrades. These amounts have been redacted from the Application as shown on BC Ferries' or the commissioner's website due to the commercially sensitive nature of such information. The commissioner accepts BC Ferries' request to the commissioner to not disclose this information in accordance with section 54 of the Act until after the procurement process is completed as disclosure of such information could reasonably be expected to harm their negotiating position with shipyards. Accordingly a separate order will be released to BC Ferries with the actual amount of major capital expenditure approved by the commissioners. This separate order shall remain confidential until completion of the procurement process.

In addition to the Application BC Ferries submitted supplementary information ("Supplementary Information") which they have requested the commissioner not disclose as disclosure may be harmful to the interests of BC Ferries and/or third parties. Upon review of the Supplementary Information the commissioner agrees that disclosure of the Supplementary Information may be harmful to the interests of BC Ferries and/or third parties and in accordance with section 54 of the Act such information will not be disclosed.

Scope of the Review

The commissioners' review relies on documents and representations of BC Ferries' management, its consultants, as well as comments received from the public. The review does not constitute a review of the financial viability of the replacement of the two vessels or its affordability to BC Ferries with or without increases in price caps. While this review does not involve a detailed assessment of the technical aspects of all the upgrades to the Spirit Class vessels it did involve an assessment of the appropriateness of the project for the Spirit Class vessels which are nearing their mid-lives and the reasonableness and prudence of the work packages contained in the Mid-Life Upgrades.

It is also outside the scope of the commissioners' review to perform due diligence on the procurement process (e.g. by reviewing contract bid documents) other than commenting on the

proposed process and the risk assessment and mitigation strategies involved in the process.

In reviewing the Application, the commissioner is mindful of his statutory responsibilities under the Act to balance the interests of ferry users, taxpayers and the ferry operator. In the context of reviewing an application for approval of a major capital expenditure the commissioners are of the view that these interests are protected and balanced if the proposed major capital expenditure meets the criteria set out in section 55(4) above.

Review Process

The commissioner engaged PricewaterhouseCoopers LLP (“PwC”) to provide technical and expert advice during the review of the Application. PwC in turn engaged a subcontractor, 3GA Marine to review the naval architectural aspects contained in the Application. The firms were asked to provide an assessment as to whether the information provided by BC Ferries in its application and answers to follow up questions reasonably supports the proposed major capital expenditure for the Mid-Life Upgrades and that the major capital expenditure is reasonable, prudent and consistent with the current Coastal Ferry Services Contract and the long-term capital plan of BC Ferries.

The consultants were also asked to confirm whether or not BC Ferries had responded adequately in their Application to the commissioner’s section 55 Application Guidelines. The consultants examined the Application and the index or the cross reference of BC Ferries’ responses to the commissioner’s section 55 guidelines contained therein and report that the explanations and information provided by the company are satisfactory and do support the proposed major capital expenditure. See Appendix B.

In conducting this review the commissioners have carefully considered the assessment by PwC and its subcontractor in reaching their own conclusions regarding the Application. In accordance with section 55(2) the determinations and conclusion of the commissioners are based on their assessment of whether the proposed major capital expenditure is:

- (a) reasonable as defined in the commissioner’s section 55 Application Guidelines,
- (b) prudent as defined in the commissioner’s section 55 Application Guidelines,
- (c) consistent with:

- (i) the current Coastal Ferry Services Contract, and
- (ii) the long term capital plan of the ferry operator.

The Guidelines provide that for purposes of applying the requirements of section 55, the commissioners will be guided by the following definitions found at BusinessDictionary.com:

“Reasonable:”

“An intelligent approach supported or justified by reason; fair, proper, sound behavior that avoids needless error and steers clear of extremes.”

“Prudent:”

“Good judgment or wisdom gained from experience, expressed in a realistic and frugal attitude. Prudence, however, is not the same as grave caution or wariness concerned only with preserving the status quo.”

Issues Raised in the Application

In reviewing the Application the commissioners identified the following issues that warranted consideration in their determination of whether to approve the proposed major capital expenditure:

- 1) Are the Mid-Life Upgrades, including the conversion to dual fuel capability, reasonable and prudent?
- 2) Have the risks associated with the proposed procurement process been carefully considered and are the mitigation strategies prudent and reasonable?
- 3) Are the Mid-Life Upgrades consistent with the current Coastal Ferry Services Contract and BC Ferries’ most recent long term capital plan?

Commissioners’ Findings and Determinations

1) Are the Mid-Life Upgrades, including the conversion to dual fuel capability, for the Spirit Class Vessels reasonable and prudent?

BC Ferries states in their Application that they intend to perform the Mid-Life Upgrades of the Spirit of Vancouver Island and Spirit of British Columbia in order to ensure the

sustainability of BC Ferries' largest route by passenger volume, vehicle traffic and total passenger-based revenue.

The Project will standardize bridge, engine room and safety layouts to improve flexibility in crew deployment, and maintain state-of-the-industry safety. It will reduce fuel costs by converting propulsion systems to enable operating on lower-cost LNG fuel, take advantage of new technology to improve energy efficiency and enhance ancillary revenue by expanding catering and retail services. The expected savings and revenue enhancements from the Project will help to reduce pressure on fares and using LNG to fuel the vessels will have the added benefit of cleaner exhaust emissions for reduced environmental impact.

To maintain the reliability and efficiency of its assets, BC Ferries follows a practice of periodic maintenance and upgrades. Each vessel observes these standards and has an individualized Long Range Maintenance Plan ("LRMP") which covers the scope, schedule and budget of all capital, refit and operating maintenance events in the vessel's life.

A MLU is a major scheduled maintenance event marking the mid-point (approximately 20-25 years) of the ferry's life cycle in order to extract the maximum economic performance from the asset. The planned MLUs are expected to reduce operating costs, enhance revenues and ensure continued reliability of those assets in the second half of their 40-to-50 year life cycle. The Spirit Class Vessels were commissioned in 1993 and 1994 and based on the opinion of independent experts "overall the structural condition of the vessels has been assessed as good and suitable for the remaining 25 to 30 years for each vessel. The propulsion plants are nearing the end of their lives. Although when using ultra-low sulphur diesel as fuel they are compliant with all emission regulations, they have experienced failures and will require major overhaul and maintenance to extend reliable operations to the vessels' end of life".

Based on the current age of the two Spirit Class Vessels and the assessments of independent experts, the commissioners have determined that implementing a mid-life extension and upgrade project for new technology as generally described in the Application is appropriate.

The scope of the Mid-Life Upgrades was divided into four work packages as follows:

Work Package 1 – Carry-Out Regulatory Requirements

WP 1 covers modifications and survey items required to maintain statutory and regulatory compliance. If this work package is not carried out the vessels' operating certificates would expire and BC Ferries would therefore be legally unable to operate, placing it in breach of the Coastal Ferry Services Contract ("CFSC"). The cost of this work package appears reasonable and the modifications and survey items are deemed prudent by the commissioners in order for BC Ferries to be in compliance with the CFSC.

Work Package 2 – Convert Propulsion to Dual Fuel ("DF")

WP 2 proposes to convert the main propulsion system for the vessels to use LNG as their primary fuel. LNG is approximately 50 percent of the cost of and much cleaner burning than the ultra-low sulphur diesel fuel the vessels currently use. The package comprises three options:

- Option 2A – Do minimum regulatory work; retain existing diesel engines,
- Option 2B – Modernize and retain existing diesel engines,
- Option 2C – Convert propulsion to dual fuel (diesel and LNG).

BC Ferries selected Option 2C as it will support yield management strategies by reducing the operating costs of the vessels below those of the Coastal Class vessels, thereby allowing the vessels to be the primary Route 1 vessel year round and increase the number of round trips they provide on an annual basis.

Based on a review by the commissioner's consultants of the financial analysis of the options the commissioners agree with BC Ferries that the preferred option is Option 2C - Convert propulsion to dual fuel. Option 2C represents the highest value option in terms of net present value and is therefore the prudent choice for the preferred option.

Work Package 3 – Implement Other Payback Projects

Included in WP 3 are the following:

WP 3.1 – Energy efficiency initiatives:

- A - Replace underwater hull coating with low friction coating to reduce fuel consumption,

- B - Modify bow and stern configuration to reduce hull resistance and fuel consumption,
- C - Replace lighting with energy efficient LED fixtures.

WP 3.2 – Ancillary revenue initiatives:

- Expand the gift shop and relocate the coffee bar,
- Use of crew for passenger amenities.

Based on a review of BC Ferries' financial analysis by the commissioner's consultants these initiatives will either reduce costs or increase ancillary revenues which would otherwise not be realized and therefore will help to reduce pressure on fares. The assumptions used in the financial analysis appear reasonable and by helping to reduce pressure on fares this work package is considered to be prudent by the commissioners.

Work Package 4 – Implement Condition Based Requirements

WP 4 includes essential maintenance which ensures the reliability of the vessels in the most cost effective manner. Although this package does not have a positive net present value (“NPV”) overall, it has a greater NPV than not implementing these requirements at the time, meaning that it benefits the farepayer. The benefits are reducing the overall cost of maintenance, minimizing the risk of maintenance service interruptions, avoiding costly unplanned repairs and avoiding the need to schedule multiple out-of-service periods which would require some degree of fleet re-deployment. The commissioners agree that by implementing condition-based requirements the risk of maintenance service disruptions in the latter half of the vessels' economic life will be reduced.

The PwC team also reviewed BC Ferries' process for determining inclusion of condition-based requirements. The process seemed reasonable as it was predicated on benefit to the farepayer and was implemented in a series of review rounds where an initial long list of candidate items was culled down to priority items.

WP 4 also includes a refresh of the interior design of the accommodation spaces on decks 5 and 6. This element of WP 4 could be considered as discretionary but BC Ferries has stated that if the refresh does not happen during the MLUs, the next opportunity would not be until

fiscal 2032 and 2033 which industry research indicates is an excessively long life span for retail service design standards without it appearing dated or negatively impacting revenue. Further, industry research indicates that a design refresh increases retail spending. While this research may not apply directly to BC Ferries as few catering amenity choices exist onboard its ferries, the refresh should prevent some degree of revenue decay. Project financials assume no positive effect from a design refresh in order to be conservative, although a foregone decline of 3.3% per year of cafeteria and buffet revenue (\$10m over the lifecycle) would achieve a discounted payback of 7.5 years.

The commissioners accept BC Ferries' position that a design refresh should prevent some degree of ancillary revenue decay. Given that Route 1 is the most profitable route in the system and carries significant traffic volumes, the commissioners feel that a refresh of the interior design is reasonable and prudent.

2) Have the risks associated with the proposed procurement process been carefully considered and are the mitigation strategies prudent and reasonable?

A thorough risk management process has been initiated by BC Ferries and will be maintained during the Mid-Life Upgrade project. The risk register has been reviewed by the commissioners and his consultants. It appears that most risk items identified have been addressed although high risk items associated with project budgeting and scheduling remain. The commissioners realize that there is inherent uncertainty in major modifications and refits to older vessels not found in new construction projects. This risk is mitigated by the fact that BC Ferries has completed considerable work to ascertain the condition of the vessels, intends to allow bidders to view the first vessel before submitting a bid and will permit the successful bidder to inspect the second vessel on the drydock prior to receiving the first vessel for conversion. However, the risk is not eliminated as condition issues may not be apparent until the work is underway. Accordingly, changes to the scope of the work packages contained in the Mid-Life Upgrades to remain on budget are a possibility.

The commissioners are aware that any scheduling delays would have a significant impact on operations. BC Ferries maintains that it has mitigated these risks by making use of scheduling contingencies, implementing project management controls and leaving the option open to postpone a portion of the implementation to a later date should delivery be delayed. The use of a dual fuel solution enables this last mitigation measure by allowing the vessels to be run on diesel fuel alone initially should the LNG fuel option not be available on time. The commissioners have noted the concerns expressed by the BC Trucking Association regarding a possible delay in delivery of the vessels back into service resulting in a possible capacity shortage or changes to the schedule of sailings on Route 1.

3) Are the Mid-Life Upgrades consistent with the current Coastal Ferry Services Contract and BC Ferries' most recent long term capital plan?

Lastly the commissioners have considered whether or not the proposed major capital expenditure is consistent with the Coastal Ferry Services Contract ("CFSC") and with BC Ferries' most recent long term capital plan. Schedule A of the CFSC stipulates core service levels for each regulated route expressed as the number of round trips to be delivered per contract year, the minimum number of round trips per day and the minimum hours of operation that BC Ferries must operate. Another requirement is that the capacity provided on each designated ferry route will be sufficient to carry the previous year's traffic (Appendix 1 of Schedule "A" to CFSC).

As the vessel capacities will not be changed and the deployment of the vessels will not change as a result of the Mid-Life Upgrades, BC Ferries will be in compliance with the terms of the current Coastal Ferry Services Contract.

On September 30th, 2014 BC Ferries submitted to the commissioner a 10-year capital plan and the proposed major capital expenditure outlined in the Application is consistent with this long term capital plan.

4) Does the Application address the major concerns of ferry users raised in comments to the commissioner?

The commissioner received only six comments from ferry users. See Appendix A. About half of the comments questioned the economics of the Mid-Life Upgrades or the timing of the upgrades given the impact on fare affordability and service levels. On the basis of his consultants' analysis of the net present values of the work packages the commissioners are satisfied that the Mid-Life Upgrades are in the interests of ferry users because they will reduce pressure on fares and help to maintain service levels in future performance terms.

As noted in the public comments, the BC Trucking Association's submission highlighted the risk for their members if there is a delay in delivery of the vessels back into service after completion of the Mid-Life Upgrades. In their submission they state "the strategies to mitigate this risk identified in the submission do not appear to include plans for additional early morning or late night sailings and additional discretionary sailings on short notice while the vessels are out of service or in the event vessel service re-entry is delayed". The commissioners feel this is a reasonable concern and should be addressed by BC Ferries as a condition of approval.

Summary of Commissioner Determinations under section 55(4)

Based upon their review of the Application as well as the supporting information supplied by BC Ferries; their review of the report and opinions of their consultants and the comments received from the public regarding the Application, the commissioner find that the proposed major capital expenditure as described in the Application to be:

- (a) reasonable,
- (b) prudent, and
- (c) consistent with:
 - (i) the current Coastal Ferry Services Contract, and
 - (ii) any long term capital plan established by the ferry operator.

Accordingly, the proposed major capital expenditure should be approved subject to the following:

- a) The maximum amount of the major capital expenditure for the Mid-Life

Upgrades to the Spirit Class vessels is set at the total amount for all work packages combined as stated in the Application which will be confirmed by a separate confidential order to BC Ferries. The maximum amount will remain confidential until completion of the procurement process;

- b) Prior to signing a final contract with a shipyard for Mid-Life Upgrades, BC Ferries must:
- (i) satisfy the commissioners that the scope of Mid-Life Upgrades is as generally described in the Application and the total cost of all the work packages combined does not exceed the maximum amount approved by the confidential order referred to in paragraph (a) above;
 - (ii) confirm that there has been no substantial change to the scope of any of the work packages and that the business rationale justifying each work package has not substantially changed in terms of net present value and payback periods;
 - (iii) satisfy the commissioners that the company has a contingency plan which addresses the concerns of commercial ferry users in the event of a potential delay in the re-entry of service of the vessels.

Appendix A

Summary of Public Comments



Appendix A

Public Comments Received BC Ferries Application for A Major Capital Expenditure for Mid-Life Upgrades to the Spirit Class Vessels

Comment #1:

Hello. I read in the local newspaper that you are seeking community input regarding your proposed major retrofit of the Spirit Class Vessels. I am going to say straight out that I am strongly opposed to the retrofit and I think it is very irresponsible of BC Ferry Corporation to be considering this sort of expenditure at this point in time. The only expenditures that BC Ferries should be investing into the BC Ferry fleet at the moment should be routine maintenance so that the current vessels can maintain their on-time performance in their current condition.

Please do not get me wrong. I am not against BC Ferries investing in their passengers. I simply feel that this retrofit is the WRONG investment at this point in time. The fact is this, that economically speaking BC Ferries is very elastic. Fares have long since reached a tipping point and the service is no longer sustainable. Your customers don't want nicer seats. They want value for their dollars. You need to attract customers to your fleet and the way to do this is by giving your customers value for their money. Decreasing fares will increase ridership.

Let me give you an example of how this works: let's take route #19 - Gabriola Island. The elasticity of this route is somewhere between 6 and 7. This means that increasing the fare by 100 percent will cause a ridership decrease of 60 to 70 percent. The current fare for a foot passenger is \$11.00 with fuel surcharge. If you currently carry 100 foot passengers on a given sailing at \$11 per passenger; with an elasticity of 7 by doubling the fare to \$22 you will only have 30 passengers. $100 \text{ passengers} \times \$11 = \$1100$. $30 \text{ passengers} \times \$22 = \$660$. Fares have doubled on almost every route since 2002. With every fare increase, ridership has declined. Ridership has finally reached the point where cuts to service levels have become necessary. On route 19, the service cuts have resulted in an additional loss of over 6% from the same time last year.

Look at BC's Northern Routes, you will see that ridership has declined by more than 40% over the last 12 years. Once inflation is accounted for, the result is that with each fare increase, revenue has decreased and not increased, proving that BC Ferries is very very elastic. Finance minister Todd Stone recently tried to blame the economy for the losses. I might have believed this if it were not for the fact that Washington State Ferries has not experienced the kind of fare increases that BC Ferries has experienced and in turn, they have experienced an increase in ridership on all routes.

The solution is not to be making major investments to the ships, but rather to be investing in the passengers themselves. I do understand that the ships do need to be maintained in order to continue reliable, on-time performance. This is not what is being proposed. What is being proposed is a major retrofit to these vessels, which is a poor investment at this point in time when ridership is suffering. Fares are scheduled to increase by yet another 5% along with additional service cuts in just a few months from now despite the additional losses it will create for the corporation.

I am appalled that this sort of spending is even being considered when BC Ferries has much bigger worries. Instead, I feel that this retrofit should be POSTPONED, and that the monies should be invested in creating value and making the ferries more affordable so that ridership will increase and the service cuts can be restored. Only once service levels have been fully restored on all routes should such a retrofit be considered. If BC Ferries takes the money that they would have used to do the retrofit and instead uses the money to create value for the customer, then there will be a light at the end of the tunnel for the BC Ferry Corporation.

I only hope this letter is not falling upon deaf ears.

Comment #2:

No problem as long as the upgrades do not increase the current exorbitant rates. Current fares should cover these expenditures.

Comment #3:

We noticed in both our local newspapers an advertisement placed by the B.C. Ferry Commission giving us an opportunity to comment on B.C. Ferries' proposed Spirit Class Mid-life upgrade project.

This costly ad was, no doubt, placed in several newspapers in B.C. just as the invitation to the public was placed in several ads inviting our input on the maintenance and operation of B.C. Ferries.

However, in spite of a deluge of input offering many ideas on saving money to have an efficient ferry system in B.C., it proved futile as the many letters were ignored. We are

wondering then, why the Ferry Commission is requesting input as it is obvious the taxpayers and ferry users in B.C. are not going to be listened to, despite what we offer for input.

It was further disappointing that the UBCM report and requests of all the politicians at the UBCM were ignored too.

Our ferry system was, and should continue to be, an extension of our highways. We have taken guests from Campbell River to Quadra Island and our guests were stunned at the cost of the 20 minute ferry ride. Needless to say, we cannot ride the ferries as often as we would like but at least we are not losing a business like some poor people who are reliant on the ferry system.

Comment #4:

Thank you for the opportunity to submit comments and suggestions regarding the proposed mid-life upgrade to the two, Spirit-Class vessels.

I have had, and enjoyed, several sailings on each of the Spirit of British Columbia and the Spirit of Vancouver Island. Most frequently, my passage was as a bicyclist; sometimes for Metro Vancouver day trips, sometimes as a fully loaded, camping / touring cyclist. As a fully loaded cyclist, I will have a significant portion of my “pack” carried in low-rider, front panniers, as well as (regular) rear panniers, plus a very efficient trailer.

The two Spirit-Class vessels have, for whatever reason, a variety of different bicycle racks among the four “vessel ends”. Of these four options, I am fully in favour of the style and design of the rack on the starboard side, forward end, of the Spirit of Vancouver Island (only). This rack is designed to securely stabilize the bicycle front wheel while accommodating a substantial pair of low-rider, front panniers. Perhaps the only short-coming is that this rack can accommodate only four (4) bicycles.

In preparation for a very probable vessel refit to coincide with the proposed upgrades, I humbly suggest and request that consideration be given to providing this aforementioned rack on both sides of each end of both these vessels. That equates to eight racks for a total capacity of 32 bikes.

Thank you for your consideration and understanding.

Comment #5:

So why wouldn't BC Ferries upgrade the "Spirit Class" boats?

The plan has to be scrutinized by knowledgeable people.

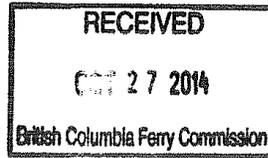
I'd ask if the conversion of main engines to dual fuel is cost effective, rather than chasing the blame-humans-for-climate-variation scam. It may well be given the low price of natural gas. However, dual fuel is more complicated and such systems are relatively new so might be unreliable – that depends on specific technology and who stands behind it. (For OTH trucks, one approach is concurrent dual fuel, using diesel to ignite but NG for most of the energy once ignited, but another is to replace fuel injectors with spark plugs so run the engine like the many NG-fueled gasoline ones on the road in BC – that's of course single fuel which is simpler.) Engine life and maintenance costs during that life are key factors (NG does not lubricate like diesel fuel does).

As for the Spirit boats themselves, they are the best in the fleet for usability by customers. In contrast, the new big boats are a jumbled mess of corridors, without proper signage – it appears that BCF did not recognize that the Spirit boats are open so it is easier to see where to go, and the new boats have more levels.

BC Ferries of course continues to be a bureaucracy, as does the monopoly union, just less so than earlier. For example, at least one of the new big ferries has incorrect signage placement for washrooms – not fixed after how many years in service?

Comment #6:

Letter from the BC Trucking Association:



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Langley, BC V1M 4A9
e bcta@bctrucking.com
t 604 888 5319 f 604 888 2941
toll free 1 800 565 2282
bctrucking.com

October 23, 2014

BC Ferry Commission
PO Box 9279 Stn Prov Govt
Victoria, BC V8W 9J7

Re.: BC Ferries' Proposed Spirit Class Mid-Life Upgrade Project

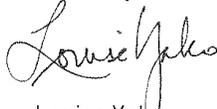
Dear Commissioner:

The BC Trucking Association (BCTA) represents member companies that depend on BC Ferries to move goods between the Lower Mainland and Vancouver Island. Among other freight, BCTA members provide Vancouver Islanders with food products and other necessities. As such, we are responding to the request for comments on BC Ferries' proposed Spirit Class Mid-Life Upgrade project.

The highest risk associated with the project appears to be scheduling and service re-entry. However, the strategies to mitigate this risk identified in the submission do not appear to include plans for additional early morning or late night sailings and additional discretionary sailings on short notice while the vessels are out of service or in the event vessel service re-entry is delayed.

BCTA respectfully requests that the Commission require BC Ferries to develop a clearly defined contingency plan should vessel service re-entry be delayed before approving the Mid-Life Upgrade project.

Sincerely,



Louise Yako
President & CEO

Appendix B

PricewaterhouseCoopers Report

BC Ferries' Application under Section 55 of the Coastal Ferry Act

BC Ferry Commission

November 20, 2014

Spirit Class Vessels Mid-Life Upgrades

Note: This report has been redacted such that information of a confidential and commercially sensitive nature is not included.



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1.0 Executive Summary

PricewaterhouseCoopers LLP (“PwC”) was engaged by the British Columbia Ferry Commission (the “Commission”) to assess British Columbia Ferry Services Inc.’s (“BCFS”, “BC Ferries”, or the “Company”) Application (the “Application”) for the Spirit Class Vessels Mid-Life Upgrades submitted on September 22, 2014 in accordance with Section 55 of the *Coastal Ferry Act* (the “Act”).

We conclude that the major capital expenditure is reasonable, prudent and consistent with the current Coastal Ferry Services Contract (“CFSC”) and the long term capital plan established by the Company, and it has adequately responded to the questions posed in the Section 55 Guidelines.

We are satisfied that the Mid-Life Upgrades are appropriately based on the asset management plans for the vessels and the results of condition reports.

BCFS have conducted extensive business case analysis to support the Mid-Life Upgrades (the “Project”) that include conversion to LNG fuel. The Project is based on analysis of four work packages:

- Regulatory requirements
- Convert propulsion to dual fuel (diesel and LNG)
- Energy efficiency and ancillary revenue initiatives
- Condition-based requirements

The preferred options within each work package are estimated to cost \$ < > million. These costs include capital, operating and refit project costs. These expenditures are consistent with the long term capital plan of the ferry operator which was released to the Commission on September 30, 2014.

The preferred options are based on a life-cycle analysis expressed on a net present value (“NPV”) basis which is considered good practice for assessing infrastructure options. The NPV analysis indicates that when incremental revenues and costs savings are factored in, the net costs of the Project are \$27.2 million over the remaining lives of the two vessels.

The process to procure the Mid-Life Upgrades is considered appropriate. BCFS have followed a number of practices in the governance of the Project and in the procurement process that it has used in the successful acquisition of a number of new vessels since 2003, including three ICF vessels acquired in 2013 that are LNG-fuelled. This process includes running a robust international competition that is based on an engineering, procurement and construction (“EPC”) contract with a fixed fee and fixed delivery schedule.

The vessel capacities will not be changed and experience shows they are appropriate for the intended service so they are considered sufficient to meet current and projected future demand and are therefore compliant with the terms of the Coastal Ferry Services Contract.

We have no major or minor concerns regarding the Application. With the exception of the first work package which is driven by regulatory requirements, the work packages are discretionary. They are based on either positive net present values or on condition-based assessments. BCFS should be required to confirm both the total final pricing and the NPV analysis for each work package based on the results of the procurement. In addition, BCFS should also be required to confirm the key terms of the procurement, as the risk profile of the Project may change depending on what is negotiated with shipyards.

A summary analysis of BCFS's responses to the Section 55 Guideline Questions is shown below.

Section 55 Category	# Section 55 questions	# Major concerns	# Minor concerns
Project Description	21	-	-
Timing and In-Service Date	3	-	-
Does the Proposed Capital Expenditure Demonstrate Good Judgement, Based on Wisdom, Experience and Good Sense?	8	-	-
Wise Use of Resources	6	-	-
Showing Due Consideration for the Future	7	-	-
Not Excessive	8	-	-
Demonstrating Good Value at a Fair, Moderate Price	8	-	-
Coastal Ferry Services Contract	1	-	-
Long Term Vision for Coastal Ferry Services in British Columbia	1	-	-

2.0 Background

In April 2003, the Province of British Columbia established the British Columbia Ferry Authority (the “Authority”), an independent corporation that holds the single issued voting share of BCFS.

BCFS as the operating subsidiary of the Authority provides coastal ferry services on the west coast of British Columbia. With 35 vessels travelling between 47 terminals, on 24 routes, BCFS is one of the largest ferry operators in the world, both in terms of fleet size and passengers carried. Its fleet includes a number of older vessels and BCFS has undertaken a process to upgrade its fleet and conduct necessary maintenance.

A Coastal Ferry Services Contract existing between the Province and BCFS defines service levels on each regulated route and the Commission sets price caps across the route groups every four years. Within its operating framework, BCFS can decide on fares, and can access capital markets directly.

The Commission is a provincial regulatory agency operating under the Coastal Ferry Act with responsibilities for making regulatory decisions affecting ferry operators in the Province.

The *2012 Coastal Ferry Amendment Act* amended Section 55 of the Act to require BCFS to first obtain the Commissioner’s approval before incurring a major capital expenditure (Section 55 (2)). By Order 12-04, dated September 30, 2012, the Commissioner determined that for the purposes of Section 55 (2), a major capital expenditure includes:

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

On September 22, 2014 BCFS made its Application to the Commission under Section 55 of the *Coastal Ferry Act*. The Application for “Spirit Class Vessels Mid-Life Upgrades” requests the following determination:

“Approval, pursuant to 55(2) of the CFA, for Project capital expenditures for the Project of up to \$< > million, inclusive of interest during construction (“IDC”), and supplemental Project expenditures of up to \$< > million, for total Project expenditures of up to \$< > million.”

According to the *Coastal Ferry Act*, the Commission has 2 months to respond to the Application.

The Application is in four parts:

- Section 1. Introduction
- Section 2. Project Description
- Section 3. Project Work Packages, Options and Analysis
- Section 4. Procurement and Risk

The Application is also supported by a number of appendices and supplementary information and technical reports.

3.0 Mandate

PwC was engaged in September 2014 by the Commission to assess the Application by BCFS for the Mid-Life Upgrades (“MLU”s) of the two Spirit Class vessels. Our assessment was conducted in accordance with Section 55 of the *Coastal Ferry Act*.

Section 55 of the Act requires that BCFS demonstrates to the Commission that major capital projects be:

- Reasonable;
- Prudent; and
- Consistent with:
 - The current Coastal Ferry Services Contract,
 - Any long term capital plan established by the ferry operator.

PwC was asked to review the information provided by BCFS, and, using the Section 55 Guidelines (Appendix A) and their professional expertise, provide an assessment of the Application.

Scope

The focus of PwC’s assessment was on the financial aspects of the Application. The scope of our work included:

- Review of the Coastal Ferry Act (amended in 2012 by Bill 47);
- Review of the Section 55 Guidelines;
- Review of the Coastal Ferry Services Contract and the Capital Plan for fiscal years 2015 through 2026;
- Attendance at a meeting with BCFS management and representatives of the Spirit Class MLU Project team to discuss the Application;
- Detailed assessment of the Application, supporting appendices and supplementary information;
- Development of written questions for BCFS;
- Reviewing responses to additional questions from BCFS received;
- Review of additional documents provided by BCFS, including:
 - Long Range Maintenance Plans for the Spirit of Vancouver Island and Spirit of British Columbia
 - Financial costs estimates for Spirit Class MLUs
 - Summary of Shipyard Responses to the Request for Expressions of Interest
- Discussions with representatives of the Commission; and
- Debrief of a draft version of this report with the Commissioner.

Subcontractors

PwC sub-contracted 3GA Marine Ltd (3GA), a technical advisor with expertise in marine architecture who reviewed the Application and had access to all the supplemental information and appropriate BCFS staff. The 3GA specialists provide consulting and engineering services for projects involving all manner of vessels including ferries and passenger ships, research vessels, general work vessels and floating structures. The company has in-depth knowledge of the domestic and international regulatory regime in which passenger ship operators’ work. It has conducted several assignments involving ferry systems in Canada including LNG-powered vessels.

3GA Marine’s assessment focussed on the naval architecture and vessel performance related issues including:

- The scope and reasonableness of the mid-life upgrade work, including the conversion to dual fuel, and
- The technical approach to implementing the planned scope on budget and in schedule.

3GA’s assessment is integrated into this report to the Commission.

Notice to Readers

This Report is issued by PwC for the exclusive use of the Commission in connection with its assessment of the Section 55 Application by BCFS for the Spirit Class MLUs.

Our work did not constitute an audit conducted in accordance with generally accepted auditing standards, an examination of internal controls nor attestation nor review services in accordance with the standards established by the Canadian Institute of Chartered Accountants. Accordingly, we do not express an opinion nor any other form of assurance on the financial or other information, or operating internal controls, of the Project.

PwC did not examine, compile or apply agreed upon procedures to satisfy the requirements of the Canadian Institute of Chartered Accountants to the financial information used in this Report and we therefore are unable to express assurances on such information except where expressly stated in the Report to form part of the scope of our work.

Further this Report does not constitute an opinion as to legal matters, including the interpretation of the Coastal Ferry Act or any other similar matters. The economic impact of the various procurement options is also outside the scope of PwC's work.

Our work is based primarily on the information and assumptions listed in the body of this Report. While we read information from various sources we did not perform checking or verification procedures except where expressly stated in the Report to form part of the scope of our work. Our work and commentary is subject to assumptions, which may change with the benefit of further detailed information. We make no representation regarding the sufficiency of our work and had we been asked to perform additional work, additional matters may have come to our attention that would have been reported to the BC Ferry Commission.

Some of the documents and figures we reviewed were produced by third parties. We did not corroborate or verify these documents and figures with these parties. It is outside the scope of our review to evaluate the methodology used to conduct independent studies; therefore, we have accepted the information as presented, including conclusions. We did review the credentials of external consultants that BCFS management relied upon and that we were unfamiliar with.

The outputs of the Report are intended to provide the BC Ferry Commission with information to assist in informing their decision making process pertaining to the Project. PwC accepts no liability in respect of any loss, damage or expense of whatsoever nature caused by any use the reader may choose to make of this Report, or which is otherwise consequent upon the gaining of access to the Report by the reader.

Our Report, including schedules and appendices, must be considered in its entirety by the reader. Selecting and relying on specific portions of the analyses, or factors considered by us in isolation may be misleading.

4.0 Approach

Our comments and conclusions are based on the formal written Application and the responses to our supplemental information requests provided by BCFS management and staff.

In reaching our conclusion about the Section 55 Application, our approach to the assessment has been to:

- Provide commentary on:
 - The rationale and scope of the Project;
 - The work packages analysed; and
 - The procurement process and its associated risks
- Pose a number of clarification questions based on the Application (Appendices B, C and D)
- Request additional analysis of BCFS (Appendices B, C and D)
- Provide summary comments on:
 - Each of the main categories under which Section 55 Guideline questions are grouped; and
 - Any major and minor concerns with the responses to each question

Concerns could stem from issues ranging from analytical approaches and procurement processes to issues of lack of clarity and adequate documentation.

Major concerns are defined as significant issues that have direct bearing on the overall conclusion about the Section 55 Application. They can relate to inadequate responses to the Section 55 Guideline questions or to the overall conclusion about the reasonableness of the request. Minor concerns are less significant in terms of their impact on the overall conclusion but still warrant comment. Each concern could be considered as an area for further review or clarification with BCFS.

5.0 Project Description

Project Overview

BC Ferries intends to perform Mid-Life Upgrades (“MLUs”) of the *Spirit of Vancouver Island* and *Spirit of British Columbia* (collectively, the “S Class” vessels) in order to ensure the sustainability of BC Ferries’ largest route by passenger volume, vehicle traffic and total passenger-based revenue.

An MLU is a major scheduled maintenance event marking the mid-point of the ferry’s life cycle in order to extract the maximum economic performance from the asset. The planned MLUs are expected to reduce operating costs, enhance revenues and ensure continued reliability of those assets in the second half of their 40 to 50 year life cycle.

The Project will standardize bridge, engine room and safety layouts to improve flexibility in crew deployment, and maintain state-of-the-industry safety. It will reduce fuel costs by converting propulsion systems to enable operating on lower-cost LNG fuel, take advantage of new technology to improve energy efficiency and enhance ancillary revenue by expanding catering and retail services. The expected savings and revenue enhancements from the Project will reduce pressure on future price cap increases for customers across the ferry system and using LNG to fuel the vessels will have the added benefit of cleaner exhaust emissions for reduced environmental impact.

The vessel capacities will not be changed and experience shows they are appropriate for the intended service. Consequently, the vessels are considered sufficient to meet current and projected future demand and are therefore compliant with the terms of the Coastal Ferry Services Contract.

BC Ferries is requesting Commission approval for the major capital expenditure for the Project of up to \$ < > million, inclusive of interest during construction (“IDC”), and supplemental Project expenditures of up to \$ < > million, for total Project expenditures of up to \$ < > million. These expenditures are consistent with the long term capital plan of the ferry operator which was released to the Commission on September 30, 2014.

The total costs of the Project are \$ < > million as shown in the following table. The total is made up of capital costs, operating costs and Project refit costs, and other costs. The condition based requirements make up 50% of the total Project costs. The conversion to dual fuel makes up 39%, the regulatory requirements make up 6% and costs for other initiatives (energy efficiency and ancillary revenues) account for the remaining 5%.

Financial Summary of Preferred Options (\$ million)

Preferred Options	Capital Project Costs		Refit Project Costs (MOI)	Other Costs	Total Project Costs (Incl. IDC)	Net Present Value	Simple Payback (Years)	Discounted Payback (Years)
	Capital	Operating						
WP 1								
Option 1A – Carry out Regulatory Requirements						(\$8.44)	N/A	N/A
WP 2								
Option 2C – Covert Propulsion to DF						\$42.05	8	12
WP 3.1								
Option 3B – Implement Energy Efficiency Initiatives						\$3.36	7	11
WP 3.2								
Option 3B – Implement Ancillary Revenue Initiatives						\$5.26	5	6
WP 4								
Option 4B – Implement Condition Based Requirements						(\$69.42)	N/A	N/A
Total Project						(\$27.20)	N/A	N/A

The table above is presented in accordance with International Financial Reporting Standards (IFRS), such that Project costs are classified as capital or operating. Operating costs will be expensed in the year they take place, whereas capital expenditures will be amortized over their assumed lives. The cost categories are further explained below:

- Capital Project Costs (Capital) - classified as capital, as opposed to major overhauls and inspections (MOI), are considered to be an upgrade, betterment or replacement that meets the company's capitalization threshold.

- Capital Project Costs (Operating) - Operating expenditures are expensed in the year they are incurred (Project operating expenditures – MLU), which include training and feasibility costs.
- Refit Project Costs (Capital) – Project costs include capital expenditures conducted on a regular basis that are required to bring the asset up to regular operating standards, and as a result, are amortized based on this regular basis. These are classified as major overhauls and inspections and include major overhauls on hull, propulsion and generator work. They are assumed to have a life of five years, and as such will be amortized over a five year period.
- Other Costs (Operating) – operating costs associated with developing manuals and purchasing life jackets that cannot be capitalized.

Fleet Maintenance Strategy

To maintain the reliability and efficiency of its assets, BC Ferries follows a practice of periodic maintenance and upgrades. Each vessel observes these standards and has an individualized Long Range Maintenance Plan (“LRMP”) which covers the scope, schedule and budget of all capital, refit and operating maintenance events in the vessel’s life.

A vessel’s life cycle is comprised of the following major maintenance events:

- Annual recertification;
- Intermediate refit and dry docking, major vessels only (approximately every 2.5 years);
- Major refit and dry docking (every 5 years for major vessels, every four years for minor vessels);
- One-quarter life upgrade (approximately 10 – 12 years);
- MLU (approximately 20 – 25 years, the single largest planned maintenance event in a life cycle);
- Three-quarter life upgrade (approximately 30 – 35 years);
- Life extension (approximately 40 – 45 years, if deemed appropriate); and
- Decommission and disposal (approximately 40 – 55 years).

Vessel Condition and Reliability

The S Class vessels were commissioned in 1993 and 1994 and have been operated safely and reliably throughout their service lives to date. The following table summarizes the significant capital projects that have been conducted on the vessels since their introduction into the service.

Date Completed	Nature of Upgrade	Vessel
March 2005	Quarter-life update including passenger accommodation upgrades	<i>Spirit of British Columbia</i>
March 2006	Quarter-life upgrade including passenger accommodation upgrades	<i>Spirit of Vancouver Island</i>
November 2008	Sewage treatment plant, pilot	<i>Spirit of British Columbia</i>
March 2009	Rebuild of main engine #3, unplanned	<i>Spirit of British Columbia</i>
February 2010	New bow thruster, condition driven; sewage pump ashore system, regulatory driven	<i>Spirit of British Columbia</i>
February 2012	Sewage pump ashore system, regulatory driven	<i>Spirit of Vancouver Island</i>

The condition of the vessels has been assessed by independent experts. The survey of the *Spirit of British Columbia* indicated that the structural condition was generally sound with minimal steel renewal required and internal hull coatings were found to be sound with minimal breakdown. Cracking has been detected and repaired in the rudder stock support bearing. Both vessels experienced fatigue failures of propeller blades (a total of five have been replaced). Overall, the structural condition of the vessels has been assessed as good and suitable for the remaining 25 to 30 years for each vessel. The propulsion plants are nearing the end of their lives. Although when using ultra-low sulphur diesel as fuel they are compliant with all emission regulations, they have experienced failures and will require major overhaul and maintenance to extend reliable operations to the vessels' end of life.

Specialist contractors (including the Classification Society) along with BC Ferries' Specialist Fleet Support Unit and Fleet Maintenance Unit technicians evaluated systems such as the elevators, refrigeration, engines, power transmission, propellers, hydraulics, safety and heating, ventilation and air conditioning. Many systems have been identified as at their predicted end-of-life as defined by condition and/or sustainability.

Both vessels have been highly reliable with only a small number of unexpected failures leading to service disruption.

We examined the Long Range Vessel Management Plans for both vessels and the MLUs are scheduled according to the plan. Condition reports for each vessel also support the MLUs. It is therefore reasonable and prudent to conduct mid-life upgrades on each of the *Spirit of Vancouver Island* and the *Spirit of British Columbia* as scheduled in the Application.

Past and Future Vessel Deployment

The S Class vessels are technically deployable to other major routes as they possess hull configurations that fit BC Ferries' standard major berths on Routes 1 (Tsawwassen to Swartz Bay), 2 (Departure Bay to Horseshoe Bay), 3 (Horseshoe Bay to Langdale) and 30 (Duke Point to Tsawwassen). However, the size, speed and manoeuvring characteristics of the vessels are not well suited for routes other than Route 1.

The vessels have traditionally been the primary vessels for Route 1 service and meet peak and shoulder season demands when augmented with a combination of part-time or full-time supplementary vessel service. Since 2010, BC Ferries has deployed more fuel efficient (but slightly smaller) Coastal Class vessels during low demand periods, which occasionally result in overload situation.

The MLUs on the vessels are required as described above and present an opportunity to reduce the operating costs of the vessels below that of the Coastal Class vessels, primarily through the adoption of LNG as fuel. This will allow the vessels to resume their traditional role as the primary year-round vessels on Route 1 while increasing efficiency.

Service Implications

The Project cannot be completed during peak season as every vessel in the fleet, less one minor vessel, is required to carry traffic to meet peak season demand. The end of the peak season in September requires the following Project timeline:

Vessel	Out-of-Service	Return-to-Service
Spirit of Vancouver Island	September 7, 2016	May 16, 2017
Spirit of British Columbia	September 6, 2017	May 17, 2018

A revised service delivery plan has been developed for use during the out-of-service period. Left unmitigated, any delay beyond mid-May will have a negative impact on service, namely, sailing overloads, customer dissatisfaction, and passengers and vehicles not carried at the end of scheduled operating day. Concerns have been expressed to the

BC Ferry Commission (see section 8.0 Public Comments) by the BC Trucking Association about whether these plans would include early morning or late nights sailings and additional discretionary sailings on short notice. These delays could result in increased costs for overtime, fuel and contractors and demand for additional round trips in the late night and early morning hours. We see schedule delays as one of the highest Project risks.

6.0 Project Work Packages, Options and Analysis

Analysis

We have considered the financial analysis developed by BC Ferries based on a discounted cashflow (“DCF”) basis over 21 years (the anticipated remaining life of the vessels) discounted at 7% with separated capital and operating costs and are generally comfortable that the assumptions used (including discount rate) are reasonable. The time period used to compare the MLUs to the replacement with new vessels is 40 years, which seems reasonable. Based on BCFS’s analysis the NPV of replacing the Spirit Class Vessels with new vessels is more costly than conducting the mid-life upgrades. On this basis we proceeded to comment on the work packages presented by BCFS as discussed below.

Work Packages

The scope of the Project was divided into four work packages (“WP”s) by BC Ferries to assist presentation and analysis. Generally, the division of scope in each WP is determined by the driver for investment. WP 1 is driven by regulatory compliance, WP 2 by the scale of its positive effect on reducing pressure on fares, WP 3 by its more modest, but still positive effect on reducing pressure on fares, and WP 4 by vessel reliability requirements.

We have commented on each work plan separately following the format that BC Ferries used in their Application. Please see Appendices B, C and D for responses to PwC questions by BC Ferries.

Work Plan	Preferred Option	Scope	NPV (\$ million)
WP 1	1B – Carry out Regulatory Requirements	Fit fire suppression system; modify elevator emergency communication system; structural repairs; survey propeller shafts; modify ancillary services; dry dock and alongside berthing for vessel	(\$8.44)
WP2	2C – Convert Propulsion to DF	Remove existing engine and controls system; fit safety systems; structural modifications to accommodate new engines; procedure and fit LNG storage tanks; procedure and fit 4 dual fuel engines; procedure and fit new ventilation systems	\$42.05
WP 3	3B – Implement Payback Projects	3.1 Install low friction hull coating; modify bulbous bow; install flow interceptor; install energy efficient lighting;	\$3.36
		3.2 Expand gift shop; relocate snack bar; new systems and equipment training	\$5.26
WP 4	4B – Implement Condition Based Requirements	Renew fire detection and control system; install modern marine evacuation system; replace rescue boats and davits; replace rudders and steering gear; upgrade corrosion control system; repair or replace hull coating and superstructure; overhaul main embarkation doors and remove decommissioned platform decks; rebuild controllable pitch propeller; replace or renew bow thrusters and motors; upgrade ventilation systems; renew power supply; replace main	(\$69.42)

switchboard and electrical distribution equipment;
renew heating and air conditioning; overhaul elevator;
overhaul pumps in machinery spaces; renew power
management; replace internal communications
systems; refresh passenger areas; replace bridge and
navigation controls; replace IT wiring and
infrastructure

Work Package 1 – Carry Out Regulatory Requirements

WP 1 covers modifications and survey items required to maintain statutory and regulatory compliance. We reviewed a list of the regulatory bodies driving the work covered in work package 1 and these are included in Appendix F.

The package comprises two options:

- Option 1A – Do not carry out regulatory scope
- Option 1B – Carry out regulatory scope

Selection of Option 1A would mean the vessels’ operating certificates would expire and BC Ferries would therefore be legally unable to operate, placing it in breach of the CFSC. Accordingly, the preferred option is Option 1B – Carry out regulatory scope.

Included in Option 1B are the regulatory items which arise as part of the necessary survey and regulatory compliance of any vessel, for example the shafts are removed for inspection. The estimated cost for this work package appears reasonable and inclusive. It is noted however that some of these items will impact the other work packages i.e. the cost associated with inspection of an item may enable that item to be updated as part of WP4. We agree that this approach is necessary as it is essential for BC Ferries to comply with the terms of the CFSC.

Work Package 2 – Convert Propulsion to Dual Fuel (“DF”)

WP 2 proposes to convert the main propulsion system for the vessels to use LNG as their primary fuel. LNG is approximately 50 percent of the cost and much cleaner burning than the ultra-low sulphur diesel (“ULSD”) fuel the vessels currently use. The package comprises three options:

- Option 2A – Do minimum regulatory work; retain existing diesel engines
- Option 2B – Modernize and retain existing diesel engines
- Option 2C – Convert propulsion to Dual Fuel (diesel and LNG)

BC Ferries selected Option 2C as it will support yield management strategies by reducing the operating costs of the vessels below those of the Coastal Class vessels, thereby allowing the vessels to be the primary Route 1 vessel year round and increase the number of round trips they provide on an annual basis. Accordingly, the preferred option is Option 2C – Convert propulsion to DF.

LNG is rapidly becoming a fuel of choice for those operators around the globe that have the opportunity to easily source the fuel. The business of building LNG powered ships is rapidly maturing and several yards around the world are developing expertise in this area. In Canada, while several engineering firms are involved in the design of LNG-filled ships being built offshore, there is only one shipyard currently building LNG vessels (Davie Shipyard in Quebec). The conversion of vessels from diesel to LNG is not as mature a business and there is an even smaller pool of global experience and none in Canada. The technical issues associated with conversion of the S class vessels to DF can only be addressed by an experienced engineering entity. The company has therefore engaged the leading Canadian company (STX - now known as Vard) to conduct the early concept studies. The procurement process has been designed to attract the global expertise on LNG. Please see section 7.0 Procurement and Risk.

As a result of the rapidly developing technology the regulatory regimes are not yet finalized. The International Maritime Organisation (IMO), Flag Authority (Transport Canada in Canada) and Classification Society (American Bureau of Shipping for the S class) are all in development mode and much of the regulatory regime for LNG on ships is still being validated. In general the International Gas Code, being an established land based code of design is being used as the basis of the new regimen for ships. The S class vessels will be treated as new ships for the regulatory purposes with respect to the LNG installation.

The major changes during the conversion will be the installation of four new engines, two gears and sufficient fuel storage tanks. The associated fuel management systems will include piping safety systems and meeting large venting requirements. It is noted that the fuel bunkering system envisaged is similar to that to be used in the ICF project with tanker trucks delivering fuel directly to bunkering stations on the car deck.

The technical challenges likely faced during the conversion will be:

- Integrating the installation into the existing ship from the perspective of design,
- Scope of change required to older structure and systems to accommodate LNG and new engines, and
- Meeting the regulatory requirements for passenger ships with LNG.

Such challenges, while significant, can be addressed and managed. We see no technical impediment to the conversion of these vessels from conventional diesel fuel power to dual gas / diesel engine.

The average savings in fuel cost for both vessels combined, including inflation, operating 12 months a year over their remaining 27 years of life, is estimated to be approximately \$12 million per year. These savings reflect:

- The forecast commodity price differential between diesel and LNG,
- The difference in consumption related to the energy burn between diesel and LNG,
- The consumption related to a single fuel and a dual fuel engine, and
- The anticipated impact on BC Ferries' current volume discount on diesel fuel purchases.

The pricing assumptions were based on the most recent information based on the futures market.

In terms of other operating costs BCFS believes the maintenance cost reductions of the DF engines will in fact be greater than the increased cost of maintaining two fuel systems. This is because the maintenance of LNG/NG fuel systems is very low due to fewer moving parts. LNG is an extremely clean fuel, and the diesel fuel system usage will be reduced by nearly 99%. However, to be conservative, BCFS has assumed that DF engine maintenance savings are fully offset by LNG fuel system maintenance costs.

We asked BC Ferries for some sensitivity analysis on fuel pricing, conversion costs and consumption for diesel and LNG. They produced the following results:

- LNG savings in the first year have to be reduced by approximately 57% (to \$2.3 million) to bring the NPV to zero (not including the impact of increased diesel cost).
- The price of LNG has to increase by approximately 51.4% to bring the NPV to zero (all else being equal).
- The capital cost needs to increase by approximately 230% to bring the NPV to zero (all else being equal).
- Increasing the current Litres/DLE for LNG by 51.4% to \$19.9 million brings the savings down to \$2.3 million and the NPV to zero (not including impact of increased diesel cost).

The above assumptions relating to fuel and capital costs for DF versus diesel appear reasonable and the sensitivities demonstrate that there would have to be significant changes in the assumptions for the conversion to not demonstrate a positive NPV from the conversion to DF.

Another factor for vessels fuelled primarily by LNG is supply. BC Ferries has conducted extensive consultations over four years with Fortis Inc., the main LNG supplier in BC. It has an existing large supply of LNG on hand on

both Vancouver Island and the Lower Mainland. Fortis is presently investing in increased LNG production capacity with a major expansion of its facility in the Lower Mainland. In summary, Fortis is an established and technically expert regulated utility which affords the potential for a stable and secure long term supply of LNG fuel.

At present, BC Ferries has not entered into a contract with Fortis for supply of LNG for the S Class vessels; however, discussions are underway.

There are other potential options for LNG supply, and BC Ferries has conducted a formal Request for Expressions of Interest for the supply of LNG for the Intermediate Class Ferries (ICFs) and has received several credible responses.

The economics are clearly in favour of LNG, based on the NPV analysis presented by BCFS. The analysis is based on life-cycle analysis presented on a net present value basis which is considered good practice for considering infrastructure options.

Sensitivity to Capital Cost Increases (\$ million)

WP 2 NPV Sensitivities (in millions)	Total Project Cost (incl. IDC)	Net Present Value
Status Quo		\$42.05
5% Capital Cost increase		\$39.38
10% Capital Cost increase		\$36.72
25% Capital Cost increase		\$28.72

Even with a 25% increase in capital costs, WP2 has a positive NPV. Two options were considered as alternatives to converting to DF. These were to do minimum regulatory work and retain the existing diesel fuel engines, and to modernize and retain the existing diesel engines. Both of these options had negative NPVs as well as other less attractive outcomes such as the foregoing of the reduction in operating costs from the lower cost LNG fuel, and likely reduced service reliability of the vessels.

We reviewed the financial analysis conducted by BCFS that included pricing assumptions and capital costs based on DF and diesel. We also considered the recent experience of BC Ferries in procuring the three ICF vessels. While we have some concerns that the cost of this conversion may well exceed the estimates developed, BCFS has indicated that they will return to the Commission with the EPC contractor’s estimates if they exceed those included in this Application. However, separating those costs associated with the LNG conversion from other WPs may be a challenge.

Work Package 3 – Implement Other Payback Projects

The Company sees several other opportunities other than the DF conversion which have positive payback potential. The returns of each are smaller than the DF conversion but not insignificant. The two categories of other payback projects are:

- WP 3.1 – Energy efficiency initiatives
 - Replace underwater hull coating with low friction coating to reduce fuel consumption
 - Modify bow and stern configuration to reduce hull resistance and fuel consumption
 - Replace lighting with energy efficient LED fixtures
- WP 3.2 – Ancillary revenue initiatives
 - Expand the gift shop and relocate the coffee bar
 - Use of crew for passenger (ancillary) amenities

WP 3 comprises two options:

- Option 3A – Do not implement payback projects
- Option 3B – Implement payback projects

Selection of Option 3B will result in cost savings and incremental ancillary revenues that would not otherwise be realized and will reduce pressure on fares. Accordingly, the preferred option is Option 3B – Implement payback projects.

Energy Efficiency Initiatives

BC Ferries measures the effectiveness of energy efficiency initiatives with reference to the overall efficiency realized from implementing a given initiative, measured in LNG fuel saved, multiplied by LNG fuel prices. The Company's policy is to implement initiatives that have a payback period of less than approximately 11 years. The following energy efficiency initiatives have been proposed:

- WP 3.1A – Replacement of underwater hull coating with low friction coating to reduce fuel consumption
- WP 3.1B – Modification of bow and stern configuration to reduce hull resistance and fuel consumption
- WP 3.1C – Replacement of lighting with energy efficient LED fixtures

With respect to WP3.1A, the assumed reduction in hull drag of 5% is based on an average improvement referenced in literature from the paint manufacturer and appears reasonable.

With respect to WP3.1B, the 3% purported increase in efficiency resulting from the proposed hull form design is based on anecdotal evidence and has not been substantiated by the retained marine consultants, Vard Marine Inc. or reference studies. The estimated results of this initiative cannot therefore be corroborated. BCFS responded to a question on this stating "BC Ferries recognizes the consulting reports provided to support these fuel efficiency initiatives do not fully justify proceeding with the investments. BC Ferries therefore considers the proposed capital spending as a target based on the target efficiency, NPV and discounted payback. BC Ferries will task the prime contractor to review the consulting reports and propose efficiency modifications which meet or exceed the targets. Should the proposals not reach the targets, BC Ferries will de-scope the initiative."

With respect to WP3.1C, the efficiency of LED versus existing lighting has been demonstrated through use in other applications.

Although the modifications proposed under WP3.B aren't economical in isolation, when combined with WP3.A as well as other aspects of the MLUs, including a reduction in propeller vibration and fatigue issues proposed by WP4, it is reasonable to assume that overall hull performance will increase and fuel consumption will decrease. The assumptions upon which BC Ferries targets are based, along with the consultant's estimates are summarised below.

Anticipated Fuel Savings Associated with the Following Energy Efficiency Initiatives

Efficiency Initiative	BCFS Assumption	Consultants' Estimate
Low friction coating	5.0%	4-9%
Bulbous bow	2.5%	Variable
Stern interceptor	0.5%	Variable

The Company intends to have the EPC contractor establish what can be achieved by each of these proposed initiatives and guarantee this performance improvement. We suggest that the Commission only approve this work package if the NPV is positive once the capital costs associated therewith are confirmed and the contractor guarantees the improvements in efficiency.

Ancillary Revenues

Ancillary revenues generated by BC Ferries help cover operating costs and reduce upward pressure on fare prices. Revenue generating amenities aboard include three food service facilities, a gift shop, a paid entry quiet lounge and an assortment of vending machines. BC Ferries has proposed to increase ancillary revenues by expanding the gift shop and relocating the snack bar to deck 6 and rebranding it as a coffee bar.

BC Ferries estimates that an increase in both the size and product selection available in the gift shop will result in an increase of \$0.36 in the average spend per passenger which represents a 30% increase in gift shop revenue. Further, BC Ferries estimates that the relocation of the snack bar, presently on deck 5, to deck 6 and its conversion to a coffee bar will generate an additional \$0.22 million annually, an increase of 15%.

BC Ferries has obtained the following support for their assertions about the increased profitability of an expanded gift shop:

- Report prepared by FS Strategy / Urban Metrics in 2012 which concluded that the current space configuration of the gift shop limits the effectiveness of the merchandizing strategy;
- Market research conducted by Synovate and IPSOS Reid which indicated that passengers desire more floor space and greater product differentiation in the gift shop; and
- Historical results displaying average customer spend increases following the expansion of gift shops on the C Class and S Class vessels.

BC Ferries has obtained the following support for their assertions about the increased profitability of the coffee bar after relocation:

- Report prepared by FS Strategy / Urban Metrics which concluded that an enhanced breakfast offering should be provided and that the coffee bar should be relocated to provide easier access for passengers located on deck 6;
- Market research conducted by IPSOS Reid which indicated that conversion of the snack bar to a premium coffee outlet has the potential to greatly increase overall patronage; and
- Historical results which suggest that relocation will provide an opportunity to target customers who are currently underserved.

Through the use of consultants' reports, market research reports and historical experience, we believe BC Ferries has appropriately substantiated their claims regarding the increased ancillary revenues that would result from the proposed expansion of the gift shop and relocation of the coffee bar.

It should be noted that the FS Strategy / Urban Metrics report advocated for the relocation of the coffee bar to Lounge B on deck 6 to appeal to passengers who wouldn't travel to deck 5 for fear of losing their deck 6 seats during busy sailings. However, relocation of the coffee bar to Lounge B on deck 6 and the resulting loss of seating would worsen the seat shortage which may decrease passenger satisfaction.

The NPV of the WP3.2 is positive even with a 5% decrease in passengers.

NPV Sensitivity for Ancillary Revenues on Change in Passenger Volumes (\$ million)

	Total Project Cost (incl. IDC)	Net Present Value	Return on Investment
Status Quo		\$5.26	194%
5% decrease in passengers		\$4.67	173%
5% increase in passengers		\$5.84	216%

Generally the assumptions associated with ancillary revenues seem reasonable. However, we suggest that the Commission only approve this work package if the NPV is positive once the capital costs are confirmed.

Work Package 4 – Implement Condition Based Requirements

WP 4 covers essential maintenance which ensures the reliability of the vessels in the most cost effective manner. This is done by consolidating maintenance essential to vessel performance and customer satisfaction into a single carefully planned project. Although this package does not have a positive net present value (“NPV”) overall, it has a greater NPV than not implementing these requirements at the time, meaning that it benefits the farepayer. The benefits are reducing the overall cost of maintenance, minimizing the risk of maintenance service interruptions, avoiding costly unplanned repairs and avoiding the need to schedule multiple out of service periods which would require some degree of fleet re-deployment. The package comprises two options:

- Option 4A – Do not implement condition based requirements
- Option 4B – Implement condition based requirements

Selection of Option 4B will result in increased vessel reliability as well as a reduction of long term operating costs and risk of unplanned failures. This will help reduce upward pressure on fares. Accordingly, the preferred option is Option 4B – Implement condition based requirements.

BC Ferries is required to manage asset condition for maximum economic performance consistent with safety, reliability and cost effectiveness. By consolidating multiple maintenance events into a larger project, BC Ferries can reduce total maintenance expense and time compared to performing multiple smaller maintenance projects.

The methodology used by the company to compile the list of condition based items to be included in this MLU is a new process introduced into the planned maintenance cycle. It is predicated on benefit to the farepayer and was implemented in a series of review rounds where an initial long list of candidate items was culled down to priority items. This process which is described in detail below has led to a reasoned list of items expenditures that will achieve the benefits described above.

Review Process to Determine Discretionary Scope Items Contained in WP4

November 13, 2013 to December 2, 2013	First Session – Scope Definition Meeting	<ul style="list-style-type: none"> All operational departments, internal resources and various contractors attended these meetings to go through the work scope to provide clarity and assume responsibility for scope items
April 8, 2014 and April 28, 2014	Second Session – Scope Definition Meetings	<ul style="list-style-type: none"> Further definition of scope, justification of scope included, clarify responsibility and definitions for scope approval
May 8, 2014 to May 9, 2014	Third Session – Scope Definition Meetings	<ul style="list-style-type: none"> Final opportunity to provide new scope items, prioritization of scope, clarification of scope justification and responsibility for approval
June 6, 2014	Spirit Class Project Steering Committee, Review	<ul style="list-style-type: none"> Extraordinary Steering Committee meeting for review of Project scope and budget
June 26, 2014	Director, Review	<ul style="list-style-type: none"> Review scope prioritization list and budget along scope reduction recommendations from operational teams
July 2, 2014	VP, Review	<ul style="list-style-type: none"> Review scope prioritization list and budget along scope reduction recommendations from operational teams
July 3, 2014	Spirit Class Project Steering Committee, Review	<ul style="list-style-type: none"> Extraordinary Steering Committee meeting to review scope prioritization list and budget as well as scope reduction recommendations from operational teams

In addition to the consolidated maintenance, the Project proposes to refresh the interior design of the accommodation spaces on decks 5 and 6. If the refresh does not happen during the MLUs, the next opportunity would not be until fiscal 2032 and 2033 which industry research indicates is an excessively long life span for retail service design standards without it appearing dated or negatively impacting revenue. Further, industry research indicates that a design refresh increases retail spending. While this research may not apply directly to BC Ferries as few catering amenity choices exist onboard its ferries, the refresh should prevent some degree of revenue decay. Project financials assume no positive effect from a design refresh in order to be conservative, although a foregone decline of 3.3% per year of cafeteria and buffet revenue (\$10.0 million over the lifecycle) would achieve a discounted payback of 7.5 years.

The overall cost of WP4 on an NPV basis is negative. However, when compared to the NPV of the increased maintenance costs if these activities were not conducted, the NPV is less negative, making it a more attractive option and hence the preferred option by BCFS as they claim it will minimize fares. This is highly dependent on the cost assumptions behind the components within the work package.

NPV Comparison of WP4 vs Foregoing WP4 (\$ million)

	Net Present Value
Conduct Condition-based scope	(\$69.42)
Forego Condition-based scope	(\$75.66)
Net impact of foregoing WP4	(\$6.23)

The NPV of WP4 is negative \$69.4 million. We requested that BCFS run sensitivities to NPV on increases in capital costs for WP4.

NPV Impact of Increasing Capital Cost of WP4 Condition Based Requirements (\$ million)

WP 4 NPV Sensitivities (in millions)	Total Project Cost (incl. IDC)	Net Present Value
Status Quo		(\$69.42)
5% Capital Cost increase		(\$72.90)
10% Capital Cost increase		(\$76.37)

Incremental maintenance costs forecasted by BCFS are expected to be \$75.7 million. This is calculated based on the expected lifecycle costs if WP4 was deferred. This means that if capital costs of the scope of the condition based requirements were to increase by 10%, by BC Ferries analysis, there would be more financial benefit to not proceeding with any of WP4 and instead bearing the maintenance costs and anticipated revenue losses. This is shown below.

NPV Comparison of Increasing Capital Cost WP4 by 10% vs Foregoing WP4 (\$ million)

	Net Present Value
Conduct Condition based scope	(\$76.37)
Forego Condition based scope	(\$75.66)
Net impact of foregoing WP4	\$0.71

Increased total maintenance costs include drydocking and underwater equipment, coating, equipment upgrades, and passenger amenities.

Within the expenses for drydocking and underwater equipment, there is extra drydocking time to allow for extraordinary maintenance of underwater equipment before replacement as well as the risk of tie up. Failure of underwater equipment will lead to vessel tie up and in the worst case emergency drydocking. Service interruptions are estimated as six days per year up to five years, four days per year up to ten years, and two days per year up to fifteen years. The risk of tie up is assumed to decrease gradually as equipment is replaced. If these assumptions are too conservative, the overall cost estimate for foregoing the condition based scope would have a lower NPV than \$75.7 million.

In that case even capital cost increases smaller than 10% for WP4 may not have a positive net impact when compared to foregoing WP4.

We suggest that the capital costs for WP4 are evaluated separately from other work packages to determine whether there is a positive NPV for this work package.

7.0 Procurement and Risk

Procurement

The Project will use a three stage procurement process conducted by the BC Ferries' Supply Chain department. The three stages are as follows:

- *Request for Expression of Interest ("RFEOI")* – The first outreach by the Company to industry to determine the level of interest. No binding agreements are entered into at this stage.
- *Request for Pre-Qualification ("RFPQ")* – The Company issues an outline specification, pro forma contract and concept design for the work or equipment to all proponents who expressed interest at the RFEOI stage. As with the RFEOI stage, no binding agreements are entered into at this stage.
- *Request for Proposal ("RFP")* – The Company requests "best and final" proposals from the proponents. The RFP submissions from the proponents are considered binding on the proponent.

The first of the two main procurement processes is to procure integrated DF propulsion and fuel system equipment. As the equipment has long lead times of up to 18 months, this is a key risk for the Project and the Company must contract for this equipment as soon as practical. BC Ferries issued a RFEOI for DF equipment supply in July 2014 and in October 2014 all respondents indicated lead times were the same or better than they indicated in their RFEOI responses. The Company issued the RFPQ to four qualified respondents in November 2014 and expects to obtain binding responses to the RFP from all respondents before the end of 2014. BC Ferries expects to contract for the equipment in January 2015, 21 months before the first S Class vessel is removed from service in order to mitigate schedule risk.

The second of the two main procurement processes is to procure the services of a prime contractor. The Company will contract for the DF conversion on an Engineering-Procurement-Construction ("EPC") basis. Under this regime, the prime contractor is responsible for detailed design, engineering, procurement of equipment and services, and conversion of the vessel. The EPC procurement method is preferable to other alternatives as the contract places the risk of the design, engineering, procurement and construction on the contractor rather than BC Ferries.

Although the EPC contracts will be similar to the design build contracts used by BC Ferries for new vessel construction, this will be the first instance where BC Ferries has utilized this type of contract. The following two aspects are new for the company but have been used in other ship conversion projects around the world.

The most significant risk resulting from the use of EPC contracts on existing vessels as opposed to for the construction of new vessels is that the asset may contain conditions unknown to the ship-owner and shipyard at the time of contract signing. In order to mitigate this risk, BC Ferries is performing extensive independent condition assessments prior to procurement with the intention of allowing bidders access to this information as well as providing ample opportunity for bidders to inspect the asset prior to bidding. BC Ferries has confirmed that it will be pursuing a fixed-fee contract complete with appropriate liquidated damages for late delivery and contractual performance is being sought. BC Ferries will also use an experienced international marine law firm to prepare the proposed contract which will include provisions for resolving issues to do with incoming asset condition.

The second aspect that is different to a traditional design-build contract is that a number of the major components that the EPC contractor would usually select and procure will have, for purposes of schedule and length of time to delivery, already been selected and procured by BC Ferries through the DF and propulsion system procurement process outlined above. This means that the engineering function has also been pre-constrained by the client selection. However the intent here is for the prime EPC contractor to take over the terms of the contract for the DF and propulsion system.

International yards and contractors will be included in the procurement process as these yards have demonstrated expertise in complex conversions and LNG systems. The principal disadvantage of using international yards is their distance from BC, which could present risks associated with transit, as well as potential incompatibility of non-North American parts. Presently no Canadian or Pacific Northwest shipyards have demonstrated experience with LNG builds or conversions.

We have no major concerns regarding the proposed procurement approach. There is budget and schedule risk as a supplier is yet to be selected. The mitigation approach appears appropriate; however contract terms are still to be negotiated.

We have reviewed the preliminary evaluation criteria for the propulsion and fuel system contractor and the prime EPC contractor, which have similar criteria but different weightings. The heaviest weightings are for operations, quality and schedule for the DF contract and for overall cost and schedule for the EPC contractor, which we believe are appropriate. For the full evaluation criteria please refer to the answers to questions by BCFS in Appendix C, q40.

RFP Preliminary Score Comparison Criteria and Weightings

Criteria Description	Weighting	
	Propulsion & fuel system	EPC
Quality		
Operation		
Overall cost		
Schedule		
Financial (payment schedule)		
Contractor/Supplier (experience, subcontractors, safety, financial capacity)		
Innovation/package		

The Company's history of vessels returning-to-service following mid-life upgrades is outlined below is good.

BC Ferries' History of Vessels Returning-to-Service Following Mid-life Upgrades

Ship	Type	Planned In-Service Date	Actual In-Service Date	Reasons for Delay
<i>Queen of Alberni</i>	MLU	20-Jun-07	26-Jun-07	On Schedule
<i>Queen of Surrey</i>	MLU	17-Jun-06	27-Jun-06	On Schedule
<i>Queen of Oak Bay</i>	MLU	17-Jun-05	18-Jun-05	On Schedule
<i>Queen of Cowichan</i>	MLU	20-Jun-04	12-Jun-04	On Schedule
<i>Queen of Coquitlam</i>	MLU	24-Jun-03	24-Jun-03	On Schedule
<i>Quinsam – Phase 1</i>	Asset Betterment	16-Feb-09	18-Feb-09	On Schedule
<i>Quinsam – Phase 2</i>	Asset Betterment	31-Mar-10	18-May-10	Design and speed issue associated with the RADs: modifications to the lube oil cooling system were required
<i>Quinitsa</i>	Asset Betterment	21-Jun-08 *Amended	25-Jun-08	On Schedule

New vessels and used vessels were considered by BCFS and deemed inappropriate in this case. High level financial analysis was conducted on new vessels and showed that the acquisition of two new coastal class vessels would have a negative NPV of \$39.3 million. Assumptions were not validated by PwC for this analysis but we believe the assertion that procuring new vessels with DF capability would be more expensive than upgrading the existing Spirit Class vessels. Many qualitative factors were considered in assessing the viability of used vessels and the main deterrent in this case was the level of risk involved in acquiring used vessels would only be acceptable if two mutually identical ships could be acquired of a type and capacity closely suited to Route 1. No such vessel duo is realistically available on the used market. Given this explanation and BC Ferries' past experience with used vessels, we concur that upgrading the Spirit Class Vessels makes the most sense.

Risk

A thorough risk management process has been initiated and maintained during the Project development period. The risk register indicates that most risk items identified have steadily declined although high risk items associated with Project budgeting and scheduling remain. Refer to Appendix E for the risk register provided by BC Ferries.

Project risk is reduced by the adoption of the EPC contract which transfers risk to the implementer of the Project, although this remains to be negotiated. However, the corollary of this reduced risk is that a premium is paid under the EPC contract. It should be noted that costs may be greater for a Canadian implementer than a more experienced Asian bidder.

Typically, there is inherent uncertainty in major modifications and refits to older vessels not found in new construction projects due to the unknown condition of the asset. This risk is mitigated by the fact that BC Ferries has completed considerable work to ascertain the condition of the vessels, intends to allow bidders to view the vessel before submitting a bid and will permit the successful bidder to inspect the second vessel on the drydock prior to receiving the first vessel for conversion. However, the risk is not eliminated as condition issues may not be apparent until the work is underway.

Any scheduling delays would have a significant impact on operations. BC Ferries has identified risk mitigation through its procurement approach that includes making use of scheduling contingencies, implementing project management controls and leaving the option open to postpone a portion of the implementation to a later date should delivery be delayed. The use of a dual fuel solution enables this last mitigation measure by allowing the vessels to be run on diesel fuel alone should the LNG addition not be completed on schedule.

Procurement Process Timeline for MLUs

Time	Action
July 2014	Request for Expressions of Interest issued
October 2014	Request for Pre-Qualifications issued
Late 2014	RFP issued
March 2015	Contract award
August 2016	Delivery of DF propulsion equipment to yard
September 2016	Delivery of Spirit of Vancouver Island to prime contractor
March 2017	Delivery of Spirit of Vancouver Island to BC Ferries home port
May 2017	Spirit of Vancouver Island returns to service
September 2017	Delivery of Spirit of British Columbia to prime contractor
March 2018	Delivery of Spirit of British Columbia to BC Ferries home port
May 2018	Spirit of British Columbia returns to service

Mitigation of Schedule Delays Arising from the EPC Procurement Method Described Above

	DF Propulsion Fuel System Equipment	Vessel Completion by Prime Contractor
Two Week Delay	BCF has specified the equipment to arrive at the shipyard before the S Class vessel is removed from service. The equipment is not required until approximately 3 months into the Project. Therefore a 2 week delay has no impact on the Project.	BCF has one month of schedule contingency built into the overall Project schedule. Therefore a 2 week delay has no impact on the Project.
One Month Delay	The equipment is not required until approximately 3 months into the Project. Therefore a 1 month delay has no impact on the Project.	BCF has one month of schedule contingency built into the overall Project schedule. Therefore a 1 month delay has no impact on the Project.
Two Month Delay	The equipment is not required until approximately 3 months into the Project. Therefore a 2 month delay has no impact on the Project.	BCF has one month of schedule contingency built into the Project overall schedule. Therefore a 2 month delay by the prime contractor will delay the vessel re-entry into service by 1 month. Should this occur BCF will sail extra round trips with the 4 vessels assigned to Route 1 to meet the traffic demand. See Appendix B, q30 supplement for costs associated therewith.

BC Ferries pointed out that there are three major schedule risk mitigation strategies embedded in the Project plan. The first is one month of schedule contingency in the schedule itself. The second is the ability to delay commission and training for LNG systems and return to service on diesel fuel, saving four to six weeks. The third is the ability to operate Route 1 with the assigned substitute vessels for up to six weeks after the planned return date of the S Class vessels before service on Route 3a is impacted.

BC Ferries have indicated the mitigations above are realistic schedule recovery plans. Combining these gives a potential schedule recovery of up to 16 weeks. The total planned schedule is 36 weeks; 16 weeks therefore represents schedule recovery potential of 44% of the total schedule. BCFS considers a 44% schedule deviation to be a very low probability scenario. BC Ferries notes that it has a further major schedule risk mitigation option, that of delaying the implementation of the first vessel, the Spirit of British Columbia in the Fall of 2016, until after the Spirit of Vancouver Island is complete, effectively delaying the Project for one year. Obviously this action can only be taken before the vessels are handed over to the Prime Contractor. The only situation which is both realistic and serious enough to warrant this action would be the failure of the main propulsion and LNG equipment to arrive at the shipyard before construction is to commence. In such a case, BC Ferries would assess the likelihood of equipment arriving in good time for use in the construction. If BC Ferries were to judge the equipment delivery risk to be unacceptable, it would not hand over the ship to the Prime Contractor.

The results of the sensitivity analysis to the NPV of an eight week scheduling delay are set out below. As a result of service being provided by vessels with lower capacity, the scenario involves implementing additional sailings to meet traffic demand. Implementing additional sailings is considered a temporary solution to mitigate short term delivery delays of the S Class vessels. It is not a long-term solution and does not replicate the service provided by the S class. Additional sailings do not provide capacity equivalent to the S Class vessels at the equivalent times of day.

Furthermore, the continued deployment of the relief vessels on Route 1 into peak season will prevent the supplementary Route 3a service commencing as scheduled. The NPV for the eight week delay does not include costs related to marketing and public relations, or revenue loss caused by schedule inconveniences. While the mitigation strategies around delays appear well thought out and the costs associated with the delay are not significant in terms of Project economics, we expect that potential frustration from passengers would arise if additional sailings could not provide capacity equivalent to S Class vessels at the equivalent times of day.

NPV Comparison of Project With and Without Schedule Delay (\$ million)

	Net Present Value
Project with no delay	(\$27.20)
Project with 8-week delay	(\$27.88)
Net cost associated with 8-week delay	(\$0.68)

Sensitivities

We believe that the discount rate used is appropriate but as in the past evaluations we requested a sensitivity analysis to a discount rate of 6%. This would make the Project even more favourable.

NPV Sensitivity on Discount Rate (\$ million)

	Discount rate			
	Total Project Cost (incl. IDC)	Net Present Value @ 7%	Net Present Value @ 6%	Difference in NPV
WP1: Regulatory scope		(\$8.44)	(\$8.73)	(\$0.28)
WP2: Dual-fuel conversion		\$42.05	\$55.19	\$13.15
WP3: Other Payback Scope		\$8.62	\$10.74	\$2.12
WP3.1: Implement Energy Efficiency Initiatives		\$3.36	\$4.37	\$1.01
WP3.2: Implement Ancillary Revenue Initiatives		\$5.26	\$6.37	\$1.12
WP4: Condition Based scope		(\$69.42)	(\$71.63)	(\$2.21)
TOTAL		(\$27.20)	(\$14.42)	\$12.78
Offset from Capital Cost savings of not doing diesel overhaul		\$20.15	\$20.76	\$0.61
TOTAL		(\$7.05)	\$6.34	\$13.39

8.0 Conclusions

We conclude that the major capital expenditure is reasonable, prudent and consistent with the current CFSC and the long term capital plan established by the Company, and it has adequately responded to the questions posed in the Section 55 Guidelines.

We are satisfied that the Mid-Life Upgrades are appropriately based on the asset management plans for the vessels and the results of condition reports.

BCFS have conducted extensive business case analysis to support the Mid-Life Upgrades that include conversion to LNG fuel.

The preferred options within each of the four work packages are based on a life-cycle analysis expressed on a NPV basis which is considered good practice for assessing infrastructure options. The NPV analysis indicates that when incremental revenues and costs savings are factored in, the net costs of the Project are \$27.2 million over the remaining lives of the two vessels.

The process to procure the Mid-Life Upgrades is considered appropriate. BCFS have followed a number of practices in the governance of the Project and in the procurement process that it has used in the successful acquisition of a number of new vessels since 2003, including three ICF vessels acquired in 2013 that are LNG-fuelled. This process includes running a robust international competition that is based on an EPC contract that contains a fixed fee and fixed delivery schedule.

The vessel capacities will not be changed and experience shows they are appropriate for the intended service so they are considered sufficient to meet current and projected future demand and are therefore compliant with the terms of the Coastal Ferry Services Contract.

We have no major or minor concerns regarding the Application. With the exception of the first work package which is driven by regulatory requirements, the work packages are discretionary. They are based on either positive net present values or on condition-based assessments. BCFS should be required to confirm both the total final pricing and the NPV analysis for each work package based on the results of the procurement. In addition, BCFS should also be required to confirm the key terms of the procurement, as the risk profile of the Project may change depending on what is negotiated with shipyards.

Appendix A: Section 55 Guideline Questions

Section 55 Guideline Questions

Section 55 Category	# Section 55 questions	# Major concerns	# Minor concerns
Project Description	21	-	-
Timing and In-service Date	3	-	-
Does the Proposed Capital Expenditure Demonstrate Good Judgement, based on Wisdom, Experience and Good Sense?	8	-	-
Wise Use of Resources	6	-	-
Showing Due Consideration for the Future	7	-	-
Not Excessive	8	-	-
Demonstrating Good Value at a Fair, Moderate Price	8	-	-
Coastal Ferry Services Contract	1	-	-
Long Term Vision for Coastal Ferry Services in British Columbia	1	-	-

Project Description	Major concern	Minor concern
a) Describe the proposal for the capital expenditure and provide a comparison to the capital currently in use, in terms, for example, of size, capacity and staff and/or crew requirements.	-	-
b) In the case of a new vessel, has an independent marine surveyor provided a condition assessment of the current vessel and is that assessment factored into the business case supporting the requested capital expenditure?	-	-
c) Is there a regulatory driver for the proposed capital expenditure?	-	-
d) Provide information on the operating costs of the vessel, terminal, information technology or other capital asset to be replaced and/or to be upgraded, covering the most recent three year period, including the current year.	-	-
e) Compare the annual maintenance costs of the existing capital asset with those expected for the replacement and explain any significant variances.	-	-
f) Have there been service disruptions due to inadequacy of the existing capital asset?	-	-
g) If age of the existing capital asset is a factor, what is the estimate of future costs of continuing its use?	-	-
h) Have there been complaints from the public, or other stakeholders about the existing capital asset?	-	-
i) Provide an estimate of the total capital costs associated with the proposed investment.	-	-
j) How was the cost estimate derived? Entirely with BC Ferries' staff or was there an external review?	-	-
k) In the case of a new vessel was the international ship broking industry contacted to determine if there are existing vessels available for purchase that may, with adaptation, be appropriate?	-	-
l) Provide an estimate of the incremental capital costs to provide "ancillary services," including catering and retail concessions, and provide estimates of the incremental operating costs to provide the ancillary services and the incremental revenue expected to be generated from those services.	-	-
m) In the case of a new vessel, demonstrate on a lifecycle cost or present value basis that the decision to build a new vessel versus the cost of acquiring a second-hand	-	-

vessel, if applicable, is a net benefit. Include sensitivity analysis in case of cost overruns.		
n) Does the proposal include significant features that are innovative or untried?	-	-
o) Is there an allowance in the estimate for inflation from the date of acceptance of a proposal to the completion date (escalation clause)?	-	-
p) Are financing costs included in the cost estimate between first payment to the supplier and the in-service date?	-	-
q) Compare the operating costs of the existing capital asset with those expected for the replacement, to include, in the case of vessels, fuel costs, crew costs and depreciation.	-	-
r) Does BC Ferries intend to capitalize any of its own internal costs with respect to the capital expenditure?	-	-
s) Identify any parts of the capital expenditure that are to be provided by BC Ferries or its subsidiaries.	-	-
t) In the case of vessels, if tenders are to be sought from foreign shipbuilders, what is the applicability of custom tariffs on importation of the vessels?	-	-
u) In the case of vessels, will BC Ferries require the contracting shipyard to bear the design and construction risk?	-	-

Timing and In-service Date	Major concern	Minor concern
a) For new or replacement vessels what is the expected in-service or deployment date and how was it derived?	-	-
b) Were potential builders, for example shipyards, contacted to determine if the proposed date is reasonable?	-	-
c) What are the consequences of a delay in the in-service or deployment date?	-	-

Does the Proposed Capital Expenditure Demonstrate Good Judgement, based on Wisdom, Experience and Good Sense	Major concern	Minor concern
i) Why is the proposed capital expenditure required now, and what are the consequences of any delay?	-	-
ii) How has this capital expenditure project been prioritized relative to other capital expenditure projects within the long term capital plan?	-	-
iii) What sources of expertise and experience have been relied upon in deciding to proceed with this capital expenditure?	-	-
iv) Provide detail on completed and/or planned consultations, in particular with the provincial government or other stakeholders.	-	-
v) In the case of new vessels, has BC Ferries considered any alternative to building and owning the new vessels?	-	-
vi) Will a new or replacement vessel require any modifications to any terminals? If so, at what additional cost?	-	-
vii) What are the procurement cost risks and how will they be mitigated?	-	-
viii) What are the consequences or the alternatives if the application is rejected?	-	-

Wise Use of Resources	Major concern	Minor concern
i) Can an existing vessel be reassigned instead?	-	-
ii) For shorter routes, were non-vessel options considered, such as a fixed link?	-	-
iii) Were non-vehicle vessels (e.g. passenger only ferries, barges, other) or a mix of vessel types considered?	-	-
iv) Has a used vessel option been considered?	-	-
v) How does the vessel align with the concept of standardization of the fleet?	-	-
vi) Would investments in technology, such as an expanded reservation system, better IT systems or a yield management program allow for a smaller sized vessel?	-	-

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

Not Excessive	Major concern	Minor concern
i) What passenger amenities will be provided, and why are they considered appropriate for the intended use of this vessel?	-	-
ii) Do any of the proposed passenger amenities require crewing levels to be higher than what is required by Transport Canada regulations?	-	-
iii) Is the vessel the right size and how has the capacity requirement been determined?	-	-
iv) Describe the objectives of BC Ferries' design standards for passenger accommodations for vessels of similar size and scope. Will the passenger accommodations for the replacement vessel deviate from these standards? If so, what is the rationale for the deviation and what impact, if any, will it have on the capital and operating costs of the vessel?	-	-
v) Will the application of logos or other BC Ferries' brand images to the vessel be consistent with BC Ferries' current practice for similar vessels. If not, how will it differ and what will be the effect on capital costs?	-	-
vi) What would have to be sacrificed to reduce total costs by 10%, and by 20%?	-	-
vii) Does vessel design or expected operating speed have any impact on labour costs?	-	-
viii) Are engines sized for efficient operations, fuel consumption and ability to recover schedule?	-	-

Demonstrating Good Value at a Fair, Moderate Price	Major concern	Minor concern
i) For new vessels what alternatives were considered? Provide the rationale (cost or otherwise) for why the alternatives were not accepted.	-	-
ii) Has the business case been built on a full life cycle costing basis?	-	-
iii) How fuel efficient will the new vessels(s) be?	-	-
iv) Will the new or replacement vessel have any impact on efficient use of labour?	-	-
v) Are the operating costs reasonable?	-	-
vi) How do the operating costs compare with the vessel being replaced?	-	-
vii) Is there any expected impact on revenue?	-	-
viii) Will crew training and certification activities be in excess of that required to meet regulatory requirements? If so, explain the rationale for this approach and whether it will result in incremental operating costs.	-	-

Coastal Ferry Services Contract	Major concern	Minor concern
i) Is the proposed capital expenditure consistent with the current Coastal Ferry Services Contract?	-	-

Long Term Vision for Coastal Ferry Services in British Columbia	Major concern	Minor concern
i) How does the proposed expenditure support the government approved long term vision for the future of coastal ferry services?	-	-

The following appendices have been removed as they include information of a confidential and commercially sensitive nature:

Appendix B: Questions to BCFS and their Responses (October 14, 2014)

Appendix C: Questions to BCFS and their Responses (November 3, 2014)

Appendix D: Questions to BCFS and their Responses (November 17, 2014)

Appendix E: Risk Register

Appendix F: Regulatory Drivers for Work Package 1