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June 21, 2021

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC
V6Z 2N3

Attention: Mr. Patrick Wruck, Commission Secretary

Dear Mr. Wruck:

Re: FortisBC Energy Inc. (FEI)

**Application for a Certificate of Public Convenience and Necessity (CPCN) for
Approval of the Advanced Metering Infrastructure (AMI) Project (AMI Project or
AMI Application)**

FEI Supplemental Information

FEI writes further to the British Columbia Utilities Commission (BCUC) letter dated May 28, 2021 (Exhibit A-2) in the above-noted proceeding. In Exhibit A-2, the BCUC requested:

- Additional procurement information;
- Working excel models of various appendices and tables;
- Format/legibility of certain appendices and figures; and
- Redacted public versions of Appendices E-1, E-2, and E-3 with reasons for each redaction.

FEI has organized this Supplemental Information filing in the following four parts as follows:

- Part 1 – matters related to modelling, format and searchability;
- Part 2 – the request for additional procurement-related information;
- Part 3 – the request to narrow the confidentiality that FEI has sought over Appendix E of the AMI Application; and
- Part 4 – the conclusion.

Part 1: Excel Models, Format and Searchability

Under the heading “Working excel models” in Exhibit A-2, the BCUC requested that FEI file working excel models of certain financial information, namely:

- Appendices G-1, G-2, G-3, G-4, G-5;
- Table 6-12;
- NPV¹ financial summary of the AMR costs provided in Table 4-2 and the associated rate impact; and
- Allocation of Project costs and rate impact to Fort Nelson

The requested working excel models are provided in Attachment 1 to this Supplemental Filing and are submitted on a confidential basis.

Under the heading “Format of Information” in Exhibit A-2, the BCUC requested that FEI provide Appendix E in PDF searchable format and to correct legibility of text in Figures 1-1, 4-1, 4-2, 5-1 in the Application. Appendix E, which was among the portions of Exhibit B-1-1 that FEI requested be held in confidence (and in that respect is also addressed in Part 3 of this letter, below), appears to have been affected by a technical issue during the upload process to the BCUC website. FEI has resolved this issue with the Commission Secretary and FEI has not detected any other issues with searchability of other parts of the AMI Application.

With respect to the illegibility of text in the identified figures, this issue appears to have occurred during the conversion of the figures from the source format to PDF format. FEI has included full-page versions of these figures with improved resolution in Attachment 2.

Part 2: Exhibit A-2 Requests under the Heading “Project Alternatives”

FEI addresses this issue in two sections below. First, section A discusses whether this information is required under the 2015 CPCN Application Guidelines (2015 CPCN Guidelines, or Guidelines), as Exhibit A-2 suggests. Second, in section B, FEI provides a substantive response to the requests in Exhibit A-2 by way of the Util-Assist FEI Gas AMI Network Procurement Summary (Util-Assist Summary) attached in Attachment 3 in this Supplemental Information filing (publicly in redacted form and on a confidential basis in unredacted form). FEI has provided the Util-Assist Summary as a Supplemental Information filing rather than including it in an amended application as in FEI’s view it is not required by the Guidelines and does not affect the relief sought in the Application.

A. Whether Requested Information Relates to “Project Alternatives”

Under the heading “Project Alternatives” in Exhibit A-2, the BCUC requested FEI to provide certain information regarding responses to its request for proposal (RFP) process, including in relation to vendors who were not selected.

¹ Capitalized terms are used as defined in Exhibit B-1, unless otherwise defined herein.

FEI is concerned that Exhibit A-2 adopts an approach to the 2015 CPCN Guidelines that departs from the text of the Guidelines and the past practice on which FEI based its filing. FEI is also concerned with the implication in Exhibit A-2 that the content of Exhibit B-1 falls short of the 2015 CPCN Guidelines despite the care that FEI took to comply with them. Therefore, while FEI provides a substantive response to the requests in Exhibit A-2 by way of the Util-Assist Summary, FEI stands behind the view of the 2015 CPCN Guidelines that it adopted in the AMI Application as filed.

The BCUC states that the “purpose” of the 2015 CPCN Guidelines is “to assist public utilities and other parties wishing to construct or operate utility facilities in preparing their applications for a [CPCN] so the review of these applications by the [BCUC] can proceed as efficiently as possible” (p. 1). The BCUC notes that the 2015 CPCN Guidelines “do not alter the fundamental regulatory relationship between utilities and the [BCUC]” (p. 1).

Under section 45 of the *Utilities Commission Act* (UCA), the BCUC considers whether or not “public convenience and necessity” require or will require “the construction or operation” for which the applicant seeks approval (s. 45(1)).

A CPCN application should discuss alternatives to the project for which approval is sought, in order to provide the BCUC and interveners with the opportunity to test whether, with a view to public convenience and necessity, the project should proceed. Section 2 of the 2015 CPCN Guidelines sets out the information that the applicant should provide regarding “alternatives” or “feasible alternatives” to the project.

FEI has provided this information in the AMI Application (Exhibit B-1), discussing each of AMI and AMR.

None of the potential vendors that FEI contemplated offered an alternative other than AMI or AMR. Qualitatively what they offered falls squarely within one or other of those two categories.

Exhibit A-2 quotes a passage from p. 75 of Exhibit B-1 stating, “[t]he Sensus technology best met FEI’s network functional requirements, is capable of integrating with existing and future FEI systems to enable delivery of FEI’s AMI Solution, and is scalable to accommodate future customer growth”. For clarity, “Sensus technology” is simply an example of AMI technology. All AMI solutions offered by vendors met the functional requirements set by FEI, were capable of integration and were scalable, although as stated above, FEI considered that the Sensus technology *best* met FEI’s network functional requirements.

The 2015 CPCN Guidelines contemplate discussion of “alternatives” to the project, not discussion of the choice among vendors who may be involved in implementing either the project or alternatives to it. As described in FEI’s draft orders (Exhibit B-1, Appendix K), the project for which approval is sought involves installation of AMI meters, communication modules and associated infrastructure.² To this, AMR is an alternative.

² The Project is described in the preambles to the draft orders in Exhibit B-1 as including “1. Installation of approximately 1,100,000 residential, commercial, and industrial advanced meters and meter retrofits of communication modules capable of remote gas consumption measurement; 2. Installation of approximately 1,100 communication modules on the gas network to increase operational awareness of the gas system state;

Underlining that vendor selection is not an “alternative” for the purpose of the 2015 CPCN Guidelines is that a vendor may be (and commonly is) chosen only after a CPCN application is filed or even after it is decided. Thus in most cases, the kind of discussion about vendors contemplated in Exhibit A-2 could not even occur in the CPCN application. The BCUC approves a project, not the vendor that a utility (the regulated entity which will continue to be responsible to the BCUC) may later select. In making such selections, the utility must use the judgment it employs, in the ordinary course, in running its operations.³

The nature of the BCUC’s role does not change simply because a vendor has already been selected prior to the filing of a given application. This is not to say that information about an already selected vendor is irrelevant in determining whether the project should be approved. As in the case of the Sensus references found in Exhibit B-1, it allows for more specificity about how the project would unfold and provides further evidence the BCUC may consider in assessing whether a utility has matters in hand. However, the BCUC’s mandate does not change to determining that Vendor A was more or less appropriate than Vendor B, for example, and this determination is not among the orders sought in the AMI Application.

Making a CPCN application (or other proceeding before the BCUC) in any respect into a contest among vendors would also have significant downsides. Even if the information is not made public (a question further addressed under subheading B), it would distract from evaluation of the project. It could introduce so many layers (given the levels of potential vendors and subcontractors) that the BCUC process would be unworkably complex. It could also attract a different set of interveners: vendors hoping to make the case, before a new audience, that they should have been selected. It could lead to spurious litigation against utilities by unsuccessful proponents; that litigation could, although likely to be resolved in utilities’ favour, consume considerable resources. It could make companies less willing to submit bids. Bidders would know that, if their bid fails, they would be subject to attack by those whose defence of the winning bid comes in the form of criticizing its competition. Any failed bidder would not only have wasted the resources required to bid, which is simply a risk any bidder must take, but beyond that could suffer a blow to reputation and economic interests that makes it otherwise worse off for having participated. In turn, successful bidders would know their involvement in the project is not assured even if the project is approved; if this does not deter them from bidding, it could at least deter them from spending time on assisting the utility in preparing its filing. Public utilities and ultimately their customers depend on utilities’ ability to maintain good relationships with prospective vendors; those relationships are far more likely to be undercut by extending debate in the regulatory process to vendor selection, rather than continuing to focus on choice of concept. The concerns identified in this paragraph are not exhaustive.

In Exhibit B-1, FEI adopted the same approach as in the CPCN application filed by FortisBC Inc. (FBC) in 2012 when seeking approval for AMI in its service territory (FBC AMI Application). Although the FBC AMI Application was filed under the 2010 version of the

and 3. Installation of the AMI network and infrastructure to communicate with customer meters and other communication modules on the FEI gas network.”

³ Although in a different context, see *British Columbia Hydro and Power Authority v. British Columbia (Utilities Commission)*, 1996 CanLII 3048 (BCCA).

CPCN Guidelines, not the 2015 CPCN Guidelines, in relation to project “alternatives” the two versions are not materially different.

The FBC AMI Application discussed four alternatives: the status quo, AMI, power line carrier (a wired version of AMI not available to gas utilities), and AMR. FBC provided net present value numbers and other commentary in relation to those four alternatives. The FBC AMI Application was preceded by an RFP addressing functional requirements that FBC had set out. A copy of the RFP was not provided as part of the FBC AMI Application, though FBC later provided it in response to an information request made by one of the interveners (Exhibit B-11, FEI’s response to B.C. Sustainable Energy Association IR 1.8.1). To the best of the utilities’ recollection, the issue related to the RFP was not whether the right vendor had been chosen, but whether there had been a broad enough opportunity for potential vendors to put forward non-radio frequency AMI alternatives for FBC’s consideration. The sort of information that is sought now in Exhibit A-2 was not provided. In its decision granting the CPCN, the BCUC reviewed FBC’s discussion of project alternatives, did not suggest that FBC should have provided a vendor-by-vendor analysis, and found that FBC had adequately considered the alternatives.

FEI appreciates that in determining the recent CPCN application of Pacific Northern Gas (NE) Ltd. (PNG(NE)), for its AMR project, the BCUC referred not simply to “Technology Alternatives” but also to “Vendor Alternatives”. The Panel noted that it “accepts PNG(NE)’s selection of Itron Canada Inc. to implement its AMR solution”. However, the Panel seemed to proceed in accordance with how PNG(NE) had chosen to present its application, by which FEI is not, of course, bound. Further, as noted above, FEI does not dispute that the vendor who is chosen pre-filing may be a relevant consideration, and Exhibit B-1 identifies Sensus as the chosen vendor. This is not the same as weighing in the regulatory process the relative merits of Vendors A and B or otherwise engaging in the detailed examination that the information sought in Exhibit A-2 would suggest the BCUC believes it should undertake.

B. Util-Assist Summary and Request for Confidentiality

Notwithstanding the cautions expressed above and while reserving its position in this regard, FEI appreciates the BCUC’s engagement. In the relatively unusual circumstances of the AMI Application where an RFP process for a significant component of the Project has already occurred, FEI provides the Util-Assist Summary in Attachment 3 to this filing.

FEI is filing the Util-Assist Summary on a confidential basis in addition to providing a redacted public version for the record of this proceeding. FEI requests that the BCUC keep the redacted portions of the Util-Assist Summary confidential for the following reasons.

The redacted information in the Util-Assist Summary:

- builds on information provided in the RFP process by third parties. In the RFP itself, FEI committed to “use commercially reasonable efforts to request confidential treatment by the BCUC of any documents that contain information provided by the Proponent as part of the Proposal”;
- could, if publicly revealed, make entities less willing to submit bids in the future, knowing not only that their own information could be revealed but also that

statements about them and their relative attributes could be broadcast publicly; and/or

- could, if publicly revealed, provide information to businesses with whom FEI is considering dealing in future about how FEI approaches certain matters, creating certain expectations and potentially skewing businesses' competitive position and outcomes of competitive processes.

Entities who participate in a given RFP should focus their attention on presenting accurate proposals rather than on potential public comparisons with other bidders and communication of their pricing and other information to competitors, potential customers and others in a public process. Further, while the RFP process outlined in the Util-Assist Summary has concluded, FEI is now embarking on another major RFP in relation to the Project (for deployment). In these and future dealings, FEI requires positive ongoing relationships with entities with whom it does or could do business. The public release of an unredacted version of the Util-Assist Summary could fundamentally undermine the above.

Rule 20.01 of the BCUC Rules of Practice and Procedure provides that, “[i]n determining whether the nature of the information or documents require a confidentiality direction, the BCUC will have regard to matters that it considers relevant”, which include “(a) whether the disclosure of the information could reasonably be expected to result in: (i) undue material financial loss or gain to a person; (ii) significant harm or prejudice to that person’s competitive or negotiating position; or (iii) harm to individual or public safety or to the environment” and “(b) whether the information is personal, financial, commercial, scientific, labour relations or technical information that is confidential and consistently treated as confidential by the person”. The list of factors set out in Rule 20.01 is not exhaustive. For example, Rule 17.02 provides that “[f]or greater certainty, nothing in these rules is intended to limit the operation of any statutory provision that protects the confidentiality of information of documents.”

For the reasons outlined above, the redactions that FEI has made to the public version of the Util-Assist Summary are to items whose disclosure could reasonably be expected to result in undue material financial loss to FEI (and thereby its ratepayers) and potentially third parties; and significant harm or prejudice to participants in RFP processes including FEI. That harm or prejudice includes harm or prejudice to the competitive positions and negotiating positions of participants including FEI.

Further, the redacted material includes commercial and other information that is confidential and is consistently treated as confidential by FEI. FEI was careful in the AMI Application when dealing with procurement-related matters and has been in other CPCN applications (such as the FBC AMI Application) as well, where an RFP process had been conducted, to deal with information appropriately. FEI is also careful in dealing with RFP-related information outside regulatory proceedings and treats it confidentially in that context as well. Further, third parties involved look for their information to be kept confidential, including through the terms of the RFP in which FEI committed, as noted above, to “use commercially reasonable efforts to request confidential treatment by the BCUC of any documents that contain information provided by the Proponent as part of the Proposal.” Rule 20.01(d) provides that among the factors to which the BCUC is to have regard in determining whether

a confidentiality direction is appropriate, is “whether the person submitting the document has any legal obligation to maintain confidentiality”.

The public interest – including in having utilities able to fulfil their mandate in providing safe, reliable service at just and reasonable rates – is aligned with confidential treatment of the redacted portions of the Util-Assist Summary and with the confidential treatment requested below for portions of Appendix E. Further, FEI expects that registered interveners would generally be able to access the protected information, as long as they executed the appropriate Undertaking of Confidentiality, subject to the possibility of there being a registered intervener in relation to whom (given their particular characteristics or circumstances) further protections are required.

Part 3: Exhibit A-2 Requests Regarding Appendix E Confidentiality

A. Background

In Exhibit A-2, the BCUC states:

The BCUC requests that FEI file public versions of Appendices E-1, E-2 and E-3 with any confidential information redacted. The BCUC requests FEI to provide specific reasons for confidential treatment for each redaction in consideration of the factors described in Rule 20.01 of the Rules. If FEI determines that any of these Appendices are not confidential, the BCUC requests FEI to provide an amended Application with all non-confidential information filed publicly.

The public filing of these documents, even with redactions, would be a departure from the manner in which the kind of documents of which Appendix E consists have been treated in CPCN applications filed by FEI as well as by FBC, for as long as those utilities (together, FortisBC) have been filing documents in this form.

FortisBC has filed documents of the nature contained in Appendix E on a confidential basis since the time it first adopted this form of documentation in or about 2016. They have maintained a consistent practice in this regard. The fact that they have uniformly filed such documents on a confidential basis reflects the importance they attribute to keeping the content confidential. Correspondingly, FortisBC does not make these documents public in other venues either.

FortisBC does not recall any occasion on which an intervener has opposed the filing by it of such documents on a confidential basis. In those cases, there has not been a procedural fairness issue to which FortisBC’s request for confidential treatment has given rise, nor has the thorough testing of the evidence been impaired. FEI does not expect any such issue to arise here. As FEI said in its Exhibit B-1 cover letter under the heading “Access to Confidential Information for Interveners”:

Should parties that choose to register in the review of this Application require access to some or all of the information filed confidentially, FEI has provided a proposed Confidentiality Declaration and Undertaking Form in Appendix K-3, to be executed before confidential information may be released to registered parties under the terms of the undertaking. FEI expects that registered

interveners would generally be able to access the confidential information as long as they executed the Undertaking of Confidentiality, subject to the possibility of there being a registered intervener in relation to whom (given their particular characteristics or circumstances) further protections are required. FEI requests that the BCUC provide it with the opportunity to file comments on any objections or concerns that it may have, should any other registered parties seek access to confidential information.

FEI anticipates that various experienced interveners will participate in the AMI Application and bring to bear their experience and expertise, so as to ensure the material is fully examined and tested.

FortisBC also does not recall any occasion on which the BCUC denied its request for full confidentiality in respect of such documents.

FEI does not suggest that the BCUC is technically bound by the prior confidential treatment given to this kind of material in those past applications, although FEI respectfully submits it should be seen as persuasive. FEI recognizes, of course, that each application filed with the BCUC is potentially different in its content and purpose, is filed in different circumstances, and may attract different potential actors to review its public filings who may pose a range of commercial, security or other threats to the utility and ultimately its customers.

FEI has given careful consideration again to the specifics of the AMI Application and its timing, its content, and the nature of the surrounding circumstances and potential risks of public release in those circumstances. In this context, the following table identifies the specific redactions FEI has made in Appendix E. The redacted version of Appendix E is provided in Attachment 4 to this filing.

Redaction No.	Appendix and Page No.	Redaction
1	Appendix E-1, page 2, Version History	Personal names in the “Prepared By” and “Reviewed By” columns of Version History.
2	Appendix E-1, page 10, Table 4.1	Content of “Description and Implications to the Project” column redacted in full.
3	Appendix E-1, pages 11 to 16, Section 5.2	Summary of Risks and Treatment Actions redacted in full.
4	Appendix E-1, page 19, Section 8, Appendix 1	“Participants” column with personal names redacted in full.
Register	Appendix E-1, Appendix 3	Risk Register fully confidential
5	Appendix E-2, page 4, Version History	Personal names in the “Prepared By” and “Reviewed By” columns of Version History.
6	Appendix E-2, page 21, Section 4	Hyperlink to Register on FEI SharePoint database redacted.
7	Appendix E-2, page 22, Section 5.2	Hyperlink to Register on FEI SharePoint database redacted.

Redaction No.	Appendix and Page No.	Redaction
8	Appendix E-3, page 2, Version History	Personal names in the “Prepared By” and “Reviewed By” columns of Version History.
9	Appendix E-3, page 7, Table 2	“Point Estimate (Most Likely)” detailed line items redacted.
10	Appendix E-3, page 10, Table 3a	“Range Estimate for Estimate Uncertainty” detailed line items redacted.
11	Appendix E-3, page 13, Table 4a	“Summary of Critical Project-Specific Risks and Assessment” redacted in full.
12	Appendix E-3, page 14, Table 4b	“Burden Rate” redacted in full.
13	Appendix E-3, page 14, Table 4c	“Expected Cost of Time-Driven Project-Specific Risks” redacted in full.
14	Appendix E-3, page 15, Table 4d	“Expected Cost of Non-Time-Driven Project-Specific Risks” redacted in full. Sentence immediately following table redacted.
15	Appendix E-3, pages 15 to 16, bulleted items	Bulleted items redacted in full.

Particular Considerations

Considerations relevant to Redactions 1-15 and the Register, as applicable, are outlined below.

Allowing a risk register to best serve its purpose

The Register as well as the content at Redactions 2-3, 11 and 13-15, or linked at Redactions 6-7, describe specific areas of risk to the Project. The Register does so at greatest length, but key elements of its content are set out as well at the portions of Appendices E-1, E-2 and E-3 to which other redactions relate.

The purpose of a risk register is to allow utility staff to have a living document in which to record concerns and potential means of mitigating or avoiding the associated risk. It is a document intended to educate and inform decision-makers at a utility in order to allow them to make sound and appropriate choices in the best interests of ratepayers. Further to the 2015 CPCN Guidelines, it may also come before the regulator and interveners, subject in the latter case to Undertakings of Confidentiality providing appropriate protection in a given case. In both respects, it is important that those preparing the risk register be encouraged to provide an unvarnished, up-to-date, possibly evolving, view of risks and how those risks may be addressed. If its authors knew that its contents would be exposed indiscriminately, including to potential counterparties to commercial contracts, potentially malevolent actors seeking to expose vulnerabilities in FEI’s systems, or other members of a broader audience who could freely access the document online for purposes outside the regulatory proceeding, inevitably a different set of considerations would affect preparation of the document. It would become less useful in serving its underlying purpose and, because of that, not serve either the ratepayer or broader public interest as well.

The expectation with which the Register (and the portions extracted or derived from it in other portions of Appendix E) was prepared and filed was, likewise, that it would be confidential, as had been – as noted above – FortisBC's unfailing experience. The content of Appendix E reflects that.

The above discussion is not specific to a given row of the Register or a specific encapsulation of the risks found elsewhere in Appendix E. Although as examined below there are certainly further justifications for confidentiality that pertain to specific risks, the discussion under this subheading focuses on the need for confidentiality protection given the nature and purpose of this type of document, not specifically given the content that populates the document at any given point in time. Indeed, that content may itself evolve over the course of the AMI Application and that evolution should be encouraged.

Protecting Negotiating Position

Although in the context of this particular Application, FEI has already contracted with Sensus for certain aspects of the Project, it will be returning to the market to seek competitive bids for deployment of the Project. It will also be dealing with other commercial entities on the Project and other projects going forward. It is in the interest of FEI's ratepayers for its negotiating position to be protected.

That negotiating position is necessarily eroded the more insight a potential counterparty has into the risks that FEI believes may exist, including timing and cost considerations, potential labour relations pressure points, and relations with other stakeholders. The Register and the other portions of Appendix E to which Redactions 2-3, 6-7, 11 and 13-15 relate contain matters that may be of interest and used to the advantage of those with whom FEI will need to negotiate, and as such cause FEI and its ratepayers significant harm.

Further, as noted in the Exhibit B-1 cover letter, "[i]f the estimated costs for the work is disclosed, FEI reasonably expects that its negotiating position may be prejudiced. For instance, the bidding parties with knowledge about the estimated costs may use the estimate costs as a reference for their bidding." Tables 2 and 3a (the portions of Appendix E-3 to which Redactions 9 and 10 relate) include information from which unit prices for contractor-provided products could be calculated; as such, it is appropriate for detailed line items to be redacted to prevent that calculation. Tables 4b-4d (to which Redactions 12-14 relate) also contain cost-related information of which potential counterparties could take advantage. The information both could be used to calculate vendors' unit prices and could be used to inform potential future bidders of expected budgets for work they could be bidding on.

Labour Relations Issues

The documents including the Register contain specific reference to union relationships and how they may be affected in given circumstances. FortisBC has ongoing dealings with unionized employees and periodically engages in collective bargaining negotiations as well as resolution of grievances, as applicable. Rule 20.01 refers specifically to labour relations information as potentially subject to confidential treatment.

Preservation of Other Relationships

In describing risks, the Register necessarily makes assessments and comments. The information in the Register and also reflected in other portions of Appendix E for which redactions are proposed is intended to gauge and address risk, not harm the business or other reputation of anyone through public release.

Threats to the System, Customers and Employees

Although the documents do not contain system diagrams, they do indicate the kinds of risks that a malevolent actor could exploit in seeking to undermine safe and reliable service for FEI customers, threaten the safety of customers or workers, or potentially expose personal information. The documents also indicate measures that FEI may take to reduce the risk; these measures would not work as well if a malevolent actor knows about, and can plan around, those measures. The Register and other points of Appendix E where risks are summarized also point to where certain points of dissatisfaction could give rise to violent or disruptive behaviour; FEI is concerned about public release encouraging those who might engage in it.

Personal Names

Redactions 1, 4, 5 and 8 contain the personal names of FEI employees or consultants. It has been FEI's practice not to include such names in public filings for privacy reasons. The names do not shed light on the substance of the AMI Application.

Consistent Confidential Treatment

As noted earlier, among the considerations noted in Rule 20.01 is whether the information for which confidential treatment is sought is consistently treated by the requesting party as confidential. As outlined earlier, that is certainly the case here, where Redactions 1-15 and the Register are all within the portions of CPCN applications for which FortisBC has consistently sought and obtained full confidential treatment.

Part 4: Conclusion

As outlined above, FEI has addressed in this Supplemental Information filing, in response to Exhibit A-2, matters related to modelling, format and searchability; the request for additional procurement-related information; and the request to narrow the confidentiality that FEI has sought over Appendix E of the AMI Application.

FEI wishes to proceed with the regulatory review of the Application as soon as possible and has, accordingly, updated the proposed dates initially filed in Application. The proposed regulatory timetable below takes into consideration the other regulatory proceedings underway, which involve many of the same key FEI personnel and interveners, and the availability of FEI personnel.

Action	Date (2021)
BCUC issues procedural order by	Monday, July 12
FEI to publish Notice by	Friday, August 20

Action	Date (2021)
Registration of Interveners	Wednesday, August 25
BCUC Information Request (IR) No. 1	Thursday, September 9
Intervener IR No. 1	Thursday, September 16
FEI Response to BCUC and Intervener IR No. 1	Wednesday, October 20
BCUC and Intervener IR No. 2	Wednesday, November 3
FEI Response to BCUC and Intervener IR No. 2	Monday, December 6
Submissions on Further Process	Monday, December 20

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Registered Parties to the FEI Annual Review for 2020 and 2021 Delivery Rates

Attachment 1

WORKING EXCEL MODELS

REFER TO LIVE SPREADSHEET MODELS

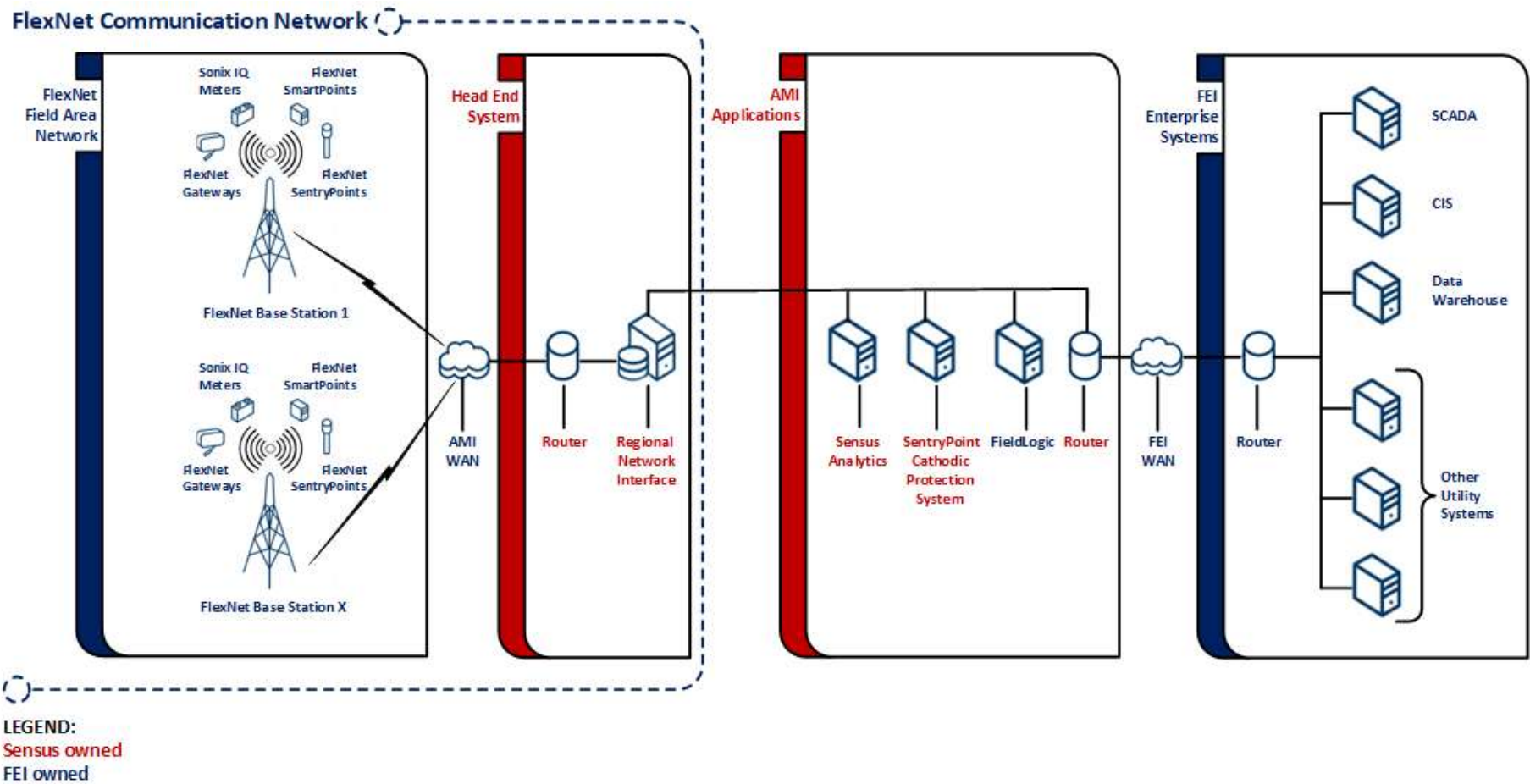
Provided in electronic format only

FILED CONFIDENTIALLY

Attachment 2

FULL PAGE FIGURES

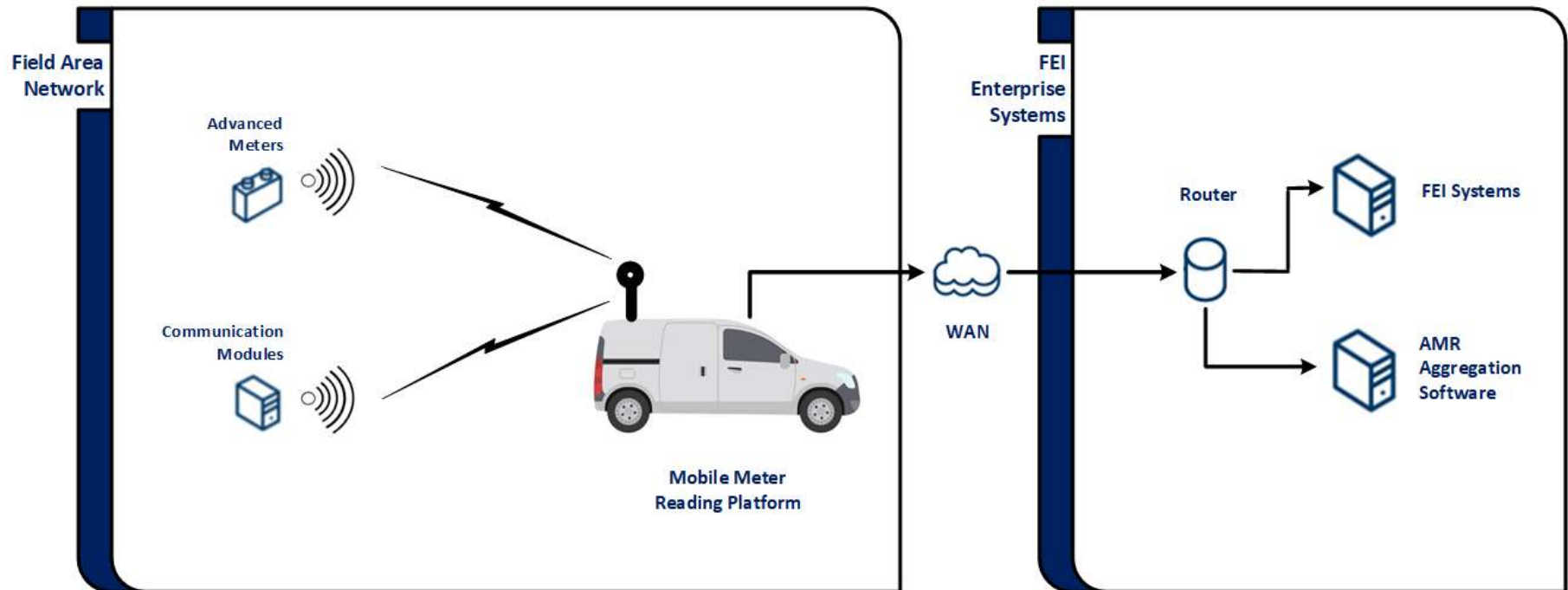
1 **Figure 1-1: Project Logical Architecture**



1

Figure 4-1: AMR System Diagram

AMR One Way Communication Network



2

Figure 4-2: AMI System Diagram

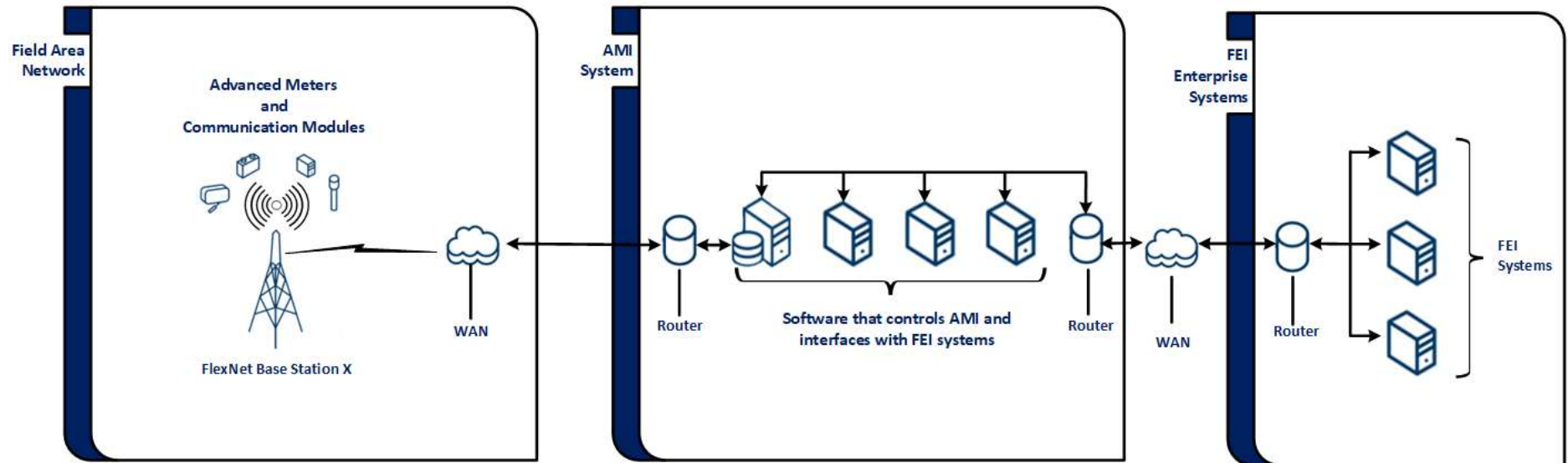
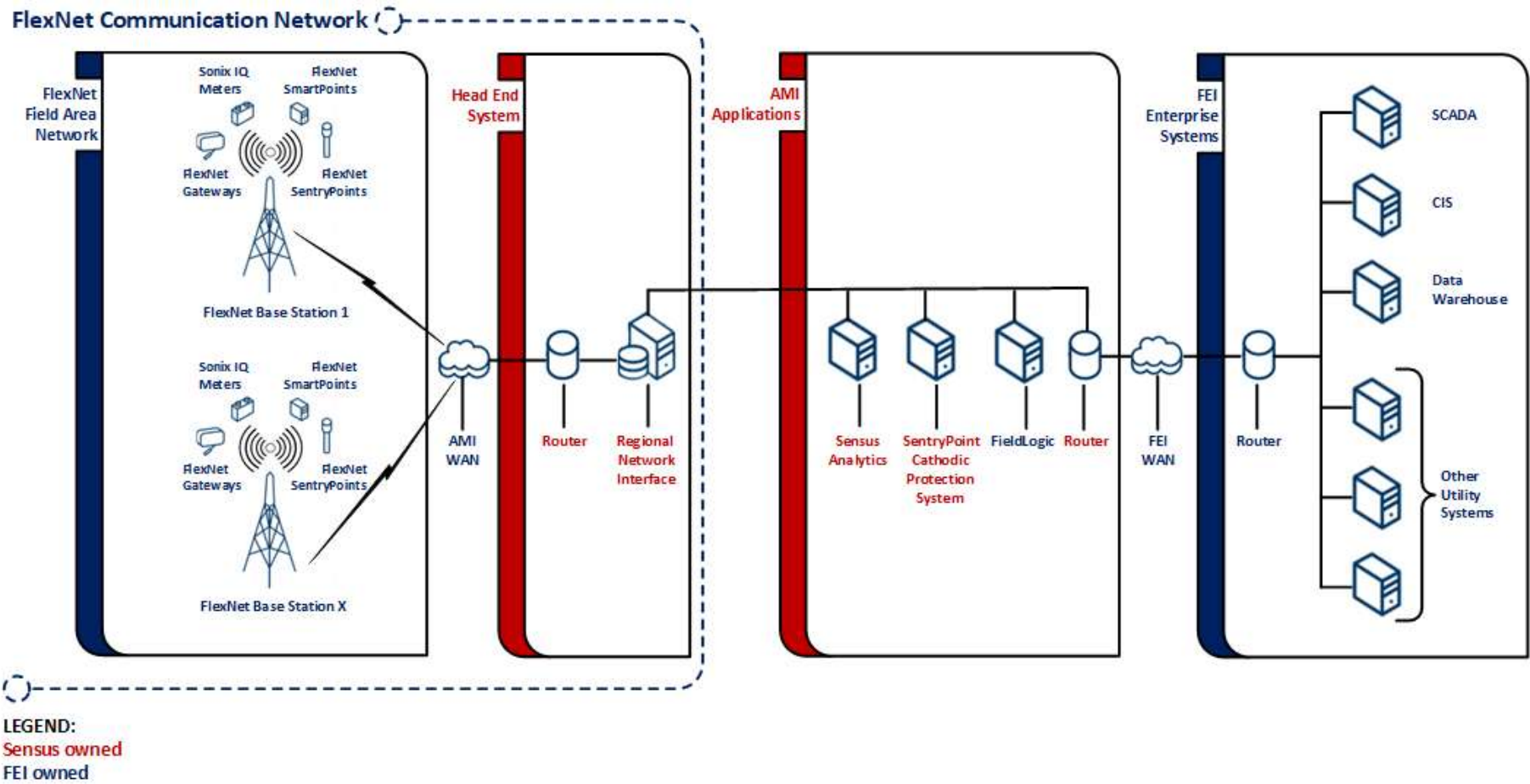


Figure 5-1: Project Logical Architecture



Attachment 3

UTIL-ASSIST SUMMARY - REDACTED

FEI Gas AMI Network Procurement Summary

Introduction

This document summarizes the process and results for FortisBC Energy Inc. (FEI)'s request for proposals (RFP) for a Gas Advanced Metering Infrastructure (AMI) Network. FEI issued its Gas AMI Network RFP in Q4 2017, which solicited pricing and solution information for network infrastructure, diaphragm meters, automated meter reading (AMR) modules, AMI modules, and solid-state gas AMI meters. The RFP also requested pricing and information regarding the proponent's meter data management (MDM) systems, implementation services, and all related system operation and maintenance services. Proposals were expected to include responses to technical requirements, detailed pricing, work plans, proponent company information, and preliminary network designs.

The RFP was issued to four proponents that offer gas meter and AMI network capabilities in the Canadian marketplace. While pricing and basic information on AMR equipment was collected, the RFP, evaluation, and overall procurement process focused on the selection of an AMI solution.

Proponent Responses

Three AMI proponents submitted responses to the RFP. One party to whom the RFP had been issued elected not to submit a response. Upon review of the three proposals submitted to FEI, one proposal was rejected and was not evaluated as pricing and detailed product specifications were not supplied.

Evaluation and Selection Criteria

The proposals that were not rejected (Qualifying Proposals) were evaluated based on predetermined criteria, including proponents' ability to meet requirements, completeness of the proposals, technical capabilities of the systems, experience of the proponents, and pricing. Proponent demonstrations were also evaluated, after initial evaluation of the written responses and pricing information took place.

Evaluation Methodology

The Qualifying Proposals were evaluated using the following methodology:

- 1. Independent Evaluations:** An evaluation team of nine senior FEI employees was formed, with representation from all pertinent departments within FEI (e.g., customer service, IS/IT, engineering, operations, etc.). Each member of the evaluation team conducted their own evaluation of the Qualifying Proposals and assessed the proponents' responses to the RFP requirements.
- 2. Flagging Discussion Items:** Individual assessments were examined and items were flagged for discussion when not consistent.
- 3. Consensus:** FEI held consensus assessment sessions where the evaluation team met to discuss flagged items. The evaluators justified their assessments and discussed the proponent responses until the group reached and agreed upon a consensus for each flagged item. This process was repeated for both proponents, until a complete consensus assessment was reached for both proponents.

4. **Pricing Analysis:** Pricing from each proponent was then examined to ensure its accuracy and completeness. Pricing figures were entered into a financial spreadsheet model to estimate the total net present value (NPV) of the costs for each proponent's solution for comparison.
5. **Proponent Demonstrations:** Both proponents then gave a half-day, in-person presentation to the FEI project team. The presentations followed a set script that included demonstrations of the solutions and Q&A time to clarify anything that wasn't clear in the written proposals. The FEI team assessed the presentations based on their content and how well they met the script's requirements.
6. **Final Assessment:** Each proponent's written RFP, pricing and demonstration assessments were combined.
7. **Revised Offer:** Both proponents were then required to submit a "Revised Offer" response, which included answers to any clarifying questions FEI had, as well as a revised pricing spreadsheet. Proponents resubmitted pricing figures to reflect more competitive offers as well as to take into account any clarified requirements or requests coming out of the in-person discussions.
8. **Final Ranking:** FEI reviewed the revised offer responses and updated the pricing evaluation model to include the revised pricing. FEI reassessed each proposal and identified the top-ranked Proponent.

Proposal and Procurement Results

This section summarizes the Qualifying Proposals. Each proponent who submitted a Qualifying Proposal offered very capable and competitive solutions that could deliver all the benefits required by the FEI business case.

Selected Proponent Proposal Summary

[REDACTED]

Unselected Proponent Proposal Summary

[REDACTED]

Pricing Summary

The total contract costs of each Qualifying Proposal, as calculated by the Util-Assist model, were compared after the revised offer process and pricing clarification requests were conducted. As part of the RFP process FEI collected costs for both vendor-operated Network as a Service (Naas) solutions, and FEI fully-owned and operated solutions.

[REDACTED]

- [REDACTED]
- [REDACTED]
[REDACTED]
- [REDACTED]

Selection

The proponents' final assessments were very close for both ownership models that FEI evaluated. Both proponents had similar total solution costs, and their meters and networks offered comparable functionality and performance specifications, which would allow them to meet FEI's requirements for service levels and achieving business case benefits. The selected proponent ranked marginally higher for both models, making it the top-ranked proponent coming out of the RFP process, but the deciding factor that re-enforced its selection as FEI's preferred proponent was its [REDACTED].

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]

Attachment 4

APPENDIX E – RISK ANALYSIS - REDACTED

Advanced Metering Infrastructure (AMI)
Qualitative Risk Assessment Report

Version *0.1*
November 2020

VERSION HISTORY

Redaction 1

Version	Date	Prepared By:	Reviewed By:	Comments
0.0	30 September, 2020	<div>██████████</div> Consultant	<div>██████████</div> Project Director <div>██████████</div> Project Director	Issued for Review
0.1	18 November, 2020	<div>██████████</div> Consultant	<div>██████████</div> <div>██████████</div>	Issued for Approval

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1. PURPOSE

FortisBC Energy Inc. (FEI) is at the development stage of the Advanced Metering Infrastructure (AMI), Gas project. This report summarizes the outcome of the qualitative risk assessment completed during the project development stage for BCUC Application filing. The objectives for the risk assessment were to:

- Identify key areas of concern to address during project execution planning and implementation
- Develop an active project risk register for on-going project risk management activities during the life-cycle of the project

A project specific risk management plan, as part of the project execution planning, will guide the management of material AMI project risks and risk treatment actions identified during this assessment.

2. PROJECT DESCRIPTION

2.1 ADVANCED METERING INFRASTRUCTURE PROJECT

The AMI, Gas meter, project provides a two-way transmission of data between the endpoint (advanced meters and other non-meter sensors) and FEI. Its purpose is to build more resiliency into the natural gas network, enhance safety, deliver better customer service, and improve billing processes. The communications network, however, has value far beyond the transfer of endpoint data.

2.2 BUSINESS OBJECTIVES

Through successful delivery of the AMI project, FEI is expecting to achieve the following business outcomes:

- Ensuring long term efficiency and viability of meter reading activities
- Enhanced customer experience by providing consistent and accurate billing, and more detail consumption data
- Improved operational health and safety from reduced driving and field work
- Improved response during loss of supply by reducing shut-off, re-pressurizing distribution system, and relight time;
- Providing near real-time monitoring for stations, and large commercial and industrials
- Avoiding societal/economic losses from large scale system disruptions
- Gas supply system with enhanced monitoring and control

- Improved response to infrastructure-damaging events, such as: fires, earthquakes, and floods; including remote shut-off during odour events
- Better environmental performance through emission reduction and increased monitoring

2.3 PROJECT SCOPE

The proposed AMI system consists of the following scope of work:

- Install a two-way communications network through-out FEI service territory
 - Procurement of AMI System hardware and software including the meters, collectors, cathodic protection devices, the head end system (HES), the meter data management (MDMS) system and cathodic protection software
 - Design of the AMI System including the communications network and wide area network (WAN)
 - Installation of the HES, the MDMS and the cathodic protection software
 - Information technology (IT) integration—connecting FEI's existing customer information system (CIS) to the HES and MDMS
 - Deployment of the communications network infrastructure
 - Deployment of 1850 non-meter communication devices
 - Cathodic protection monitoring and control
 - Pressure, temperature, level monitoring
- Bringing Industrial and Large commercial endpoints onto the AMI communications grid
- Replacing 100% of residential/small commercial diaphragm meters (approximately 1 million) with advanced ultrasonic meters and required bypass valves and regulators.
- Planning and implementing the organizational change management initiatives required to design, integrate, deploy and operate the new AMI System.

2.4 PROJECT DELIVERY APPROACH

The project-delivery method assumes FEI will engage two major Contractors to design, install, deploy and operate the AMI system:

- Supplier will supply meters, network equipment, and sensors; provide professional services for network design, installation, and integration; and provide on-going SaaS and sustainment services for managing the network and day-to-day HES operation.
- Deployment contractor to install/deploy meters, regulators, and bypass valves; provide deployment Contact Centre support.

FEI will supply bypass valves and regulators for the project.

FEI team will assume the overall project management for the project, including other supporting business functions, such as, regulatory approvals, stakeholder engagement and consultation, and organizational change management and readiness required by the project.

The contracting approach for the project includes:

- Lump Sum pricing: for all the Engineering Design and Integration work
- Unit rate based pricing: for Equipment Deployment

Table 2.1 outlines high-level project development and execution timelines for the project execution.

Table 2.1 High-level Estimated Project Development and Execution Timelines

Activity Milestone	Start Period	End Period
BCUC Application Submission		Q1 2021
BCUC Application Approval		Q1 2022
Network System: <ul style="list-style-type: none">• Planning• Design• Installation and Testing	Q2 2022	Q4 2022
Back Office Systems (IT and Enterprise Application Systems) <ul style="list-style-type: none">• Planning• Design• Integration and Testing	Q2 2022	Q2 2023
Endpoint/ Advanced Meter Deployment <ul style="list-style-type: none">• Planning• Deployment• Support	Q3 2023	Q1 2026
Organizational Change and Readiness <ul style="list-style-type: none">• Consultation and Engagement• Operational Capacity and Capability building	Q2 2021	Q1 2026

2.5 PROJECT OBJECTIVES

This Project is performance driven to ensure delivery of the expected business outcomes defined in section 2.2. The following project execution specific objectives have been defined for the successful execution of the AMI Project:

- Execution of the Project scope within the approved project budget to support justification of the project (stick to approved budget for BCUC application).

- Execution of the project scope that meets the schedule target for the project (starting meter installation on time, and complete deployment/installation within 3 years);
- Early engagement with internal business stakeholders to capture design, integration, testing and operational requirements, to support smooth deployment and transition to Operations.
- Compliance with all safety and environmental legislations leading to zero harm to all those involved either directly or indirectly with the Project;
- Consultation and engagement with current customers including Indigenous communities to communicate the scope and benefit of this project; address concerns; and ensure buy-in for the project

3. AMI PROJECT RISK ASSESSMENT

3.1 PROJECT RISK ASSESSMENT SCOPE

The scope of this risk assessment is to conduct a qualitative risk review of the project, with resulting risk information documented into a Risk Register. The risk register will be a living document for the project. The register will be updated continuously during the lifecycle of the project.

3.2 RISK REVIEW METHODOLOGY

The risk identification, analysis, and risk treatment action development followed FEI's Risk Management Framework (risk management process methodology) to develop the project risk register. Figure 3.1, outlines a high-level diagram of the risk management process.

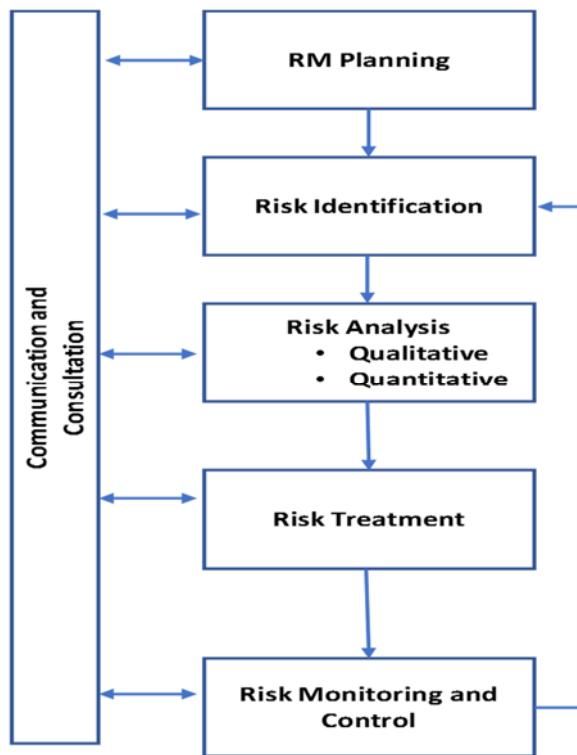


Figure 3.1 Risk Review Process

3.3 RISK MANAGEMENT PLANNING

The Risk Facilitator conducted planning meetings to define the scope of the risk assessment, required participants, and the risk assessment process; the risk register; risk breakdown structure for risk identification and categorization; and the risk prioritization matrix for use during the assessment.

A project specific risk management plan (Execution Stage) to be developed, subsequent to this assessment, will guide the management of identified major risks and corresponding risk treatment actions, and emerging future project risks post-BCUC application. The plan will be an integral part of the project execution planning and implementation activities.

3.4 THE PROJECT RISK MATRIX

FEI places a high priority to the health and safety of its employees and the public, and the protection of its operating environment.

FEI will be using safe work practices during design, build, testing, and deployment stages to minimize probability of incidents resulting from this project. Designing a safe and reliable system for Operations will be the focus.

The project will balance between performance, schedule, and cost objectives based on the following priorities:

- Performance: To ensure business operation performance, i.e. safe and continuous supply of gas to FEI customers - with the least impact to the public and sustain FEI's good reputation
- Cost: Cost must be managed accurately and prudently to remain accountable against project's BCUC filing cost commitment
- Schedule: Starting meter deployment on time (i.e. expect BCUC approval by Q4 2021, and Network and business systems ready by Q4 2022) to commence meter installation by Q2 2023 and complete deployment by Q1 2026

Using the above criteria as a guide, the AMI Project Management Team defined the schedule and cost criteria for risk prioritization. The project risk matrix is a key component of the risk assessment used for prioritization of identified risks (see [Appendix – 2, Project Risk Prioritization Matrix](#)). The use of this matrix by the project team was limited to risk prioritization, identification of unacceptable risks, and risk treatment recommendations to Management. Allocation of resources for risk treatment requires prior validation of the risk and the recommended treatment options, and approval by the Project Director(s).

The following project criteria define the project specific risk prioritization matrix:

- Project Capital of approximately \$500 Million CDN
- Project schedule delay (weeks or months) from expected major milestone dates on critical path to project completion.
- Other impact criteria are defined in accordance with previously defined Company risk assessment criteria.

3.5 RISK ASSESSMENT ACTIVITIES

Due to the COVID-19 lockdown, all risk assessment related activities were conducted online. Meetings were organized using Skype meetings. The following risk management activities were performed to develop the project risk register:

Activity Events	Description
Individual Interviews (March 2020)	Individual interviews conducted with selected internal stakeholder management personnel and the core Project Management Team to: <ul style="list-style-type: none">• Understand business objectives and expectations• Gather project contextual information• Identify project execution challenges and opportunities

Activity Events	Description
Group Risk Workshop #1 (24 March 2020)	<p>Risk identification session with key project team members including representation from most internal business stakeholder groups</p> <ul style="list-style-type: none"> • Project overview and risk process guidance was presented • Team was assigned to identify risks and send risk information over a week period to risk facilitator
Risk validation, assessment, and treatment planning (April 2020 – July 2020)	<p>The Core Project Team consisting of the Business Director, Project Director (Deployment), Project Director (Technology), and Organizational Change Manager, and the Risk Facilitator:</p> <ul style="list-style-type: none"> • Reviewed and validated identified risks, and assigned risk owners • Established the Risk Prioritization Matrix (Project Directors) • Performed elicitation, assessment, and planning of risk treatment actions for all assigned risks (as risk owners) • Reviewed completed risk assessment and treatment actions <p>On-going guidance of the risk assessment and treatment planning process was provided by the Risk Facilitator</p> <p>Note: Identified risks were migrated to the FEI Major Projects Risk Management Tool (register) for the on-going management of the project risks</p>

At the time of this risk assessment:

- An earlier version of a project register, originally prepared for draft vendor contract preparation, was available
- Lessons learned information from previous AMI (Electric meter) project was available
- Meter set survey was planned but not completed

3.6 RISK ASSESSMENT PARTICIPANTS

Appendix 1 to this document presents the list of project team participants who attended and contributed to the risk review process.

4. PROJECT CONTEXT – INTERNAL AND EXTERNAL FACTORS

The project team identified the external and internal factors that may influence the level of uncertainty during the approval and execution stages of the project. Table 4.1 summarizes these factors and their implication to the project.

Table 4.1: Project Internal and External Factors

Redaction 2

Factors	Description and Implications to the Project
External Factors	
	<ul style="list-style-type: none"> [Redacted] [Redacted] [Redacted] [Redacted]
Internal Factors	
	<ul style="list-style-type: none"> [Redacted] [Redacted] [Redacted] [Redacted] [Redacted] [Redacted]

5. RISK REVIEW OUTCOME

5.1 RISK REVIEW OUTCOME – THE RISK REGISTER

The major deliverable of this risk assessment is the project risk register. The risk register is the living document for documenting project risk information throughout the project lifecycle. It is the primary source of risk information to support

- Risk management planning to define the risk management effort during the development stage (BCUC application) and subsequent project execution stages (post BCUC application submission).

Approximately 92 risks were identified equally distributed between Network/business systems design and deployment, Endpoint/advanced meter deployment, and organizational change management. While 50 of the identified risks are considered significant requiring active management, the other 42 risks are considered minor risks to be monitored. There will be further consolidation and validation of identified risks as the project progress into its next stage of the execution process.

The risk register (see Appendix 3) resides online at the AMI Project team SharePoint folder.

5.2 SUMMARY OF RISKS AND TREATMENT ACTIONS

Redaction 3

[Redacted]	
[Redacted]	
■	[Redacted]
■	[Redacted]
■	[Redacted]
■	[Redacted]
■	[Redacted]
■	[Redacted]
■	[Redacted]
■	[Redacted]

5.2.1

[REDACTED]

[REDACTED]

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- [REDACTED]
- [REDACTED]

5.2.2

[REDACTED]

[REDACTED]

[REDACTED]

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5.2.3

[REDACTED]

[REDACTED]

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- PAGE 13

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5.2.5 [REDACTED]
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5.2.6 [REDACTED]
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[REDACTED]
[REDACTED]
[REDACTED]

[illegible][illegible]

■ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

5.2.9 [REDACTED]

[REDACTED]

6. EXITING CONTROLS AND RISKS TREATMENT ACTIONS

For each risk item in the risk register, existing controls, if available, and risk treatment action(s), when required, are defined. The Risk Owners assigned for each risk will:

- Evaluate the effectiveness of existing controls through out the project lifecycle and initiate corrective actions, if required, working with the control owner business or project function.
- Elaborate action items identified, authorise and incorporate action(s) into the project execution plan, implement actions by assigning the appropriate Action Owner, and report progress to project management.
- Identify and report any secondary risks associated with implementing the risk treatment actions.

Implementation and effectiveness of risk treatment actions will be part of the risk control activities, integral with the project execution process during the BCUC application review period and project execution, post-BCUC approval.

7. RECOMMENDATIONS AND NEXT STEPS

A project risk register is initiated using the risk information obtained from the risk identification sessions with various internal business stakeholders, and further elicitation and assessment with

the core Project Management Team members (Risk Owners). There is a consensus, among Risk Owners, that the implementation of existing and future controls, if implemented effectively, will reduce the perceived risk levels.

- Review key lessons learned from the Electric Meter AMI project as it relates to the Gas Meter AMI and incorporate learning into the project execution planning
- Leverage past organizational and other utilities experience to develop a detail deployment plan to ensure:
 - Minimal customer service interruption, and safe deployment
 - Effective post-deployment customer support
 - Minimal disruption to business operation (collection of accurate and timely customer consumption information) and lost revenue
- Ensure Use Case studies and development capture all essential business requirements for the future-state business operations (post Gas AMI deployment) that are affected by the project.
- Involve internal business stakeholders in the development of these Use Cases to ensure essential and mandatory requirements for the future state operation are addressed.
- Allow enough time in the schedule to ensure all installed network and business systems and associated business functions are tested and properly functioning to minimise post-deployment operational performance risks.
- Allocate risk ownership to the party that is well positioned to manage the project risks, either the major Contractors, equipment/software vendors, FEI Project Management, and FEI internal business stakeholders, and diligently monitor implementation of risk reduction/avoidance actions using project review and risk review activities. Contractual obligations/controls supersede risk management accountabilities, however, the FEI Project Management Team shall regularly monitor vendor performance risks specified in vendor contracts to ensure cost, schedule, and operational performance targets, and compliance to defined standards and regulations are met.
- The AMI system affects the future operations of various business functions and customer services. A comprehensive set of change management activities shall be planned and implemented, an integral part of the project management function to ensure readiness to operationalizing the AMI system and achieve its intended strategic benefits. Areas of change readiness include:
 - Review and adjustments to operational policies, processes, procedures, and controls
 - Consultation with, engagement and alignment of internal business stakeholders and customers with the future state service and operations
 - Organizational readiness to support and maintain the future state operations – resource planning, training, and customer fulfilment services (business and technical support functions)
 - Service provider (vendor) relations and performance management

The following steps will be essential to sustain an active management of the AMI project risks:

- Develop and implement the project specific risk management plan (Execution Stage) will be developed to guide the management of identified major risks and corresponding risk treatment actions, and emerging project risks post BCUC application.
- Complete the transfer of the risk register information into the Major Project Risk Management Tool to facilitate the monitoring and control of risk treatment actions, and continuously update risk level and emerging risks information
- Sort out the risk items that are specified to be managed by the major vendors as part of the contractual requirement to define alternate approach for monitoring these risks

8. APPENDIX 1 – RISK WORKSHOP PARTICIPANTS

Redaction 4

Participants	Organization	Functional Group	Interviews with Selected Group (March 2020) Business Objectives	Workshop (24 March, 2020) Risk Identification	AMI Core PMT Reviews (April - July 2020) Risk Assessment and Treatment Planning
[REDACTED]	FEI	Health & Safety		√	
[REDACTED]	FEI	Training		√	
[REDACTED]	FEI	IS - Data, Integrations, HW/SW		√	
[REDACTED]	FEI	Indigenous Relations		√	
[REDACTED]	FEI	Change Manager	√	√	√
[REDACTED]	FEI	External Communication		√	
[REDACTED]	FEI	Internal Audit		√	
[REDACTED]	FEI	System Integrity & Compliance	√	√	
[REDACTED]	FEI	Operations (Meter Shop, Musters)		√	
[REDACTED]	FEI	Legal / Procurement / Privacy		√	
[REDACTED]	FEI	Billing Operations		√	
[REDACTED]	FEI	Meter Shop	√	√	
[REDACTED]	FEI	Gas Supply	√	√	
[REDACTED]	FEI	Cyber Security		√	
[REDACTED]	FEI	Operations (Meter Shop, Musters)		√	
[REDACTED]	FEI	Director	√	√	√
[REDACTED]	FEI	Project Director	√	√	√
[REDACTED]	FEI	Project Director	√	√	√
[REDACTED]	FEI	Finance		√	
[REDACTED]	FEI	Corporate Communications		√	
[REDACTED]	FEI	Business Process		√	
[REDACTED]	FEI	Customer Service	√	√	
[REDACTED]	FEI	Facilities		√	
[REDACTED]	FEI	Environmental		√	
[REDACTED]	FEI	Customer Experience, Billing Services		√	
[REDACTED]	FEI	Security		√	
[REDACTED]	FEI	Major Projects		√	
[REDACTED]	FEI	Indigenous Relations		√	
[REDACTED]	FEI	IS - Data, Integrations, HW/SW		√	
[REDACTED]	FEI	Major Projects		√	
[REDACTED]	FEI	IT PMO		√	
[REDACTED]	FEI	Gas Supply		√	
[REDACTED]	FEI	IS - Data, Integrations, HW/SW		√	
[REDACTED]	FEI	HR (org / job changes)		√	
[REDACTED]	FEI	Regulatory		√	
[REDACTED]	FEI	Innovation	√	√	
[REDACTED]	FEI	Demand Side Management		√	
[REDACTED]	FEI	PMO & Supply Chain		√	
[REDACTED]	FEI	Energy Solutions (Transportation Customer)		√	
[REDACTED]	FEI	Energy Supply		√	
[REDACTED]	YPS Inc.	Major (Facilitator)	√	√	√

9. APPENDIX 2 – RISK MATRIX

This risk matrix presented in this appendix was used for risk prioritizing identified risks into “Major”, “Moderate”, and “Minor” risk levels.

The use of this matrix by the project team is limited to risk prioritization, identification of unacceptable risks, and risk treatment recommendations to Management. Allocation of resources for risk treatment requires prior validation of the risk and the recommended treatment options, and approval by the Project Director(s).

The following project criteria define the project specific risk prioritization matrix:

- Project Capital of approximately \$500 Million CDN
- Project schedule delay (weeks or months) from expected major milestone dates on critical path to project completion.
- Other impact criteria are defined in accordance with previously defined Company risk assessment criteria.

		<i>Note: For purpose of selecting impact of an event, utilize most severe outcome of Project Specific and Corporate impact analyzed</i>				
		Very Low	Low	Medium	High	Very High
Probability (Likelihood)	Very High (>50%)	Moderate	Moderate	Major	Major	Major
	High (5 - 50%)	Minor	Moderate	Major	Major	Major
	Medium (1-5%)	Minor	Moderate	Moderate	Major	Major
	Low (0.1-1.0%)	Minor	Minor	Moderate	Moderate	Moderate
	Very Low <0.1%	Minor	Minor	Minor	Minor	Moderate

ADVANCED METERING INFRASTRUCTURE PROJECT

QUALITATIVE RISK ASSESSMENT REPORT – PHASE 3 FEED



AMI Project			IMPACT				
Risk Prioritization Matrix			Very Low	Low	Medium	High	Very High
Impact Category	Impact Sub-Category	Quantification					
Project Cost (CAPEX of \$500 Million assumed) What percentage of CAPEX is at risk?	Project Cost	\$ Cdn					
	Project Cost	\$ Cdn	$\leq \$50K$	$> \$50K$ to $\leq \$500K$	$> \$500K$ to $\leq \$5$ Million	$> \$5$ to $\leq \$50$ Million	$> \$50$ Million
Project Schedule	Project Schedule	Delay	≤ 2 Weeks	2 to ≤ 4 Weeks	> 1 to ≤ 4 Months	> 4 to ≤ 6 Months	> 6 months
Performance	Scope Functional/Performance Quality	Qualitative	No noticeable quality impact	Impact on quality of minor project deliverable and/or component	Significant impact on quality of major project deliverable and/or component	Quality unacceptable to Project Manager/ Project Sponsor	Quality does not meet performance or business expectations
Health and Safety	Health and Safety	Qualitative	An event where there would be no material cost impact to the company from a Health and Safety perspective.	A minor injury or minimal impact to a person that could possibly result in a small claims court settlement. Included is staff time spent dealing with the claim.	Serious injury, or adverse short-term health impact (i.e. the person would recover without long-term disability)	Multiple serious injuries or one fatality, or adverse long-term health impact.	Multiple fatalities
Environmental	Soil, Water, Wildlife, Vegetation, Emissions, etc.	Qualitative	No/negligible environmental impacts with no public/regulatory interest	Event resulting in minor public/regulatory concerns. Short term or easily mitigated impact on land.	Event resulting in moderate Environmental impacts with ongoing public/regulatory concerns	Long-term or major environmental damage and a high level of public/regulatory response (i.e. may include media).	Uncontrolled environmental damage and significant public/regulatory response (media will be involved).
Regulatory	Legal Compliance / Industry Practice	Qualitative	No compliance issue. No Corporate image impact	May or may not be meeting legal compliance / industry practice, low potential for impact. May also include minor impact to corporate image.	Potential gap with respect to legal compliance/industry practice (no consensus within company) without life safety impact. May also include moderate impact to corporate image.	Potential gap with respect to legal compliance/industry practice (no consensus within company) with life safety impact. May also include significant impact to corporate image.	Identified gap with respect to legal compliance/industry practice with life safety impact. May also include substantial impact to corporate image.
Corporate Responsibility and Service Continuity	Societal	Qualitative	Negligible or minor customer annoyance due to planned event.	Minor event causing impact or lost revenue for the customer, for less than a day, in an isolated area (could be one business); An outage for less than 1 hour or infrequent momentary outages (~1 per year).	Event causing impact or lost revenue for a few industrial or commercial customers for a period of 1 to 5 days	Event causing impacts or lost revenue for many customers, for a period of more than 5 days and less than 2 weeks; of 4 hours up to 24 hours	Substantial impact or disruption of customer base (e.g. revenue, loss of gas use for >2 weeks or loss of electric use for >1 day, influencing a very-wide geographic footprint > 10,000 customers); Results in secondary impacts to customers.
Corporate Responsibility and Service Continuity	External Relations (Federal, Provincial, and Municipal Governments; Indigenous Communities, Special Interest Groups, etc.)	Qualitative	Event causes no external relations issues.	Event leads to strained communications with external agencies. Follow-up requires meetings between external agencies and Company staff in order to maintain trust.	Trust between Company and external agencies has been eroded to a point that cannot be rectified by enhanced communications.	Company has lost influence with external agencies.	Event leads to a total breakdown of relationship with external agencies, typically on a province-wide basis. Future decisions will be made with no input from Fortis.
Operations Financial (Physical Damage / Economic Loss)	Property Damage: Physical impact to public property	Qualitative	Event causes no/negligible damage to public property.	Minor repair required to facilities. Derived from typical Company claims which include the settlement, the legal, investigative costs and possible curtailment claims.	Larger scale damage with possible associated fire. Derived from Company typical claims that include the settlement, the legal, investigative costs and possible curtailment claims.	Destruction of a single dwelling, small building, or damage to property	Destruction of multiple dwellings, major commercial/industrial, or extensive damage to property
Operations Financial (Physical Damage / Economic Loss)	Service Disruption, Lost Revenue and Capacity	Semi-Qualitative	Event causes negligible to Short-term minor service interruption, negligible commodity loss, and/or minor customer annoyance due to planned event. An outage of less than 100 customer-days	Loss of service to 5-10 residential or 1-2 commercial customers for 1-2 days, and/or minor commodity loss; Low level customer annoyance resulting from improper repair of property or evacuation of 1-5 customers. Assume staff costs and possible minor customer compensation. An outage equaling over 100 customer days and less than 500 customer-days	Service disruption/customer annoyance to 150 residents (approx. 8-12 hrs.), and/or moderate commodity loss; Cost impact to the Company to re-establish loyalty with a number of profitable customers; Possibly affect future growth opportunities with customers; Costs associated with customer relationship programs. An outage equaling over 500 customer days and under 5000 customer-days	Service disruption to 1,500 customers or a large industrial customer for approximately 7 days, and/or significant commodity loss; An outage equaling over 5,000 customer days and under 50,000 customer days	Service disruption to 9,000 customers for approximately 7 days, and/or substantial commodity loss. An outage equaling over 50,000 customer days
Operations Financial (Physical Damage / Economic Loss)	Damage or Prevention of Damage to Company Assets	Semi-Qualitative	An event where there would be no material cost impact to the company from a Company Damage perspective (\$0; \$0)	Raw cost of damages to Company Assets (repair or replace); Includes cost of response. (\$50K; \$5K)	Raw cost of damages to Company Assets (repair or replace); Includes cost of response. (\$250K; \$25K)	Raw cost of damages to Company Assets (repair or replace); Includes cost of response. (\$750K; \$750K)	Raw cost of damages to Company Assets (repair or replace); Includes cost of response. (> \$1500K; \$150K)

10. APPENDIX 3 – RISK REGISTER Confidential

11. DISCLAIMER:

Yohannes Project Services prepared this report for FEI. The report is based on information collected from FEI staff during various risk assessment workshops and individual meetings. The consultant accepts no responsibility or liability of any kind for consequences of using the information in this report. It is the responsibility of the user to assess the risk identification and assessment processes, tools, and results against the user's experience and ensure its appropriate application and interpretation.

Advanced Metering Infrastructure (AMI) Project Risk Management Plan

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Document Information

Document Purpose	The Risk Management Plan describes the associated processes, systems, tools, templates, and practitioner's roles and responsibilities that guide and support effective Risk Management for the AMI Project (the Project). This document was prepared for and owned by the AMI Project Team and will be progressively updated throughout the Project as necessary.
File Name(s)	
Original Author(s)	Yohannes Afework

Revision History

Redaction 5

Version	Date	Prepared By:	Reviewed By:	Comments
0.0	27 November, 2020	██████████ Consultant	██████████ Project Director ██████████ Project Director	Issued for Review
0.1	22 December, 2020	██████████ Consultant	Major Projects Team	Issued for Review
0.2	09 April, 2021	██████████ Consultant	██████████ ██████████	Issued for Approval

1. Introduction

1.1 Purpose

The Risk Management Plan (the “Plan”) for the Advanced Metering Infrastructure (AMI) Project (the “Project”) defines the risk management process to be implemented throughout the planning, design, build, integration and testing, deployment, and closeout Phases of the Project.

The Plan will ensure that risks associated with meeting Project’s business and project-specific execution objectives are identified, assessed, prioritized, and managed (as required) in accordance with Fortis BC’s [Risk Management Framework \(the “Framework”\)](#). The Framework is in accordance with the AACE International, INC (AACE) recommended practices for Risk Management.

Management of project risk is a responsibility of all project team members including internal support groups and external service providers.

The Project Directors (Technology and Deployment) are responsible for the implementation and revision of this Plan to ensure that the risk management process remains appropriate and relevant to deal with the level of risk faced by the project.

This Plan was prepared for and owned by the AMI Project Team and will be progressively updated throughout the Project as necessary. Potential revision milestones include:

- Half-way during the regulatory process in Q4 2021;
- Shortly after the BCUC approval, prior to commencing the development and installation of Network and Back Office Systems; and
- During readiness to commence Endpoint/Advanced Meter deployment.
- 6 months into Meter deployment

1.2 Background

The AMI, Gas meter, project provides a two-way transmission of data between the endpoint (advanced meters and other non-meter sensors) and FEI. Its purpose is to build more resiliency into the natural gas network, enhance safety, deliver better customer service, and improve billing processes. The communications network, however, has value far beyond the transfer of endpoint data.

The Project consists of the following scope of work:

- Install a two-way communications network through-out FEI service territory
 - Procurement of AMI System hardware and software including the meters, collectors, cathodic protection devices, the head end system (HES), the meter data management (MDMS) system and cathodic protection software

- Design of the AMI System including the communications network and wide area network (WAN)
- Installation of the HES, the MDMS and the cathodic protection software
- Information technology (IT) integration—connecting FEI’s existing customer information system (CIS) to the HES and MDMS
- Deployment of the communications network infrastructure
- Deployment of 1850 non-meter communication devices
- Cathodic protection monitoring and control
- Pressure and temperature level monitoring
- Bringing Industrial and Large commercial endpoints onto the AMI communications grid
- Replacing 100% of residential/small commercial diaphragm meters (approximately 1 million) with advanced ultrasonic meters and required bypass valves and regulators.
- Planning and implementing the organizational change management initiatives required to design, integrate, deploy and operate the new AMI System.

1.2.1 Project Objectives

Through successful delivery of the AMI project, FEI is expecting to achieve the following business outcomes:

- Ensuring long term efficiency and viability of meter reading activities
- Enhanced customer experience by providing consistent and accurate billing, and more detail consumption data
- Improved operational health and safety from reduced driving and field work
- Improved response during loss of supply by reducing shut-off, re-pressurizing distribution system, and relight time;
- Providing near real-time monitoring for stations, and large commercial and industrials
- Avoiding societal/economic losses from large scale system disruptions
- Gas supply system with enhanced monitoring and control
- Improved response to infrastructure-damaging events, such as: fires, earthquakes, and floods; including remote shut-off during odour events
- Better environmental performance through emission reduction and increased monitoring

1.2.2 Project Execution Objectives

The project has the following execution objectives, the achievements of which form the basis for risk identification, assessment and treatment in this Plan:

- Execution of the Project scope within the approved project baseline budget to support justification of the project (ensure control within approved budget for BCUC application).
- Execution of the project scope that meets the schedule target for the project (starting meter installation on time, and complete deployment/installation in approx. 3 years);
- Early engagement with internal business stakeholders to capture design, integration, testing and operational requirements, to support smooth deployment and transition to Operations.
- Compliance with all safety and environmental legislations leading to zero harm to all those involved either directly or indirectly with the Project;
- Regulatory Compliance and Management: Maintain compliance with regulatory and other authority requirements, permits and approvals during project execution. Adhere to agreements and commitments made during project planning.
- Consultation and engagement with current customers including Indigenous communities to communicate the scope and benefit of this project; address concerns; and ensure buy-in for the project
- Minimum unintended negative impact to public and company assets during project execution.
- Minimize service interruption to customers during deployment.
- Ensure contractor supplies competent and fully qualified workforce during full project lifecycle
- Ensure procurement and receipt of materials and services that align with project schedule and quality requirements.
- Preservation of Corporate reputation.

1.2.3 Project Risk Environment

The following factors characterise the internal and external environment affecting the Project development and execution:

- Negative customer sentiment against RF Emission and/or fear of Data Privacy. These may affect timely approval and permits for the project, and influence acceptance of the project by current customers.

- The project system touches multiple enterprise systems, requires a robust interface/integration design and testing, and organizational change management activities to support seamless operations during and post-meter deployment
- Implementation of new meter technology that has a limited installation history in North American gas distribution networks,
- COVID-19 and subsequent mitigation efforts, may negatively influence availability or timely delivery of critical material, equipment, and services. Also, affect turnaround time for consultation with customers and other external stakeholders.
- Multiple major projects are being proposed for CPCN approval, may cause regulatory fatigue – increased uncertainty to the application and approval process, and timeline as well as potential resourcing risk during the project.
- The nature of the project replaces current practice of manual meter readings. Also, the project execution approach is to contract out the meter deployment work rather than using internal employees, this may negatively impact internal labour relations
- Project has several intangible business benefits that can't be accounted numerically into the project's financial model, this may affect its attractiveness for management's investment decisions
- Senior member of the core Project Management Team comes with past AMI project (Electric) experience, allows early application of past lessons learned for project success
- Senior Management supports the project, the project is positioned well for acquiring the right internal resources

1.2.4 Project-Delivery Method

The project-delivery method assumes FEI will engage two major Contractors to design, install, deploy and operate the AMI system:

- Supplier will supply meters, network equipment, and sensors; provide professional services for network design, installation, and integration; and provide on-going SaaS and sustainment services for managing the network and day-to-day HES operation.
- Deployment contractor to install/deploy meters, regulators, and bypass valves; provide deployment Contact Centre support.

FEI will supply bypass valves and regulators for the project.

FEI team will assume the overall project management for the project, including other supporting business functions, such as, regulatory approvals, stakeholder engagement and consultation, and organizational change management and readiness required by the project.

The contracting approach for the project includes:

- Lump Sum pricing: for all the Engineering Design and Integration work
- Unit rate based pricing: for Equipment Deployment

Table 1 outlines high-level project development and execution timelines for the project execution.

Table 1: High-level Estimated Project Development and Execution Timelines

Activity Milestone	Start Period	End Period
BCUC Application Submission		Q1 2021
BCUC Application Approval		Q1 2022
Network System: <ul style="list-style-type: none"> • Planning • Design • Installation and Testing 	Q2 2022	Q2 2023
Back Office Systems (IT and Enterprise Application Systems) <ul style="list-style-type: none"> • Planning • Design • Integration and Testing 	Q2 2022	Q2 2025
Endpoint/ Advanced Meter Deployment <ul style="list-style-type: none"> • Planning • Deployment • Support 	Q3 2023	Q3 2026
Organizational Change and Readiness <ul style="list-style-type: none"> • Consultation and Engagement • Operational Capacity and Capability building 	Q2 2021	Q4 2026

1.3 Terms and Definitions

See Appendix A for definitions of commonly used terms in this Plan.

Risk Management terms and definitions adopted in *AACE International, Recommended Practice No. 10S-90 "Cost Engineering Terminology"* are used for this plan, unless otherwise specified.

2. Project Risk Management Plan

2.1 Objectives

The Risk Management Process (*the "process"*) aims to manage all foreseeable risks in a manner that is proactive, effective, and appropriate, in order to maximize the likelihood of the project achieving its objectives, while maintaining risk exposure at an acceptable level. It aims to engage all project stakeholders appropriately, creating ownership and buy-in to the project objectives and to the risk management actions.

Project risk information will be communicated to project stakeholders in a timely manner at an appropriate level of detail. The Risk Management Process implemented by the Plan will enable project stakeholders to focus attention on those areas of the project most at risk, by identifying the major risks that have the greatest influence (positive or negative) on achievement of the project objectives (See sections 1.2.1 and 1.2.2).

2.2 Scope

This Plan is a component of the overall Project Execution Plan. The scope of this plan includes the risk management activities focused on the AMI project lifecycle, which includes the following activities:

- Early project work during BCUC application review
- Network System - Planning, Design, Installation, and Testing
- Back Office Systems (IT and Enterprise Application Systems) - Planning, Design, Integration and Testing
- Endpoint/ Advanced Meter Deployment – Planning, Deployment, and Support (during deployment)
- Organizational Change and Readiness - Consultation and Engagement, and Operational Capacity and Capability building

Throughout this plan, risk management refers to the management of potential negative events (threats) and positive events (opportunities) that may affect the project's execution and business objectives outlined in Sections 1.2.1 and 1.2.2 of this document.

2.3 Risk Management Roles and Responsibilities

The AMI Project Director – Planning and Governance is accountable for the management of risk during the lifecycle of the project. Detailed project risk management roles and responsibilities for project participants, including the Project Risk Review Team (PRRT) are defined in Appendix B.

2.4 Issue Management

Project Issue Management is not within the scope of this plan. An issue is a significant (currently occurring) event that is already affecting achievement of project objectives, or unplanned questions or decisions that need to be addressed by a process other than risk management.

The Project Manager is responsible for the management of project issues based on priorities established by assessing the urgency and importance of an issue. An Issue is reported as part of a regular project performance reporting at the Contract and/or Project levels. Where an issue is reported, the subsequent report should contain an explanation of how the issue has been resolved.

3. Risk Management Processes and Tools

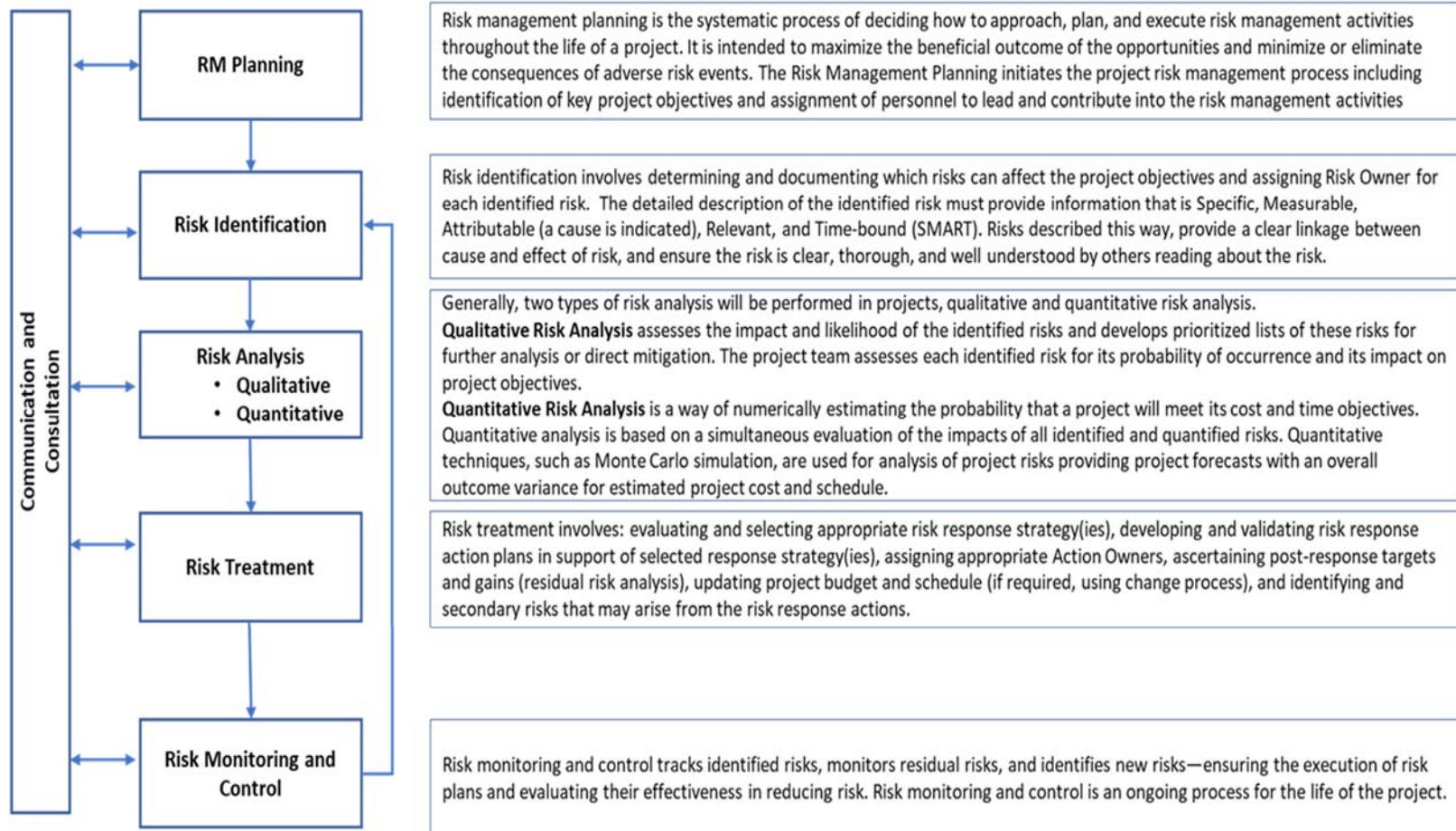
The project will implement applicable risk management processes summarized in Figure 3.1. *Project Risk Management Process Overview*.

3.1 Project Risk Management Planning

The Risk Management Planning activities include the following main tasks:

- Development and implementation of the Project Risk Management Plan (this document).
- Risk management skill development and training – Up on request by the Project Directors, current and newly appointed project team members will be provided training on:
 - The Major Project’s Risk Management Framework and use of supporting tools
 - Use of the SharePoint risk register system and process (work) flow for identification and management of project risks
- Engaging risk owners and other project stakeholders through individual risk identification and reviews, interviews, facilitated risk workshop activities, and periodic project review meetings.
- Defining the risk documentation requirements for the project, including the risk register and risk communication reports.
- Defining a project specific Risk Matrix for standardized prioritization of risks.

1 **Figure 3.1: Project Risk Management Process Overview¹**



2

¹ Major Projects Risk Management Framework

3.1.1 The Risk Prioritization Matrix

The project will balance between performance, schedule, and cost objectives based on the following priorities:

- **Performance:** To ensure business operation performance, i.e. safe and continuous supply of gas to FEI customers - with the least impact to the public and sustain FEI's good reputation
- **Cost:** Cost must be managed accurately and prudently to remain accountable against project's BCUC filing cost commitment
- **Schedule:** Starting meter deployment on time (i.e. expect BCUC approval by Q2 2022, and Network and business systems ready by Q2 2023) to commence meter installation by Q2/3 2023 and complete deployment by Q3 2026

The risk matrix for the Project is primarily defined for risk prioritization, identification of unacceptable risks, and risk treatment recommendations to Management. Allocation of resources for risk treatment requires prior validation of the risk and the recommended treatment options, and approval by the Project Manager.

The following project criteria define the project specific risk prioritization matrix:

- Project Capital of approximately \$500 Million CDN
- Project schedule delay (weeks or months) from expected major milestone dates on critical path to project completion.

Other relevant impact criteria related to the Project's execution objectives (Section 1.2.2) are defined in accordance with previously defined Company risk assessment criteria. See Appendix D for detailed description of the risk prioritization criteria.

3.2 Risk Assessment (Identification and Analysis)

3.2.1 Risk Identification

A risk identification and qualitative assessment of identified risks has been completed as part of the Project Planning and CPCN Application deliverables. See the Project's SharePoint Risk Register Tool, for updated project risk information. The current project risk register has been created with relevant risk information documented using information gathered from past risk assessments (Electric AMI), individual risk identification interviews and facilitated risk workshops through out the development stages of the project. The SharePoint database register will be the tool for documenting validated risk information, emerging and existing risks.

Emerging project risks will be identified on an on-going basis during the project lifecycle. Risks are identified using several methods:

- Review of risks identified from ongoing stakeholder consultations; requirement gathering and analysis; meter surveys; Network Systems and Back Office design and test reviews; contract formation, bid review, evaluation and awards; deployment readiness reviews; deployment field reports; field inspection and monitoring activities; and post-deployment support activities.
- Periodic individual or group interviews conducted with Risk Owners and other selected project team members.
- Change and trend (cost/schedule) reviews – changes that may have an impact to the project baseline plan (cost, schedule, performance, etc.). Project Management (Cost/Schedule Controls and Risk Management) will:
 - Assess risks of any change request to the project plan in accordance with the Project's change management process;
 - Examine significant variances in cost/schedule trend to identify any realized risks.
- Scheduled facilitated workshops (i.e. schedule risk analysis, construction readiness reviews, etc.) with key participants with representatives from Owner's and Contractor's project management and functional groups.
- Risks randomly identified by project team members or other stakeholders, using the online risk identification template.

With the exception of emergency risks (identified during project execution), when a new risk is identified the Risk Manager along with the Project Manager will validate the risk prior to entering the risk into the database system and assigning a Risk Owner. This will ensure all identified risks are valid and appropriately defined and characterised.

The status of each risk in the register will be defined using the following definitions: New, Rejected, Assigned, Open, Closed/Managed, and Closed/Realized.

3.2.2 Risk Analysis

3.2.2.1 Qualitative Risk Analysis

Qualitative analysis will be the primary method of risks assessment for the Project. Qualitative analyses of newly identified risks or review of existing risks will be carried out utilizing the risk prioritization matrix (See Appendix D). The risk matrix is categorized based on groups of impact criteria to specific project objectives:

- Cost, Schedule and Performance

- Health and Safety, Environment, Regulatory, Corporate Responsibility and Service Continuity
- Operational

The likelihood of risk and their impacts will be estimated to determine the risk levels and convert ratings to an initial priority list.

Risk Owners are responsible to review and update, as required, qualitative assessment of risks periodically. Updates to qualitative or quantitative risk analysis will be documented only in the residual (post-treatment) analysis fields.

3.2.2.2 Quantitative Risk Analysis

QRA methods will be used to calculate and establish the Project's cost contingency during Class 3 and recalibration of the contingency at subsequent stages, when required. QRA will establish the aggregate effect of estimate uncertainty and project specific risks (critical) on the overall project cost estimate.

- Estimate uncertainty is the uncertainty in the quantities and rates that have been used to generate the cost estimates, for each major cost breakdown in the cost estimate model. The uncertainty ranges should be determined (using expert judgement) by the responsible Managers and their teams producing the estimates (applied to remaining expenditure only).
- The QRA process also quantify the effect on cost of critical project specific risks – both opportunities and threats. The project estimating personnel should estimate the cost of risk impacts, and take into account all existing management actions / controls included in plans and estimates, any further cost of mitigation or fall-back plans, and insurance recovery.

QRA for contingency recalibration during subsequent stages of the project may be conducted:

- After BCUC approval (if required)
- At completion of Design
- As directed by the Project Director(s), when:
 - FEI directs a significant change in the project scope
 - Contractor's schedule/cost significantly exceeds budgeted cost plus the variance that can be afforded by existing contingency
 - Significant depletion of planned contingency relative to expected project accomplishment

Quantitative risk analysis and contingency recalibration will be conducted using applicable AACE recommended practices, AACE RP No. 40R-08, *CONTINGENCY ESTIMATING – GENERAL PRINCIPLES*.

3.3 Risk Treatment

Risk Treatment is an activity that determines the appropriate risk treatment option(s) and action plan(s) to deal with identified risks.

Each identified and validated risk in the register is assigned a Risk Owner. The Risk Owner in consultation with Subject Matter Experts (SME) will produce the risk treatment option(s) and action plan(s) for all major and moderate risks with unacceptable risk levels.

Resources and activities for the treatment action plans, after authorization by the Project Manager, will be included in the project budget, schedule, and project management plans.

The following consideration will be made when creating and evaluating the risk treatment option(s) and action plan(s):

- Criticality, connection of risk to critical items
- Priority, determined by the Risk Level, and Risk Owner's and management's judgement
- Sensitivity in terms of the timing for completion of risk treatment actions
- Identify and assess Secondary Risks that may arise as a direct result of implementing a risk treatment action. This is to ensure the project is dealing with the original threat without introducing an additional threat. Note: Secondary risks are treated and managed in the same manner as the primary risks.
- Benefit to cost ratio assessment, and consideration to the effect of secondary risks that may exist
- Agreement by impacted stakeholders

Once a risk treatment option is selected and risk action plan(s) are defined, the Risk Owner will update the risk register and assess the residual (remaining) risk level for each risk owned – assuming effective implementation of each risk action.

The Risk Owner will monitor the effectiveness of risk treatment actions. The standard Risk treatment option(s) include:

- Threats: Avoid, Reduce, Transfer, or Accept.

Note: Accept may mean monitor risk, research risk to better understand and characterise risk, or simply accept the risk and do nothing.

- Opportunities: Exploit, Share, Enhance, or Accept

3.3.1 Risk Treatment Action(s) Implementation

Each Risk Owner will perform the following steps to implement the risk treatment actions, currently defined in the project risk register:

1. Risk Owner will review the existing controls and risk treatment actions defined on each assigned risk.
2. Ensure all existing controls are part of the planned project or functional execution plan, processes, and procedures, if not, communicate with the accountable functional lead (Control Owner), the inclusion and/or effective implementation of identified existing controls.
3. Review all additional risk treatment option and action plans defined in the risk register, validate actions, elaborate the action plans, assign Action Owner, plan, authorize action plan implementation, and report progress.
4. Ensure all, but “significant actions” are included in the project execution plan, their implementation timeline defined in the project schedule, and cost of implementation included in the project cost estimate.
 - Note: Once project baseline is defined, during Execution Phase, every new significant risk treatment is a Change, and its implementation has to happen via the Change Control process.
5. Communicate risk treatment actions, schedule and cost information of treatment actions to the Project Controls Team.
6. Ensure the documentation of all action plans, assigned Action Owners into the risk register, such that, implementation can be tracked and reported using the SharePoint Risk Register workflow.
7. Identifying any secondary threats or opportunities arising from response.

3.4 Risk Monitoring and Control

The project’s risk monitoring and control process will include:

- A monthly (biweekly, when required) individual meeting with each Risk Owner to review risk treatment status, risk level, and any emerging risks that need to be managed.
- Monthly Risk Review Meeting with the Project Risk Review Team (PRRT) to identify new risks, review progress on existing significant risks and agreed responses (including revised qualitative residual risk assessment of the significant risks) , and assess process effectiveness. PMs will review and report on Contractor’s scope and performance risks. An extended facilitated version of this meeting will be considered at major project milestones prior to:

- Network System (Planning , Design, and Installation and Testing)
- Back Office Systems (Planning, Design, Integration and Testing)
- Endpoint/ Advanced Meter Deployment (Planning, Deployment)
 - Also, to assess Organizational Change Readiness (Operational Capacity and Capability)
- Project closeout risk review at the end of the project
- On a monthly basis, the PM will provide project risk update to the Program Director and the Executive team. This update/review uses the standard reporting tool defined by Major Project's Risk Management Reporting Dashboard

3.4.1 Periodic Project Risk Management Reporting

The PRRT will review the risk register status on at least monthly basis. The Project Manager and/or the Project Risk Manager will lead the PRRT. Typical review items include

- Risk Summary Report containing the following basic information:
 - Executive Summary
 - Project Status and Overall Risk Status (at the review period)
 - Top Risks with agreed actions and risk owners
 - Key changes since last review
 - Risks outside project scope or control
 - Conclusion and recommendations
 - Appendix: An updated Risk Register (reference to the SharePoint Risk Database)

Appendix E illustrates a risk-reporting template that can be used as a guide.

The Monthly Risk Assessment Report to the PM is prepared by the Project Risk Manager or designate, based on information from:

- Each Risk Owner's commentary and update to the risk register information.
- Project Manager's monthly risks assessment (Commentary) of Contractor's work performance

Note:

- *Risk Owners are responsible for reviewing risk register information and providing monthly commentary updates on the risks they own, on the status of treatment actions, lessons learned, challenges and issues, and major trends.*

- *PM is responsible for providing monthly commentary updates on contractor's performance risks, challenges and issues, major trends, and lessons learned.*

3.4.2 Major Milestone – Reviews

When required, as directed by the PM, the Risk Manager supported by Risk Owners and/or the PRRT, will prepare a detailed risk report for use during major milestone reviews. See section 3.4 for candidate major milestones for the Project. The report's objectives is to demonstrate project risks are managed to acceptable levels. The report will include:

- Project Status and Overall Risk Status ((at the review period)
- Summary Risk Profile
- Summary of Top (Major) Risks with agreed actions and risk owners
- Quantitative Analysis [Where Used]
 - Model input and structure
 - Key outputs and analysis
- Key changes since last reporting
- Risks outside project scope or control
- Commentary on the status of the risk management system
- Conclusion and recommendations
- Appendix:
 - An updated risk register
 - Quantitative Analysis data [where used]
 - Other detailed supporting data

See Appendix F for Risk Reporting Template

3.4.3 Monitoring and Reporting Risks Assigned to Contractors

Risks assigned to prime vendors, and service providing Contractor's, as part of contractual specifications, terms, and conditions, are the responsibilities of the Contractor to manage.

Communicating Contractor's Scope of Work performance risk to FEI (to assess the overall health of the project) will be the responsibility of the Project Manager (or designate) managing the Contract. See Appendix C, reporting Contractor's performance risk.

3.5 Risk Communication

The risk registers and the supporting action plans will provide the basis for most of the Project's risk communication in the form of reporting. Risk communication will take place at various levels during the execution of the project:

- Identification of new risks
- Monthly risk review and update with Risk Owners
- Periodic Contractor's performance review, trend/forecast reports, and change notifications
- Monthly PRRT risk reporting and reviews
- Major Project's Risk Dashboard
- Risk updates to government regulatory agencies, TBD as part of the CPCN approval
- Basic Introduction to Risk Framework, the Risk Management Plan and SharePoint Register - Training

Table 3.5 outlines key risk communication items for the Project

Table 3.5: Risk Communication for the AMI Project

Item	Frequency	Audience	Originator	Format
New Risk (includes risks identified in approved Changes)	Anytime	PM and/or Risk Manager	All Project Participants Change Originator	Online – SharePoint Risk Identification Template Approved Change Order
Monthly Risk Review	Monthly (Biweekly, if required)	Risk Manager	Risk Owners	Online – SharePoint Risk Register Update
Contractor's Performance Risk Update	Monthly	Project Manager (s)	FEI designate PMs (assigned to each Contractor)	Verbal and Commentary Written Report
Monthly Risk Report	Monthly	Risk Manager	Risk Owners	Commentary Written Report or Verbal
Monthly Project Risk Overview Report	Monthly	Project Manager(s) / Program Director	Risk Manager	Written Report
Executive Risk Dashboard	Monthly	Executive Leadership	Risk Owners	Major Projects Online SharePoint Dashboard
Periodic Formal Risk Review Report	As required at major milestones	Project Manager	Risk Facilitator/Risk Manager	Written Analysis and Report, as required

Item	Frequency	Audience	Originator	Format
Project Risk Update	TBD Post BCUC Approval	BCUC	Program Director / Project Manager(s)	Part of a Project Update
Basic Introduction to Risk Management Plan, and SharePoint Register -Training	At least once, before BCUC approval, and during the Project Execution	Project Team (Risk Participants)	Risk Manager	Planned Online Instruction or Demo

3.6 Training

To ensure effective implementation of the Risk Management Plan, the following training sessions will be delivered for the Project Team Members:

Training Method	Content	Timing
Short 1 hour series (Risk Manager/Advisor)	<ul style="list-style-type: none"> Overview of the Project's Risk Management Plan and Process An overview of how to use the Project's Risk Register and Risk Prioritization Matrix 	Within the first 2 months of Application Filing (The AMI Project Director, Planning and Governance will determine firm schedule)
Self Learning: (Major Project Risk Management Framework SharePoint Site)	<ul style="list-style-type: none"> Overview of FEI's Project Risk Management Framework 	

4. Risk Management Tools and Methods

The project will implement the following risk management tools:

- Risk Register: A SharePoint database risk register managed by Major Project's Risk and Governance Team. Click the following URL to access risk register:
- Risk Matrix: The project will adopt the standard Project Specific Risk Prioritization Matrix (see Appendix D) approved by the Project Manager.

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5. Risk Documentation

The project will document risk information using:

- The Risk Register is the primary tool for recording identified risks, the likelihood and impact (for both qualitative and quantitative assessments), proposed response strategies and action plan summary, and assessment of residual risk after application of the risk response actions.
- The Action Register: To capture risk response actions proposed by the Risk Owner. The Action Register is part of the risk register database. Action Owners shall complete and report risk actions in a timely manner.
- All monthly and special reports defined in Table 3.5, Risk Communication for the Project.

5.1 Risk Register

The Register contains several fields to ensure each risk is tracked from identification through to completion. For this project, there will be one risk register:

- AMI Risk Register:



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The Management and reporting of risk information within the Project Risk Register is the responsibility of the PM or designate Risk Manager. The register will be living documents that will be part of the Project Risk Management Plan.

6. Risk Management Resource Requirements

One full-time equivalent (FTE) Risk Management personnel will be required to support the risk management activities by being responsible for ensuring identified risks are documented, assigned, and reporting on Risk Management strategies and mitigations; and this responsibility may be shared. Risk ownership will be shared amongst various members of the project team and others within the FEI organization as applicable.

Several service contracts for quantitative risk analysis may be required during the project lifecycle to support cost contingency development and re-evaluation, during various phases of the project, as discussed in Section 3.2.2.2, Quantitative Risk Analysis.

7. Contingency Estimation, Allocation, and Management

7.1 Contingency Estimation

7.1.1 Background

Contingency amount accounts for risks and uncertainties caused by:

- Planning and estimating errors, and omissions
- Minor price fluctuations (other than general escalation)
- Design developments and changes within the scope
- Variations in market and environmental conditions

Contingency amount does not account for additional costs and schedule caused by:

- Major scope changes such as changes in end product specification, capacities, sizes, and location of the asset or project
- Extraordinary events such as major strikes and natural disasters
- Escalation and currency effects

Contingency will be estimated using accepted AACE practices. The major cost breakdowns include:

- Owner Cost
- Material and Equipment (HW, SW, Endpoint/Advanced Meter)
- Contracted Services:
 - Network/Back Office (Design, Integration and Testing, and support)
 - Endpoint/Advanced Meter Deployment and support

Contingency estimation method currently used by Major Projects use parametric (empirical) models developed for industrial pipeline and facility development projects. This is not suitable for System design, integration, testing, and deployment of new endpoint/advanced meter technologies.

A detailed contingency analysis report will be completed.

7.1.2 Contingency Recalibration

The Project Manager(s) will regularly review the Project's contingency to review availability of adequate funds for the remaining work.

The Project Manager(s) will trigger review, if contingency re-evaluation is required during the execution of the project on a remaining scope of work, if approved trends for project cost/schedule variance (excluding major changes) are forecast to exceed the established contingency amount.

The assessment will be done on the remaining project budget at risk (excluding project cost that is already incurred) using up-to-date risk register information at the time of the analysis. The Project Manager or the designated Project Risk Manager will coordinate this activity.

7.2 Contingency Allocation and Drawdown Management

The Project Manager(s) with the support of the Project Controls team will administer the allocation of contingency during execution of the project, and its drawdown. This will be in accordance with the projects' Cash flow and Change Management plans.

8. Appendices

Appendix A – Terms and Definition

Risk Management terms and definitions adopted in AACE International, Recommended Practice No. 10S-90 “Cost Engineering Terminology” are used for this plan, unless otherwise specified.

Cause: Events or circumstances that may influence or cause uncertainty in asset or project performance. Risk driver and risk factor are synonymous used terms.

Critical Item (or Risk): is “one whose actual value can vary from its target, either favourably or unfavourably, by such a magnitude that the bottom line cost (or profit) of the project would change by an amount greater than its critical variance,” with the bottom line critical variance being specified as follows in AACE 40R-08:

- Cost change: plus or minus 0.5%, and
- NPV change: plus or minus 5%.

Hollmann, John. Project Risk Quantification: A Practitioner's Guide to Realistic Cost and Schedule Risk Management (p. 252).

Impact: In risk management, the consequence or effect of a risk event or condition.

Opportunity: Uncertain event that could improve desired results or improve the probability that a desired outcome will happen.

Probability: Estimate of the uncertainty associated with a risk, describing how likely it is to occur, expressed either descriptively (e.g., Very Low/Low/Medium/High/Very High) or numerically as a percentage (e.g., in the range 1-99%).

Risk: An uncertain event or condition that could affect a project objective or business goal.

Project Specific Risk: A risk taxonomy designation used to classify project risks for the purposes of selecting a quantification method (i.e., contingency determination). Project-specific risks are uncertainties (threats or opportunities) related to events, actions, and other conditions that are specific to the scope of a project. (e.g., weather, soil conditions, etc.). The impacts of project-specific risks are unique to a project.

Systemic Risk: A risk taxonomy designation used to classify project risks for the purposes of selecting a quantification method (i.e., contingency determination). Systemic risks are uncertainties (threats or opportunities) that are an artefact of an industry, company or project system, culture, strategy, complexity, technology, or similar over-arching characteristics.

Risk Breakdown Structure: A framework or taxonomy to aid risk identification and for organizing and ordering risk types throughout the risk management process.

Risk Management: A process for managing asset and project risks. In FEI Framework process includes risk management planning, risk assessment, risk treatment and risk control.

Risk Register: A formal record of identified risks, typically including additional summary information as regards assessment, treatment and control of the risks. The content may be qualitative, quantitative or both.

Risk Assessment: a risk management process, which includes the identification and analysis of risks.

Risk Identification: A risk management process step (part of risk assessment) for identifying and describing risks for risk analysis and subsequent steps.

Risk Analysis: A risk management process step (part of risk assessment) and methodology for qualitatively and/or quantitatively screening, evaluating and otherwise analysing risks to support risk treatment and control.

Qualitative Risk Analysis: Risk analysis used to screen risks wherein risk probabilities of occurrence and impacts are expressed narratively or in ranked categories of severity. Typically incorporates use of a risk matrix.

Quantitative Risk Analysis: Risk analysis used to estimate a numerical value (usually probabilistic) on risk outcomes wherein risk probabilities of occurrence and impact values are used directly rather than expressing severity narratively or by ranking as in qualitative methods.

Risk Response: The risk management process for identifying contingency plans for how the occurrence of a project-specific *critical item (risk)* will be responded. The scope of a risk impact estimate depends on the response.

Risk Treatment: The risk management process for identifying, evaluating, and selecting risk treatments to identified risks.

Risk Treatment (Options and Actions): Options(s) or Strategy and action(s) identified and planned in the risk treatment process to address risks.

Threat: an uncertainty that, if it occurs, will have an adverse or downside impact on an objective or objectives.

Appendix B – Roles and Responsibilities

This role and responsibilities matrix apply for both risk management activities within the FortisBC and Contractor's Organization.

Role	Responsibility
Director, Energy Measurement and Technology Executive Sponsor	The Executive ensures the effective implementation of the Risk Management Plan and executes the business group's portfolio of Projects
Major Projects Group	The Major Project's Risk and Governance team: <ul style="list-style-type: none"> • Develops, maintains, and monitors the implementation of the Risk Management Framework • Provides risk management training (the framework and its supporting systems and tools) and supports the project teams • Ensures the alignment and integration between risk management and all other functional areas, and the corporate risk management policies, procedures, and standards, as applicable
Project Manager (Execution) Note: For the AMI Project this role refers to the two Project Directors (Network /IT Back Office, and Sensor/Advance Meter Deployment)	The Project Manager (PM) is accountable for the development and implementation of the Risk Management Plan. The PM is also accountable for project risk communication and reporting to the FEI Executive Sponsorship Team. The PM is also responsible for facilitating communication of project risks among other interfacing FEI projects external to the project. The PM manages the performance of contractors, and ensure that the terms and conditions of the contracts are being met. The PM is the key personnel to inform the FEI team about risks associated with Contractors performance.
Project Risk Manager/ Advisor/ Coordinator (For the AMI Project this role is a responsibility of the AMI Project Director – Planning and Governance)	The Project Risk Manager is responsible for the development and execution of the risk management plan. This person may be responsible for one or more projects. For each project, the Project Risk Manager is responsible for: <ul style="list-style-type: none"> • The coordination and development of a fit-for-purpose risk management strategies and plans. • Facilitating the Day-to-Day risk management process for the project – working with assigned Risk Owners • Coordinate the preparation and execution of project specific quantitative risk analysis, when required • Delivering, required risk management deliverables, during project milestone reviews
Risk Owners Generally designated to Project Discipline or Function Lead(s) including the PM(s)	Responsible for all aspects of risk management within the scope of project discipline's or contractual accountability, the Risk Owner <ul style="list-style-type: none"> • Promotes and performs continuous risk identification, analysis, and planning and execution of risk response within the area of accountability. • Maintains effective communication (risk information) with the Project Risk Manager

Role	Responsibility
	<ul style="list-style-type: none"> Proactively defines and executes risk response strategies and actions, ensuring risk response action is performed within expected standards of care and effectiveness. Ensures risk response actions assigned are executed and reported back to the Risk Manager Follows-up on risk monitoring and control actions, changing conditions and new risks as they surface Performs quality assurance of risk documentation - rationale and evidence. Collect information regarding the assigned risk(s) and assess its relevance. Identify proposed risk response actions to treat the risk. Assign/Nominate an Action Owner for each such action. Update information about risks owned and associated treatment and contingent information in the Risk Register.
Control Owner	<p>Control Owner is accountable for the effectiveness of a designated business control function (policies, standards, processes and procedures) that support day-to-day project functions.</p> <p>These control functions are Technical (Network, IS/IT, Sensor and Advanced Meter), Operations, Health and Safety, Sustainability and Environment, QA/QC, financial controls, procurement and contracting, internal and external relations and communications, etc.</p>
Project Risk Review Team (PRRT)	<p>The team is the core team for the project. The PM forms this team. The review team is responsible for:</p> <ul style="list-style-type: none"> Reviewing, validating and appraising Risk Owner's assessment of existing and emerging risks Reviewing, validating and appraising Risk Owner's proposed treatment and contingency response strategy, actions and action owner Reviewing status update of risks and risk actions provided by Risk Owners (consolidated by the project Risk Manager) Identifying content of risk communication to Contractors, Project Team and Project Stakeholders <p>Note: The members of this team can vary based on the Phase of the project development and execution. Key members of this team may include:</p> <ul style="list-style-type: none"> The PM(s), Organization Change Lead, Risk Manager Major Vendor/Contractor's PM(s), Project Controls Lead Back Office/ EA PM, Business Process Lead, Customer Services Lead Procurement Lead, Contract Management Lead, Operations Lead Technical System (Non-IT) Lead, External/Internal Stakeholder Relations Lead, Labour Relations and HR Health Safety, Environment, and Security Lead Deployment PM, Meter Shop Lead, etc. <p>The PM will assign one or more of the review team members to represent other related stakeholders that do not have direct representation in the review team.</p>

Role	Responsibility
Action Owner	The Action Owner implements and manages the risk treatment actions assigned by the Risk Owner. The Action Owners also communicates the status of assigned actions to the Risk Owner.
Project Planner/ Scheduler	The Project planner/scheduler is responsible for providing the following inputs to support the project risk management process: <ul style="list-style-type: none"> • Basis of schedule (logic, duration estimate, etc.) and assumptions • A schedule model; a schedule build with a logical step on how the project is going to be executed (longest finish-to-start logical path, unconstrained, with some near critical work package activities) • Potential risks that may affect the schedule estimate
Project Controls Manager (Lead)	Responsible for establishing contingency management process, in alignment with the Project's Change Management Plan <ul style="list-style-type: none"> • The Project Controls Manager or designate administers Contingency identified in Class 3 during project execution. • Prepares Contingency Drawdown requests for Project Management Team approval. • Maintains a Trend Log documenting Contingency drawdown • Maintains the control budget, current budget and the forecast. • Participates in risk identification, analysis, planning, tracking and reporting continuously.
Risk Initiator (All Project Team Members)	All project team members are "Risk Initiators." They are responsible to identify and report emerging threats and opportunities that have the potential to influence the project objectives.

Appendix C – Monitoring Contractor’s Performance Risk

The Contractor(s) and their sub-contractors perform most of the scope of work for the project, and comprise substantial sources of risk. Depending on the contracting type used, the PM(s) will ensure all risks allocated to the Contractor(s) are properly documented and communicated through the Contract(s), and agreed by the Contractor(s), prior to Contract Award.

It is the Contractor’s responsibility to manage risk associated with the contracted scope of work in an acceptable manner.

The FEI Project Manager(s), accountable for the Contractor’s deliverables, have a responsibility to evaluate Contractor’s performance based on formal progress reports and periodic information generated and distributed by the Contractor and/or FEI functional representatives interfacing with the Contractor’s daily activities, including trend and change request information measured, assessed and managed by the Project Controls Team.

For the AMI Project, post Contract Award, Contractor’s performance related risks are monitored by the Project Manager or a designated FEI Project Leader (performing a Risk Owner role) responsible for various scopes of contracted work. Communicating Contractor’s performance risk to FEI (assessment of the project performance) will be the responsibility of the Project Manager or his/her designate Project Leader managing each construction contract.

Appendix D – Risk Prioritization Matrix

This risk matrix presented in this appendix was used for risk prioritizing identified risks into “Major”, “Moderate”, and “Minor” risk levels.

The use of this matrix by the project team is limited to risk prioritization, identification of unacceptable risks, and risk treatment recommendations to Management. Allocation of resources for risk treatment requires prior validation of the risk and the recommended treatment options, and approval by the Project Director(s).

The following project criteria define the project specific risk prioritization matrix:

- Project Capital of approximately \$500 Million CDN
- Project schedule delay (weeks or months) from expected major milestone dates on critical path to project completion.
- Other impact criteria are defined in accordance with previously defined Company risk assessment criteria.

		Risk Impact Category (Cost, Schedule, Performance/Quality/Scope)				
		IMPACT				
Likelihood (Probability)		Very Low	Low	Medium	High	Very High
Very High (>50%)		Moderate	Moderate	Major	Major	Major
High (5 - 50%)		Minor	Moderate	Major	Major	Major
Medium (1-5%)		Minor	Moderate	Moderate	Major	Major
Low (0.1-1.0%)		Minor	Minor	Moderate	Moderate	Moderate
Very Low <0.1%		Minor	Minor	Minor	Minor	Moderate

AMI Project			IMPACT				
Risk Prioritization Matrix			Very Low	Low	Medium	High	Very High
Impact Category	Impact Sub-Category	Quantification					
Project Cost (CAPEX of \$500 Million assumed) What percentage of CAPEX is at risk?	Project Cost	\$ Cdn					
	Project Cost	\$ Cdn	<= \$50K	>\$50K to <=\$500K	>\$500K to <=\$5 Million	>\$5 to <=\$50 Million	> \$50 Million
Project Schedule	Project Schedule	Delay	Budget Overrun < =0.01% * Capex	0.01% * Capex < Budget Overrun < =0.1% * Capex	0.1% * Capex < Budget Overrun < = 1% * Capex	1% * Capex < Budget Overrun < = 10% * Capex	Budget Overrun > 10% * Capex
Performance	Scope Functional/Performance Quality	Qualitative	<2 Weeks	2 to <= 4 Weeks	>1 to <= 4 Months	>4 to <= 6 Months	> 6 months
Health and Safety	Health and Safety	Qualitative	No noticeable quality impact	Impact on quality of minor project deliverable and/or component	Significant impact on quality of major project deliverable and/or component	Quality unacceptable to Project Manager/ Project Sponsor	Quality does not meet performance or business expectations
Health and Safety	Health and Safety	Qualitative	An event where there would be no material cost impact to the company from a Health and Safety perspective.	A minor injury or minimal impact to a person that could possibly result in a small claims court settlement. Included is staff time spent dealing with the claim.	Serious injury, or adverse short-term health impact (i.e. the person would recover without long-term disability)	Multiple serious injuries or one fatality, or adverse long-term health impact.	Multiple fatalities
Environmental	Soil, Water, Wildlife, Vegetation, Emissions, etc.	Qualitative	No/negligible environmental impacts with no public/regulatory interest	Event resulting in minor public/regulatory concerns. Short term or easily mitigated impact on land.	Event resulting in moderate Environmental impacts with ongoing public/regulatory concerns	Long-term or major environmental damage and a high level of public/regulatory response (i.e. may include media).	Uncontrolled environmental damage and significant public/regulatory response (media will be involved).
Regulatory	Legal Compliance / Industry Practice	Qualitative	No compliance issue. No Corporate Image impact	May or may not be meeting legal compliance / industry practice, low potential for impact. May also include minor impact to corporate image	Potential gap with respect to legal compliance/industry practice (no consensus within company) without life safety impact. May also include moderate impact to corporate image.	Potential gap with respect to legal compliance/industry practice (no consensus within company) with life safety impact. May also include significant impact to corporate image.	Identified gap with respect to legal compliance/industry practice with life safety impact. May also include substantial impact to corporate image.
Corporate Responsibility and Service Continuity	Societal	Qualitative	Negligible or minor impact or lost revenue due to planned event.	Minor event causing impact or lost revenue for the customer, for less than a day, in an isolated area (could be one business); An outage for less than 1 hour or infrequent momentary outages (~1 per year).	Event causing impact or lost revenue for a few industrial or commercial customers for a period of 1 to 5 days	Event causing impacts or lost revenue for many customers, for a period of more than 5 days and less than 2 week; of 4 hours up to 24 hours	Substantial impact or disruption of customer base (e.g. revenue, loss of gas use for >2 weeks or loss of electric use for >1 day, influencing a very-wide geographic footprint > 10,000 customers); Results in secondary impacts to customers.
Corporate Responsibility and Service Continuity	External Relations (Federal, Provincial, and Municipal Governments; Indigenous Communities, Special Interest Groups, etc.)	Qualitative	Event causes no external relations issues.	Event leads to strained communications with external agencies. Follow-up requires meetings between external agencies and Company staff in order to maintain trust.	Trust between Company and external agencies has been eroded to a point that cannot be rectified by enhanced communications.	Company has lost influence with external agencies.	Event leads to a total breakdown of relationship with external agencies, typically on a province-wide basis. Future decisions will be made with no input from Fortis.
Operations Financial (Physical Damage / Economic Loss)	Property Damage: Physical impact to public property	Qualitative	Event causes no/negligible damage to public property.	Minor repair required to facilities. Derived from typical Company claims which include the settlement, the legal, investigative costs and possible curtailment claims.	Larger scale damage with possible associated fire. Derived from Company typical claims that include the settlement, the legal, investigative costs and possible curtailment claims.	Destruction of a single dwelling, small building, or damage to property	Destruction of multiple dwellings, major commercial/industrial, or extensive damage to property
Operations Financial (Physical Damage / Economic Loss)	Service Disruption, Lost Revenue and Capacity	Semi-Qualitative	Event causes negligible to Short-term minor service interruption, negligible commodity loss, and/or minor customer annoyance due to planned event. An outage of less than 100 customer-days	Loss of service to 5-10 residential or 1-2 commercial customers for 1-2 days, and/or minor commodity loss; Low level customer annoyance resulting from improper repair of property or evacuation of 1-5 customers. Assume staff costs and possible minor customer compensation. An outage equaling over 100 customer days and less than 500 customer-days	Service disruption/customer annoyance to 150 residents (approx. 8-12 hrs.), and/or moderate commodity loss; Cost impact to the Company to re-establish loyalty with a number of profitable customers; Possibly affect future growth opportunities with customers; Costs associated with customer relationship programs. An outage equaling over 500 customer days and under 5000 customer-days	Service disruption to 1,500 customers or a large industrial customer for approximately 7 days, and/or significant commodity loss; An outage equaling over 5,000 customer days and under 50,000 customer days	Service disruption to 9,000 customers for approximately 7 days, and/or substantial commodity loss. An outage equaling over 50,000 customer days
Operations Financial (Physical Damage / Economic Loss)	Damage or Prevention of Damage to Company Assets	Semi-Qualitative	An event where there would be no material cost impact to the company from a Company Damage perspective (\$0-\$0)	Raw cost of damages to Company Assets (repair or replace); Includes cost of response. (\$50K; \$5K)	Raw cost of damages to Company Assets (repair or replace); Includes cost of response. (\$250K; \$25K)	Raw cost of damages to Company Assets (repair or replace); Includes cost of response. (\$750K; \$750K)	Raw cost of damages to Company Assets (repair or replace); Includes cost of response. (> \$1500K; >\$150K)

Appendix E - Project Monthly Risk Report Template

Project Summary Report: Project Name:		Period:	Submission Date:
Executive Summary:			
Project Status and Overall Risk Status:			
Top Risks, Treatment, Control, and Risk Owners			
Risk ID	Risk Description	Risk Treatment and Control Summary	Risk Owner
Key/Significant Changes since last review (during reporting period):			
Comment on how effectively risk treatments are being actioned:			
Risks outside project scope or control:			
Commentary on the Status of Risk Management Plan Implementation on the Project:			
Commentary on Lessons Learned:			
Conclusion and Recommendations:			
Project Manager:		Reviewer:	
Date:		Date:	
Attachments: Risk Response Action Plan Summaries for Major (Top) Risks:			

Detail Project Milestone Risk Report					Period:		Submission Date:		
Project Name: YYYY									
Executive Summary:									
Project Status and Overall Risk Status:									
Summary Risk Profile									
Probability	Impact							Number of Valid Risks In each Risk Level	
	Very Low	Low	Medium	High	Very High			Last Period	Current Period
Very High	Moderate	Moderate	Major	Major	Major		Major		
High	Minor	Moderate	Major	Major	Major		Moderate		
Medium	Minor	Moderate	Moderate	Major	Major		Minor		
Low	Minor	Minor	Moderate	Moderate	Moderate				
Very Low	Minor	Minor	Minor	Minor	Moderate				
Top Risks, Treatment and Control and Risk Owners									
Risk ID	Risk Description					Risk Treatment and Control Summary			Risk Owner
Key/Significant Changes since last review (during reporting period)									
Risks outside project scope or control:									
Commentary on the Status of Risk Management Plan Implementation on the Project:									
Conclusion and Recommendations:									
Project Manager:					Reviewer:				
Date:					Date:				
Attachments:	Updated Risk Register								
	Quantitative Analysis (Model input and Structure, key output and analysis)								
	Other								

Advanced Metering Infrastructure (AMI) Contingency Estimation Report

Version 0.2
09 April 2021

VERSION HISTORY

Redaction 8

Version	Date	Prepared By:	Reviewed By:	Comments
0.1	18 March, 2021	[REDACTED] Consultant	[REDACTED] Project Director [REDACTED] Project Director	Issued for Review
0.2	09 April, 2021	[REDACTED] Consultant	Major Projects [REDACTED] [REDACTED]	Issued for Approval

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1. PURPOSE

This report summarizes the method, steps and outcome of the cost contingency estimation completed during the project development stage of the Advanced Metering Infrastructure (AMI) Gas project for BCUC Application filing. The contingency estimate is to account for the expected cost of project execution risk related to the following:

- Estimate uncertainty related to the level of project definition, project planning, and organizational maturity to execute the project, here after, referred as “Systemic Risks.”
- Event driven project-specific risks that may have significant impact on the estimated Project cost. Cost of risks includes time driven (schedule) and non-time driven costs.

The analysis is based on the Class 3 estimates and schedules (revisions dated March 2 and March 4, 2021) prepared by the AMI Project Team.

2. EXECUTIVE SUMMARY

The following summary outlines the outcome of the contingency estimation:

Point Estimate (Most Likely)	\$555,341,277
Estimate Uncertainty (Systemic Risk)	\$18,858,674
Cost of Time-Driven Risk	\$10,626,667
Cost of Non-Time-Driven Risk	\$4,770,000
Expected Project Total (E + (1* σ))	\$589,596,617
Contingency (%)	6.2%
Contingency (\$)	\$34,255,340

The methods, steps, data, and calculations used to derive the outcome of this estimation are described in the remaining sections of this report.

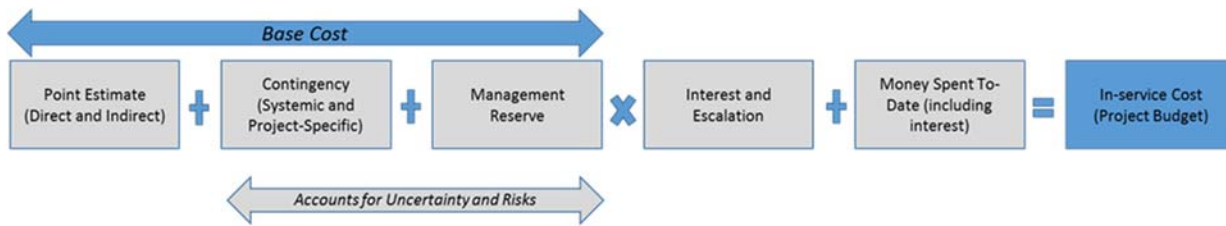
3. SCOPE

The estimate development process is a structured approach that builds the estimate from the bottom-up as shown in Figure 1.

The scope of this report is to document:

- The methods and steps applied to estimate the contingency portion of the project budget

Figure 1: Estimate Structure



- The outcome of the contingency estimation based on a deterministic estimate of the project's systemic and project specific risks by using a hybrid of various AACE recommended practices or methods to perform the analysis, i.e. expert judgement, range estimates, and expected value methods.

Note:

- Money spent To-date is a very small portion of the estimate; it is included as part of the point estimate in 2020.

4. TERMS AND DEFINITIONS

Confidence interval - The probability that a result will be within a range.

Contingency - is an amount added to the estimate to address this uncertainty and associated risks that could be encountered during project design and deployment. Contingency is developed with the expectation that some or all of it will be spent. Therefore, the Point Estimate alone does not adequately represent the project's cost.

Critical project-specific risks - Those with material impact on project economics or other success measures. The potential impact of such risks is typically approximately > than 0.5% of the project cost estimate (Point Estimate) and/or approximately > than 0.5% of the project execution schedule duration, if they occur. This is a benchmark as a guide; the Project Leadership Team will make the final call, as to what can be included as a critical risk.

Expected value – In risk analysis, the product of probability times impact; i.e., a risk weighted measure of impact. In statistical usage, synonymous with the mean.

Expert judgement

- Opinions, advice, recommendations, or commentary proffered, usually upon request, by a person or persons recognized, either formally or informally, as having specialized knowledge or training in a specific area.
- Deliberate discernment of a situation or proposed course of action by those whose knowledge, skills, and abilities are developed from specialized education and experience, which enable them to better understand the situation or propose an optimal course of action than could those whose professional backgrounds are not so specialized.

Management reserve - is an amount added to cover uncertainty items with very high impacts but lower likelihood of occurrence and/or substantial risk items not appropriate to be covered through contingency (e.g. major scope changes, etc.).

Risk (Project-specific) - are uncertainties (threats or opportunities) related to events, actions, and other conditions that are specific to the scope of a project. The impacts of project-specific risks are unique to a project. Generally, the details on these risks are not known at early stages of project definition but they are typically the dominant risk type at later stages of project definition. Typical project specific risks include:

- Government approval and/or other delivery delays
- System integration issues
- Skilled resource availability
- Deployment quality issues (e.g., rework)

Risk (Systemic) – In this assessment, systemic risks (defined as estimate uncertainty) are the result of the project “system”, i.e. the level of project definition and planning, organizational maturity to execute the project, execution complexity, estimating biases, etc. Their probability of occurrence is 100%, i.e. they are facts about the project system.

5. METHODOLOGY AND STEPS

A hybrid of various AACE recognized practices/methods (RP 40R-08), was used to estimate the contingency for the AMI project. The AACE practices/methods applied include expert judgement, range estimates, and expected value methods. The methods explicitly link the level of risk and uncertainty on the project to the contingency amount developed.

Table 1 summarizes the methodology and steps applied to develop the cost of estimate uncertainty and project-specific risks that make up the contingency amount for the project.

Table 1: Contingency Estimation Methods and Steps

Estimate Type	Methods	Steps
Point (most likely) Estimate.	<ul style="list-style-type: none">• Project Team and Vendor input – bottom up• Risk-free costs based on an initial set of assumptions and current market conditions.	<ul style="list-style-type: none">• Developed point estimate by accounting direct and indirect costs of major categories (cost elements) of work that make up the AMI Project. See Table 2.• Significant participation and input, during estimate development, by major vendors and internal business support groups.
Expected estimate uncertainty (Systemic Risk)	<ul style="list-style-type: none">• Expert judgement using range estimates, to quantify the cost of systemic risks• Expected (mean) value method	<ul style="list-style-type: none">• Range estimate of cost elements based on the status of project definition, execution complexity, and past experience designing and

Estimate Type	Methods	Steps
	<ul style="list-style-type: none"> Use of standard deviation (σ) to establish range of estimate and confidence level 	<p>installing electric AMI project. See Table 3a and 3b. for range estimates and rationale associated with the range estimates.</p> <ul style="list-style-type: none"> Determine expected (mean) values (beta distribution) Calculate standard deviation (σ) to establish range of estimate Define confidence level at $+ 1 \sigma$
Expected cost of project-specific risks	<ul style="list-style-type: none"> Expert judgement to identify critical project-specific risks, assess likelihood and the range of time-driven and non-time-driven impacts to quantify the cost of project-specific event driven risks Expected (mean) value method Use of standard deviation (σ) interval to establish confidence level 	<ul style="list-style-type: none"> Review current risk register; identify critical project-specific risks. Combine risks of similar nature and impact for quantification, if any. Define the probability of occurrence, and the range of impact (most likely, optimistic, and pessimistic values) for each risk Estimate the cost of risk using an expected-value method (beta distribution), based on probability of occurrence times potential cost impact. Define Confidence interval, standard deviation (σ) Estimate cost of project-specific risk at expected value $+ 1 \sigma$ Sum up the cost of project-specific risks

6. PROJECT ESTIMATE

6.1 POINT ESTIMATE - COST

A Class 3 Point Estimate was provided as an input to the contingency estimation. It is comprised of both direct and indirect project costs, and is a forward-looking estimate (i.e. estimate of what will be spent). It is based on a set of key variables including material and equipment quantities, unit prices, and labor rates.

The estimate is dependant on numerous factors, which include the amount of scope definition and design completed, and market conditions at the time the estimate was completed. As such, there is uncertainty and risks associated with the Point Estimate. Furthermore, interest and escalation costs are not included in the Point Estimate.

The assumptions that form the basis of the Point Estimate are derived from multiple sources:

- Learning/experiences from previous Electric AMI project by FEI

- Information from equipment, solution, and deployment vendors
- Information on labour and service costs from FEI internal support function groups
- Market survey and broadly gathered market intelligence

The point estimate breakdown direct and indirect costs of major cost categories (cost elements) of work that make up the AMI Project. Table 2 summarizes point estimate broken down by major cost categories of work, cost elements (direct and indirect costs), that make up the AMI Project.

The point estimate (most likely project cost) estimate is approximately \$555.3 M. The point estimate excludes contingency, reserves and escalation.

6.2 SCHEDULE

While business case development and initial project planning has been ongoing for several years, the estimate duration begins in 2021 (including actual costs booked prior to January 2021) and continues until CPCN filing and completion of last deployment in Q2 2026, as follows:

- Prepare: Pre-notice to proceed – 27 months, between Q1 2020 and Q2 2022
- Define: Design, build, integrate, and ready for deployment – 12 months, between Q1 2022 and Q4 2022
- Deployment: Installation of network, meter and non-meter equipment – 44 months, between Q1 2023 to Q2 2026

Table 2: Point Estimate (Most likely)

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Estimate by Year								
	2020	2021	2022	2023	2024	2025	2026	Most Likely (Estimate)
PM Capital								
Subtotal	3,613,129	3,402,504	6,887,338	11,283,236	10,647,132	8,560,587	4,883,795	49,277,720
Network Capital								
Subtotal	0	0	632,681	7,939,414	7,440,330	394,079	0	16,406,504
Software Capital								
Subtotal	0	0	2,646,035	3,380,223	1,500,039	955,654	0	8,481,951
Non Meter Capital								
Subtotal	0	0	53,297	1,020,976	1,447,196	357,996	333,007	3,212,473
Sustaining Capital								
Network Sustaining Capital	0	0	0	0	0	21,400	75,328	96,728
Software Sustaining Capital	0	0	0	55,826	56,943	98,207	100,171	311,146
Non Meter Sustaining Capital	0	0	0	0	0	0	0	0
Subtotal	0	0	0	55,826	56,943	119,607	175,499	407,874
Meter Capital (Meter)								
Subtotal								245,032,528
Meter Capital (Jomar)								
Subtotal								78,777,150
Installation (Meter)								
Subtotal								122,466,907
Installation (Jomar)								
Subtotal								24,456,528
Customer Center Support								
Subtotal								6,821,642
							Project Total	555,341,277

7. CONTINGENCY ESTIMATION

The contingency estimation incorporates the expected cost of two types of risks: systemic risk and project-specific risk.

7.1 BACKGROUND – STATISTICAL TERMS AND FORMULAS

The following terms and statistical formulas are used in assessing the expected costs of various risk types.

Expected Value (Mean for Beta Distribution): $E = (O + (4 \times M) + P) / 6$

Where:

E is expected value:

O is the Optimistic value

P is the Pessimistic value

M is the Most Likely value, or Estimate

Note:

- A beta distribution is assumed for all range estimates, i.e. estimate uncertainty and risk impact ranges.
- Calculations of expected or mean values for range estimates are based on an approximate formula derived from a statistical distribution technique called Beta Distribution.

Standard Deviation for Beta Distribution: $\sigma = (P - O) / 6$

Note:

- The use of standard deviation allows for determination of safe range values and the probability associated with the range.

Range of Estimate: $E \pm (n * \sigma)$

Where the upper boundary is: $E + (n * \sigma)$; and the lower boundary is: $E - (n * \sigma)$

‘n’ is sigma level which determines the probability, or confidence level.

If $n=1$, then Probability is 68.27%

If $n=2$, then Probability is 95.45%

7.2 EXPECTED COST OF SYSTEMIC RISKS (ESTIMATE UNCERTAINTY)

The following categories of systemic risks were factored in determining the expected cost of systemic risk:

- Level of scope development and design deliverables completed
- Basis information used to develop the cost and schedule estimation
- Level of project technology and overall project execution (design, integration, deployment, and organizational readiness) complexity

Table 3a summarizes the range estimate for each cost category for the project. The range estimates primarily account for optimistic and pessimistic scenarios of the following uncertainties:

- Amount of internal and external resources required for the project to address complexity during execution, and quality assurance required
- Quantity of required meter and non-meter equipment, and the price of equipment
- Productivity of installation crew
- Cost (rate) of internal resources and major vendor's installation crew

Table 3b summarizes the rationale used to estimate the pessimistic and optimistic ranges, hence the basis for calculating the estimate uncertainty for the project.

Note:

Systemic risks are estimated using a parametric model. A parametric model is an equation, developed based on empirical data that explicitly links risk drivers to cost change, which takes the quantified systemic risks as an input and produces expected cost. This method is a standard approach on FEI pipeline and facility construction projects to assess the overall impact of systemic risks. However, this method could not be applied to the AMI project due to the uniqueness of the project, that there are no historical data sets of completed similar projects to derive and employ the required empiricism for parametric modelling.

Table 3a: Range Estimate for Estimate Uncertainty

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	Most Likely (Estimate), M	Optimistic, O	Pessimistic, P	Expected Value, E	Expected Value at E + (1* σ)
PM Capital					
Subtotal	49,277,720	45,724,522	57,260,680	50,016,014	51,938,707
Network Capital					
Subtotal	16,406,504	15,027,718	20,077,772	16,788,584	17,630,260
Software Capital					
Subtotal	8,481,951	7,411,591	12,373,640	8,952,172	9,779,181
Non Meter Capital					
Subtotal	3,212,473	2,792,300	4,650,303	3,382,082	3,691,749
Sustaining Capital					
Subtotal	407,874	407,874	407,874	407,874	407,874
Meter Capital (Meter)					
Hardware (Meter)	245,032,528	241,229,172	252,707,091		
Subtotal	245,032,528	241,229,172	252,707,091	245,677,729	247,590,716
Meter Capital (Jomar)					
Hardware (Jomar)	78,777,150	71,096,379	95,320,353		
Subtotal	78,777,150	71,096,379	95,320,353	80,254,222	84,291,551
Installation (Meter)					
Installation (Meters)	122,466,907	116,343,562	134,713,598		
Subtotal	122,466,907	116,343,562	134,713,598	123,487,465	126,549,138
Installation (Jomar)					
Installation Jomar	24,456,528	23,233,702	26,902,182		
Subtotal	24,456,528	23,233,702	26,902,182	24,660,333	25,271,746
Customer Center Support					
Labour	6,821,642	6,480,559	7,503,805		
Subtotal	6,821,642	6,480,559	7,503,805	6,878,489	7,049,030
	555,341,277	529,747,379	611,917,298	560,504,964	574,199,951

Table 3b: Rationale for Range Estimate – Estimate Uncertainty

Item Number	Cost Element	Optimistic	Pessimistic
1	PM Capital	<ul style="list-style-type: none"> Project deploys minimal Quality Assurance (QA) resource. Sensus integration is not complex. 	<ul style="list-style-type: none"> Factored additional labor to account for more difficult than normal deployment and QA assurance - mostly for higher than anticipated refusal rates. Additional consulting might also be required if the project is more difficult to manage than expected. Additional funds were added to assist in developing Sensus' integration in the case that the Data Repository is more complex
2	Network Capital	<ul style="list-style-type: none"> Base station (BS) count was decreased to minimum best case 	<ul style="list-style-type: none"> Increased base station. There may be a need to supplement coverage, if meters are more obstructed or placed indoors than expected, and preliminary design is insufficient to provide required coverage.
3	Software Capital	<ul style="list-style-type: none"> Simpler integration than expected and therefore takes less number of IS resources 	<ul style="list-style-type: none"> Accounts for potential increment in cost due to the uncertainty in software integration-complexity as scope is not fully flushed out until define/design
4	Non Meter Capital	<ul style="list-style-type: none"> Labor durations turn out to be conservative. Less number of Vehicle Base Stations are required than estimated. 	<ul style="list-style-type: none"> Longer labor durations than expected and an increase to the cost of other ancillary material
5	Sustaining Capital	<ul style="list-style-type: none"> No significant uncertainty 	<ul style="list-style-type: none"> No significant uncertainty
6	Meter Capital (Meter)	<ul style="list-style-type: none"> Lower number of advanced meter exchanges/installs and C&I customers smart point installs, 1% less assuming the projected number of new-customer-adds is less than estimated number for 2021-2026. Lower number (5%) of regulators exchanged than estimated due to inaccuracies in meter survey data. 	<ul style="list-style-type: none"> Higher number of advanced meter exchanges/installs and C&I customers smart point installs, 2% higher assuming the projected number of new-customer-adds is higher than estimated number for 2021-2026. Higher number (10%) of regulators exchanged than estimated due to inaccuracies in meter survey data.
7	Meter Capital (Jomar)	<ul style="list-style-type: none"> Price of Jomar bypass valves lower than estimated (5%) due to favorable changes in the Euro/ US exchange rate, and price of brass. 	<ul style="list-style-type: none"> Price of Jomar bypass valves higher than estimated (10%) due to unfavorable changes in the Euro/ US exchange rate, and price of brass. Increased the number of Jomars that are required to be installed during the project by 10% (I.e. customer growth projections

Item Number	Cost Element	Optimistic	Pessimistic
			turn out to be too low and a lower number of Jomars are actually installed during 2021 and 2022 planned meter exchanges).
8	Install (Meter)	<ul style="list-style-type: none"> Better than estimated productivity rate, approximately 5%, leading to decreased installation cost 	<ul style="list-style-type: none"> Lower than estimated productivity rate that may be a result of high customer refusal rates that will require rework and/or longer than planned installation durations. Anticipate a 10% increase to Installation costs (includes cost of internal workforce/ deployment vendor).
9	Install (Jomar)	<ul style="list-style-type: none"> Better than estimated productivity rate, approximately 5%, leading to decreased installation cost 	<ul style="list-style-type: none"> Lower than estimated productivity rate that may be a result of high customer refusal rates that will require rework and/or longer than planned installation durations. Anticipate a 10% increase to Installation costs (includes cost of internal workforce/ deployment vendor).
10	Customer Center Support	<ul style="list-style-type: none"> Decreased cost of customer support (by 5%), due to lesser time requirement to answer customer's questions. Lower number of appointments than planned (by 1%) if project is able to obtain an online booking app 	<ul style="list-style-type: none"> Increased cost of customer support (by 10%), possibility of spending more time on the phone with customers addressing questions about new meters, and potential health and safety, and other concerns. Higher number of appointments than planned (by 2%) related to higher customer growth than expected.

The estimated value of estimate uncertainty (expected cost of systemic risk) is summarized in Table 3c.

Table 3c – Estimate Uncertainty (expected cost of systemic risk)

Estimate Uncertainty (Systemic Risk Related)	Estimate Uncertainty							Estimate Uncertainty
	Probability	Estimate Range Summary						
		Optimistic	Most Likely	Pessimistic	Expected Value, E	Confidence Interval (σ)	Expected Value at E + (1* σ)	
Estimate	100%	\$529,747,379	\$555,341,277	\$611,917,298	\$560,504,964	13,694,986	574,199,951	\$18,858,673.60
Estimate Uncertainty (Systemic Risk Related)								\$18,858,674

The other portion of the contingency estimation is the expected value for cost of project-specific risks. A selected number of project-specific risks were identified and consolidated, from the current project risk register, as critical risks for estimating the cost of project-specific risks. Table 4a summarizes these critical risks and assessment of their probabilities of occurrence and impacts, schedule and/or cost.

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[illegible]

Note:

The impacts of nominal or non-critical risks were assumed to be covered by the systemic risk component of the contingency estimate.

For each critical risk, the following were estimated:

- Realistic estimates of probability of occurrence,
- A range of (optimistic, most likely and pessimistic) impact: time driven (schedule) and non-time driven costs.

The cost of risks includes time-driven (schedule) and non-time-driven costs. The cost of time-driven (schedule) risks are translated by multiplying each schedule impact by the average burden rate or pre-defined carrying cost (for owner caused delays) for each applicable category of delayed activity. See Table 4b for list of assumed burden rates and carrying costs for various categories of delayed activities during the execution of the AMI project.

Table 4b: Burden Rate

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Estimate by Year						
Key Activities	Cost Breakdown	Schedule	Duration (Months)	Amount	\$ per Month	Comment

The expected cost of time-driven and non-time-driven project-specific risks are summarized in Table 4c and Table 4d, respectively.

Table 4C: Expected Cost of Time-Driven Project-Specific Risks

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Risk Events (Time Driven)	Time Driven Risk Cost							Burn Rate per Month	Cost of Risk
	Schedule Impact Range (Months)								
	Probability	Optimistic	Most Likely	Pessimistic	Expected Value, E	Confidence Interval (σ)	Expected Value at E+ (1* σ)		

Table 4d: Expected Cost of Non-Time-Driven Project-Specific Risks

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Risk Events (Non-Time Driven)	Non-Time Driven Risk Cost							Cost of Risk
	Probability	Cost Impact Range						
		Optimistic	Most Likely	Pessimistic	Expected Value, E	Confidence Interval (σ)	Expected Value at E + (1* σ)	

[Redacted]

8. RESULT AND DISCUSSION

The cost of estimate uncertainty and project-specific risks at one σ confidence interval is \$34.26 Million or 6.2% of the most likely estimate \$555.3 million. Table 5 presents a summary of the expected costs of risks and expected project base estimate, without the management reserve.

Table 5: Summary of Estimate, Expected Cost of Risks and Contingency Amount

Point Estimate (Most Likely)		\$555,341,277
Estimate Uncertainty (Systemic Risk)		\$18,858,674
Cost of Time-Driven Risk		\$10,626,667
Cost of Non-Time-Driven Risk		\$4,770,000
Expected Project Total (E + (1* σ))		\$589,596,617
Contingency (%)		6.2%
Contingency (\$)		\$34,255,340

Meter equipment and their installation comprise 49% and 26% of the total project cost.

The cost of estimate uncertainty (systemic risks) is primarily attributed to the maturity of scope definition and the stage of vendor involvement in accurately defining quantity and pricing of meter equipment and corresponding duration and labour rate for their installations.

The critical project-specific risks are attributed to time-driven and non-time-driven risks:

- [Redacted]
- [Redacted]

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- [REDACTED]

Most project risks, systemic or project-specific, will be managed as part of an on-going risk management process during the execution of the project. The project has also established contracting strategies, using necessary terms and condition into existing and future contracts to manage vendor caused delays. The impact of FEI caused schedule delays will be managed by contractual instruments that are designed to restrict vendor carrying penalty costs to acceptable terms.

9. DISCLAIMER:

Yohannes Project Services prepared this report for FEI. The report is based on information collected from FEI staff during various risk assessment workshops and individual meetings. The consultant accepts no responsibility or liability of any kind for consequences of using the information in this report. It is the responsibility of the user to assess the risk information and assessment methods and processes, tools, and results against the user's experience and ensure its appropriate application and interpretation.