ALTALINK
A BERKSHIRE HATHAWAY ENERGY COMPANY

December 16, 2019

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

Dear Mr. Frehlich:

Re: P2122 – Cypress Wind – 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 Cypress Wind 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:

- **~70m of 240 kV line connecting to 983L transmission line via T-tap configuration:**
  - One (1) monopole structure
  - One kilometer of buried fibre to connect to the telecom network

The Service Proposal estimate for the project is $2.08 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.

The targeted in-service date (ISD) for the project is 1st June 2021. Meeting any ISD is contingent upon a number of factors, including, but not limited to, regulatory approvals, material procurement, and construction conditions.

There are no costs included for the impact of a hearing related to the Facility Applications for the EDF Renewables Development Inc. Facilities that may impact AltaLink's portion of the wind farm development. If a hearing does occur, there will be significant additional costs associated (regulatory costs, project delay costs, equipment storage and other cost related to the project), which are not included in the Service Proposal. AltaLink would require a Project Change Proposal for these additional costs.

If you have any questions or if you require further information, please contact Andrew Smith at (403)387-3518. The confirmation of Direct Assignment should be sent to Keith Turriff, Director, Project Development & Siting.

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

Yours truly,

Darcy Fedorchuk, P.Eng,
Vice President, Project Development

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Service Proposal (SP)

Cypress Wind

AML D.0737/AESO P2122

Rev. 2

February 5, 2020

Prepared by:

Andrew Smith, P.Eng, Project Manager

CONFIDENTIAL

REVISIONS HISTORY

Rev.	Date (MM-DD-YYYY)	Sections Changed	Changes
0	12-08-2019	N/A	Initial version.
1	12-17-2019	Several	General Updates throughout the document.
2	02-05-2020	Several	Minor revisions and typos.

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
MPLS	Multiprotocol Layer Switching
MSL	Mining Surface Lease
MVA	Megavolt Ampere
NID	Needs Identification Document
NGR	Neutral Grounding Reactor
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

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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 Cypress Wind 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:

- T-tap and build 70m of 240 kV transmission line from the existing 983L, to connect the customer substation named Woolchester 1019S. The new 240kV transmission line is to be named 983AL.

The project development is illustrated in the single-line diagram(s) (SLDs) in Appendix A.

The estimated cost for the proposed development is $2,084,130 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 In-Service-Date (ISD) is June 1, 2021. The project schedule is shown in Appendix C.

This SP meets the requirements outlined in the AESO's direction letter, dated September 13, 2019 as well as the P2122 Functional Specification Version 1, dated August 12, 2019. This Service Proposal takes into account all applicable AESO Authoritative Documents and technical standards in effect as of August 12, 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 Line 983L

- Build approximately 70m of 240kV S/C, to be designated 983AL, to 1019S Woolchester off of the new dead-end structure. This will include insulators and all necessary hardware up until the customer A-frame. The connection is a T-tap configuration.
- The tap on the existing 983L line is between structure 116 and 117.
- Install one (1) dead-end structures for 983AL T-tap configuration.
- The new structures will be self-supported monopole.
- The conductor proposed for the new structures is 1033 ACSR Curlew with single configuration.
- Overhead shield wire will not be installed.
- The meteorological and mechanical design parameters used for the new 240 kV transmission line structures are the same as for the existing transmission line 983L.
- The rating of the 983L will not change as a result of this project.

- Engineering and design standards utilized in this project are AEUC, CSA, ISO Rules, and AltaLink standards.
- No major crossings (river, highway, or lines) are required.
- No camp requirements.

2.2 Substations

2.2.1 Woolchester 1019S

Woolchester 1019S is not an AltaLink owned substation. However, AltaLink will own protection, SCADA and telecommunication equipment at this location. Substation location is in the vicinity of NW-20-10-4-W4 and approximately 70m near line 983L in-between structures 116 and 117.

2.2.1.1 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 locked with a 5/16" shackle (MIC 5191102). AltaLink will provide the padlocks to be installed on the cabinets. EDF shall provide two independent DC sources. A dedicated mini-marshalling rack for all circuits to and from EDF equipment inside the AltaLink cabinets is required. EDF shall provide air conditioning to the building.

- EDF is to provide AltaLink:

    - Space for three cabinets
    - 120 V AC & 130V DC for powering AltaLink devices and control circuits
    - (2) two independent CT cores, (2) independent VT secondary connections and (2) independent trip circuits
    - IRIG – B timing signal
    - A breaker fail signal from the 240kV breaker
    - Access to high side MOD for lock and tagging by AltaLink

2.2.2 Bowmanton 244S

2.2.2.1 Studies

Voltage unbalance studies on 983L and 983AL are required. If voltage unbalance exceeds 1% under normal operating conditions they shall provide mitigation solutions and their cost estimates.

2.3 Telecommunication Facilities

2.3.1 General Requirements

The following are required for the project:

- An ADUG fibre optic transmission between the splice box installed on structure 983L114 and Woolchester 1019S to provide protection, SCADA, and remote communication.

- (1) One MPLS node and related equipment at 1019S Woolchester.
- Telecommunication modifications to Bowmanton 244S and Whitla 251S.

2.3.2 Woolchester 1019S

The communication infrastructure for a 240 kV substation shall be installed at Woolchester 1019S. It shall consist of:

- A 48 SMF ADUG cable from the splice box at 983L114 to a pull box outside the 1019S substation fence line. EDF will provide an HDPE conduit to transition the ADUG from the pull box into the substation. The details of the intermediate junction points from the AltaLink pull box to the AltaLink patch panel (inside the cabinets) will be determined via discussion with EDF.
    - The buried fibre shall be installed inside an IPEX HDPE SDR11 conduit or equivalent.
- (1) One Nokia 7705 SAR MPLS routers
- (1) Omniswitch 6865-P16XD
- (1) VOIP Phone
- (1) AltaLink approved firewall
- (1) RS232 splitter panel
- (1) 130V/48VDC power converter and distribution breaker panel
- (1) Multitel Fusion RTU
- (1) Fibre patch panel
- (1) 20” NEMA-4 junction box
- A new TPR circuit installed between 1019S and 251S/244S

The 7705 router will connect to the AML MPLS network via the fibre connections to 244S and 251S. The customer telecom switch will also connect to the AltaLink node.

2.3.3 Bowmanton 244S

This project will provide a telecommunication link between 244S and 1019S via the OPGW on 983L.

Both SEL and GE relays will be using direct relay to relay communication via the OPGW. SEL remote access will be via the SDI slot on node ‘A’ and GE remote access via the SDI slot on node ‘B’.

2.3.4 Whitla 251S

This project will provide a telecommunication link between 251S and 1019S via the OPGW on 983L.

Both SEL and GE relays will be using direct relay to relay communication via the OPGW. SEL remote access will be via the SDI slot on node ‘A’ and GE remote access via the SDI slot on node ‘B’.

2.4 Protection and Control

2.4.1 Woolchester 1019S

- 983AL Line Protections A&B using new SEL 411L and GE L90 relays

2.4.2 Bowmanton 244S

- 983L Line Protections A&B using new SEL 411L and GE L90 relays

2.4.3 Whitla 251S

- 983L Line Protections A&B using 411L and GE L90 relays

2.5 Salvaged Equipment

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

2.6 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 $2,084,130 CAD, and it has an accuracy of +20%/−10% and a base year of 2021. The cost estimate is valid for 90 days.

The SP 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 ISD for the project is June 1, 2021. 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: 983L T-tap

	Start date	Finish Date
Engineering	October 2020	January 2021

Procurement	August 2020	March 2021
Construction	February 2021	May 2021
Commissioning	April 2021	May 2021

4.2 Substations

	Start date	Finish Date
Engineering	October 2020	January 2021
Procurement	August 2020	March 2021
Construction	February 2021	May 2021
Commissioning	April 2021	May 2021

4.3 Telecommunication Facilities

	Start date	Finish Date
Engineering	October 2020	January 2021
Procurement	August 2020	March 2021
Construction	February 2021	May 2021
Commissioning	April 2021	May 2021

4.4 Scheduled ISD

The scheduled ISD for the Project is June 1, 2021.

4.5 Construction Limitations and Constraints

- There are no environmental constraints known at the time of Service Proposal submission.
- 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;
- AltaLink will provide all regulatory approvals, licenses, county/municipal approvals, right-of-way agreements, easements and all necessary landowner contacts when/as required. Costs for these activities have been included in the estimate.
- 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 spring/summer construction;
- Construction matting for 50% of the ROW 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);
- 240kV tap point consists of 1 steel dead end, self-supporting;
- Roads accessible during construction (especially for moving heavy equipment);
- 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;
- Helicopter and/or special vehicle delivery costs have not been included;
- Estimate assumes Concurrent Engineering is not required;
- Engineering and procurement will not advance prior to receipt of P&L;
- Light reclamation work has been included;
- Cash flow is based on milestone schedule, AML functional group estimates, and EPC milestone payments.

5.2 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.

5.3 Operational Outages

Outages on the 983L line are available in throughout the year. Simultaneous outages of 983L and 964L are more difficult and would require significant coordination.

5.4 Allowances

There is no AFUDC included in the SP estimate as the In Service Date is planned for within the 2021 calendar year.

5.5 Escalation

Escalation rate for the project is 2.4%.

6.0 Deviations from the Functional Specification

There are no deviations from the AESO P2122 Functional Specification Version 1 dated August 12, 2019.

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.

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

Table 7-1 – Risk Identification and Mitigation Strategy

	Risk	Mitigation
1	**There is a risk** of a design change on the structure configuration.	Engage an engineering services contractor with the structure design.
2	**There is a risk** of insufficient space in the Customer Substation control building for the reqiured TFO telecomm and P&C equipment.	Requirements have been communicated to the Customer to incorporate into their design.
3	**There is a risk** that construction activies encounter non-frozen ground conditions and additional access/rig mats are required to accommodate efficient constuction activities.	Accept, cost impact has been added to contingency.
4	**There is a risk** of poor weather (e.g. cold, snow, etc.) during construction leads to inefficiencies and/or delays.	Accept, cost impact has been added to contingency.
5	**There is a risk** that there is a change to the RAS scheme due to other projects in-flight that impact the protection requirements for this project.	Accept, cost impact has been added to contingency.
6	**There is a risk** that unidentified buried objects are discovered while trenching the buried fibre.	Accept, cost impact has been added to contingency.

8.0 Operation and Outages

Outages will be required on the 240 kV transmission line 983L to T-tap the new 240 kV transmission line 983AL. 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
983L	4-6 days	Erect monopole and install conductors between new 983AL0 and 1019S A-frame

9.0 APPROVAL

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

APPENDIX A:
FIGURES

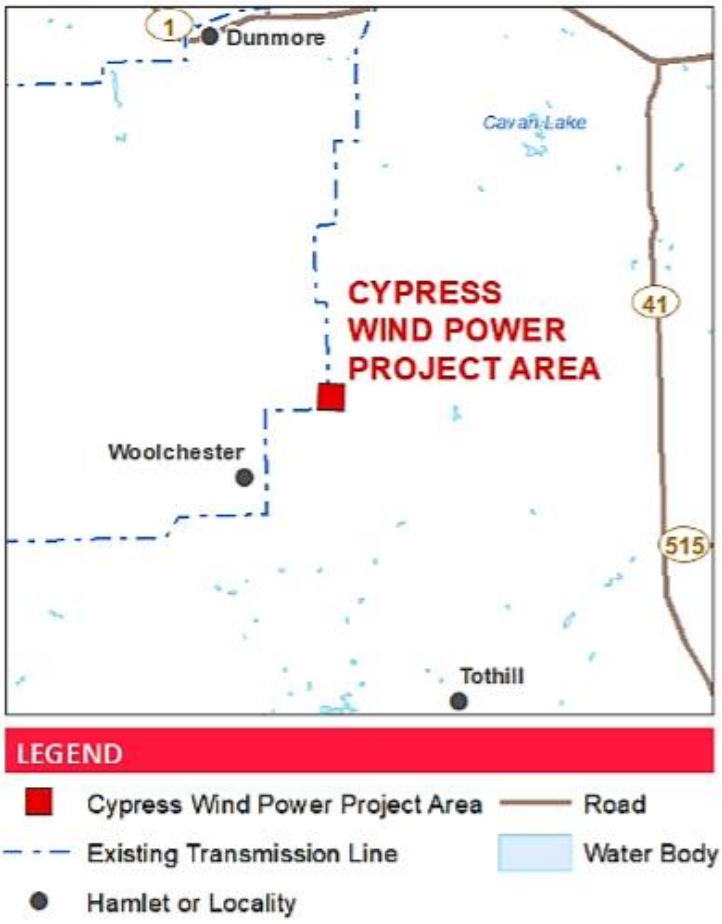
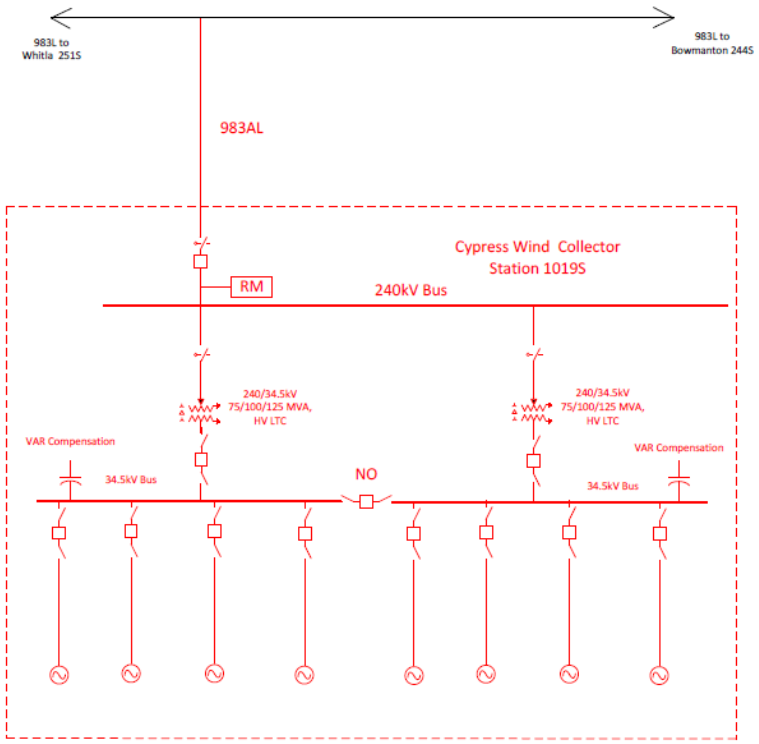
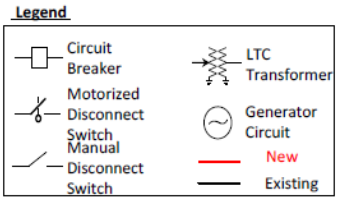


Figure A-1 – Project Area Map





Note

This single line diagram is intended to illustrate the electrical interconnection. It is provided by the **market participant** and is not to scale, nor does it depict the exact line routes or substation locations, and it is subject to change.

Proposed Collector Substation 1019S

P2122-S-SLD-01

Figure A-2 – Single Line Diagram

APPENDIX B:
COST ESTIMATE

AESO Project Name & No.	Cypress Wind Project Connection		P2122 / D.0737	TRANSMISSION PROJECT ESTIMATE SUMMARY
Prepared by:	AltaLink Management Ltd.			
AACE Class:	3	Estimate Basis	SP	
High Range	20%	Low Range	-10%	
Date of Estimate:	06-Dec-19	Base Year Used	2021	
In Service Date:	01-Jun-21			
	SYSTEM	PARTICIPANT	TOTAL	ASSUMPTIONS
TRANSMISION LINE				
Material	$ -	$ 27,231	$ 27,231	
Labour	$ -	$ 171,465	$ 171,465	
Supply & Install	$ -	$ -	$ -	
TOTAL TRANSMISSION LINE	**$ -**	**$ 198,696**	**$ 198,696**	
SUBSTATION				
Material	$ -	$ 91,613	$ 91,613	
Labour	$ -	$ 470,229	$ 470,229	
Supply & Install	$ -	$ -	$ -	
TOTAL SUBSTATION	**$ -**	**$ 561,842**	**$ 561,842**	
TELECOMMUNICATION				
Material	$ -	$ 115,711	$ 115,711	
Labour	$ -	$ 200,448	$ 200,448	
Supply & Install	$ -	$ -	$ -	
TOTAL TELECOMMUNCATIONS	**$ -**	**$ 316,159**	**$ 316,159**	
OWNERS				
Pre-SP cost	$ -	$ 75,721	$ 75,721	
Proposal to Provide Service	$ -	$ 38,136	$ 38,136	
Facility Applications	$ -	$ 86,312	$ 86,312	
Regulatory & Compliance	$ -	$ -	$ -	
Land Rights - Easements	$ -	$ 44,038	$ 44,038	
Land - Damage Claims	$ -	$ 5,415	$ 5,415	
Land - Acquisitions	$ -	$ -	$ -	
Other	$ -	$ -	$ -	
TOTAL OWNERS COST	**$ -**	**$ 249,621**	**$ 249,621**	
DISTRIBUTED				
Procurement Management	$ -	$ 20,606	$ 20,606	
Project Management	$ -	$ 245,928	$ 245,928	
Construction Management	$ -	$ 108,605	$ 108,605	
Contingency	$ -	$ 160,000	$ 160,000	
Escalation	$ -	$ 33,211	$ 33,211	
TOTAL DISTRIBUTED	**$ -**	**$ 568,350**	**$ 568,350**	
SALVAGE				
Transmission Line Labour	$ -	$ -	$ -	
Substation Labour	$ -	$ -	$ -	
Telecom Labour	$ -	$ -	$ -	
Land Remediation and Reclamatio	$ -	$ -	$ -	
TOTAL SALVAGE	**$ -**	**$ -**	**$ -**	
OTHER COSTS				
AFUDC	$ -	$ -	$ -	
E&S/Overhead	$ -	$ 189,462	$ 189,462	
TOTAL OTHER	**$ -**	**$ 189,462**	$ 189,462	
TOTAL PROJECT	$ -	$ 2,084,130	$ 2,084,130	

Figure B-1 – Estimate Summary

Cypress Wind Project Connection
Cumulative Cost Flow

2018	ATD	Dec-19 Month 1	Jan-20 Month 2	Feb-20 Month 3	Mar-20 Month 4	Apr-20 Month 5	May-20 Month 6	Jun-20 Month 7	Jul-20 Month 8	Aug-20 Month 9	Sep-20 Month 10	Oct-20 Month 11	Nov-20 Month 12
Cost Flow	90,266	44,130	42,305	39,801	21,680	28,031	25,525	6,510	5,557	5,831	8,133	112,055	71,622
AFUDC	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumul. $Flow	**90,266**	134,396	176,702	216,503	238,182	266,213	291,738	298,248	303,805	309,636	317,769	429,824	501,446

	Dec-20 Month 13	Jan-21 Month 14	Feb-21 Month 15	Mar-21 Month 16	Apr-21 Month 17	May-21 Month 18	Jun-21 Month 19	Jul-21 Month 20	Aug-21 Month 21	Sep-21 Month 22	Oct-21 Month 23	Nov-21 Month 24
Cost Flow	104,190	292,978	258,716	435,749	249,131	95,657	50,705	39,307	30,878	5,724	5,316	4,042
AFUDC	0	0	0	0	0	0	0	0	0	0	0	0
Cumul. $Flow	605,636	898,613	1,157,330	1,593,078	1,842,209	1,937,866	1,988,571	2,027,877	2,058,756	2,064,480	2,069,796	2,073,838

	Dec-21 Month 25	Jan-22 Month 26	Feb-22 Month 27	Mar-22 Month 28	Apr-22 Month 29	May-22 Month 30	Jun-22 Month 31	Jul-22 Month 32	Aug-22 Month 33	Sep-22 Month 34	Oct-22 Month 35	Nov-22 Month 36
Cost Flow	10,292	0	0	0	0	0	0	0	0	0	0	0
AFUDC	0	0	0	0	0	0	0	0	0	0	0	0
Cumul. $Flow	2,084,130	2,084,130	2,084,130	2,084,130	2,084,130	2,084,130	2,084,130	2,084,130	2,084,130	2,084,130	2,084,130	2,084,130

Figure B-2 – Estimate Cash Flow

APPENDIX C:
PROJECT SCHEDULE

Activity/Milestone	Start	Finish
Issue Functional Specification		2019-09-03
AESO PIP Direction to TFO		2019-09-13
AESO S35 FA Direction to TFO		2019-09-13
AESO S39 SP Direction to TFO		2019-09-13
AESO S25 Materials Direction to TFO		NA
Submit SP to AESO		2019-12-17
File NID application		2020-03-19
Facilities Application		2020-03-26
NID Approval		2020-12-15
AUC Facilities Approval (P&L)		2020-05-29
AUC Connection Order		NA
Transmission Lines		
Engineering	October 2020	January 2021
Procurement	August 2020	March 2021
Construction	February 2021	May 2021
Commissioning	April 2021	May 2021
Substation		
Engineering	October 2020	January 2021
Procurement	August 2020	March 2021
Construction	February 2021	May 2021
Commissioning	April 2021	May 2021
Telecommunications		
Engineering	October 2020	January 2021
Procurement	August 2020	March 2021
Construction	February 2021	May 2021

Commissioning	April 2021	May 2021
Energization Checklist		2021-05-23
In-Service Date		2020-06-01
Project Close Out		2021-12-01