

March 6, 2020

Dennis Frehlich
Vice President, Grid Reliability, Executive Office
Alberta Electric System Operator
2500, 330-5th Avenue SW
Calgary, Alberta T2P 0L4

Dear Mr. Frehlich:

Re: P2032 – Cascade Combined Cycle – Service Proposal

AltaLink Management Ltd. (AML), in its capacity as General Partner of AltaLink, L.P., is pleased to submit a Service Proposal (SP) for the Cascade combined Cycle project. AltaLink understands that the AESO will direct assign this project to AltaLink if it proceeds.

The project scope of work is to engineer, procure, construct, and commission the following:

- Relocate the existing 240-kV transmission lines 973L and 974L to the south side of Bickerdike 39S.
- Install three (3) new 240-kV transmission lines (1084L, 1168L and 1135L), each approximately 1-km in length, between 39S Bickerdike and the Customer Substation Whisky Jack 1047S.
- Relocate a portion of two 138kV lines (740L and 847L) south of 39S Bickerdike to accommodate the new 1168L transmission line, and the relocated 973L and 974L transmission lines coming in to the south of Bickerdike 39S.
- Substation expansion at Bickerdike 39S (~110 m x 12-15 m) with the following new equipment to install: seven (7) new 240-kV manual disconnect switches, four (4) 240-kV live-tank circuit breakers, three (3) 240-kV motor-operated disconnect switches, seven (7) 240kV Capacitive voltage Transformers, twelve (12) 240kV Currents Transformers.
- Install Protection & Control equipment, as required, at the following substations: 39S Bickerdike, 1047S Whisky Jack, 310P Sundance and 58S Edson.
- Two fiber-optic links to Substation 1047S Whisky Jack via OPGW on lines 1084L and 1168L.
- Install Telecom equipment, as required, at the following substations: 1047S Whisky Jack and 58S Edson.

The Service Proposal estimate for the project is \$16.1 million. The project cost estimate and cash-flow estimate are stated in the attached Service Proposal (Appendix B).

The cost estimate has an accuracy of +20%/-10%. As agreed, the cost estimate is only for informational and tracking purposes pursuant to Schedule F of AltaLink's Transmission Terms and Conditions, approved by the AUC. Therefore, the cost estimate is not binding. Should the project proceed, AltaLink will capitalize the actual cost of the final project. AltaLink requests that it be involved in any third-party discussions regarding the project estimate or schedule.



Sustainable Electricity Approved™
Canadian Electricity Association
APPROVED



2611 3rd AVE SE, CALGARY, ALBERTA, T2A 7W7
WWW.ALTLINK.CA

The targeted in-service date (ISD) for the project is March 25, 2022. Meeting any ISD is contingent upon a number of factors, including, but not limited to, regulatory approvals, material procurement, and construction conditions.

If you have any questions or if you require further information, please contact Fabrice Larré at 403-365-7682. The confirmation of Direct Assignment should be sent to Keith Turriff, Director, and Project Development & Siting.

Thank you for your consideration of this proposal. We look forward to receiving the AESO's endorsement.

Yours truly,

Scott Thon, P.Eng, ICD.D
President and Chief Executive Officer

David Koch EVP & CFO

for Scott Thon



Sustainable Electricity Approved™
Canadian Electricity Association



Service Proposal (SP)

**Cascade Combined Cycle
AML D.0740/AESO P2032**

Rev. 1

March 12, 2020

Prepared by:

Fabrice Larré, P.Eng, Project Manager, Project Development

CONFIDENTIAL

REVISIONS HISTORY

Rev.	Date (MM-DD-YYYY)	Sections Changed	Changes
0	03-05-2020	N/A	Initial version.
1	03-12-2020	Various sections	AESO comments addressed – no scope at Sundance 310P

GLOSSARY

A	Amp
AC	Alternating Current
AESO	Alberta Electric System Operator
AIES	Alberta Interconnected Electrical System
AFUDC	Allowance for Funds Used During Construction
AML	AltaLink Management Ltd.
AUC	Alberta Utilities Commission
BIL	Basic Insulation Levels
CSS	Connection Study Scope
CT	Current Transformer
DC	Direct Current
DER	Distributed Energy Resource
DFO	Distribution Facilities Operator
EPC	Engineering, Procurement and Construction
EZE	Easement
FA	Facility Application
IED	Intelligent Electronic Device
ISD	In-Service Date
IPP	Independent Power Producer
IR	Information Request
ISO	Independent System Operator, now AESO
kV	Kilovolt
kVA	Kilovolt Ampere
LTC	Load Tap Changing
Mb	Megabyte
MOD	Motor Operated Disconnect
MPLS	Multiprotocol Layer Switching
MSL	Mining Surface Lease
MVA	Megavolt Ampere
NEMA	National Electrical Manufacturers Association
NID	Needs Identification Document
NGR	Neutral Grounding Reactor

OHSW	Overhead Shield Wires
P&C	Protection and Control
P&L	Permit and License
PT	Potential Transformer
RAS	Remedial Action Scheme
ROW	Right-of-Way
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SP	Service Proposal
SLD	Single Line Diagram
SMU	Synchrophasor Measurement Unit
SONET	Synchronous Optical Networking
SP	Service Proposal
T	Transformer (ie T1 for transformer #1)
TFO	Transmission Facilities Operator
VCE	Vegetation Control Easement

TABLE OF CONTENTS

1.0	PROJECT OVERVIEW.....	6
2.0	SCOPE OF WORK	6
2.1	Transmission Lines.....	7
2.1.1	Transmission Line Scope	7
2.1.2	Re-Termination of 973L and 974L.....	7
2.1.3	New Build of Line 240kV 1084L, 1135L and 1168L	7
2.1.4	Relocation of Line 740L and 847L	7
2.1.5	740L Temporary By-Pass.....	7
2.3	Substations	8
2.2.1	Bickerdike 39S	8
2.3.3	Edson 58S.....	9
2.3.4	Dalehurst 975S.....	9
2.3.5	Whisky Jack 1047S	9
2.4	Telecommunication Facilities.....	9
2.4.1	Bickerdike 39S.....	9
2.4.2	Whisky Jack 1047S	9
2.4.3	Edson 58S.....	10
2.5	Protection and Control.....	10
2.5.1	Bickerdike 39S.....	10
2.5.2	Whisky Jack 1047S	10
2.5.3	Edson 58S.....	10
2.5.4	Remedial Action Scheme	10
2.5.5	Customer Interface 1047S Whisky Jack	10
2.6	SCADA.....	11
2.6.1	Bickerdike 39S.....	11
2.6.2	Whisky Jack 1047S	11
2.6.3	Edson 58S.....	11
2.7	Salvaged Equipment.....	11
2.8	Spatial and Technical Diagrams.....	12
3.0	COST ESTIMATES.....	12
3.1	AESO Cost Template.....	12
3.2	Additional Work	12
4.0	PROJECT SCHEDULE.....	12
4.1	Transmission Lines.....	12
4.2	Substations	13
4.3	Telecommunication Facilities.....	13
4.4	Scheduled ISD	13
4.5	Construction Limitations and Constraints.....	13
5.0	ASSUMPTIONS.....	14
5.1	Scope	14
5.2	Operational Outages	15
5.3	Allowances.....	15
5.4	Escalation.....	15
6.0	DEVIATIONS FROM THE FUNCTIONAL SPECIFICATION	15

7.0 RISK MANAGEMENT.....	16
8.0 OPERATION AND OUTAGES.....	17
9.0 APPROVAL	17
APPENDIX A: FIGURES	18
APPENDIX B: COST ESTIMATE	20
APPENDIX C: PROJECT SCHEDULE.....	25

1.0 PROJECT OVERVIEW

In accordance with the Terms and Conditions of Service, AltaLink Management Ltd. (AML) has prepared this Service Proposal (SP) for the Cascade Combined Cycle Project (referred to as “the Project”), in support of the Alberta Electric System Operator’s (AESO’s) development.

The scope of work for the Project includes, but is not limited to, the following major components:

- Relocate the existing 240-kV transmission lines 973L and 974L to the south side of Bickerdike 39S.
- Install three (3) new 240-kV transmission lines (1084L, 1168L and 1135L), each approximately 1-km in length, between 39S Bickerdike and the Customer Substation Whisky Jack 1047S.
- Relocate a portion of two 138kV lines (740L and 847L) south of 39S Bickerdike to accommodate the new 1168L transmission line, and the relocated 973L and 974L transmission lines coming in to the south of Bickerdike 39S.
- Substation expansion at Bickerdike 39S (~110 m x 12-15 m) with the following new equipment to install: seven (7) new 240-kV manual disconnect switches, four (4) 240-kV live-tank circuit breakers, three (3) 240-kV motor-operated disconnect switches, seven (7) 240kV Capacitive voltage Transformers, twelve (12) 240kV Currents Transformers.
- Install Protection & Control equipment, as required, at the following substations: 39S Bickerdike, 1047S Whisky Jack and 58S Edson.
- Two fiber-optic links to Substation 1047S Whisky Jack via OPGW on lines 1084L and 1168L.
- Install Telecom equipment, as required, at the following substations: 1047S Whisky Jack and 58S Edson.

The project development is illustrated in the single-line diagrams (SLDs) in [Appendix A](#).

The estimated cost for the proposed development is \$16,103,584 CAD. The SP cost estimate is provided in [Appendix B](#). Costs are attributable to the customer.

The cash flow is shown in the attached cash flow estimate in [Appendix B](#).

The original requested In-Service-Date (ISD) were January 2, 2021 for phase 1 and January 2, 2022 for phase 2. The scheduled ISD is March 25, 2022 for both phases. The project schedule is shown in [Appendix C](#).

This SP meets the requirements outlined in the AESO’s direction letter, dated September 9, 2019 as well as the P2032 Functional Specification Version V2, dated November 27, 2019. This Service Proposal takes into account all applicable AESO Authoritative Documents and technical standards in effect as of November 8, 2019.

2.0 SCOPE OF WORK

AML is accountable for all project management, land or land-use acquisition, siting, and applicable regulatory approvals and permits, material procurement, construction, commissioning, acceptance, energization, and closeout documentation requirements for its facilities to interconnect to the Alberta Interconnected Electrical System (AIES).

2.1 Transmission Lines

2.1.1 Transmission Line Scope

Relocate the existing 240-kV transmission lines 973L and 974L to the south side of Bickerdike 39S. Install three (3) new 240-kV transmission lines (1084L, 1168L and 1135L), each approximately 1-km in length, between 39S Bickerdike and the Customer Substation Whisky Jack 1047S. Relocate a portion of two 138kV lines (740L and 847L) south of 39S Bickerdike to accommodate the new 1168L transmission line, and the relocated 973L and 974L transmission lines coming in to the south of Bickerdike 39S.

2.1.2 Re-Termination of 973L and 974L

The existing 973L and 974L shall be re-terminated to the south side of 39S. To accomplish this 973L/974L shall be cut mid-span of structure 974L2 and 974L3. The double circuit line 973L/974L will be changed into two single circuits. The conductor type will also transition from 2 x 477 Hawk conductor to 1 X 1590 conductor at the cut in point.

2.1.3 New Build of Line 240kV 1084L, 1135L and 1168L

AltaLink is to build three new transmission lines connecting 1047S Whisky Jack and 39S Bickerdike. 1084L and 1135L will be single circuit for the new portion of the line until the 973L/974L line re-termination cut-in point. At this point structures 973L1 and 973L2 shall be used to connect the lines 1084L and 1135L to 39S Bickerdike. Existing conductors and one of the shield wires will be reused. One of the OHSW will have to be replaced with OPGW. The line conductor will transition from 1 X 1590 Falcon to 2 X 477 Hawk (existing) at the 973L/974L re-termination cut in point. 1168L will be single circuit for the entire line length.

OPGW for 1084L and 1168L shall be terminated in the last dead end structure outside 39S Bickerdike and 1047S Whisky Jack.

2.1.4 Relocation of Line 740L and 847L

In order to accommodate space for the three 240kV transmission lines that will be connecting to the south of 39S Bickerdike, sections of 740L and 847L are required to be relocated. The current structures will be replaced.

2.1.5 740L Temporary By-Pass

Outage availability on 740L is limited. In order to complete the relocation of 740L, a temporary reconnection of 740L is required. The temporary connection to either a by-pass line or an adjacent transmission line will be performed with live-line techniques.

2.3 Substations

2.2.1 Bickerdike 39S

Various studies shall be completed for the Bickerdike 39S substation: Grounding Study, Station Services Studies, Drainage Study, and Insulation coordination.

The substation fence shall be expanded by 110m X 12m with the following new equipment to install: seven (7) new 240-kV manual disconnect switches, four (4) 240-kV live-tank circuit breakers, nine (9) 240kV Surge Arresters, three (3) 240-kV motor-operated disconnect switches, seven (7) 240kV Capacitive voltage Transformers, twelve (12) 240kV Currents Transformers.

Three new A-frames will be installed to accommodate the three new 240kV lines into the substation.

Major new equipment is shown in the table below:

Quantity	Equipment	Comments
7	240 kV Disconnect Switch – Manual – Centre side break- gang operated 2000A 900kV BIL	6 for three new breakers 1 for existing diameter
4	240kV Live-tank breakers	1 for existing diameter 3 for new diameter
9	240kV Surge Arresters	3 for 974L 3 for 973L 3 for 1168L
3	240kV Vertical Break Motor Operated Disconnect switch 2000A 900kV BIL	2 for relocated 973L/974L 1 for 1168L
7	240 kV Capacitive Voltage Transformers	3 for 974L 3 for 973L 1 for 1168L
12	240kV Current Transformers	For 4 new breaker

2.3.3 Edson 58S

A Grounding Study update is required.

2.3.4 Dalehurst 975S

A Grounding Study update is required.

2.3.5 Whisky Jack 1047S

Whisky Jack substation 1047S is not an AltaLink owned substation. However, AltaLink will own protection, SCADA and telecommunication equipment at this location.

2.3.5.1 Control Building

All AltaLink-owned protection, SCADA and telecommunication equipment at this location:

- All AltaLink owned equipment shall be installed in lockable enclosed cabinets. The cabinets are to be lockable with a padlock with a 5/16" shackle (MIC# 5191102). AltaLink will provide the padlock(s) to install on the cabinets.
- AltaLink will be provided with space for five (5) cabinets in the customer inside the control building of 1047S Whisky Jack substation. AltaLink is to install the protection relays racks inside four (4) of the cabinets and install the fiber and telecom equipment in the fifth cabinet.
- The customer will provide HVAC for the building.
- The customer will provide 130V DC for powering AltaLink devices and control circuits from separately fused circuits.
- Access to the line entrance disconnect switches for lock and tag by AltaLink will be provided by the customer.

2.4 Telecommunication Facilities

This project will require fiber-optic connections between Bickerdike 39S and Whisky Jack 1047S. The communication media will use new OPGW cable installed on 1084L and 1168L transmission line.

2.4.1 Bickerdike 39S

The communication infrastructure for a substation shall be installed at 39S Bickerdike. The telecommunication system at 39S Bickerdike shall consist of the following:

- Two fiber-optic links to Substation 1047S Whisky Jack via OPGW on lines 1084L and 1168L. Because 1135L becomes double circuit ~300m outside 1047S Whisky Jack, 1135L will not have an OPGW.
- New Telecom equipment to install as per the project requirement.

2.4.2 Whisky Jack 1047S

Customer will provide conduits between the 1047S Whisky Jack substation fence and the AltaLink equipment cabinets for AltaLink's fiber optic cable. AltaLink will own all of the fiber optic cable installed and the installed MPLS equipment. Customer will own all of the conduits from the fence to the control building of 1047S Whisky Jack.

2.4.3 Edson 58S

New Telecom equipment to install and wiring modifications as per the project requirement.

2.5 Protection and Control

2.5.1 Bickerdike 39S

AltaLink to design and install the following equipment at Bickerdike 39S:

- Install 1084L Line Protections A&B using SEL 411L and GE L90 relays.
- Install 1135L Line Protections A&B using SEL 411L and GE L90 relays.
- Install 1168L Line Protections A&B using SEL 411L and GE L90 relays.
- Modify 973L Line Protections A&B relays.
- Modify 974L Line Protections A&B relays.
- Modify 740L Line Protections A&B relays.
- Modify 847L Line Protections A&B relays.
- Modify 240kV B1 and B2 Bus Protection A&B relays.
- Modify 138kV B1 and B2 Bus Protection A&B relays.
- Modify T1 B1 and B2 Transformer Protection A&B relays.
- Modify T2 B1 and B2 Transformer Protection A&B relays.
- Modify existing wirings and settings as required for the project.

2.5.2 Whisky Jack 1047S

AltaLink to design and install the following equipment at Whisky Jack 1047S:

- Install 1084L Line Protections A&B using SEL 411L and GE L90 relays.
- Install 1135L Line Protections A&B using SEL 411L and GE L90 relays.
- Install 1168L Line Protections A&B using SEL 411L and GE L90 relays.

2.5.3 Edson 58S

AltaLink to design and install the following equipment at Edson 58S:

- Install 890L RAS Monitoring equipment.

2.5.4 Remedial Action Scheme

There are three (3) new Remedial Action Schemes required for this project as per the AESO's Functional Specification.

- 890L (from 58S to 207S) Overload Mitigation Scheme
- 39S T1 & T2 Overload Mitigation Scheme
- 1084L, 1135L and 1168L Last Terminal Open (LTO) Contingency Mitigation

2.5.5 Customer Interface 1047S Whisky Jack

It is assumed that the customer will send the required data to the AESO without the use of AltaLink's communication network. AltaLink relay modules will be installed on racks inside cabinets in Whisky Jack

1047S substation. Line relays shall have three phase voltage and current from two independent voltage transformer windings and current transformer cores (provided by Cascade Power) wired to them. The P&C circuits shall transition from AltaLink to Cascade Power ownership at the marshalling point in the AltaLink cabinets.

The relay's power supply shall be from independently protected direct current power supply. The 'A' line protection shall trip breaker trip coil one and the 'B' line protection shall trip breaker trip coil two.

The breaker status and line airbreak status shall be wired as inputs to their respective line relays.

'A' and 'B' line protection relays are to send trip, single-pole reclose and breaker failure initiation signals to the Cascade Power breaker failure protection and breaker control relays.

Breaker fail protection operation for the 240kV breakers shall send direct trips to 39S via the line protection relays.

RAS interface to the customer P&C will be hardwired.

2.6 SCADA

2.6.1 Bickerdike 39S

The following equipment will installed:

- Two (2) substation Ethernet switches
- Four (4) SEL-2440 for alarms
- Two (2) SEL-2440 for indication and control

2.6.2 Whisky Jack 1047S

The following equipment will installed:

- One (1) AltaLink standard Local/Remote switch module per AL-SCA-05450.
- One (1) Ethernet switch as required.
- One (1) AltaLink standard SEL-2523 annunciator.
- One (1) AltaLink standard SCADA terminal server.
- One (1) SMP4/DP as the RTU.
- One (1) SEL 2440 for Alarms
- One (1) SEL 2440 for controls.
- Install an IRIG-B clock for time synchronization of all new relays and IEDs

2.6.3 Edson 58S

- Modify existing wirings and settings as required for the project.

2.7 Salvaged Equipment

- There is no major equipment to be salvaged in the project scope of work.

2.8 Spatial and Technical Diagrams

The following spatial and technical diagrams are provided in [Appendix A](#):

- **Project Area/Transmission Line Route Map**
- **Single Line Diagram**

3.0 COST ESTIMATES

3.1 AESO Cost Template

The estimated cost for the proposed development is \$16,103,584 CAD, and it has an accuracy of +20%/-10% and a base year of 2022. The cost estimate is valid for 90 days.

The Service Proposal spreadsheets are in [Appendix B](#), and the cash flow is shown in [Appendix B](#). The entire cost is customer cost.

AML requests involvement in any third-party discussions regarding the project estimate or schedule. As agreed, the price estimates are only for informational and tracking purposes, pursuant to Section 9 of the ISO Rules, approved by the Alberta Utilities Commission (AUC). The cost estimate is not binding; however, if the Project proceeds, AML will capitalize the actual costs of the final project as part of the AESO's Direct Assignment letter.

3.2 Additional Work

There is no additional work required to support the maintenance and the operations work for the project scope of work.

4.0 PROJECT SCHEDULE

The original requested In-Service-Date (ISD) are January 2, 2021 for phase 1 and January 2, 2022 for phase. The scheduled ISD is March 25, 2022. The schedule is attached in [Appendix C](#); the schedule shows the project milestones for the major components of the Project. Meeting the schedule is contingent upon, but not limited to, receiving timely AESO direction to file, obtaining regulatory approval, construction conditions, environmental restrictions, and other factors that are outside AML's control.

4.1 Transmission Lines

	Start date	Finish Date
Construction: Tree Clearing	2020-11-30	2020-12-18
Field Geotechnical Studies	2021-01-04	2021-01-29
Engineering	2021-03-01	2021-08-30
Procurement	2021-01-11	2021-12-06

Construction	2022-01-03	2022-03-25
Commissioning	2022-03-01	2022-03-25

4.2 Substations

	Start date	Finish Date
Engineering	2021-03-01	2021-08-30
Procurement	2021-01-11	2021-12-06
Construction	2021-10-04	2022-03-25
Commissioning	2022-02-07	2022-03-25

4.3 Telecommunication Facilities

	Start date	Finish Date
Engineering	2021-03-01	2021-08-30
Procurement	2021-01-11	2021-12-06
Construction	2021-10-04	2022-03-25
Commissioning	2022-02-07	2022-03-25

4.4 Scheduled ISD

The scheduled ISD for the Project is March 25, 2022.

4.5 Construction Limitations and Constraints

- There are environmental constraints known at the time of Service Proposal submission such as Soft ground conditions may be encountered during construction which may require additional mitigation. Frozen ground conditions is required for Transmission Lines field work activities.
- There are no construction limitations known at the time of the Service Proposal submission.

5.0 ASSUMPTIONS

5.1 Scope

- One round of consultation is required;
- No AUC hearing;
- Outages are available and do not delay the project schedule;
- All approvals, access, permits, funding and P&L are available when required;
- No funding delays;
- Project construction proceeds in an uninterrupted fashion;
- Assume Winter 2021 and 2022 construction;
- Assume construction matting is included;
- Assume no mobile substation is required;
- Storage costs for material not included (material is delivered directly to site);
- No unusual considerations for substation access (normal setback for roads);
- Assume construction survey is required;
- Roads accessible during construction (especially for moving heavy equipment);
- Change in the scope of work, foundations or substation locations may affect the cost of the work;
- Geotechnical Studies results might change the structure and foundation types;
- Disposal and removal of containment soil or other materials is not included in the cost estimate;
- Traffic accommodation costs not included;
- Detailed design has not been completed for specific foundation types based on existing ground conditions;
- Light reclamation work has been included;
- Cash flow is based on milestone schedule, AML functional group estimates, and EPC milestone payments;
- It is assumed that AltaLink's facility drawings accurately represent the current state of the system and AltaLink facilities;
- It is assumed that the entire design and construction of this project is to occur in one phase except for Tree Clearing mitigation and Geotechnical Studies;
- It is assumed that the relocation of 740L can be completed using live line techniques;
- It is assumed that the second battery bank at Bickerdale 39S installed by a capital maintenance project will be in service prior to the construction of this project;
- It is assumed that the customer will send the required data to the AESO without the use of AltaLink's communication network;
- It is assumed that the existing A-frame on the south side of 39S will be able to take the load of new disconnect arrangement and line termination;
- It is assumed that the customer will install maintenance switches the breakers at 1047S Whisky Jack for the purposes of Last Terminal Open (LTO) RAS implementation. Weather and Environmental
- Normal weather assumed for the time of year in which construction is scheduled (no unusual factors such as periods of severe heat or cold, heavy rain, etc.);
- No mitigation costs for any extraordinary environmental considerations;
- No Water Act Approval;
- No construction schedule delays or interruptions due to environmental restrictions or wildlife setbacks.

5.2 Operational Outages

240kV Line Outages are not restricted if the lines are taking one out at a time

If 847L and 740L are connected through the bypass there will be 13 substations on the radial feed which could add some system constraints.

5.3 Allowances

There is no AFUDC included in the SP Estimate.

5.4 Escalation

Includes current standard estimating Escalation rate of 2.4% per annum; based on a projected cash flow (36) month project duration from initiation to In Service Date). Applied to AML supplied equipment and EPC cost only.

6.0 DEVIATIONS FROM THE FUNCTIONAL SPECIFICATION

There is one deviations from the AESO P2032 Functional Specification V2 dated November 27, 2019: the Project Change Proposal (PCP) number 3 to amend the ISD to March 25, 2022.

7.0 RISK MANAGEMENT

AML will work with the AESO, as well as internal departments and vendors, to mitigate generic risks through continual communication and observance of timelines.

CONTINGENCY / RISK REGISTER

RISK	DESCRIPTION	IMPACT	PROB	COST IMPACT	CONTINGENCY	ACTION	RESPONSE
KNOWN	Safety incident	High	10%	\$ 100,000	\$ 10,000	Accept	AML will work with the EPC and subcontractor on the safety plan to avoid incidents
	Outage	High	30%	\$ 300,000	\$ 90,000	Mitigate	Early coordination with the outage planner. 45 day notice will be required for outages on this project.
	Outage	Medium	40%	\$ 180,000	\$ 72,000	Mitigate	Outage Plan to address the Settings issues. Complete Coordination studies when Engineering has started.
	Construction	Low	30%	\$ 130,000	\$ 39,000	Mitigate	Early coordination with EPC and Costumer
	Construction	Low	20%	\$ 150,000	\$ 30,000	Accept	Construction to occur during the winter with frozen ground conditions.
	Construction	Medium	30%	\$ 80,000	\$ 24,000	Accept	Drawing and engineering field check.
	Environment	Medium	30%	\$ 200,000	\$ 60,000	Accept	Rig mats may be required for activities planned to be executed without rig mats
	Construction	Medium	20%	\$ 200,000	\$ 40,000	Accept	Cost impact has been added to contingency.
	Design	High	50%	\$ 350,000	\$ 175,000	Accept	Adjust the Design to comply to the Studies results
	Construction	Medium	30%	\$ 78,000	\$ 23,400	Accept	200 mats for 30 days \$3 per day and \$300 install/removal
	Construction	Low	20%	\$ 117,000	\$ 23,400	Mitigate	100 mats for 90 days \$3 per day and \$300 install/removal
	Construction	Medium	20%	\$ 180,000	\$ 36,000	Mitigate	Engage early discussion to reduce construction cost and timeline
	Hotline work	Low	50%	\$ 120,000	\$ 60,000	Mitigate	Early coordination with the outage planner and EPC
	Construction	Low	25%	\$ 200,000	\$ 50,000	Accept	Contractor may require a different mix of equipment or for longer duration than estimated
	Engineering	Low	20%	\$ 30,000	\$ 6,000	Accept	Will be determined through detailed design
	Construction	Low	20%	\$ 60,000	\$ 12,000	Accept	Actual amount of topsoil and fill may differ from estimate. Geotech to confirm
	Construction	Medium	20%	\$ 50,000	\$ 10,000	Mitigate	Early discussion with Pipeline owner to discuss placement and structure type.
	Construction	Low	25%	\$ 150,000	\$ 37,500	Accept	Market Price variations between SP estimate and time of procurement
	Construction	Low	25%	\$ 40,000	\$ 10,000	Accept	Market Price variations between SP estimate and time of procurement
	Construction	High	25%	\$ 250,000	\$ 62,500	Mitigate	Proposed plan would put 13 substations on a radial feed. Study will be required to confirm acceptability of proposed solution.
	Construction	Low	20%	\$ 20,000	\$ 4,000	Mitigate	Project assumes crews are mobilized and work without interruption to ISD.
	Construction	Low	30%	\$ 60,000	\$ 18,000	Accept	Final Reclamation Scope will be determined after construction is complete
	Construction	Low	30%	\$ 50,000	\$ 15,000	Accept	Brown field site may require additional hydrovac to work around existing cables than estimated.
	Construction	Low	25%	\$ 10,000	\$ 2,500	Mitigate	Work planned for January (frozen conditions)
	Construction	Low	20%	\$ 50,000	\$ 10,000	Mitigate	Studies to be completed early in Engineering
	Construction	Low	10%	\$ 60,000	\$ 6,000	Mitigate	Studies to be completed early in Engineering
	Construction	Low	20%	\$ 80,000	\$ 16,000	Mitigate	Studies to be completed early in Engineering
	Construction	Low	25%	\$ 30,000	\$ 7,500	Accept	6 additional at \$5000 per pile
	Construction	Low	40%	\$ 25,000	\$ 10,000	Accept	
	Construction	Medium	20%	\$ 40,000	\$ 8,000	Mitigate	Analysis to be completed early in Engineering
	E&S rate higher than estimated	Low	10%	\$ 150,000	\$ 15,000	Accept	1% higher on \$15M
	CONTINGENCY						<i>Total used in Summary-Tab 1</i>
Risk Simulation Use Only (below)							
				CONTINGENCY P50	\$ 950,000.00		<i>Total used in Summary-Tab 1</i>
				CONTINGENCY P70	\$ 1,135,000.00		<i>Total used in Summary-Tab 1</i>

Table 7-1 refers to the project-specific risks associated with the Project.

8.0 OPERATION AND OUTAGES

Outages will be required at various locations for 240kV and 138kV Lines. This preliminary high-level construction and outage plan is provided in Table 8-1 for reference purposes. A detailed outage plan will be developed well in advance with proper coordination with all the stakeholders.

Table 8-1 – Preliminary Outage Plan

Outage Element	Approximate Duration	Work to be Performed
973L/974L at the same time	Not to be greater than 5 days. Further mitigation (e.g. temporary UVLS Settings) may be required as determined during outage coordination studies.	Cut into line to re-terminate on south of 39S. Complete work on 240kV bus during this outage to accommodate new diameter additions
740L to 426S Coalspur	Temporary line bi-pass is required – Live line work	Relocation of 740L
740L to 58S Edson	5 days	973L, 974L and 1168L Line crossing into 39S
847L	Outage shall be limited in time as much as possible. Assume live line work is required to sectionalize the line at 406S Fickle Lake.	Relocation of 847L and 740L By-Pass

9.0 APPROVAL

The signature on the title page of this Service Proposal represents the Approval.

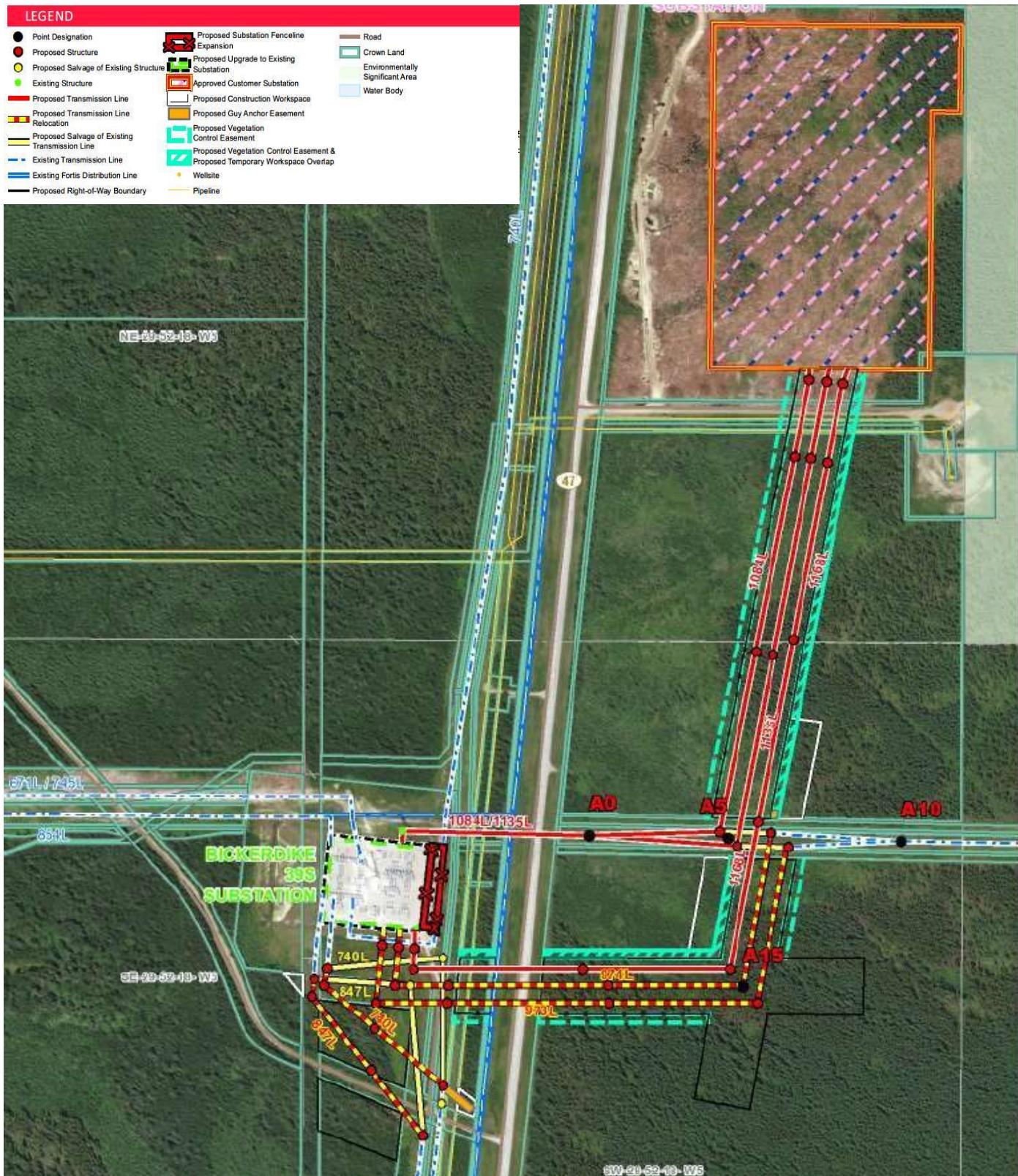


Figure A-1 – Project Area Map / Proposed Transmission Line Route

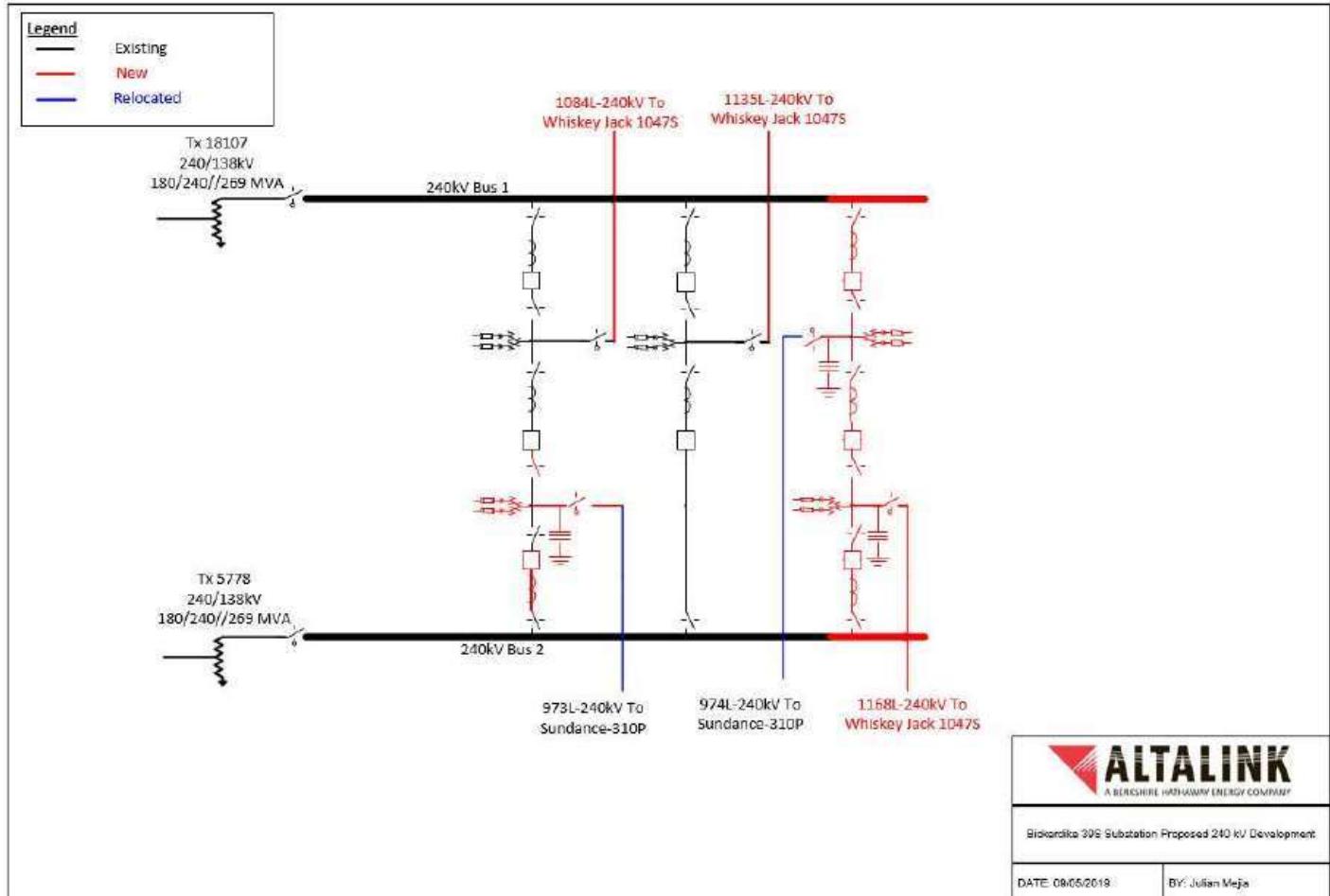


Figure A-2 – Single Line Diagram

APPENDIX B:
COST ESTIMATE

AESO Project Name & No.	Cascade Combined Cycle			P2032 / D0740	
Prepared by:	Altalink Management Ltd.				
AACE Class:	3	Estimate Basis		Service Proposal	
High Range	20%	Low Range		-10%	
Date of Estimate:	March 5, 2020	Base Year		2022	
In Service Date	25-Mar-22	In Service Year		2022	
	SYSTEM	PARTICIPANT	TOTAL	ASSUMPTIONS	
TRANSMISSION LINE					
Material	\$ -	\$ 2,293,323	\$ 2,293,323		
Labour	\$ -	\$ 2,068,507	\$ 2,068,507		
Supply & Install	\$ -	\$ -	\$ -		
TOTAL TRANSMISSION LINE	\$ -	\$ 4,361,830	\$ 4,361,830		
SUBSTATION					
Material	\$ -	\$ 3,653,569	\$ 3,653,569		
Labour	\$ -	\$ 2,781,091	\$ 2,781,091		
Supply & Install	\$ -	\$ -	\$ -		
TOTAL SUBSTATION	\$ -	\$ 6,434,660	\$ 6,434,660		
TELECOMMUNICATION					
Material	\$ -	\$ 106,974	\$ 106,974		
Labour	\$ -	\$ 167,540	\$ 167,540		
Supply & Install	\$ -	\$ -	\$ -		
TOTAL TELECOMMUNICATIONS	\$ -	\$ 274,514	\$ 274,514		
OWNERS					
Pre-SP Cost	\$ -	\$ 71,376	\$ 71,376		
Service Proposal	\$ -	\$ 54,881	\$ 54,881		
Facility Applications	\$ -	\$ 221,048	\$ 221,048		
Regulatory & Compliance	\$ -	\$ -	\$ -		
Land Rights - Easements	\$ -	\$ 129,389	\$ 129,389		
Land - Damage Claims	\$ -	\$ -	\$ -		
Land - Acquisitions	\$ -	\$ -	\$ -		
Land - Other	\$ -	\$ -	\$ -		
TOTAL OWNERS COST	\$ -	\$ 476,694	\$ 476,694		
DISTRIBUTED					
Procurement Management	\$ -	\$ 50,497	\$ 50,497		
Project Management	\$ -	\$ 1,019,727	\$ 1,019,727		
Construction Management	\$ -	\$ 481,596	\$ 481,596		
Contingency	\$ -	\$ 950,000	\$ 950,000		
Escalation	\$ -	\$ 527,451	\$ 527,451		
TOTAL DISTRIBUTED	\$ -	\$ 3,029,271	\$ 3,029,271		
SALVAGE					
Transmission Line Labour	\$ -	\$ 11,208	\$ 11,208		
Substation Labour	\$ -	\$ -	\$ -		
Telecom Labour	\$ -	\$ -	\$ -		
Land Remediation and Reclamation		\$ -	\$ -		
TOTAL SALVAGE	\$ -	\$ 11,208	\$ 11,208		
OTHER COSTS					
AFUDC			\$ -		
E&S		\$ 1,515,406	\$ 1,515,406		
TOTAL OTHER	\$ -	\$ 1,515,406	\$ 1,515,406		
TOTAL PROJECT	\$ -	\$ 16,103,584	\$ 16,103,584		

Figure B-1 Estimate Summary

RISK	DESCRIPTION	IMPACT	PROB	COST IMPACT	CONTINGENCY	ACTION	RESPONSE					
KNOWN	Safety incident: Safety incident that result of delay and more project constraints.	High	10%	\$ 100,000	\$ 10,000	Accept	AML will work with the EPC and subcontractor on the safety plan to avoid incidents					
	Outage There is a risk of outages not being available as required, temporary adjustment to accommodate the outages.	High	30%	\$ 300,000	\$ 90,000	Mitigate	Early coordination with the outage planner. 45 day notice will be required for outages on this project.					
	Outage Extent of the P&C Settings changes when coordination study is completed due to the numerous substation involved.	Medium	40%	\$ 180,000	\$ 72,000	Mitigate	Outage Plan to address the Settings issues. Complete Coordination studies when Engineering has started.					
	Construction Interface management among AML and the Customer project portion that create delays and increase budget.	Low	30%	\$ 130,000	\$ 39,000	Mitigate	Early coordination with EPC and Costumer					
	Construction Heavy equipment running on roads to create damage.	Low	20%	\$ 150,000	\$ 30,000	Accept	Construction to occur during the winter with frozen ground conditions.					
	Construction Engineering field changes due to existing brownfield site where telecom or P&C work is needed.	Medium	30%	\$ 80,000	\$ 24,000	Accept	Drawing and engineering field check.					
	Environment Unfrozen ground condition which impose work constraint.	Medium	30%	\$ 200,000	\$ 60,000	Accept	Rig mats may be required for activities planned to be executed without rig mats					
	Construction Delay due to weather reducing productivity of construction crew.	Medium	20%	\$ 200,000	\$ 40,000	Accept	Cost impact has been added to contingency.					
	Design Transmission Line Geotech Report Studies result to impose construction constraints or changes to foundations	High	50%	\$ 350,000	\$ 175,000	Accept	Adjust the Design to comply to the Studies results					
	Construction Additional Rig mats required for Transmission Line Construction	Medium	30%	\$ 78,000	\$ 23,400	Accept	200 mats for 30 days \$3 per day and \$300 install/removal					
	Construction Rig Mats are required for laydown areas for substation work related	Low	20%	\$ 117,000	\$ 23,400	Mitigate	100 mats for 90 days \$3 per day and \$300 install/removal					
	Construction Highway crossing: Regulator to impose construction restriction	Medium	20%	\$ 180,000	\$ 36,000	Mitigate	Engage early discussion to reduce construction cost and timeline					
	Hotline work Hotline work required for connecting by-pass or new lines	Low	50%	\$ 120,000	\$ 60,000	Mitigate	Early coordination with the outage planner and EPC					
	Construction Right of Way (ROW) Clearing: Tree clearing contractor needs more equipment on site	Low	25%	\$ 200,000	\$ 50,000	Accept	Contractor may require a different mix of equipment or for longer duration than estimated					
	Engineering Setting Changes required at 310P	Low	20%	\$ 30,000	\$ 6,000	Accept	Will be determined through detailed design					
	Construction site survey/Geotech determines additional cut/fill required for rough grading of substation expansion	Low	20%	\$ 60,000	\$ 12,000	Accept	Actual amount of topsoil and fill may differ from estimate. Geotech to confirm					
	Construction Proximity to existing pipelines required changes to structure type, size or locations	Medium	20%	\$ 50,000	\$ 10,000	Mitigate	Early discussion with Pipeline owner to discuss placement and structure type.					
	Construction Price of steel increases/quantity of steel increases for transmission line structures	Low	25%	\$ 150,000	\$ 37,500	Accept	Market Price variations between SP estimate and time of procurement					
	Construction Price of steel increases/quantity of steel increases for Substation	Low	25%	\$ 40,000	\$ 10,000	Accept	Market Price variations between SP estimate and time of procurement					
	Construction Proposed by pass requires an alternate solution due to the number of substations that would be on a radial feed.	High	25%	\$ 250,000	\$ 62,500	Mitigate	Proposed plan would put 13 substations on a radial feed. Study will be required to confirm acceptability of proposed solution.					
	Construction Customer A-Frames or construction delays require crews to demo and remob	Low	20%	\$ 20,000	\$ 4,000	Mitigate	Project assumes crews are mobilized and work without interruption to ISD.					
	Construction Additional seeding and reclamation required	Low	30%	\$ 60,000	\$ 18,000	Accept	Final Reclamation Scope will be determined after construction is complete					
	Construction Additional Hydrovac required within substation for trenching around existing cables.	Low	30%	\$ 50,000	\$ 15,000	Accept	Brown field site may require additional hydrovac to work around existing cables than estimated.					
	Construction Rig mats required during Geotech	Low	25%	\$ 10,000	\$ 2,500	Mitigate	Work planned for January (frozen conditions)					
	Construction DC study determines that the existing battery bank requires upgrades	Low	20%	\$ 50,000	\$ 10,000	Mitigate	Studies to be completed early in Engineering					
	Construction AC study determines that Station service requires upgrades	Low	10%	\$ 60,000	\$ 6,000	Mitigate	Studies to be completed early in Engineering					
	Construction Grounding study determines that additional grounding is required	Low	20%	\$ 80,000	\$ 16,000	Mitigate	Studies to be completed early in Engineering					
	Construction Additional screw piles are required in substation	Low	25%	\$ 30,000	\$ 7,500	Accept	6 additional at \$5000 per pile					
	Construction Hydrovac required for placement of structures near existing pipelines	Low	40%	\$ 25,000	\$ 10,000	Accept						
	Construction South A-frame in 39S requires upgrades for new line termination	Medium	20%	\$ 40,000	\$ 8,000	Mitigate	Analysis to be completed early in Engineering					
	E&S rate higher than estimated	Low	10%	\$ 150,000	\$ 15,000	Accept	1% higher on \$15M					
UNKNOWN					CONTINGENCY	\$ 982,800	Total used in Summary-Tab 1					
	Risk Simulation Use Only (below)											
	<table border="1"> <tr> <td>CONTINGENCY P50</td> <td>\$ 950,000.00</td> <td>Total used in Summary-Tab 1</td> </tr> <tr> <td>CONTINGENCY P70</td> <td>\$ 1,135,000.00</td> <td>Total used in Summary-Tab 1</td> </tr> </table>							CONTINGENCY P50	\$ 950,000.00	Total used in Summary-Tab 1	CONTINGENCY P70	\$ 1,135,000.00
CONTINGENCY P50	\$ 950,000.00	Total used in Summary-Tab 1										
CONTINGENCY P70	\$ 1,135,000.00	Total used in Summary-Tab 1										

Figure B-2 Contingency Summary

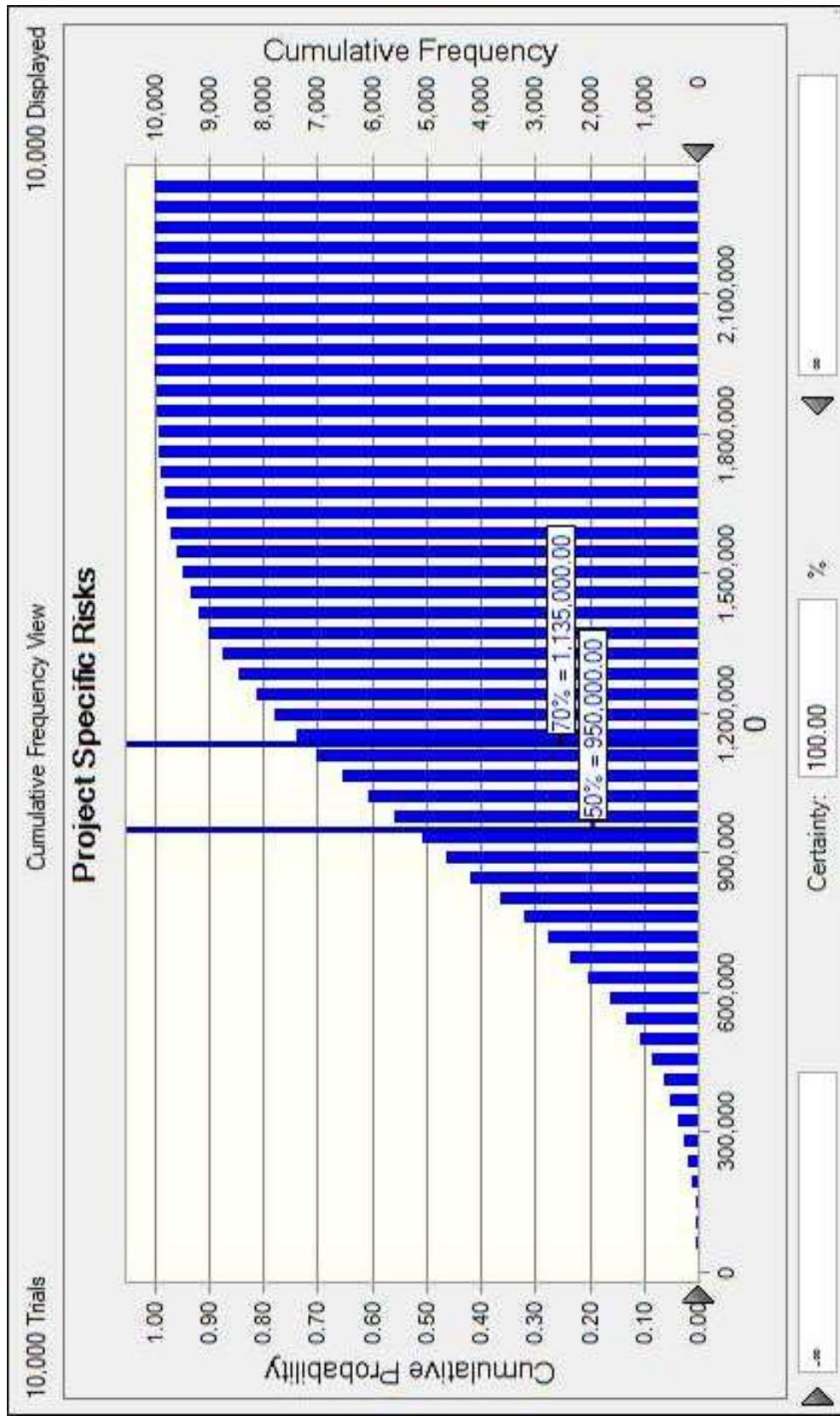


Figure B-2.1 Monte Carlo Contingency Analysis

Cascade Combined Cycle
Cumulative Cost Flow

	2018	ATD	Jan-20 Month 1	Feb-20 Month 2	Mar-20 Month 3	Apr-20 Month 4	May-20 Month 5	Jun-20 Month 6	Jul-20 Month 7	Aug-20 Month 8	Sep-20 Month 9	Oct-20 Month 10	Nov-20 Month 11	Dec-20 Month 12
Cost Flow	155,737	55,936	62,362	91,156	30,994	31,388	46,260	25,949	44,828	20,436	18,346	20,899	215,993	
AFUDC	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cumul. \$Flow	155,737	211,673	274,035	365,190	396,184	427,573	473,833	499,782	544,610	565,046	583,391	604,290	820,283	
	Jan-21	Feb-21	Mar-21 Month 15	Apr-21 Month 16	May-21 Month 17	Jun-21 Month 18	Jul-21 Month 19	Aug-21 Month 20	Sep-21 Month 21	Oct-21 Month 22	Nov-21 Month 23	Dec-21 Month 24		
Cost Flow	217,298	77,782	25,504	217,461	226,699	229,717	212,018	285,839	1,656,043	1,302,367	1,564,488	2,674,785		
AFUDC	0	0	0	0	0	0	0	0	0	0	0	0		
Cumul. \$Flow	1,037,582	1,115,363	1,140,867	1,358,328	1,585,027	1,814,744	2,026,762	2,312,601	3,968,644	5,271,011	6,835,499	9,510,284		
	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22		
Cost Flow	2,153,795	1,872,921	1,432,939	281,129	279,654	284,146	266,927	7,273	9,921	4,595	0	0		
AFUDC	0	0	0	0	0	0	0	0	0	0	0	0		
Cumul. \$Flow	11,664,079	13,537,000	14,969,939	15,251,068	15,530,722	15,814,867	16,081,794	16,089,067	16,098,989	16,103,584	16,103,584	16,103,584		

Figure B-3 Cash Flow Estimate

APPENDIX C:
PROJECT SCHEDULE

Activity/Milestone	Start	Finish
Issue Functional Specification		2019-11-27
AESO PIP Direction to TFO		2019-09-09
AESO S35 FA Direction to TFO		2019-09-09
AESO S39 SP Direction to TFO		2019-09-09
AESO S25 Materials Direction to TFO		NA
Submit SP to AESO		2020-03-06
File NID application		2020-03-27
Facilities Application		2020-03-30
NID Approval		2020-08-01
AUC Facilities Approval (P&L)		2020-08-01
AUC Connection Order		NA
Transmission Lines		
Field Geotechnical Studies	202-01-04	2021-01-29
Engineering	2021-03-01	2021-08-30
Procurement	2021-01-11	2021-12-06
Construction	2022-01-03	2022-03-25
Construction: Tree Clearing	2020-11-30	2020-12-18
Commissioning	2022-03-01	2022-03-25

CONFIDENTIAL

Substation	
Engineering	2021-03-01
Procurement	2021-01-11
Construction	2021-10-04
Commissioning	2022-02-07
Telecommunications	
Engineering	2021-03-01
Procurement	2021-01-11
Construction	2021-10-04
Commissioning	2022-02-07
Energization Checklist	2022-03-07
In-Service Date	2022-03-25
Project Close Out	2022-09-26