

REVIEW OF THE COST STATUS OF MAJOR TRANSMISSION PROJECTS IN ALBERTA

From The Transmission Facilities
Cost Monitoring Committee

DECEMBER 2016 REPORT



REVIEW OF THE COST STATUS OF MAJOR TRANSMISSION PROJECTS IN ALBERTA - DECEMBER 2016

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Industry Abbreviations Commonly Found In This Report

Alberta Electric System Operator	(AESO)	Facility Application	(FA)
Alberta PowerLine L.P.	(APL)	General Tariff Application	(GTA)
Alberta Utilities Commission	(AUC)	High Voltage Direct Current.	(HVDC)
Allowance for Funds Used During Construction	(AFUDC)	In-Service Date	(ISD)
AltaLink Management Ltd.	(AltaLink)	Long-Term Plan	(LTP)
ATCO Electric Ltd.	(ATCO)	Needs Identification Document.....	(NID)
Critical Transmission Infrastructure.....	(CTI)	Permit and Licence	(P&L)
Direct Assign Capital Deferral Account	(DACDA)	TransAlta Corp.	(TransAlta)
Distribution Facility Owner	(DFO)	TransAlta Utilities.....	(TAU)
ENMAX Power Corp.	(ENMAX)	Transmission Facilities Cost Monitoring Committee	(TFCMC)
EPCOR Distribution and Transmission Inc.	(EDTI)	Transmission Facility Owner	(TFO)
EPCOR Utilities Inc.	(EPCOR)	Transportation Utility Corridor.....	(TUC)

Message From The Chair

This is the twelfth report from the Transmission Facilities Cost Monitoring Committee (referred to in this report as the “TFCMC” or the “Committee”) to its stakeholders. The report provides a detailed and structured summary of the cost, scope and schedule information of the transmission projects monitored by the Committee on a monthly basis for the period of May 1, 2016 to November 30, 2016.

During this period, the Committee examined the progression of nine major transmission projects, with the total cost of these projects estimated at just under \$3.647 billion¹. A listing of these projects can be found in Section 1, while details for these projects are contained in Appendices B and C.

Section 2 of this report contains several key learnings and observations made by the Committee while monitoring the progress of the transmission projects. The Committee appreciates the information provided by AltaLink on their internal value engineering process and the quality issues on spacer dampers.

Through the TFCMC’s work in monitoring transmission project costs, it has and continues to identify opportunities to minimize costs. Since its inception, the Committee has made recommendations to take advantage of these opportunities. No new recommendations are contained in this edition of the TFCMC report.

Section 3 provides an update on the status of all previous recommendations. The Committee received a letter from the Minister of Energy responding to the Committee’s recommendations with respect to the COM Pilot follow-up and the need to maximize the value of the existing transmission grid when implementing the Renewable Electricity Program. The Committee is encouraged by the appreciation expressed in her letter for the work of the Committee and its focus on mitigating transmission project costs.

The Alberta Electric System Operator (AESO) is continuing its work on enhancing and strengthening ISO Rule 9.1 in the areas of cost estimating, cost reporting and procurement.

In addition to issuing a limited quantity of hard copies of this semi-annual report, the report will be posted on the Utilities Consumer Advocate’s website for access by any interested parties.

Thank you for your continuing support. The TFCMC’s next semi-annual report is scheduled for release in the fall of 2017. Your comments to improve the report will be much appreciated. Please email your comments to TFCMC@gov.ab.ca



Henry Yip
Chair, Transmission Facilities Cost Monitoring Committee

¹ This figure does not include costs for Project 1590 – Fort McMurray West Area 500 kV Transmission Bulk System Reinforcement (FMACW) – as this project falls under a competitive procurement process. If the cost of Project 1590 is included, the projects would be valued at just under \$5.08 billion.

1 Transmission Projects Covered Under The TFCMC's Mandate

The TFCMC has the authority to review records relating to the cost, scope and schedule of transmission facility projects expected to cost more than \$100 million. These transmission projects include all lines and substations, which make up the transmission facilities required to transfer power between generators and loads.

Monitored Projects

The TFCMC monitored nine projects during the period covered by this report. The nine projects have a combined Authorized Budget of just under \$3.647 billion² (as detailed in Appendix B).

The monitored projects, in alphabetical order, are:

- **COMPLETED CENTRAL EAST AREA TRANSMISSION DEVELOPMENT (CETD);** PROJECT 811 – Transmission development in Wainwright, Lloydminster, Provost, Vegreville and Cold Lake. | **Current Estimated Cost: \$342.2 million** |
- **NEW DOWNTOWN CALGARY TRANSMISSION REINFORCEMENT PROJECT (DCTRP);** PROJECT 1456 – 138 kV transmission system reinforcement to alleviate identified constraints and to contribute to the long-term reliable operation of the 138 kV transmission system in the downtown Calgary area. | **Current Estimated Cost: \$144.48 million** |
- **COMPLETED EDMONTON REGION 240 KV LINE UPGRADES (ERLU);** PROJECT 786 – Upgrading 240 kV lines in the Edmonton area and adding one 240 kV phase shifter at Livock substation to gain more capacity out of the existing 240 kV network. | **Current Estimated Cost: \$197.3 million** |
- **FORT MCMURRAY WEST AREA 500 KV TRANSMISSION BULK SYSTEM REINFORCEMENT (FMACW);** PROJECT 1590 (formerly Project 838) – Construction of a West 500 kV transmission line from the Edmonton region to the Fort McMurray area. | **Current Estimated Cost: \$1.433 billion** |
- **NORTHWEST (OF) FORT MCMURRAY TRANSMISSION DEVELOPMENT (NW FMM);** PROJECT 1180 – To provide service and connect future industrial customers in areas northwest of Fort McMurray where there are no transmission facilities. | **Current Estimated Cost: \$235.1 million** |
- **RED DEER REGION TRANSMISSION DEVELOPMENT (RDTD);** PROJECT 813 – 240/138 kV transmission system reinforcements in the Red Deer area. | **Current Estimated Cost: \$408.2 million** |
- **SOUTH AND WEST OF EDMONTON TRANSMISSION DEVELOPMENT (SWEATR);** PROJECT 850 – Transmission system reinforcement to the 138 kV systems south and west of the City of Edmonton. | **Current Estimated Cost: \$304.3 million** |
- **SOUTHERN ALBERTA TRANSMISSION REINFORCEMENT (SATR);** PROJECT 787 – To accommodate wind generation in southern Alberta. | **Current Estimated Cost: \$1.866 billion** |
- **THICKWOOD HILLS 240 KV TRANSMISSION DEVELOPMENT AND REACTIVE POWER REINFORCEMENT (THTD);** PROJECT 1186 – To connect the Fort McMurray West 500 kV transmission project to the existing transmission system in the Thickwood Hills area, west of Fort McMurray. | **Current Estimated Cost: \$149.2 million** |

² This figure does not include costs for Project 1590 – Fort McMurray West Area 500 kV Transmission Bulk System Reinforcement (FMACW) – as this project falls under a competitive procurement process. If the cost of Project 1590 is included, the projects would be valued at just under \$5.08 billion.



2. TFCMC Observations To Date

As the Transmission Facilities Cost Monitoring Committee (TFCMC) moves forward with its mandate to review the cost of major transmission projects, it embarks on in-depth assessments of these undertakings (in the case of new projects)³ or focuses on a more detailed analysis of existing ones and relevant issues based on the monthly reports⁴ it receives.

This section describes some of the substantive observations made by the Committee during the period covered by this report.

AESO Update On Transmission Implications Of The Government Of Alberta's Climate Leadership Report

The Renewable Electricity Program, arising out of the Government of Alberta's Climate Leadership Report, targets 30% renewable generation by 2030.

The time frame is to have the first competition for renewable generation open in early 2017 and for contracts to be awarded in the fall of 2017. The first competition will be for up to 400 megawatts that must be online by 2019.

At the time of the briefing, at the November 2016 TFCMC meeting, Greg Retzer of the Alberta Electric System Operator (AESO) advised the Committee that specifics relating to the Renewable Electricity Program are starting to become available although not all the details have been finalized.

Spacer Damper Replacements

AltaLink Management Ltd. (AltaLink) provided a presentation to the TFCMC, at its September 2016 meeting, on the need to replace failed spacer dampers.

A spacer damper connects two or more wires at intervals between transmission towers to reduce movement in adverse weather conditions by preventing the two wires from contacting and damaging each other. Spacer dampers are attached to the wires with clamps and secured by bolts.

AltaLink first discovered failed spacer dampers on 964L/983L (Bowmanton-Whitla Project) in January 2015. After a series of inspections of affected lines across the province, AltaLink concluded that it was not a Bowmanton-Whitla issue but a systemic issue. Inspection activities were still ongoing at the time of the presentation, and AltaLink also initiated an investigation into the root cause of the failures.

An inspection and monitoring plan was put in place by AltaLink, which said that this will continue until the spacer dampers are fully replaced. This included detailed air and ground patrols.

There have been about 100 incidents where equipment has fallen to the ground. Landowners and agencies have been notified of this issue as well as the Alberta Utilities Commission (AUC). Signs have been installed in public areas to raise awareness of the hazard.

AltaLink said it is unusual to experience such failures in the first couple of years of a new transmission line. The spacer damper in question was not used on older lines/projects.

The plan is to replace all twin bundle spacer dampers before June 2017. AltaLink said a replacement is not immediately available for tri-bundle type spacer dampers. It is tightening existing dampers at high risk-locations; a tri-bundle replacement was being assessed at the time of the presentation.

There is no estimate yet of the cost of all this work, and discussions are under way in terms of legal proceedings.

³ New projects added to the TFCMC's purview receive an in-depth review in addition to being inserted into the Committee's month-to-month examination process.

⁴ The TFCMC continues to receive monthly reports from the AESO, which originate from the TFOs, on all projects valued at \$100 million and over.

Value Engineering

Also at the September 2016 TFCMC meeting, AltaLink's Johanne Picard-Thompson, Senior Vice President Projects, and Marie France Samaroden, Director, Engineering at AltaLink, shared with the TFCMC the value engineering process they employ at AltaLink.

Value engineering is a systematic approach to innovation. It is a process to analyze a project or product from a functional perspective in order to identify what functions are required, which functions are providing value to the user, and an assessment of whether different methods can be identified to provide those functions. The process employed by AltaLink is similar to that developed by General Electric during World War II.

AltaLink said it embeds value engineering into the front end of its processes. It also said it sees it as a continuous improvement process and that it challenges them to keep improving their standards going forward. The earlier you employ value engineering in the process, the more influence it has. There is still value in doing it in later project phases but it may not result in as much savings. The process it uses is to:

- Identify Required Functions (Not Solutions)
- Brainstorm Alternatives
- Screen Alternatives Against Requirements
- Estimate Cost & Worth, and
- Select the Highest Value Alternative.

AltaLink provided a number of examples to the TFCMC in the presentation showing cost savings or the avoidance of spending additional dollars on projects.

Rate Treatments To Recover Transmission Related Investments

On August 25, 2016, the AUC issued Bulletin 2016-16 setting out its determinations with respect to Proceeding ID 2421, which the AUC initiated in January 2013 to investigate alternatives to mitigate the impact on consumers of transmission related investments.

The proceeding built on the work of the Transmission Cost Recovery Subcommittee (TCRS), a subcommittee of the TFCMC, and analyzed the impact on consumers of both a rate cap/deferral account approach and a delayed depreciation recovery approach.

The analyses were undertaken using the Transmission Rate Impact Projection (TRIP) model, which was originally developed by the TCRS and subsequently taken over by the AESO.

The AUC concluded that it was not going to adopt, as a policy, either the rate cap/deferral account approach or the delayed depreciation recovery approach. Instead, the AUC will continue to consider the impact on consumers on a case-by-case basis in the context of Transmission Facility Owner (TFO) general rate applications.

Projection Of Average Transmission Costs

The TRIP model, as noted in the previous item, was taken over by the AESO, who at the time, committed to continue to develop and publish the model for use by all stakeholders.

The model provides long-term projections of both transmission rates and the average delivered cost of electricity in Alberta. For example, the model provides 20-year projections of total customer bills for typical large industrial, small industrial and residential customers. The model includes extensive data on future transmission costs, including forecasts of annual capital expenditures for every major transmission project. The model also allows users to easily test the sensitivity of the projections to changes in key assumptions, including changes in the forecasts of load growth, pool prices, inflation rates and transmission capital costs.

At the November 2016 TFCMC meeting, the AESO announced that they would no longer publish the TRIP model. Instead, to provide industrial consumers with information to aid in their planning and to provide residential consumers with an approximate projection of how much they may pay for transmission costs in the future, the AESO provided the following chart setting out their current projection of average transmission costs.

Transmission rate projections

	Near term projections (2016–2020)					Medium term projections (2021–2025)				
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Transmission system capital spend (2016 \$ Million)	\$378	\$461	\$168	\$1,339	\$502	\$57	\$576	\$514	\$1,001	\$926
Transmission connection capital spend (2016 \$ Million)	\$99	\$99	\$99	\$99	\$99	\$99	\$99	\$99	\$99	\$99
Capital maintenance and replacement (2016 \$ Million)	\$276	\$276	\$276	\$276	\$276	\$276	\$276	\$276	\$276	\$276
Total revenue requirement* (\$ Millions)	\$1,978	\$2,023	\$2,258	\$2,396	\$2,525	\$2,627	\$2,851	\$2,985	\$3,132	\$3,264
DTS energy forecast (GWh)	62,005	59,068	64,934	66,593	68,709	70,008	71,532	73,129	74,632	75,805
Average transmission rate (\$/MWh)	\$31.91	\$34.25	\$34.78	\$35.99	\$36.76	\$37.53	\$39.85	\$40.82	\$41.97	\$43.06
Average transmission portion (600kWh) of residential monthly bill (\$)	\$19.14	\$20.55	\$20.87	\$21.59	\$22.05	\$22.52	\$23.91	\$24.49	\$25.18	\$25.84

*Revenue requirement is the total transmission charge that is to be recovered from all consumers in that year.

➤ LOOKING FORWARD TO 2026–2035

While looking beyond 10 years can produce less certain projections, we have prepared our projections to 2035.

Key highlights from those projections are:

- Transmission system capital spend from 2026 to 2035 is \$3,422 (2016 \$ Million)
- Average transmission rate in 2035 is \$48.42/MWh
- Average transmission portion of a residential monthly bill in 2035 is \$29.05 (600 kWh/month)

As noted in the above chart, the AESO is projecting that average transmission costs will increase from approximately \$32/MWh in 2016 to just under \$37/MWh in 2020 and to \$43/MWh in 2025. The projected capital spend by 2020 is \$2.9 billion based on transmission system projects that have been planned or that are under construction.

The AESO has also agreed to provide similar cost information to the Committee annually.

Learnings From The AUC Decision On AltaLink's 2012/2013 Deferral Accounts Reconciliation

On June 6, 2016, the AUC released Decision 3585-D03-2016 regarding AltaLink's 2012 and 2013 Deferral Accounts Reconciliation Application. Key findings in the decision⁵ include the following:

- Of AltaLink's requested rate base additions of \$1,977 million, the AUC disallowed costs of less than \$7 million. [4]
- The burden of proof to establish prudence is on the applicant; the AUC has no obligation to presume prudence when no evidence is provided to the contrary. [115]
- The fact that no party challenges an applicant on its evidence is not a determination of prudence. [116]
- The AESO's failure to comment on a TFO's prudence is not a determination of prudence. [139]
- Facility Applications (FAs) are the venue in which design-related issues should be addressed. [144]
- Directing an audit is an exceptional exercise and is not a substitute for the AUC's own examination of project costs in a deferral account proceeding. [273]
- The AUC found that intervener requests for cost and performance audits were excessive and unwarranted. [274]
- The AUC found that the rates AltaLink negotiated with Burns and McDonnell Canada Ltd. and SNC-Lavalin ATP Inc. reflect market competitive rates for its engineering, procurement and construction management (EPCM) services. [380]
- The AUC found that AltaLink's decision to apply ISO Rule 502.2 (Transmission Line Design Standards) in advance of the Rule coming into effect was reasonable. [533]
- The AUC did not agree with intervener claims that AltaLink did not undertake a cost/benefit analysis of alternatives to the use of rig mats. [574]
- The AUC did not agree with intervener criticism of AltaLink's use of helicopters. [597]
- The AUC found that the cost of temporary capacitor banks provided to accommodate an in-service date (ISD) requested by an industrial customer should be treated as participant-related costs under the AESO's construction contribution policy. [1276]

The TFCMC monitors AUC decisions for the purpose of identifying areas where the TFCMC's efforts can be helpful to the Commission. The TFCMC took note of several points contained in Decision 3585-D03-2016 respecting the AltaLink 2012 and 2013 Deferral Account Reconciliation, such as:

- TFOs must assist the AESO by providing information such as cost implications of viable alternatives or trade-offs between costs and ISD targets for consideration by the AESO. The TFOs' responsibility is an active one and if evidence demonstrates that a TFO failed to provide this assistance, the TFO could not simply rely on the AESO's directions as justification for pursuing a course of action and incurring the resultant costs of doing so. Through its project monitoring activities, the Committee can contribute to the identification of trade-offs between costs and ISD targets. [141]
- The AUC went to considerable length to document the history of each major project from its perspective (such as AUC decisions, permits and licenses, etc.). The monitoring work of the TFCMC that focusses on Service Proposal costs, changes to Service Proposal costs and explanations provided for those changes, can contribute to developing this type of documentation.
- The AUC recognizes that design decisions can contribute significantly to project costs. The AUC will allow ratepayer groups, including members of the TFCMC, to participate in FA proceedings as interveners to challenge design decisions from a cost perspective.

⁵ For the bullet points, the numbers in brackets represent paragraph numbers in AUC Decision 3585-D03-2016.

AESO Transmission Development Initiatives⁶

At the TFCMC's September 2016 meeting, the AESO updated the Committee on several of its transmission development initiatives including the new Downtown Calgary Transmission Reinforcement Project that the TFCMC is now monitoring.

The Downtown Calgary project consists of a new 138 kV transmission line between the existing ENMAX No. 2 and ENMAX No. 8 substations and associated modifications to the existing ENMAX No. 2 and ENMAX No. 8 substations. The Needs Identification Document (NID) for the project was approved on June 1, 2016. The FA is expected to be filed in February 2017. March 2021 is the scheduled ISD. Currently an outage on one of the existing two 138 kV lines would likely cause an outage on the other downtown Calgary line.

In regards to developments in the province's Central East region, the AESO said it has re-assessed the needs for the area and is now looking at the following project: Provost to Edgerton & Nilrem to Vermilion Transmission Development (PENV). The scope would consist of two circuits from Hansman Lake 650S to Edgerton 899S and from Nilrem 574S to a new substation near Vermilion. Two transmission line options are being assessed: 144/138 kV or 240 kV initially energized at 138 kV. The ISD would be the first quarter of 2021. Two TFOs would be involved, AltaLink and ATCO Electric.

On developments in the Northwest Region, the AESO said it is looking at two smaller projects:

- The Grande Prairie Loop Transmission Upgrade, expected to come in at under \$100 million, would increase the load-serving capability of the Grande Prairie Loop by adding a 144 kV line into the area. It would have a 2020 ISD and NID approval is expected in 2018.
- The second Northwest project would be the Rycroft Transmission Development. The scope is to review the 144 kV transmission line and VAR support to enhance the Rycroft area. It would resolve smaller pocket issues.

From 2016 to 2020, inflight projects energizing in the near term will total about \$2.5 billion. Current early stage initiated developments total about \$500 million.



⁶ In this instance, this section includes an observation on the Downtown Calgary Transmission Reinforcement Project, that was just added to the TFCMC's list of monitored projects and as such replaces the report's traditional section of Observations on New Projects.

Observations On Completed Projects

■ CENTRAL EAST AREA TRANSMISSION DEVELOPMENT (CETD) – Project 811

The project consisted of additional substations and upgrades to existing facilities in order to accommodate load and generation growth in central Alberta. The AESO originally outlined the need for the 138/144 kV upgrades involving two stages of implementation.

Since then, the AESO identified 12 project components from the original NID Approval that are no longer needed or have been rendered inappropriate by changing needs in the Central East sub-region. A new NID Application for the Central Region (1781 - Provost to Edgerton & Nilrem to Vermilion Transmission Development) was filed in December 2016. The new NID will address transmission requirements in the region and also remove from the AUC NID Decision those facilities that were approved as part of project 811, but not constructed and now deemed as no longer needed.

All other construction is complete, and the project will be closed pending approval of Project 1781, and receipt and review of the final costs.

■ EDMONTON REGION 240 KV LINE UPGRADES (ERL) – Project 786

This project involved upgrading 240 kV lines in the Edmonton area and adding one 240 kV phase shifter at the Livock substation to get more capacity out of the existing 240 kV network.

The project was delayed due to land access issues for the completion of the 1043L transmission line and the re-termination of 909L. TransAlta and the Enoch First Nations did resolve this impasse and reached an access agreement, with work being finished in late 2016.

The project is now complete and will be closed pending receipt and review of final costs expected in February 2017.



3. TFCMC Results to Date | Recommendations

This marks the twelfth semi-annual report that the TFCMC has released. In the 11 previous editions, a total of 13 recommendations have been made – all with the goal of enhancing the monitoring and management of transmission costs in Alberta. Nine of the recommendations were directed to the Alberta Electric System Operator (AESO) and four have been made to Alberta Energy.

Instead of recommendations, the TFCMC's June 2013 report focused on a list of the Committee's Top 5 transmission priorities. This list came about as Alberta Energy initiated a review of its transmission cost management policy and sought input from leaders in the electricity sector⁷.

Recommendations to the Alberta Electric System Operator

The AESO, as noted in earlier editions of this semi-annual report, has been proactive in its response to recommendations made by the Committee, adopting a majority of the TFCMC's recommendations. The TFCMC continues to be encouraged by the overall direction and response that the AESO has taken in regards to these recommendations.

Recommendations already implemented:

- **JUNE 2011 REPORT, RECOMMENDATION NUMBER 1:** That the AESO improve future NID estimates by including fully loaded costs – allowance for funds used during construction (AFUDC), escalation, engineering and supervision, and owners' costs.
- **JUNE 2011 REPORT, RECOMMENDATION NUMBER 2:** That the AESO improve the estimates in the AESO Long-Term Transmission Plan by employing third-party cost estimates or cost estimate verification as well as from benchmark data being compiled by AESO.
- **JUNE 2011 REPORT, RECOMMENDATION NUMBER 3:** That the AESO develop a transmission cost benchmarking competency and database.
- **JUNE 2011 REPORT, RECOMMENDATION NUMBER 4:** That the AESO enhance compliance of the material procurement provisions of Rule 9.1.
- **JUNE 2011 REPORT, RECOMMENDATION NUMBER 6:** That the AESO initiate a review process on the current framework for cost accountability.
- **DECEMBER 2012 REPORT, RECOMMENDATION NUMBER 1:** That the AESO, with assistance from TFCMC consultants, undertake a case study concerning the cost changes for Project 671 – from the NID through to the PPS and the authorized budget – and this should include lessons learned from the Yellowhead project and lessons about reporting under ISO Rule 9.1 (Compliance Monitoring).
- **DECEMBER 2013 REPORT, RECOMMENDATION NUMBER 1:** That the AESO take the necessary steps to change the relevant rules so that it is clear that it will only review change orders for scope and in-service date changes.

The remaining AESO recommendations

The AESO has expanded the following recommendation into the broader context of the TFCMC's earlier cost accountability recommendation. The AESO's goal is still to coordinate with the Alberta Utilities Commission (AUC) on the development of a reporting protocol with respect to the treatment of transmission project costs.

⁷ To see the TFCMC's Top 5 Transmission Priorities in their entirety, please consult the TFCMC's June 2013 semi-annual report. It can be found online at <https://ucahelps.alberta.ca/regulatory-reporting.aspx>

- **DECEMBER 2011 REPORT, RECOMMENDATION NUMBER 2:** That for each Direct Assigned project, the AESO provide to the Alberta Utilities Commission a summary of the scope changes authorized by the AESO for that project including the following:

- I. The AESO's assessment on whether each scope change was needed;
- II. A summary of the alternatives available to meet each scope change;
- III. The AESO's assessment on whether the alternative recommended by the TFO to address each needed scope change was the most appropriate alternative; and
- IV. The AESO's assessment on whether the cost of each scope change as estimated by the TFO was reasonable.

This information would form part of the AUC's consideration, under section 25(4) of the Transmission Regulation, in determining the TFO's prudence in managing the cost of the Direct Assigned project.

December 2016 TFCMC Report update: the AESO plans to provide a recommendation for the development of an AUC reporting protocol as it drafts and consults on revisions to ISO Rule 9.1.3 (Project Reporting). The AESO intends to initiate the formal review of 9.1.3 commencing in January 2017.

The AESO considers the following recommendation closed:

- **JUNE 2012 REPORT, RECOMMENDATION NUMBER 1:** That for each Direct Assigned Capital project estimated to cost in excess of \$100 million⁸ at the Needs Identification Document stage, the AESO will publish a cost benchmarking report at the time the Transmission Facility Owner files its Facility Application with the Alberta Utilities Commission for approval. To the extent that there are significant project cost changes between the Proposal to Provide Service stage and the TFO's application before the AUC for rate base approval, the AESO will update and publish its cost benchmark report.

The AESO notes that the AUC has not expressed any interest in receiving or using such a report. The AESO has established a protocol with the AUC for transfer of cost information when projects exceed the cost estimate threshold. The cost information includes reports gathered under AESO Rule 9.1 and if pertinent, AESO benchmarking analysis.

Further, the AESO has made the cost-benchmarking database available to the public. Therefore any interested party may create their own benchmarking report, for example, if they are intervening in a TFO proceeding. The AESO processes for cost estimate reviews also include a benchmarking analysis. These processes have been shared with the AUC and the TFCMC.

Cost Accountability Recommendation: Status of ISO Rule 9.1 – Transition to Rule 504.5 Series

ISO Rule 504.5 (Service Proposals and Cost Estimating) became effective April 29, 2016. The AESO plans to review and revise all remaining 9.1 ISO Rules and intends to initiate the formal review of 9.1 commencing in January 2017.

Rule 9.1 Update

The AESO is continuing its work in enhancing and strengthening Rule 9.1 in the areas of cost estimating, cost reporting and procurement.

In 2016, Section 9.1.1 of the rule, Eligible TFO, was amended. The AESO resumed its review of ISO Rule 9.1.5 in the latter half of 2016. Feedback from stakeholders on the AESO's rule recommendation paper was reviewed and the AESO continues to work on Rule 9.1.5 in 2017.

⁸ According to Section 10 of Ministerial Order 64/2010, the mandate of the TFCMC is to review all Transmission Facility Projects forecast to cost in excess of \$100 million. In a letter dated January 12, 2011, the Minister of Energy clarified that the starting point for the TFCMC when reviewing cost variances is the estimate in place when a project is approved by an Order in Council for Critical Transmission Infrastructure (CTI) projects, or, the estimate in place when the Needs Identification Document (NID) is approved by the Alberta Utilities Commission (AUC). The AESO, of course, is at liberty to file benchmarking cost reports with various stakeholders, including the AUC, in respect of projects below the \$100-million threshold.

Recommendations to the Provincial Government

The TFCMC has directed four recommendations to Alberta Energy through its semi-annual reports. One⁹ of the two, **Recommendation Number 5 in the June 2011 Report**, was considered premature by the Department given the implementation of the other recommendations from the same semi-annual report.

The TFCMC made a second recommendation for the Department to consider. This one, **Recommendation Number 1 in the December 2011 Report**, reads as follows:

- That the Minister of Energy modify the Transmission Regulation to require TFOs to seek AESO authorization of CTI pre-construction expenditures incurred prior to AUC approval of the Facility Application.

The Minister, in a letter to the Committee, advised that Alberta Energy would consider this recommendation as it reviews potential amendments to the Transmission Regulation, and Alberta Energy has considered this recommendation as part of its review. Amendments to the Transmission Regulation were made in September 2014. Numerous regulatory changes were put into effect on September 22, 2014, including the elimination of Critical Transmission Infrastructure (CTI) provisions for projects starting after September 22, 2014.

In the last report, June 2016, the Committee added two new recommendations, both also for the Government of Alberta, directed specifically to the Minister of Energy.

Recommendation Number 1 in the June 2016 Report:

1. The TFCMC recommends that Alberta Energy expeditiously take action on the proposals from the Cost Oversight Management (COM) Subgroup.

A pilot project to explore the potential value of the COM initiative was completed more than 12 months ago. According to the information publicly available, all members of the COM Subgroup except the AESO recommended that the pilot be extended for new pre-NID projects expected to receive a regulatory decision on their NID applications within two years. This two-year extension of the pilot program would allow an assessment of whether the COM function results in an improvement in the efficiency of regulatory proceedings. The AESO indicated that they are opposed to the institutionalization of the COM function, but did not oppose an extension of the pilot project.

The Committee supports this policy initiative because it could improve cost management of electricity transmission projects in Alberta, thereby protecting consumers from unnecessary increases in their energy costs. The province's Climate Leadership Plan (CLP) could trigger new transmission development projects. Expeditious actions to move forward with the COM initiative would help to establish a more robust cost management structure for electricity transmission projects before any new projects are undertaken.

Recommendation Number 2 in the June 2016 Report:

2. In regards to the implementation of the Climate Leadership Plan (CLP), the TFCMC recommends that:
 - The coal retirement plan and any policy decisions related to replacement natural gas-fired generation consider the impact on the cost of transmission and attempt to utilize the existing transmission system as much as possible.

⁹ The recommendation reads: That for non Critical Transmission Infrastructure (CTI) projects, the Department of Energy consider legislative changes to require a second approval stage by the AUC if cost estimates exceed a pre-determined limit. The TFCMC recognizes the need to avoid unnecessary project delays due to factors outside the control of the TFOs.

For example, the concept of using brownfield sites for new natural gas-fired generation warrants full consideration. Policy decisions need to encourage new generators be located close to existing transmission capacity, in order to protect consumers by minimizing the overall cost impact of the CLP. It would make sense to use existing surplus transmission capacity before causing new transmission facilities to be built.

- Locational criteria be included in the renewables procurement process.
- The CLP's objective is that renewable generating capacity will provide 30% of Alberta's electricity by 2030. In its report, the Climate Change Advisory Panel recommended a competitive procurement process, whereby successful bidders for government contracts would be provided with renewable credits. The contracts would be awarded to projects requiring the lowest renewable credits, in order to protect electricity consumers from unnecessary rate increases. The TFCMC submits that considering transmission costs in this process will protect consumers by minimizing the overall cost impact of the CLP.

The Minister, the Honourable Margaret McCuaig-Boyd, responded on October 24th, 2016, in a letter to TFCMC Chair Henry Yip. Her letter, in part, states:

" ... I appreciate the important work that the committee does to monitor Alberta's major transmission projects, its focus on mitigating project costs for the benefit of Albertans, and the recommendations it has provided since its inception.

I am aware that the pilot for the initiative took place between June 2014 and June 2015, and was subsequently reviewed by the Cost Oversight Management subgroup. I acknowledge that the TFCMC supports the recommendations of the subgroup members, that the initiative be extended to include a review of projects in the pre-Needs Identification Document stage of a transmission project.

Department staff are evaluating the optimal approach for transmission cost management in Alberta to ensure effectiveness and efficiency. In this work, we are taking into consideration the value offered by both the initiative and the TFCMC.

Regarding the Climate Leadership Plan, I appreciate the TFCMC's recommendation to use the existing transmission infrastructure to the extent possible, as well as the committee's recommendation to include location criteria in the development of renewable energy in the province. I can assure you that the policy team responsible for the Renewable Electricity Program is working closely with the Alberta Electric System Operator and giving careful thought to the transmission impacts of the program.

As we continue this work, we welcome any further perspective from the TFCMC."

The Committee appreciates the supportive response from the Minister and is encouraged by the direction her ministry is taking, as conveyed in the letter.

New Recommendations

The Committee has no additional recommendations for this report.

Appendix A: About The TFCMC

Origin And Composition Of The Transmission Facilities Cost Monitoring Committee

The Government of Alberta created the Transmission Facilities Cost Monitoring Committee (TFCMC) on July 31, 2010 through a Ministerial Order issued by the Honourable Ronald Liepert, then Minister of Energy, in order to ensure Albertans have the benefit of increased transparency on the cost of transmission projects.

According to the Ministerial Order, number 64/2010, the TFCMC can consist of up to 13 individuals as follows:

- the **Alberta Association of Municipal Districts and Counties** may appoint one member;
- the **Alberta Chambers of Commerce** may appoint one member;
- the **Alberta Direct Connect Consumers Association** may appoint one member;
- the **Alberta Federation of Rural Electrification Associations** may appoint one member;
- the **Alberta Urban Municipalities Association** may appoint one member;
- the **Consumers' Coalition of Alberta** may appoint one member;
- the **Canadian Federation of Independent Business** may appoint one member;
- the **Industrial Power Consumers Association of Alberta** may appoint one member;
- the **Independent Power Producers Society of Alberta** may appoint one member;
- the Minister may also appoint up to two **independent members** with technical, regulatory, transmission facility development or other experience that, in the opinion of the Minister, will benefit the Committee;
- the **Independent System Operator** ("Alberta Electric System Operator") shall appoint one member; and
- the **Office of the Utilities Consumer Advocate** shall appoint one member.

The TFCMC's Mandate

The TFCMC's mandate is to review records that relate to the cost, scope, schedule and variances of Alberta transmission facility projects forecast to cost in excess of \$100 million. This may include more than one transmission facility, if it is a part of a contiguous transmission facility project. The Alberta Electric System Operator (AESO), a not-for-profit entity that is responsible for the safe, reliable and economic planning and operation of Alberta's transmission system (also known as the Alberta Interconnected Electric System) determines which transmission facilities are part of a transmission facility project.

In a letter dated January 12, 2011, the Minister of Energy clarified that the starting point for the TFCMC – when reviewing cost variances – is the estimate in place when a project is approved by an Order in Council for Critical Transmission Infrastructure (CTI) projects, or, the estimate in place when the Needs Identification Document (NID) is approved by the Alberta Utilities Commission (AUC). The TFCMC, therefore, does not review any of the projects from an initial prudence, need, technology choice or staging perspective.

The TFCMC cannot delay or slow the development of transmission facility projects.

In late June 2011, the Minister of Energy provided his support of a request from the TFCMC to explore and develop innovative approaches to cost recovery for new transmission facilities in Alberta. The TFCMC was asked to undertake this initiative on a priority basis, together with the Transmission Facility Owners (TFOs), the AESO and Alberta Energy. The findings of this initiative were submitted in April 2012 to the Assistant Deputy Minister, Electricity, Alternative Energy and Carbon Capture and Storage, for consideration and action.

The TFCMC's Members

The organizations and independent members named in the Ministerial Order forming the TFCMC represent a cross-section of industry, consumer and business groups with ties to Alberta's electricity sector.

Organizations and independent members are listed alphabetically:

Alberta Association of Municipal Districts and Counties (AAMDC)

The AAMDC advocates on behalf of the province's 69 municipal districts and counties. The association assists its members in achieving strong, effective local government. Their representative on the TFCMC is **Dwight Oliver, a Past Director for AAMDC District 2.**

Alberta Chambers of Commerce (ACC)

The ACC is a federation of 125 Chambers of Commerce, which in turn represents 24,000 businesses. The ACC ensures its members' business interests are improved through the development and advocacy of policy to the provincial and federal governments. Their representative on the TFCMC is **Ken Kobly, ACC President & CEO.**

Alberta Direct Connect Consumers Association (ADC)

The ADC represents nine large industrial consumers who have facilities directly connected to the transmission system. The ADC members represent the key sectors of forestry, chemical and cement manufacturing. The aggregate electricity demand of the membership represents about 7% of the Alberta load. Their representative on the TFCMC is **Colette Chekerda, ADC Executive Director.**

Alberta Electric System Operator (AESO)

The AESO is a not-for-profit entity, is independent of any industry affiliations, and owns no transmission or market assets. It is responsible for the safe, reliable and economic planning and operation of the Alberta Interconnected Electric System. Their representative on the TFCMC is **Kelly Yagelniski, AESO's Director, Transmission Program Support.**

Alberta Federation of Rural Electrification Associations (AFREA)

The AFREA is a not-for-profit cooperative association representing member Rural Electrification Associations (REAs) who provide rural power services throughout Alberta. It is committed to promoting the economic welfare and value of its cooperative members by providing strong representation to government and industry stakeholders with one voice. Their representative on the TFCMC is **Dan Astner, Representative District 3 on the AFREA Board as District Director for member REAs: Battle River.**

Alberta Urban Municipalities Association (AUMA)

The AUMA represents urban municipalities including cities, towns, villages, summer villages and specialized municipalities, and more than 85% of Albertans. It represents and advocates for the interests of its members to the provincial and federal governments. Their representative on the TFCMC is **Andre Chabot, AUMA Director, Cities Over 500,000.**

Consumers' Coalition of Alberta (CCA)

The CCA is comprised of the Consumers' Association of Canada (Alberta Division) and the Alberta Council on Aging. The CCA, a coalition of two public interest groups, participates as a collective in public utility hearings to ensure rates, tolls and charges for residential customers are just and reasonable. Their representative on the TFCMC is **Azad Merani, CCA Consultant.**

Independent Power Producers Society of Alberta (IPPSA)

The IPPSA represents Alberta's power producers. IPPSA is a forum for dialogue among Alberta's power producers and a proponent of competition in Alberta's electricity market. Their representative on the TFCMC is **Evan Bahry, IPPSA's Executive Director.**

Industrial Power Consumers Association of Alberta (IPCAA)

The IPCAA is an organization representing large industrial customers, including such key sectors as oil & gas, forest products, petrochemicals and steel. Its mission is to take a leadership role in achieving a fair, open and efficient marketplace for electricity sales and service in Alberta. Their representative on the TFCMC is **Vittoria Bellissimo, IPCAA's Executive Director**.

Office of the Utilities Consumer Advocate (UCA)

The UCA is the voice of small consumers in Alberta's electricity and gas markets. The UCA advocates on behalf of Alberta's low-volume or smaller users of electricity and natural gas, those being residential, small business and farm utilities consumers, and helps them to make informed choices. As well, the UCA represents and protects their interests by participating in utility hearings and inquiries. The UCA representative on the TFCMC is **Wayne Taylor**.

TFCMC Independent Members:

Allen Snyder, of Winnipeg, brings a background and a wealth of knowledge in the electricity sector to the TFCMC. He held several key executive positions with Manitoba Hydro including Vice President of Transmission & Distribution, Power Supply and Corporate Services over the past 20 years. He also established the very successful Manitoba Hydro International with sales of software and services to more than 60 countries worldwide. Currently, he is Vice President of Energy Services for Wood West & Associates.

Henry Yip is a senior business executive with more than 30 years of broad business experience in Canada and the USA. He has held senior executive positions in large corporations and entrepreneurial business enterprises, and has advised governments in the area of city planning, strategy development, technology commercialization, international business collaboration and grant application approval. His current business interests include Executive Chair at Nirix Technology, and President of C'andcee Development. He is a past Chair of the Board at Edmonton Economic Development Corporation.

Former Members

Canadian Federation of Independent Business (CFIB)

The CFIB is an association representing small- and medium-sized businesses across Canada that takes direction from its more than 109,000 members, providing independent businesses a voice at all levels of government. The CFIB resigned in early 2014, stating it believes its involvement is no longer necessary due to the re-establishment of an independent regulatory review process and the repeal of Bill 50.

The Operations Of The TFCMC

In January 2016, due to a reduced project activity environment, the TFCMC began a six-month trial of holding its meetings every second month as opposed to meeting every month. At the end of the trial period, the Committee decided to continue with this approach.

Since the fall of 2015, the Committee moved to a video conference model for its meetings. Utilizing video conferencing facilities made available by Alberta Energy in the cities of Edmonton and Calgary, Committee members can choose to attend in either location that would allow them to minimize time and costs. The primary purpose of the meetings is to review reports provided by AESO on the cost status of transmission projects that are within the Committee's purview. The first meeting took place in September 2010.

The TFCMC reviews the reasons for cost variances of all these projects. When appropriate, it retains external experts to prepare information requests (IRs) for the AESO and the Transmission Facility Owners (TFOs) for further illumination on the reasons for the variances.

Each calendar year, the TFCMC is required to provide at least two reports to the member organizations represented on the committee as well as at least one report to the Ministers of Energy and Service Alberta. The reports summarize the records it reviews and the status of the transmission facility projects.

The TFCMC strives for consensus in its decision-making process but a simple majority of those present at a meeting is the minimum threshold for agreement.

Independent member Henry Yip chairs the TFCMC. The TFCMC secretary is Laura Severs, engaged through Alberta Energy; she also serves as the Committee's technical writer.

The TFCMC will also form subcommittees from time to time to facilitate the workings of the Committee. There were two active subcommittees in operation during the period of this report:

- A standing subcommittee to monitor and approve expenditures incurred by the members of the TFCMC during the course of discharging its mandate.
- The Information Request (IR) subcommittee; this group develops appropriate questions for the TFOs in order to get clarification on information previously provided by the TFOs on the cost status of the various transmission projects. This subcommittee is supported by external expert advisors when required.



Appendix B: The Transmission Projects At A Glance

Facility Applications for each project are sorted by the forecast or actual in-service date (ISD). The Facility Application number column in each project's initial chart is provided as an easy reference to its location on the accompanying map. Please note that due to updated information, some costs, dates and items may have changed from previous TFCMC reports and as such please use this latest material going forward.

1. **COMPLETED CENTRAL EAST AREA TRANSMISSION DEVELOPMENT (CETD); PROJECT 811** – Transmission development in Wainwright, Lloydminster, Provost, Vegreville and Cold Lake.

THE PROJECT: To accommodate load and generation in central Alberta, additional substations and upgrades to existing facilities were required. The Central East project served the dual purpose of meeting the growing demand for electricity for pipelines moving oilsands production, and the connection of more than 500 MW of proposed gas-fired generation and wind farms in the eastern region of Central Alberta. Aging infrastructure, overloads, and low voltages in the large area east of Edmonton, from Cold Lake in the Northeast region to Hardisty, compelled the substantial rebuild of the 138 kV and 144 kV systems, and the decommissioning of aging 69 kV and 72 kV lines. The Alberta Electric System Operator (AESO) originally outlined the need for the 138/144 kV augmentation and upgrade, with two stages of implementation.

THE COMPONENTS: Originally, there were two stages to this project, however, Stage 2 has been cancelled and the current Needs Identification Document (NID) is being amended to address the cancellations. Additionally, a new project is being developed to address system constraints.

The major components for Stage 1 of the project were: a new 144/25 kV Watt Lake substation; the conversion of three existing 72/25 kV substations to 144/25 kV; a new 240 kV switching station in the Cold Lake area, energized at 144 kV initially; a new double-circuit 144 kV line from the existing Mahihkan 837S to the new switching station; a new 240 kV double-circuit line (one-side strung) from the new switching station to the existing Bonnyville 700S and initially energized at 144 kV; a new single-circuit line from the existing Wainwright 51S to the existing Edgerton 899S; a new 144 kV capacitor bank at Vermilion 710S; the addition of one 138/72 kV transformer at the existing Wainwright 51S; rebuild six existing 138 kV or 144 kV lines to increase capacity, and restore ratings of existing 144 kV lines by mitigating line clearances and discontinuing the use of existing 72 kV equipment at existing substations or lines.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
Line Clearance Mitigation	10	Restore ratings of existing 144 kV lines by mitigating line clearances	July 18, 2012
Heisler Area Upgrades	7	Convert Heisler 764S from 72 kV to 144 kV; addition of 144/72/25 kV transformer from Vermilion 710S; new 144 kV single-circuit line from Heisler 764S to existing 7L701 and discontinue use of existing 6L05	July 27, 2013
Vermilion 710S Substation Upgrade	6	Addition of 144 kV–25 VAr capacitor bank; addition of a new 144/25 kV transformer; relocation of existing 144/72/25 kV transformer to Heisler 764S; discontinue use of existing 72 kV equipment at Vermilion 710S and discontinue use of 6L06 (Kitscoty 705S to Vermilion 710S)	September 15, 2013
St. Paul Area Upgrades – Watt Lake, 7LA92	3	New 144/25 kV Watt Lake and new 144 kV line from Watt Lake to existing 7LA92	December 12, 2013

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
Cold Lake Area Reinforcements (Except Bonnyville to Bourque)	1	New 144 kV switching station (Bourque 970S); new 144 kV double-circuit line from existing Mahihkan 837S to new 144 kV switching station and rebuild existing 144 kV lines (7L87, 7L74 and 7L83)	January 30, 2014
St. Paul Area Upgrades – Whitby Lake	5	Rebuild St. Paul 707S from 72/25 kV to 144/25 kV substation; new 144 kV double-circuit line from St. Paul 707S to existing 7L70 creating an in/out configuration	June 25, 2014
Kitscoty Area Upgrades	8	Convert Kitscoty 705S from 72 kV to 144 kV; addition of 144/72/25 kV transformer from Heisler 764S; new 144 kV double-circuit line from Kitscoty 705S to existing 7L14	December 4, 2014
St. Paul Area Upgrades	4	St. Paul 707S and 7L139/7L70 in/out	August 1, 2016
Cold Lake Area Reinforcements – Bonnyville	2	New 240 kV double-circuit line (one-side strung) from new 144 kV switching station to existing Bonnyville 700S, initially energized at 144 kV	December 13, 2016
Line Clearance Mitigations	11,12	Restore ratings of existing 144 kV lines by mitigating line clearances	CANCELLED
Wainwright Upgrades	13	25 km of single-circuit line from Wainwright 51S to 704L	CANCELLED

THE TRANSMISSION FACILITY OWNER(S): AltaLink Management Ltd. (AltaLink) and ATCO Electric Ltd. (ATCO).

PROJECT COST:

TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
Central East Area Transmission Development	\$246 Million (2013\$)	\$342.2 Million (ISD\$ with escalation for Stage 1)

CURRENT STATUS: The relocation of the existing distribution feeders as well as the salvage of transmission facilities discontinued from service as part of the Bonnyville Transformer Addition is expected to be completed in February 2017.

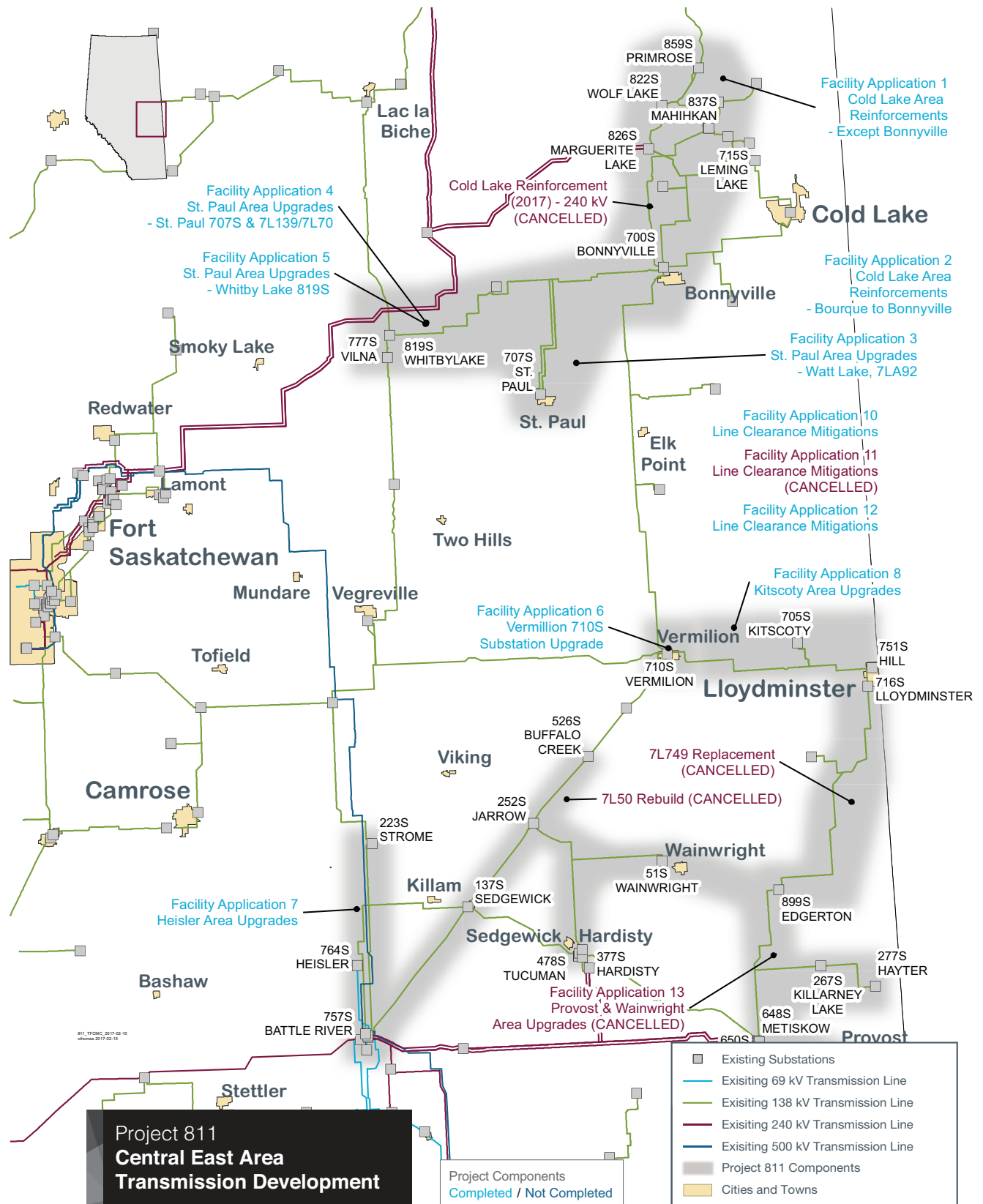
The AESO identified 12 project components from the original NID approval that are no longer needed or have been rendered inappropriate by changing needs in the Central East sub-region.

A new NID Application for the Central Region (Project 1781, Provost to Edgerton & Nilrem to Vermilion Transmission Development) was filed in December 2016. The new NID will address transmission requirements in the region, and remove from the Alberta Utilities Commission (AUC) NID decision those facilities that were approved, as part of Project 811, but not constructed and now deemed as no longer needed.

All other construction is complete and the project will be closed pending approval of Project 1781, and the receipt and review of the final costs.

PROJECT RISKS

There are no risks to report at this time.



2. **NEW DOWNTOWN CALGARY TRANSMISSION REINFORCEMENT PROJECT (DCTRP);** PROJECT 1456 – 138 kV transmission system reinforcement to alleviate identified constraints, and to contribute to the long-term reliable operation of the 138 kV transmission system in the downtown Calgary area.

THE PROJECT: In the very near term, the City of Calgary's downtown load supply is at risk of significant overloads on two main 138 kV transmission lines through the city's core. The AESO's 2013 Long-Term Transmission Plan and a supporting Calgary Sub-Region Plan have identified a need by 2017 for enhancements to the downtown Calgary transmission system to address the thermal constraints and to accommodate load growth in the city centre.

THE COMPONENTS: The project includes the construction of a new 138 kV transmission circuit between the existing ENMAX No. 2 and ENMAX No. 8 substations.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
Downtown Calgary Transmission Reinforcement Project	1	Construct a new 138 kV transmission circuit between the existing ENMAX No. 2 and ENMAX No. 8 substations	First Quarter 2021

THE TRANSMISSION FACILITY OWNER(S): ENMAX.

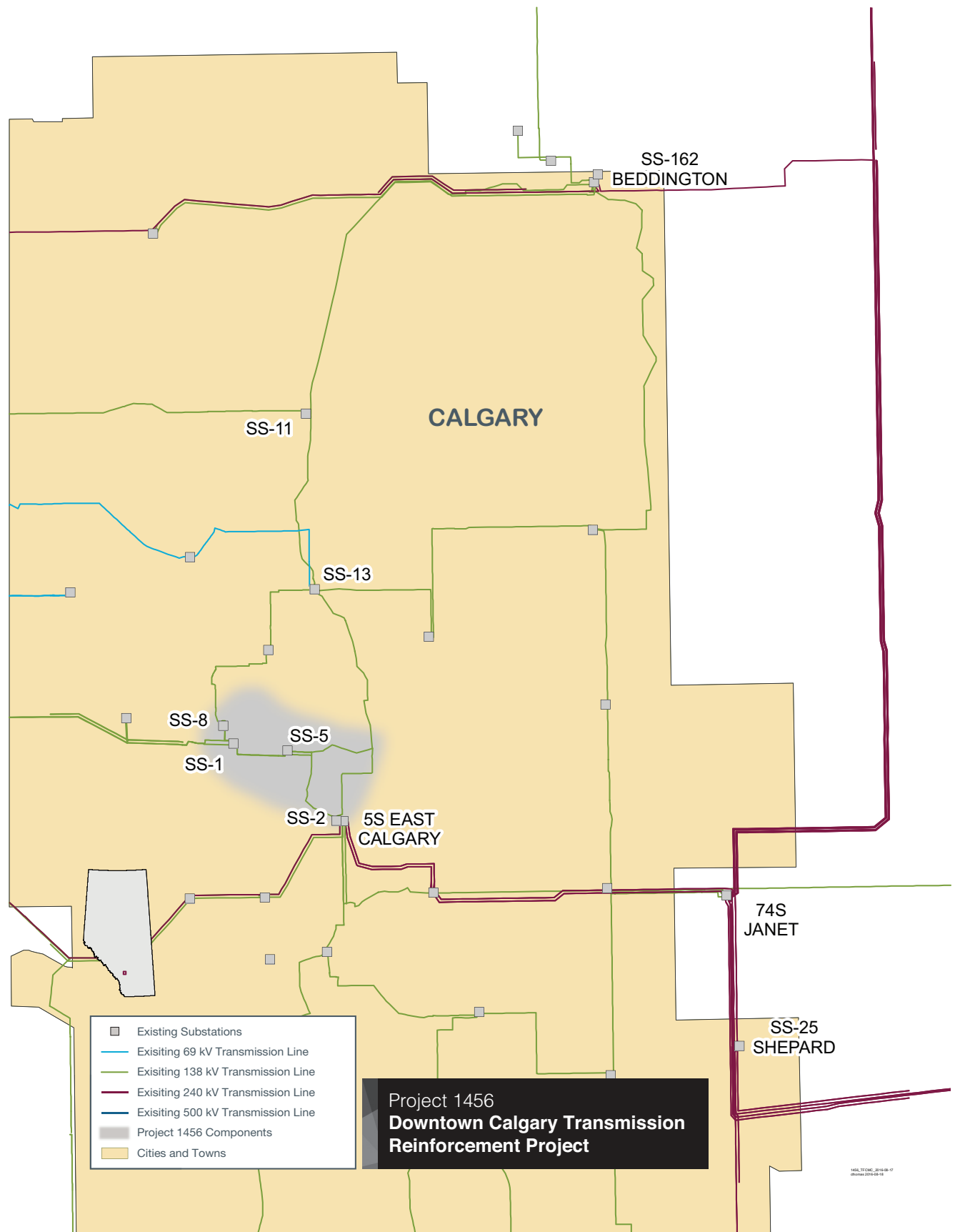
PROJECT COST:

TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
Downtown Calgary Transmission Reinforcement Project	Not Applicable	\$144.48 Million (ISD\$ with escalation)

CURRENT STATUS: The AESO's NID was approved on June 1, 2016. ENMAX plans to file its Facility Application (FA) in the third quarter of 2017 and complete construction by the first quarter of 2021.

PROJECT RISKS

The risks include schedule challenges related to development and construction in an urban area.



3. **COMPLETED EDMONTON REGION 240 KV LINE UPGRADES (ERLU);** PROJECT 786 – Upgraded 240 kV lines in the Edmonton area and added one 240 kV phase shifter at the Livock substation to gain more capacity out of the existing 240 kV network.

THE PROJECT: More than 4000 MW of baseload generation that serves as the main source of electricity for the majority of the province is situated near Wabamun Lake in the Edmonton region. This generation supports central and south Alberta loads, northwest regional loads, Edmonton-area loads and major industrial loads located in the Fort Saskatchewan area. There were major thermal overloads of transmission facilities throughout the Edmonton region. The 138 kV transmission paths from Wabamun to North Calder and East Edmonton to Nisku, and from East Edmonton to the Fort Saskatchewan area were weak during peak load conditions, and voltage violations occurred in those two areas due to weak system support.

THE COMPONENTS: The 240 kV transmission system developments in the area included a rebuild of some sections of the existing transmission line, an increase in capacity of the lines by replacing conductors, the reconfiguration of the system, building new lines and the installation of a special protection scheme for multiple contingencies to ensure system reliability in the area. Additionally, a 240 kV phase-shifter transformer was installed at Livock 939S in the Fort McMurray area.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
AltaLink Keephills Substation addition	1	Additions at Keephills	July 31, 2010
AltaLink1045L, 909L Restrung	5	Restrung four km of 908L and 909L outside Sundance 310P substation (first four km of the lines); 908L is renumbered to 1045L	March 20, 2011
EPCOR Jasper, Petrolia	6	Upgrade bus work and protections	June 14, 2011
EPCOR 1044EL, 1045EL	3	Restrung approximately 24 km of existing 904L at Jasper 805S – in/out line section; renumber EPCOR's portion of the line to 1044EL (going to Petrolia 816S) and 1045EL (going to Sundance 310P)	February 29, 2012
ATCO Phase Shifter	7	Add 600 MVA phase shifting transformer at Livock 939S	August 20, 2013
TransAlta 902L	8	Rebuild portion of 902L	November 12, 2014
AltaLink Rebuild 240 kV 904L (1043L) TransAlta 902L, Re-terminate 909L at Sundance	2 and 4	Delegate the work to AltaLink for re-termination of the existing 240 kV 909L at Sundance 310P (Ellerslie 89S to Sundance 310P); rebuild approximately 50 km of the existing 240 kV line 904L between Jackfish Lake west of Edmonton and Petrolia 816S; salvage the existing 240 kV structures, conductor and hardware; build a new section of approximately 12 km of 240 kV line utilizing double-circuit structures with one-side strung to connect Keephills 320P substation to the rebuild of 904L – renumbered to 1043L (Keephills 320P to Petrolia 816S)	November 30, 2016

THE TRANSMISSION FACILITY OWNER(S): AltaLink, EPCOR Distribution and Transmission Inc. (EDTI) and ATCO.

PROJECT COST:

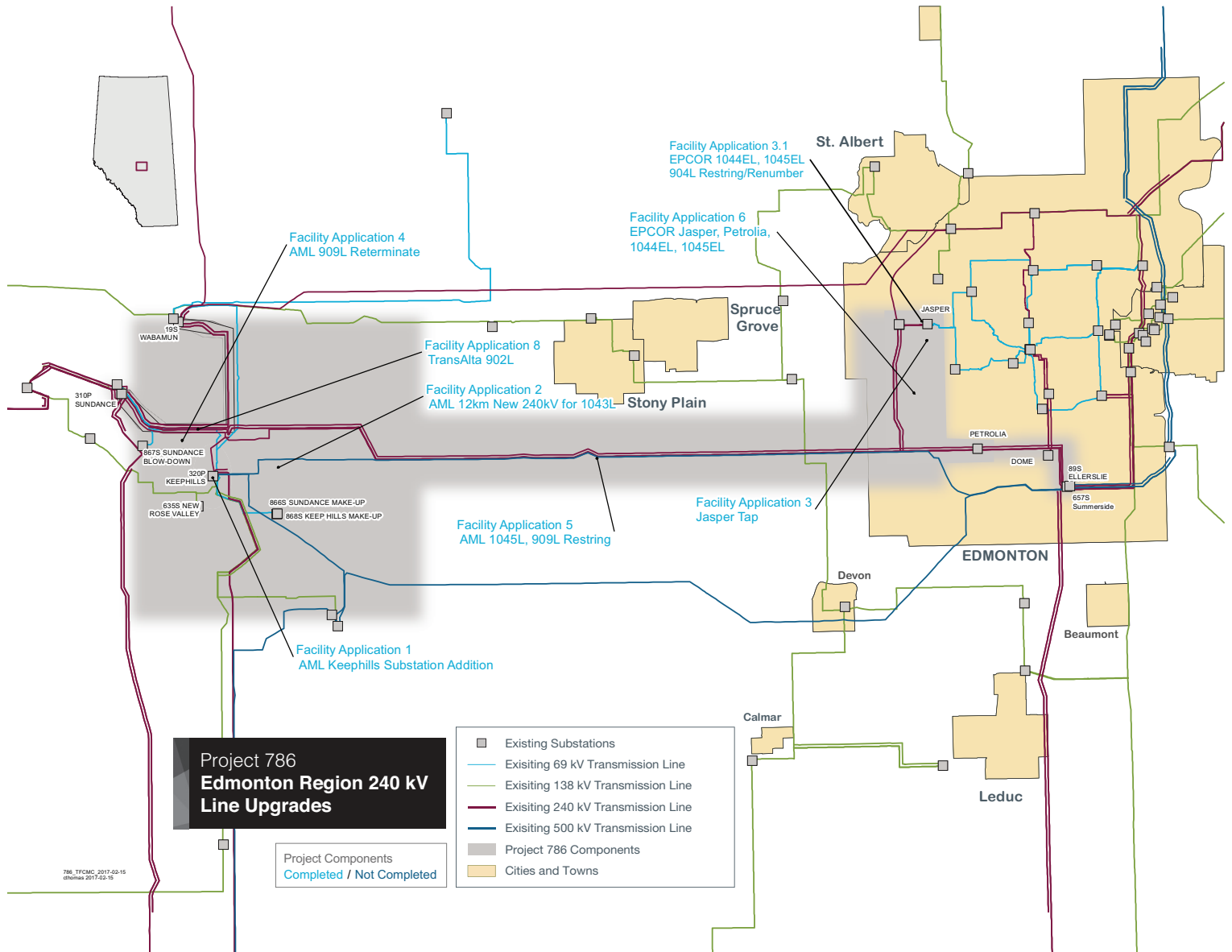
TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
Edmonton Region 240 kV Line Upgrades	\$182 Million (2013\$)	\$197.3 Million (ISD\$ with escalation)

CURRENT STATUS: The project is now complete and will be closed pending receipt and review of final costs expected in February 2017.

The increase in the current estimated cost for this period is the result of inclusion of Allowance for Funds Used During Construction (AFUDC) costs. In Decision 3524-D01-2016 of AltaLink's 2015-2016 GTA Tariff application, AltaLink received approval for the discontinuation of Construction Work in Progress (CWIP) and the return of the AFUDC accounting method (capitalizing AFUDC to project expenditures) effective January 1, 2011.

PROJECT RISKS

There are no risks to report at this time.



4. FORT MCMURRAY WEST AREA 500 KV TRANSMISSION BULK SYSTEM REINFORCEMENT (FMACW); PROJECT 1590 (Formerly Project 838) – Construction of a West 500 kV transmission line from the Edmonton area to the Fort McMurray area.

THE PROJECT¹⁰: The Fort McMurray West Area transmission project is to serve load from the expected growth of the oilsands industry in the northeastern part of the province.

THE COMPONENTS: The major components for Stage 1 of the project (West 500 kV Line) are approximately 500 km of 500 kV single-circuit transmission line from Thickwood Hills 951S to Sunnybrook 510S; a 500 kV substation switchyard at Thickwood Hills 951S to terminate the north end of the West 500 kV line; modifications to the Sunnybrook 510S substation to terminate the south end of the West 500 kV line, and a 500/240 kV 1200 MVA transformer bank at Thickwood Hills 951S.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
Fort McMurray Area Bulk System Development Stage 1 – West Line	1	One 500 kV transmission line will be constructed from a new substation at Thickwood Hills to the Genesee area, referred to as the West 500 kV line	2019

THE TRANSMISSION FACILITY OWNER(S): Alberta PowerLine L.P. (APL).

PROJECT COST:

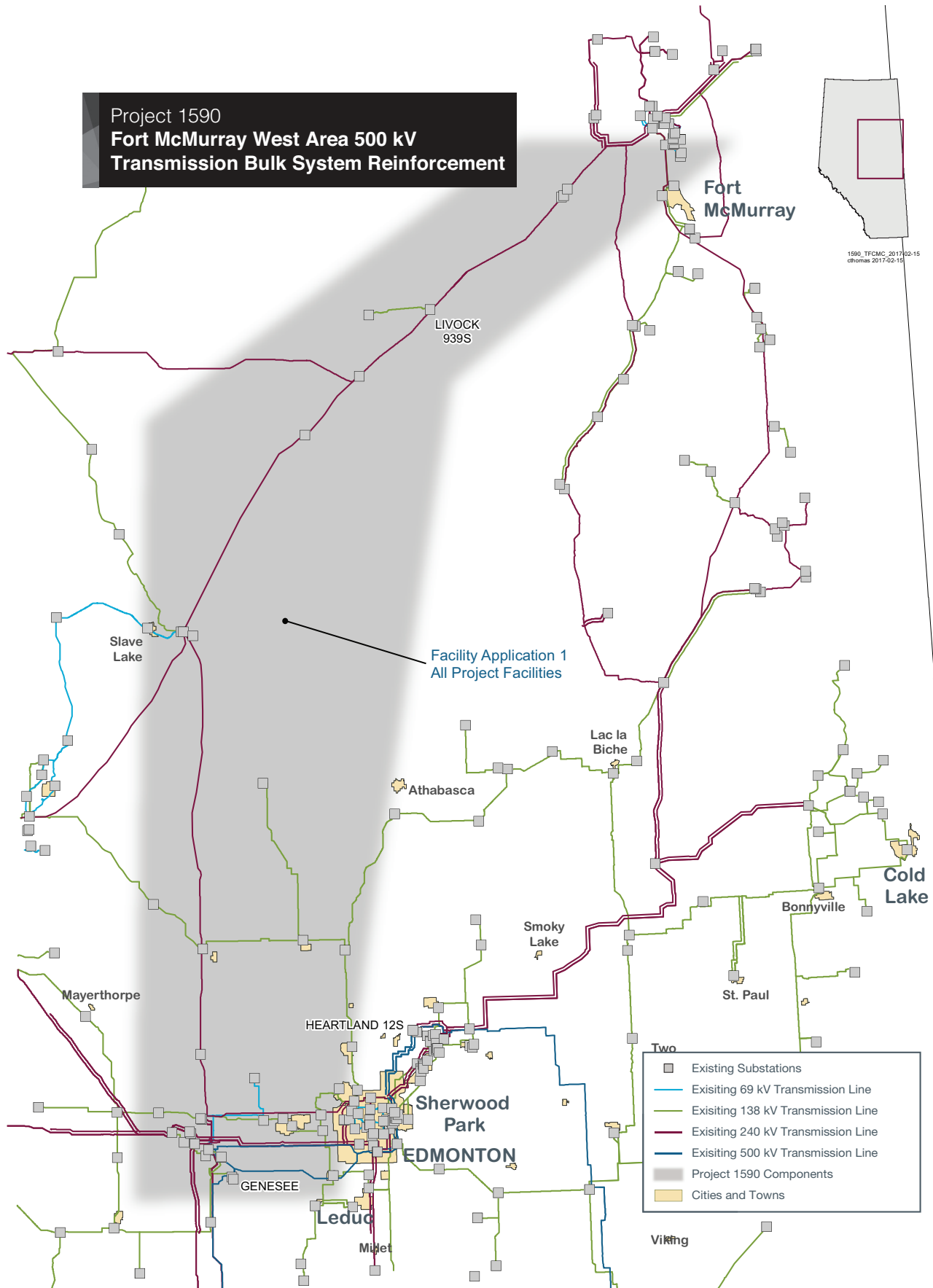
TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
Fort McMurray West Area 500 kV Transmission Bulk System Reinforcement	Stage 1: \$1.796 Billion (2013\$)	Stage 1: \$1.433 Billion

CURRENT STATUS: APL filed its FA with the AUC on December 1, 2015. The AUC project hearing was held in Edmonton and was completed in late 2016. A final decision is expected by early February 2017. The target In-Service Date (ISD) is June 1, 2019.

PROJECT RISKS

Delays in the connecting substation projects (1186-Thickwood Hills and 1655-Sunnybrook/Livock) may affect the ISD.

¹⁰ Prior to the December 2015 TFCMC semi-annual report, this project was referred to as Project 838, Fort McMurray Area Transmission Bulk System Reinforcement, which was to have seen the construction of two 500 kV transmission lines from the Edmonton area to the Fort McMurray area. However, the AESO deferred the launch of Stage 2, the East 500 kV Line, due to a slower economic environment and sustained low oil prices. The East 500 kV line would have been constructed from a new substation at Thickwood Hills to the Heartland area. Going forward, Project 838 has been renumbered and renamed and now only includes the West 500 kV Line. Further, 838 was the project number for both the West and East lines. Now that both projects are on separate deployment paths, the AESO needed to create different project numbers in order to separate them.



5. **NORTHWEST (OF) FORT MCMURRAY TRANSMISSION DEVELOPMENT (NW FMM); PROJECT 1180**
 – To provide service and connect future industrial customers in areas northwest of Fort McMurray where there are no transmission facilities.

THE PROJECT: The Northwest (of) Fort McMurray 240 kV Transmission Development includes a 240 kV looped system extending west from existing transmission facilities between the Dover 888S and Joslyn 849S substations, including the addition of two new 240 kV substations. This expansion of the transmission system will serve developing (electricity intensive) industrial growth as oilsands extraction facilities and related industrial developments are proceeding into areas where there are currently no transmission facilities to provide service, and connect future industrial customers.

THE COMPONENTS: Major components include a new 240 kV switching substation (Birchwood Creek 960S-NW FMM South); existing 9L57 line in/out at Birchwood Creek 960S; a new 240 kV switching station (Ells River 2079S-NW FMM North); 9L08 Joslyn to Dover line in/out at Ells River 2079S (approximately 50 km of 240 kV double-circuit line, designated as 9L08/9L76), and approximately 80 km of 240 kV single-circuit line (9L95), between Ells River 2079S and Birchwood Creek 960S.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
Birchwood Creek substation and 9L57 in/out	1	Birchwood Creek: new 240 kV switching substation; existing 9L57 line in/out at Birchwood Creek	April 1, 2015
Ells River substation, 9L76 and 9L08, in/out 240 kV double-circuit line from existing 9L08 to Ells River substation	2	9L08, Joslyn to Dover line in/out at Ells River (approximately 50 km of 240 kV double-circuit line)	NOT PROCEEDING
Ells River to Birchwood Creek Line 9L95, 240 kV line between Ells River and Birchwood Creek	3	Approximately 80 km of 240 kV double-circuit line, one-side strung, between Ells River and Birchwood Creek	NOT PROCEEDING

THE TRANSMISSION FACILITY OWNER(S): ATCO.

PROJECT COST:

TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
Northwest (of) Fort McMurray Transmission Development	\$343 Million (2013\$)¹¹	\$235.1 Million (ISD\$ with escalation)

CURRENT STATUS: The Birchwood Creek switching substation and 9L57 240 kV in/out went in service on March 9, 2015.

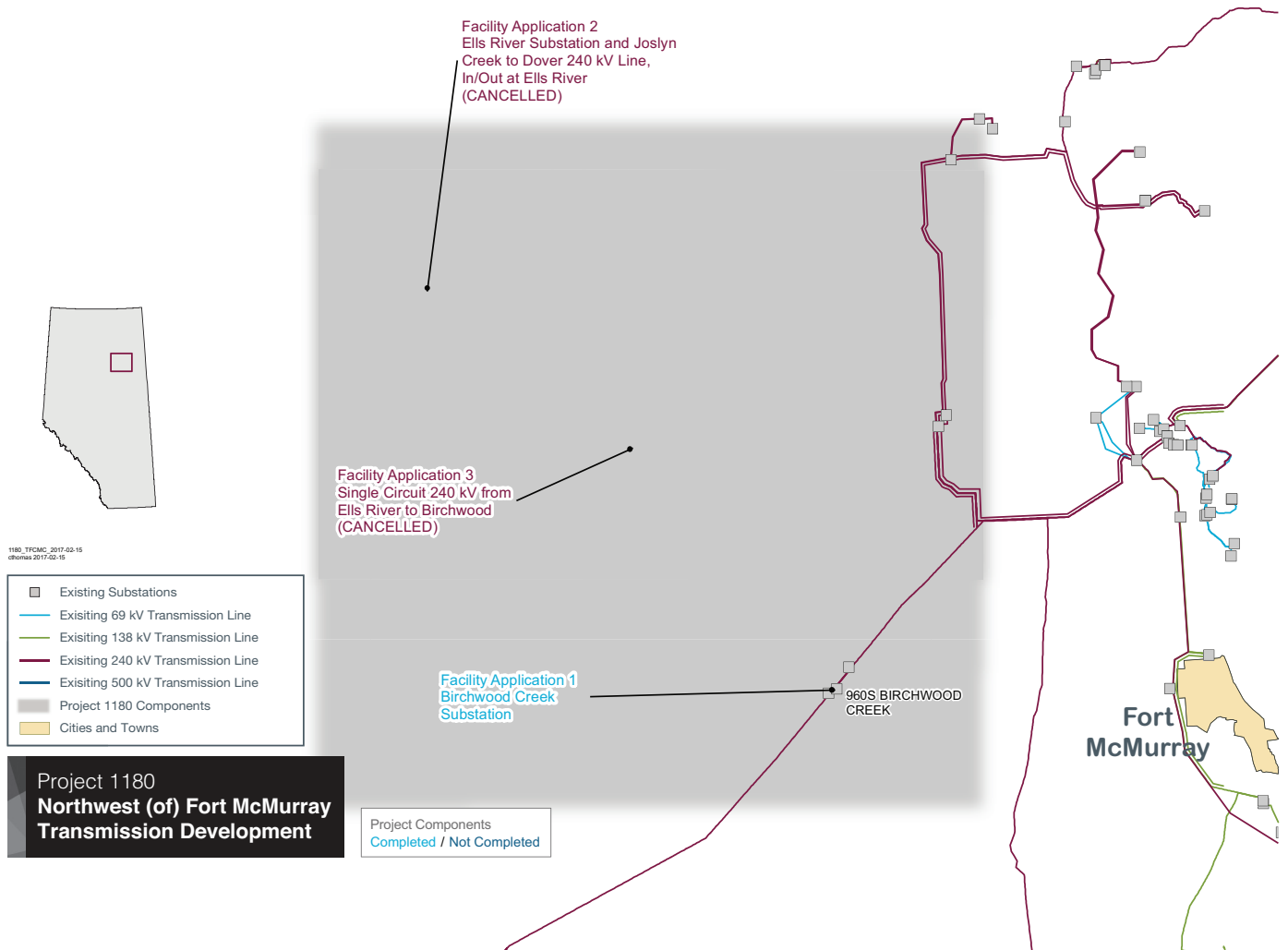
The AESO instructed ATCO in September 2015 to suspend work related to the FA for the Ells River substation and 9L76/9L08 240 kV in/out double circuit as customers cancelled connection projects in the area, and these developments are no longer required.

In early 2017, the AESO will issue a Notice of Project Cancellation for the unconstructed components of the project: Ells River Substation, 240 kV transmission line 9L76/9L08, and 240 kV transmission line 9L95.

¹¹ Referenced as the “240 kV double-circuit line from Livock to Joslyn Creek” in the Long-Term Transmission Plan filed in June 2012.

PROJECT RISKS

There are no risks to report at this time.



6. RED DEER REGION TRANSMISSION DEVELOPMENT (RDTD); PROJECT 813 – 240/138 kV transmission system reinforcements in the Red Deer area.

THE PROJECT: Growing demand from industrial, commercial, farming, and residential, along with existing constraints on the system have created the need to strengthen the transmission system in the Red Deer region.

THE COMPONENTS: There are two stages of transmission development for the project.

The major components for Stage 1 of the project are building new 240/138 kV substations near Didsbury, Ponoka and Innisfail; upgrading substations near Benalto and West Lacombe; adding approximately 150 km of new and rebuilt transmission line, and salvaging more than 100 km of existing transmission line.

The only component left for Stage 2 of the project is building a third 138 kV line from Gaetz to Joffre.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
Red Deer Area Transmission Development Stage 1 – Brownfields	1	Split 768L and 778L; 240/138 kV transformer at Benalto 17S; capacitor banks at Joffre 535S, Prentiss 276S and Ellis 332S	November 28, 2013
Red Deer Area Transmission Development Stage 1 – Greenfields	3	New Johnston 240/138 kV substation and new transmission lines; 138 kV line from NE Lacombe 212S to Ellis 322S; new Wolf Creek 240/138 kV substation and new transmission lines; new Hazelwood 240/138 kV substation and new transmission lines	December 15, 2016
Red Deer Area Transmission Development Stage 1 – Rebuilds	2	Rebuild 80L from S. Red Deer 194S to N. Red Deer 217S; rebuild 80L from S. Red Deer 194S to Red Deer 63S; rebuild 755L from Red Deer 63S to Piper Creek 247S to Joffre 535S, and rebuild 717L from Red Deer 63S to Benalto 17S	February 1, 2017
Red Deer Area Transmission Development – New 423L	6	New 138 kV (423L) transmission line from 332S Ellis to 212S NE Lacombe	February 28, 2017
Red Deer Area Transmission Development Stage 1 – Salvage	5	Salvage 80L from Ponoka 331S to West Lacombe 958S; salvage 80L from Red Deer 63S to Innisfail 214S to Olds 55S; salvage 716L from Wetaskiwin 40S to Ponoka 331S	April 13, 2017
Red Deer Area Transmission Development Stage 2 – Rebuild 166L	4	Rebuild 166L from Didsbury 152S to Harmattan 256S	ON HOLD
Red Deer Area Transmission Development Stage 2 – 2017 Facilities	7	Component energizations	ON HOLD

THE TRANSMISSION FACILITY OWNER(S): AltaLink.

PROJECT COST:

TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
Red Deer Region Transmission Development	\$329 Million (2013\$)	\$408.2 Million (ISD\$ with escalation)

CURRENT STATUS: Stage 1 includes Brownfield developments, Rebuilds, and Greenfield developments. The Brownfields went in service in 2013, and the Rebuilds and Greenfields are expected to be in service by the third quarter of 2017.

Two FAs are under construction with a forecast ISD of the third quarter of 2017.

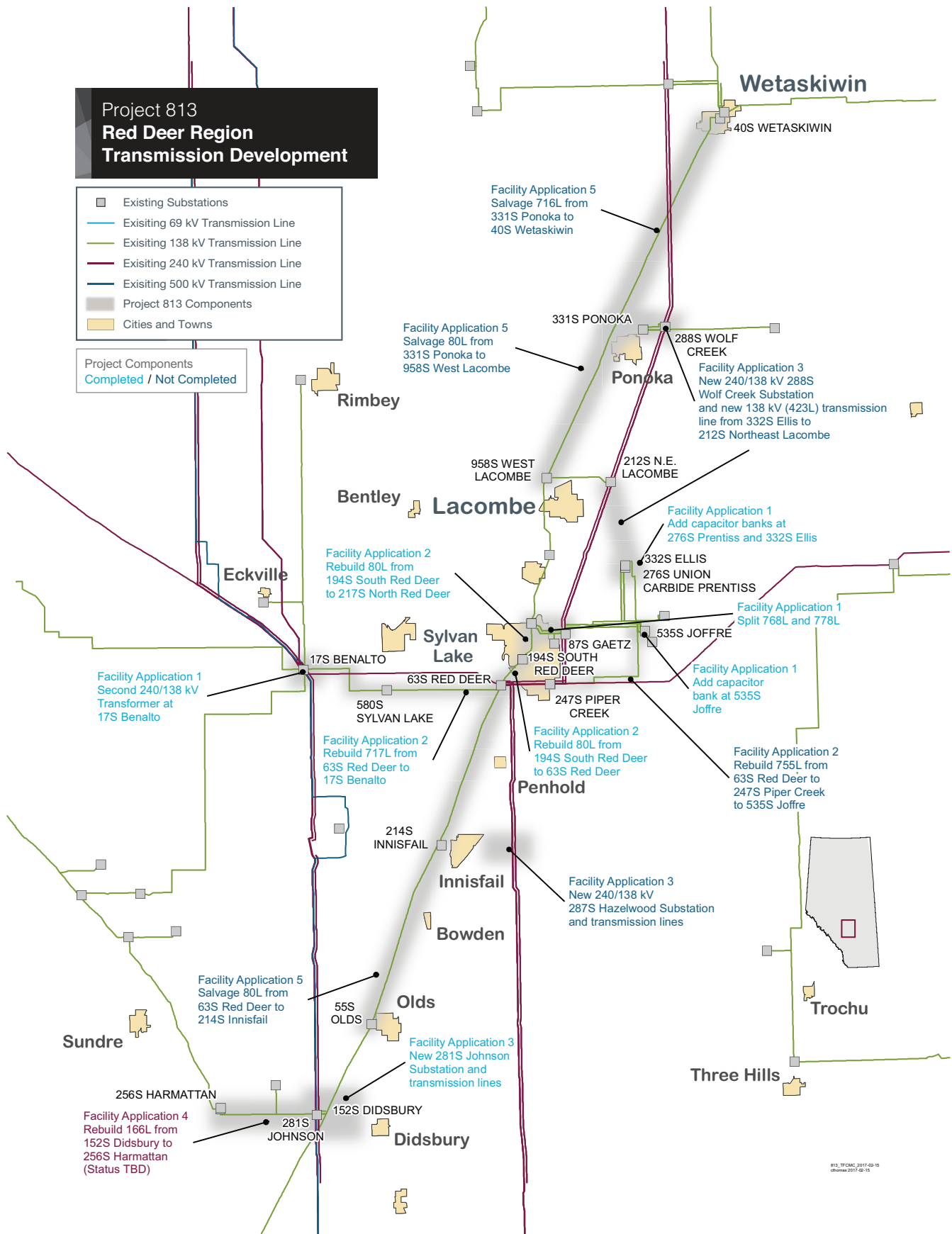
Stage 2 development is the rebuild of line 166L. Updated Central Region study results indicate that the line is not needed until 2030 or later. In November 2015, the AESO issued a Stop Work Direction to AltaLink to cease all work related to the rebuild of 166L.

The increase in the current estimated cost for this period is the result of inclusion of AFUDC costs. In Decision 3524-D01-2016 of AltaLink's 2015-2016 GTA Tariff application, AltaLink received approval for the discontinuation of CWIP and the return of AFUDC accounting method (capitalizing AFUDC to project expenditures) effective January 1, 2011.

PROJECT RISKS

Risks for Stage 1 include the need to coordinate outages with other projects to meet the 2017 third quarter ISD, which will be mitigated by the AESO and AltaLink's Operations teams.

There are potential delays to the ISD of the Hazelwood 287S substation due to line routing amendments awaiting AUC approval.



7. SOUTH AND WEST OF EDMONTON TRANSMISSION DEVELOPMENT (SWEATR); PROJECT 850 – Transmission system reinforcement to the 138 kV systems south and west of the City of Edmonton.

THE PROJECT: In preparation of the South and West Edmonton Plan, the AESO considered the specific needs and timing of existing and future transmission facilities in the South and West Edmonton area. There is insufficient transmission capacity in the South and West Edmonton area and transmission reinforcements are required to provide the needed capacity to meet future load growth.

The South and West Edmonton Transmission Development will add two new 240/138 kV substations, one south of the town of Stony Plain and one close to the Nisku 149S substation; reconfigure the 138 kV network in the vicinity of the Cooking Lake 522S substation; rebuild portions of the 138 kV transmission lines, and modify existing substations in the area.

THE COMPONENTS: The list for the South and West of Edmonton Transmission System Development is as follows: a new 240/138 kV Harry Smith substation; a new 240/138 kV Saunders Lake substation; two new 138 kV lines between 780L and Cooking Lake, and reconfiguration; one 138 kV 27 MVar capacitor bank at Leduc 325S, and existing 138 kV lines reconfiguration.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
New capacitor bank at Leduc 325S	5	One 138 kV 27 MVar capacitor bank at Leduc 325S	July 1, 2017
Open 133L from Wabamun 19s to 234L tap	4	Operate 133L line from Wabamun 19S to 234L tap normally open (operating condition)	December 31, 2017
Two new 138 kV lines between 780L and Cooking Lake and, reconfiguration	3	Two new 138 kV circuits, 780L to Cooking Lake 522S, and augmentation of Cooking Lake 522S Substation (upgrades existing bus, addition of circuit breakers with isolating switches)	December 31, 2017
New Saunders Lake Substation	2	New Saunders Lake 289S substation including two 240/138 kV 400 MVA transformers; modifications to Nisku 149S, Wetaskiwin 40S and Ellerslie 89S; proposed Wolf Creek 288S, Bigstone 86S; four new 240 kV lines, two new 138 kV lines, and rebuild 780L and 858L between Nisku and Saunders Lake	December 31, 2017
New Harry Smith Substation	1	New 240/138kV Harry Smith 367S substation including two 240/138 kV 400 MVA transformers; modifications to Acheson 305S, Stony Plain 434S and Keephills 320P substations; two new 240 kV lines, and three new 138 kV lines	December 31, 2017
New EPCOR scope of work	N/A	P&C line renumbering	December 31, 2017

THE TRANSMISSION FACILITY OWNER(S): AltaLink.

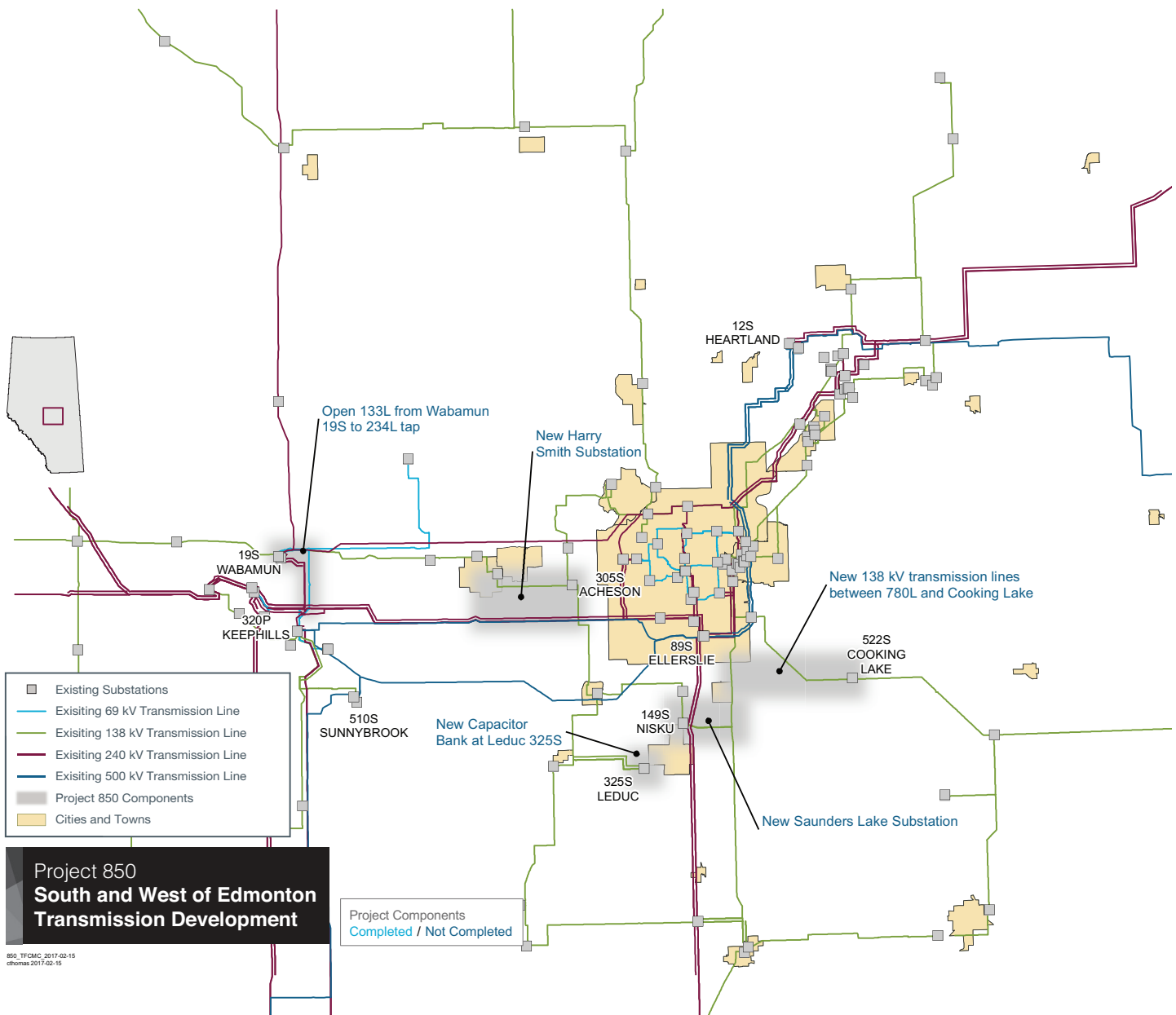
PROJECT COST:

TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
South and West of Edmonton Transmission Development	\$194 Million (2013\$)	\$304.3 Million (ISD\$ with escalation)

CURRENT STATUS: AltaLink commenced construction in November 2016 forecasting a project ISD for December 2017.

PROJECT RISKS

There are no risks to report at this time.



8. SOUTHERN ALBERTA TRANSMISSION REINFORCEMENT (SATR); PROJECT 787 – To accommodate wind generation in southern Alberta.

THE PROJECT: The existing capacity of the transmission system in southern Alberta is insufficient to provide adequate system access for the interconnection of additional wind-powered generation. Additional substations and upgrades to existing facilities are required. The AESO originally outlined the need for a 240 kV AC looped system with three stages of implementation.

THE COMPONENTS: The project includes three stages of development.

Stage 1: COMPLETED – Reinforcing the 240 kV system in the Fort MacLeod and the Brooks–Medicine Hat corridor.

Stage 2: To reinforce the 240 kV and 138 kV systems in the Glenwood, Lethbridge, Blackie and City of Medicine Hat areas, including a 240 kV system loop connection to the 500 kV Langdon–Cranbrook line.

Stage 3: CANCELLED – Interconnect the Ware Junction–Langdon area via a 240 kV line.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
Milo Junction Switching Station	2	Build a switching station at Milo Junction	November 1, 2011
PST Addition at Russell 632S	3	Phase shifting transformer and new Russell substation	April 25, 2012
Ware Junction Substation upgrade	13	933L line in/out at Ware Junction	October 4, 2013
Cassils to East Medicine Hat	4	240 kV lines from Cassils to new Bowmanton	November 27, 2013
East Medicine Hat to Whitla 240 kV Transmission Line	5	240 kV lines from Bowmanton to new Whitla	March 25, 2014
911L Line Replacement	1	Build new 240 kV lines from Foothills substation to Windy Flats substation	August 21, 2015
Medicine Hat Area 138 kV Line Development	6	138 kV system upgrades in the Medicine Hat area	December 5, 2016
Blackie Area 138 kV Upgrade	11	138 kV system upgrade in the Blackie area	May 28, 2016
Castle Rock Ridge to Chapel Rock 240 kV Line	7	240 kV Line from Goose Lake to new Chapel Rock 500 kV substation	ON HOLD
Etzikom Coulee S/S and 240 kV Line to Picture Butte S/S	8	240 kV line from Etzikom Coulee to Picture Butte (formerly called MATL) substation	NOT PROCEEDING
240 kV Line from Etzikom Coulee to Goose Lake	9	240 kV line from Etzikom Coulee substation to Goose Lake substation	NOT PROCEEDING
Etzikom Coulee S/S to Whitla 240 kV Line	10	240 kV line from Journault to Whitla substation	NOT PROCEEDING
Cypress Reactive Power Addition	12	Reactive power addition at Cypress 562S substation	ON HOLD

THE TRANSMISSION FACILITY OWNER(S): AltaLink.

PROJECT COST:

TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
Southern Alberta Transmission Reinforcement	\$2.493 Billion (2013\$)	\$1.866 Billion (ISD\$ with escalation)

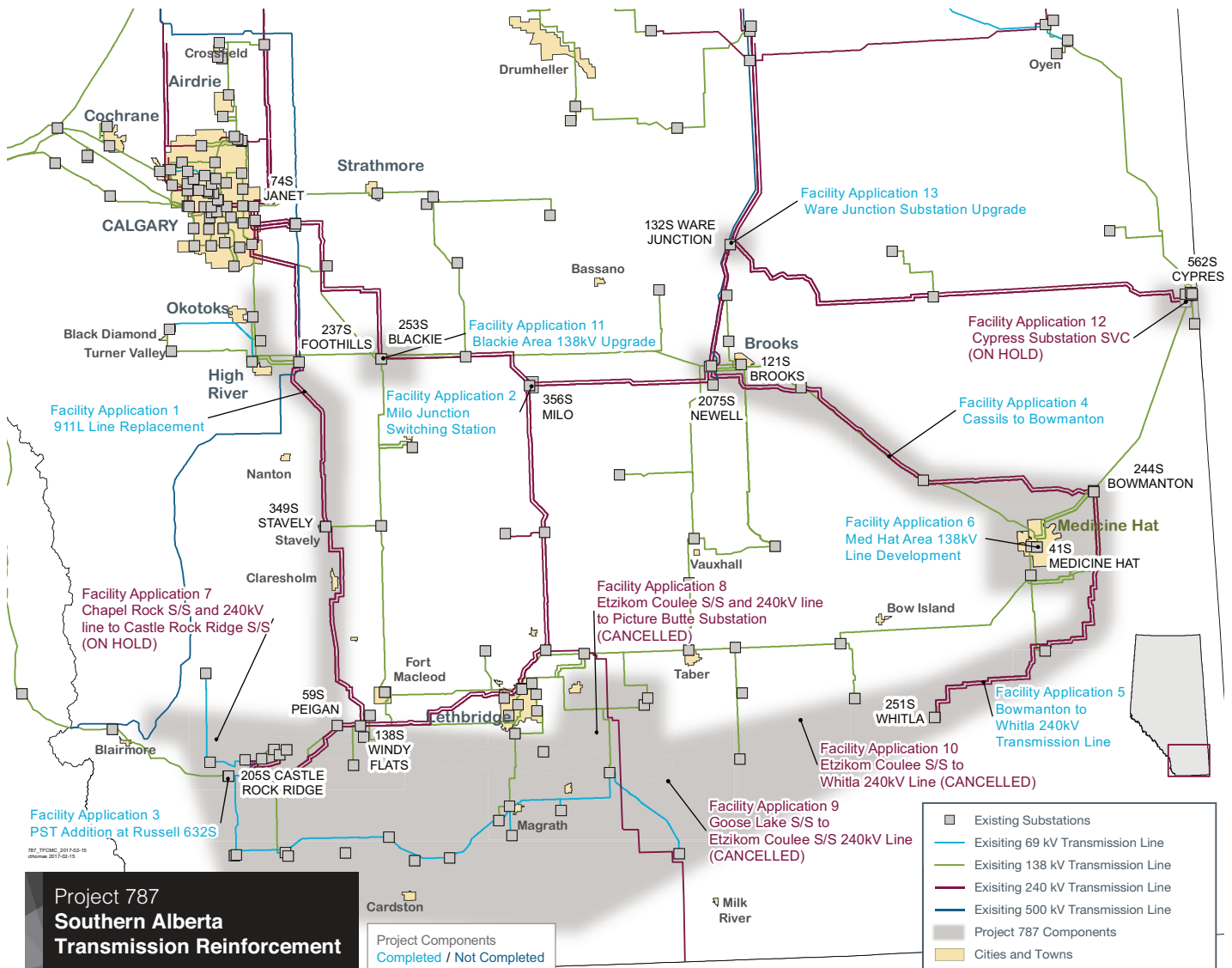
CURRENT STATUS: Stage 1 has been completed.

Stage 2 scope includes eight FAs. Three FAs have been energized and three FAs will not be proceeding. The preparation work on two FAs has been stopped (the need and timing of these applications are being re-evaluated by the AESO).

Stage 3 has been cancelled.

PROJECT RISKS

The Castle Rock Ridge to Chapel Rock transmission development and the Cypress Reactive Power project elements are under review and adjustments may be required based on need and timing.



9. **THICKWOOD HILLS 240 KV TRANSMISSION DEVELOPMENT AND REACTIVE POWER REINFORCEMENT (THTD);** PROJECT 1186 – To connect the Fort McMurray West 500 kV transmission project to the existing transmission system in the Thickwood Hills area, west of Fort McMurray.

THE PROJECT: This consists of a 240 kV substation and reactive power reinforcement for the 500 kV Fort McMurray West project. The present requested ISD is the fourth quarter of 2018, which is at least six months ahead of the 500 kV West Line.

THE COMPONENTS: The project includes the construction of a new 240 kV substation that will terminate four 240 kV lines and also includes the construction of approximately 20 km of new double-circuit 240 kV line.

FACILITY APPLICATION NAME	FACILITY APPLICATION NUMBER	FACILITY APPLICATION DESCRIPTION	FORECAST OR ACTUAL IN-SERVICE DATE
Thickwood	1	Construct a new 240 kV substation and 20 km of 240 kV double-circuit line	October 1, 2018

THE TRANSMISSION FACILITY OWNER(S): ATCO.

PROJECT COST:

TRANSMISSION PROJECT	AESO LONG-TERM TRANSMISSION PLAN (FILED JANUARY 2014) ESTIMATED COST	CURRENT ESTIMATED COST
Thickwood Hills 240 kV Transmission Development and Reactive Power Reinforcement	Not Applicable ¹²	\$149.2 Million (ISD\$ with escalation)

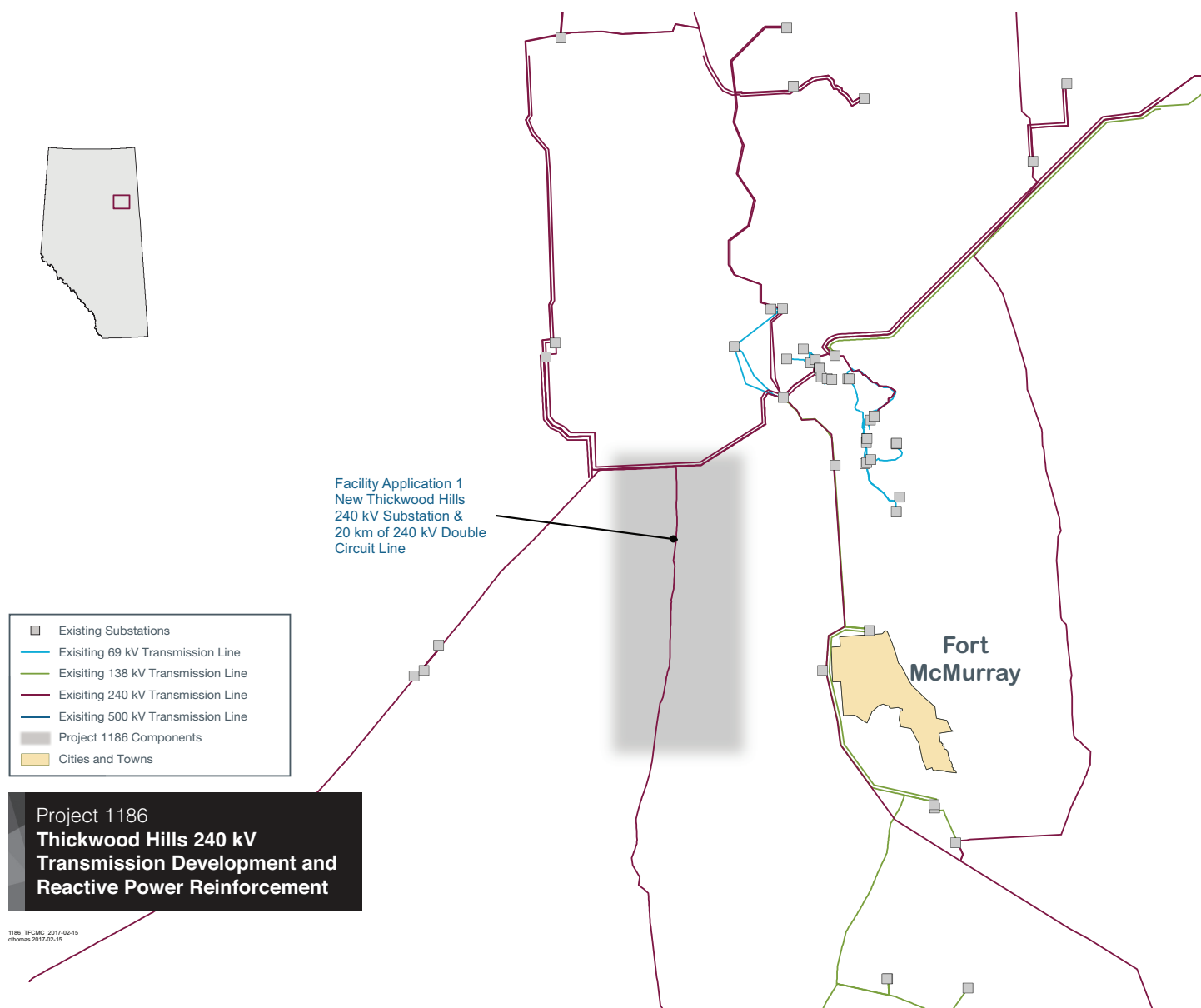
CURRENT STATUS: The AESO filed the NID on December 16, 2014, and received approval on March 12, 2015.

ATCO filed their FA on December 11, 2015. FA approval is currently expected to coincide with the 500 kV Fort McMurray West Facility Application approval in the first quarter of 2017. The current ISD is the fourth quarter of 2018, which is expected to be at least six months ahead of the ISD of the 500 kV Fort McMurray West line.

PROJECT RISKS

There are no risks to report at this time.

¹² The 'Not Applicable' entry is because the costs for this project were not broken out in the AESO Long-Term Transmission Plan that was filed in January 2014.



Appendix C: Previously Monitored Projects

Since the TFCMC began its deliberations, the Committee has monitored a total of 20 different transmission projects. To date, 13 of the projects have been completed, or are in service, and for the purpose of TFCMC reporting are considered closed. Those undertakings, and their final costs, are below. Projects are listed alphabetically.

- ◇ **ALBERTA INDUSTRIAL HEARTLAND BULK TRANSMISSION DEVELOPMENT (HBTD); PROJECT 629** – Construction of a double-circuit 500 kV transmission line, connecting the Heartland region (northeast of Fort Saskatchewan) to existing 500 kV transmission facilities in the Edmonton area.

NID Estimate: Not Available¹³ | Service Proposal Estimate: \$580.7 million | Final Project Cost: \$699.5 million¹⁴ |

Removed from monitoring: TFCMC December 2014 Report

- ◇ **NEWLY COMPLETED PROJECT: CENTRAL EAST AREA TRANSMISSION DEVELOPMENT (CETD) – PROJECT 811** – Additional substations and upgrades to existing facilities to accommodate load and generation growth in central Alberta.

NID Estimate: \$431.0 million | Service Proposal Estimate: \$243.4 million | Estimated Final Project Cost: \$342.2 million¹⁵ |

Removed from monitoring: TFCMC December 2016 Report

- ◇ **CHRISTINA LAKE AREA 240 KV TRANSMISSION DEVELOPMENT (CHL); PROJECT 1101** – Transmission facilities serving new oilsands developments and enhanced reliability to existing oilsands operations.

NID Estimate: \$406.6 million | Service Proposal Estimate: \$418.9 million | Final Project Cost: \$490 million |

Removed from monitoring: TFCMC December 2015 Report

- ◇ **EAST CALGARY TRANSMISSION PROJECT AND ENMAX SHEPARD ENERGY CENTRE CONNECTION (ECTP); PROJECT 719** – Serving growing demand for electricity in the Calgary and High River planning areas and an interconnection to the ENMAX Shepard Energy Centre.

NID Estimate: \$132.6 million | Service Proposal Estimate: \$136.3 million | Estimated Final Project Cost: \$164.26 million¹⁶ |

Removed from monitoring: TFCMC December 2015 Report

- ◇ **NEWLY COMPLETED PROJECT: EDMONTON REGION 240KV LINE UPGRADES (ERL) – PROJECT 786** – Upgraded 240 kV lines in the Edmonton area and added one 240 kV phase shifter at the Livock substation to get more capacity out of the existing 240 kV network.

NID Estimate: \$125.4 million | Service Proposal Estimate: \$155 million | Estimated Final Project Cost: \$197 million¹⁷ |

Removed from monitoring: TFCMC December 2016 Report

13 A NID Estimate was not available. However, the Alberta Electric System Operator's (AESO) Long-Term Plan (LTP) showed a cost of \$613 million in 2013 dollars.

14 The final cost for this project is \$ 699,495,464.

15 The AESO is awaiting the final costs for this project. This amount will be updated once it is available.

16 The AESO is awaiting the final costs for this project. This amount will be updated once it is available.

17 The AESO is awaiting the final costs for this project. This amount will be updated once it is available.

- ◇ **ENMAX NO. 65 SUBSTATION (ESCS); PROJECT 922¹⁸** – New 240 kV substation in south Calgary and 138 kV development due to overloading in south Calgary.

NID Estimate: Not Available¹⁹ | Service Proposal Estimate: \$38 million | Final Project Cost: \$45 million |

Removed from monitoring: TFCMC June 2014 Report

- ◇ **FOOTHILLS AREA TRANSMISSION DEVELOPMENT (FATD) – EAST PROJECT; PROJECT 1117** – Serving growing demand in South Calgary, High River and the surrounding area.

Part of the overall FATD project, which is estimated to cost \$921 million according to the AESO's LTP plan filed in January 2014.

NID Estimate: Not Applicable²⁰ | Service Proposal Estimate: \$443.5 million | Estimated Final Project Cost: \$465.23 million²¹ |

Removed from monitoring: TFCMC December 2015 Report

- ◇ **HANNA REGION TRANSMISSION DEVELOPMENT (HATD); PROJECT 812** – Transmission development in the Hanna, Sheerness and Battle River areas.

NID Estimate: \$983 million | Service Proposal Estimate: \$940.9 million | Final Project Cost: \$997.3 million²² |

Removed from monitoring: TFCMC June 2015 Report

- ◇ **NORTH SOUTH TRANSMISSION REINFORCEMENT (HVDC); PROJECT 737** – Construction of two 500 kV HVDC transmission lines from the Edmonton area to the Calgary and south regions.

NID Estimate: Not Available²³ | Service Proposal Estimate: \$3.058 billion | Estimated Final Project Cost: \$3.6 billion²⁴ |

Removed from monitoring: TFCMC December 2015 Report

- ◇ **NORTH FORT MCMURRAY TRANSMISSION DEVELOPMENT (NFMD); PROJECT 791** – Transmission development relieving constraints and for forecast demand north of Fort McMurray.

NID Estimate: \$237.44 million | Service Proposal Estimate: \$237.44 million | Final Project Cost: \$352.3 million |

Removed from monitoring: TFCMC June 2014 Report

- ◇ **NORTHWEST TRANSMISSION DEVELOPMENT (NWTG); PROJECT 535** – Transmission expansion and enhancement in northwest Alberta.

NID Estimate: \$262 million²⁵ | Service Proposal Estimate: \$669.4 million | Final Project Cost: \$583 million |

Removed from monitoring: TFCMC December 2013 Report

18 The TFCMC monitored Project 922, ENMAX No. 65 Substation. While the current value of the project is below the \$100-million TFCMC threshold, the original project initially came in above the threshold and this is why the Committee kept it on its list of monitored projects.

19 A NID Estimate was not available. However, the AESO LTP showed a cost of \$37 million in 2011 dollars.

20 For this project, the TFO was not requested to provide NID cost estimates. Rather both AltaLink and ENMAX were directed to provide Service Proposal Estimates. The AESO used this estimate in its NID application and the TFOs used these estimates when they filed their Facility Applications.

21 The AESO is awaiting the final costs for this project. This amount will be updated once it is available

22 Final costs for AltaLink developments were received and reviewed by the AESO in May 2015. Final costs for ATCO developments were received in June 2015. The final cost for this project is \$ 997,264,513.

23 A NID Estimate was not available. However, the AESO LTP showed a cost of \$3.164 billion in 2013 dollars.

24 The AESO is awaiting the final costs for this project. This amount will be updated once it is available.

25 In the June 2011 TFCMC Report it was reported that the need for this project was recognized in March 2006 and the need approval was granted in August 2006 with the total project scope envisioned at \$262 million. However, due to project scope changes, the value increased.

- ◇ **SOUTHERN ALBERTA TRANSMISSION DEVELOPMENT (SATD);** PROJECT 416 – Transmission development in Goose Lake-Peigan and North Lethbridge region.

NID Estimate: \$77 million | Service Proposal Estimate: \$91 million | Final Project Cost: \$238 million |

Removed from monitoring: TFCMC June 2013 Report

- ◇ **YELLOWHEAD AREA TRANSMISSION DEVELOPMENT (YATD);** PROJECT 671 – Serving increased electricity demand; replaced aging infrastructure, and improved reliability for the Drayton Valley, Hinton, Edson and Alberta Beach areas.

NID Estimate: \$84 million | Service Proposal Estimate: \$126 million | Final Project Cost: \$141 million²⁶ |

Removed from monitoring: TFCMC December 2013 Report

²⁶ The estimated final cost of this project was \$148 million, as noted in the December 2013 TFCMC Report – at that time, final costs were not available. The actual final cost came in at \$140,652,893.

Appendix D: TFCMC Working Documents

The TFCMC receives reports and cost summary updates, on a monthly basis, in order to better understand the costs and changes associated with the transmission projects it monitors. In this part of the report, samples of the cost summary updates are included to provide readers with a better insight as to the type of material the TFCMC studies.

The cost summaries on the following pages are just a portion of the individual documents, which also include detailed information on authorized cost changes and cost estimate changes from the Needs Identification Document (NID) phase to the Service Proposal stage.

As the documents on the following pages are an example, or working documents, of just some of the material the TFCMC reviews, there could be cost discrepancies between Appendices B and D on a particular project. Please refer to Appendix B for the most recent and accurate estimated cost figures.

Project Cost Reporting for TFCMC, Project 786: Edmonton Region 240 kV Line Upgrades (ERLU); November 2016 Meeting

Project: 786 Cost Summary for [Edmonton Region 240 kV Line Upgrades] Refreshed @ 11/4/2016 2:07:02 PM

Project #	NID name			NID Filing Date	NID Approval Date	NID Estimated Cost	PPS Estimated Cost	Authorized Cost Change	Authorized Budget	Total Changes	Percent Change of Auth
786	Edmonton Region 240 kV Line Upgrades			2008-08-26	2009-02-24	125.41M	155.03M	23.31M	178.34M	25	13.1%

Project 786 Details by FA

TFO	Cost Grouping	FA #	FA name	Stage	Facility Application Filing Date	Facility Application Approval Date	Overall Facility ISD	PPS Estimated Cost	Authorized Cost Changes	Authorized Budget	No Of Changes	Percent Change Of Auth
AltaLink	1,2,4,5	1	AML Keephills Substation Addition (Formerly P953)	6	2009-11-06	2010-03-19	2010-07-31	101.35M	12.66M	114.01M	19	11.1%
		2	AML Rebuild 240kV 904L (1043L)	6	2010-07-28	2011-08-12	2016-09-29					
		4	AML 902L Restriring & 909L Retermination (Formerly P1057)	6	2011-08-05	2012-10-31	2016-08-18					
		5	AML 908L, 909L Restriring (Formerly P1058)	6	2009-09-13	2010-02-10	2011-03-20					
ATCO	7	7	ATCO Phase Shifter (Formerly P957)	6	2009-09-14	2010-03-25	2013-08-20	31.52M	8.00M	39.51M	3	20.2%
EPCOR	3	3	EPCOR 1044EL, 1045EL (Formerly P955)	6	2010-10-15	2011-08-12	2012-02-29	7.97M	0.00M	7.97M	0	0.0%
	6	6	Epoch Jasper, Petrolia (Formerly P955)	6	2010-04-15	2010-06-16	2011-06-14	4.55M	2.65M	7.20M	3	36.8%
TransA.	8	8	TransAlta 902L	6	2011-08-05	2012-10-31	2014-11-12	9.65M	0.00M	9.65M	0	0.0%

Comments

TransAlta and the Enoch FN have completed an agreement and AltaLink is scheduled to complete the work by November 30, 2016.

Project Cost Reporting for TFCMC, Project 787: Southern Alberta Transmission Reinforcement (SATR); November 2016 Meeting

Project: 787 Cost Summary for [Southern Alberta Transmission Reinforcement] Refreshed @ 11/4/2016 2:07:02 PM												
Project #	NID name			NID Filing Date	NID Approval Date	NID Estimated Cost	PPS Estimated Cost	Authorized Cost Change	Authorized Budget	Total Changes	Percent Change of Auth	
787	Southern Alberta Transmission Reinforcement			2008-12-30	2009-09-17	3,442.90M	1,415.62M	(5.26M)	1,410.36M	57	-0.4%	
Project 787 Details by FA												
TFO	Cost Grouping	FA #	FA name	Stage	Facility Application Filing Date	Facility Application Approval Date	Overall Facility ISD	PPS Estimated Cost	Authorized Cost Changes	Authorized Budget	No Of Changes	Percent Change Of Auth
AltaLink		7	Castle Rock Ridge to Chapel Rock 240 kV Line (Formerly P1034)	4	2017-02-17	2018-03-20	2019-06-28					
		8	Etzikom Coulee S/S and 240kV line to Picture Butte S/S (Formerly P1035)	4	2017-06-16	2018-06-18	2020-01-01					
		9	Goose Lake S/S to Etzikom Coulee S/S 240kV Line (Formerly P1036)	4	2017-11-23	2018-02-10	2020-01-01					
		10	Etzikom Coulee S/S to Whittla 240kV Line (Formerly P1037)	4	2017-07-14	2018-07-16	2020-01-01					
		12	Reactive Power Addition to Cypress 562S (Formerly P1039)	4	2020-10-13	2021-02-02	2022-01-04					
	1	1	911L Line Replacement (Formerly P882)	6	2012-09-25	2013-11-11	2015-08-21	440.17M	-0.43M	439.74M	15	-0.1%
	2	2	Milo Junction Switching Station (Formerly P883)	6	2009-12-21	2010-08-05	2011-11-01	29.70M	0.47M	30.17M	4	1.6%
	3	3	PST Addition at Russell 632S (Formerly P884)	6	2010-08-27	2011-01-12	2012-04-25	17.21M	-0.08M	17.13M	1	-0.5%
	4	4	Cassils to Bowmanton (Formerly P886)	6	2010-07-27	2011-06-08	2013-11-27	407.91M	-28.10M	379.81M	4	-7.4%
	5	5	Bowmanton to Whittla 240kV Transmission Line (Formerly P887)	6	2010-07-27	2011-06-08	2014-03-25	352.75M	-41.77M	310.98M	3	-13.4%
	6	6	Med Hat Area 138kV Line Development (Formerly P888)	5	2012-12-03	2013-10-18	2016-12-09	120.29M	61.46M	181.75M	22	33.8%
	11	11	Blackie Area 138kV Upgrade (Formerly P1038)	6	2014-09-11	2015-01-16	2016-05-28	41.45M	2.73M	44.18M	5	6.2%
	13	13	Ware Junction Substation Upgrade (Formerly P1040)	6	2011-04-05	2012-02-06	2013-10-04	6.13M	0.47M	6.61M	3	7.2%

Comments

Null

Project Cost Reporting for TFCMC, Project 811: Central East Area Transmission Development (CETD); November 2016 Meeting

Project: 811 Cost Summary for [Central East Area Transmission Development] Refreshed @ 11/4/2016 2:07:02 PM

Project #	NID name			NID Filing Date	NID Approval Date	NID Estimated Cost	PPS Estimated Cost	Authorized Cost Change	Authorized Budget	Total Changes	Percent Change of Auth
811	Central East Area Transmission Development			2010-05-17	2011-02-10	431.00M	243.39M	100.59M	343.98M	10	29.2%

Project 811 Details by FA

TFO	Cost Grouping	FA #	FA name	Stage	Facility Application Filing Date	Facility Application Approval Date	Overall Facility ISD	PPS Estimated Cost	Authorized Cost Changes	Authorized Budget	No Of Changes	Percent Change Of Auth
ATCO	1,2	1	FA 1 - Cold Lake Area 144 kV Reinforcements	6	2012-03-07	2012-12-11	2014-01-30	141.08M	54.83M	195.92M	3	28.0%
		2	FA 2 - Bonnyville 700S and 7L146	5	2012-04-27	2013-07-02	2016-12-13					
	3,4,5	3	FA 3 - St. Paul Area Upgrades - Watt Lake 956S	6	2011-12-23	2013-03-27	2013-12-12	50.85M	31.92M	82.77M	2	38.6%
		4	FA 4 - St. Paul Area Upgrades - St. Paul 707S and 7L139/7L70 in/out	6	2012-07-12	2013-12-20	2016-05-25					
		5	FA 5 - St. Paul Area Upgrades - Whitby Lake 819S 144kV CB Addition	6	2011-12-23	2012-04-20	2014-06-25					
	6	6	FA 6 - Vermillion 710S Substation Upgrade	6	2011-10-24	2012-05-16	2013-09-15	6.70M	2.92M	9.62M	1	30.4%
	7,8	7	FA 7 - Heisler Area Upgrades	6	2011-12-23	2012-02-27	2013-07-27	31.48M	10.91M	42.39M	4	25.7%
		8	FA 8 - Kitscoty Area Upgrades	6	2012-06-13	2013-01-02	2014-12-04					
	10,12	10	FA 10 - 7L701 Line Clearance Mitigation (Letter of Enquiry)	6	2011-10-24	2012-02-27	2012-07-18	13.28M	0.00M	13.28M	0	0.0%
		12	FA 12 - 7L53/7L117 Line Clearance Mitigation	6	2012-09-11	2012-10-01	2016-11-10					

Comments

Construction continues as planned; only Bonnyville 700S - Stage 2 (Energization #25) remains under construction; in-service planned for February 2017.

Project Cost Reporting for TFCMC, Project 813: Red Deer Region Transmission Development (RD TD); November 2016 Meeting

Project: 813 Cost Summary for [Red Deer Area Transmission Development] Refreshed @ 11/4/2016 2:07:02 PM

Project #	NID name			NID Filing Date	NID Approval Date	NID Estimated Cost	PPS Estimated Cost	Authorized Cost Change	Authorized Budget	Total Changes	Percent Change of Auth
813	Red Deer Area Transmission Development			2011-07-20	2012-04-10	222.80M	337.50M	66.91M	404.41M	65	16.5%

Project 813 Details by FA

TFO	Cost Grouping	FA #	FA name	Stage	Facility Application Filing Date	Facility Application Approval Date	Overall Facility ISD	PPS Estimated Cost	Authorized Cost Changes	Authorized Budget	No Of Changes	Percent Change Of Auth
AltaLink		7	RDATD Facility Application 7 - Stage II 2017 Facilities	4	2017-10-18	2018-05-02	2018-10-31					
	1	1	RDATD Facility Application 1 - Brownfields	6	2011-09-26	2012-09-27	2013-11-28	20.72M	10.96M	31.68M	16	34.6%
	2	2	RDATD Facility Application 2 - Rebuilds	5	2013-06-18	2014-07-28	2017-02-02	137.30M	25.26M	162.56M	22	15.5%
	3,6	3	RDATD Facility Application 3 - Greenfields	5	2013-06-18	2014-07-28	2017-03-30	179.48M	30.69M	210.17M	27	14.6%
		6	RDATD Facility Application 6 - 423L	Null	2013-06-18	2015-11-27						

Comments

Construction continues as planned.

Project Cost Reporting for TFCMC, Project 850: South and West of Edmonton Transmission Development (SWEATR); November 2016 Meeting

Project: 850 Cost Summary for [South and West of Edmonton Transmission Development] Refreshed @ 11/4/2016 2:07:02 PM

Project #	NID name			NID Filing Date	NID Approval Date	NID Estimated Cost	PPS Estimated Cost	Authorized Cost Change	Authorized Budget'	Total Changes	Percent Change of Auth'
850	South and West of Edmonton Transmission Development			2012-12-14	2014-05-05	172.17M	306.61M	0.00M	306.61M	0	0.0%

Project 850 Details by FA

TFO	Cost Grouping	FA #	FA name	Stage	Facility Application Filing Date	Facility Application Approval Date	Overall Facility ISD	PPS Estimated Cost	Authorized Cost Changes	Authorized Budget	No Of Changes'	Percent Change Of Auth'
AltaLink	1.2	1	Facility Application 1 - Cooking Lake - Saunders Lake - Leduc - Wabamun	4	2015-10-16	2016-07-15	2018-07-31	306.43M	0.00M	306.43M	0	0.0%
		2	Facility Application 2 - Harry Smith Development	5	2015-10-30	2016-07-28	2017-12-31					
EPCOR	6	6	FA6 - EPCOR P&C and Line Renumbering (Facility Application Not Required)	5	2015-04-02	2015-04-02	2017-12-31	0.17M	0.00M	0.17M	0	0.0%

Comments

Detailed design underway. Construction planned to start on Q4-2016

Project Cost Reporting for TFCMC, Project 1180: Northwest (of) Fort McMurray Transmission Development (NW-FMM); November 2016 Meeting

Project: 1180 Cost Summary for [NW Ft McMurray Transmission Development] [Refreshed @ 11/4/2016 2:07:02 PM](#)

Project #	NID name			NID Filing Date	NID Approval Date	NID Estimated Cost	PPS Estimated Cost	Authorized Cost Change	Authorized Budget	Total Changes	Percent Change of Auth
1180	NW Ft McMurray Transmission Development			2011-11-10	2012-06-19	366.29M	235.09M	0.00M	235.09M	0	0.0%

Project 1180 Details by FA

TFO	Cost Grouping	FA #	FA name	Stage	Facility Application Filing Date	Facility Application Approval Date	Overall Facility ISD	PPS Estimated Cost	Authorized Cost Changes	Authorized Budget	No Of Changes	Percent Change Of Auth
ATCO		3	Facility Application 3 - 9L95	4	2017-04-17	2017-10-02	2018-07-09					
	1	1	Facility Application 1 - Birchwood Creek	6	2013-10-31	2014-01-08	2015-03-10	35.60M	0.00M	35.60M	0	0.0%
	2	2	Facility Application 2 - Ellis River/9L08/9L76	4	2018-01-03	2018-06-20	2019-06-05	199.49M	0.00M	199.49M	0	0.0%

Comments

Remaining facilities deferred until further notice.

Project Cost Reporting for TFCMC, Project 1186: Thickwood Hills 240 kV Transmission Development and Reactive Power Reinforcement (THTD); November 2016 Meeting

Project: 1186 Cost Summary for [Thickwood Hills 240 kV Transmission Development and Reactive Power Reinforcement] Refreshed @ 11/4/2016 2:07:02 PM

Project #	NID name			NID Filing Date	NID Approval Date	NID Estimated Cost	PPS Estimated Cost	Authorized Cost Change	Authorized Budget'	Total Changes	Percent Change of Auth
1186	Thickwood Hills 240 kV Transmission Development and Reactive ..			2014-12-16	2015-03-12	156.84M	132.43M	0.00M	132.43M	0	0.0%

Project 1186 Details by FA

TFO	Cost Grouping	FA #	FA name	Stage	Facility Application Filing Date	Facility Application Approval Date	Overall Facility ISD	PPS Estimated Cost	Authorized Cost Changes	Authorized Budget	No Of Changes'	Percent Change Of Auth'
ATCO	1	1	Thickwood	4	2015-12-11	2017-02-17	2018-10-01	132.43M	0.00M	132.43M	0	0.0%

Comments

AUC Decision and P&L on the Facility Application is pending.

Project Cost Reporting for TFCMC, Project 1456: Downtown Calgary Transmission Reinforcement Project (DCTRP); November 2016 Meeting

Project: 1456 Cost Summary for [Downtown Calgary Transmission Reinforcement] [Refreshed @ 11/4/2016 2:07:02 PM](#)

Project #	NID name	NID Filing Date	NID Approval Date	NID Estimated Cost	PPS Estimated Cost	Authorized Cost Change	Authorized Budget	Total Changes	Percent Change of Auth
1456	Downtown Calgary Transmission Reinforcement	2015-11-18	2016-06-01	144.48M	0.00M	0.00M	0.00M	0	0.0%

Project 1456 Details by FA

TFO	Cost Grouping	FA #	FA name	Stage	Facility Application Filing Date	Facility Application Approval Date	Overall Facility ISD	PPS Estimated Cost	Authorized Cost Changes	Authorized Budget	No Of Changes	Percent Change Of Auth
ENMAX		1	FA1 - All ENMAX Facilities	4	2017-01-16	2018-01-15	2021-03-31					

Comments

ENMAX plans to file its Facility Application in Q1 2017 and complete construction by Q2 2021.



Appendix E: Transmission Facility Owners Responses

Under the TFCMC's mandate, the Committee shall allow Transmission Facility Owners (TFOs) to review and provide written comments on any report produced that references a TFO or a project a TFO is developing. The following responses were received in regards to the December 2016 Report.



2611 3rd Ave SE, Calgary, Alberta, T2A 7W7

www.altalink.ca

April 30, 2017

Henry Yip
Transmission Cost Monitoring Committee
Email: hcyip@telus.net

Subject: 12th Semi Annual Transmission Cost Monitoring Committee Report

Henry,

Thank you for the opportunity to review the TFCMC's twelfth semi-annual Transmission Cost Monitoring Committee Report. AltaLink continues to be supportive of reviewing project progress with the TFCMC in order to provide customer associations more visibility to project progress and cost.

AltaLink appreciated the opportunity to present to the Cost Monitoring Committee in September 2016. At that time we provided an update on our ongoing focus on Value Engineering and spacer dampers. I am pleased to report that AltaLink was able to provide approximately \$27M of capital savings through the 2016 efforts on Value Engineering. In addition, we are on track with the space damper replacement program and expect to complete all twin bundle space dampers by the end of June 2017 as planned.

Lastly, AltaLink is pleased that the Cost Monitoring Committee noted the outcome of AUC Decision 3585-D03-2016 regarding the 2012 and 2013 Deferral Account Reconciliation Application. In particular, the commission supported the use of helicopters, access mats and EPC rates as reasonable and prudent for the projects under review. On April 5, 2017, AltaLink filed its next Deferral Account Application covering projects completed in 2014 and 6 projects completed in 2015. We anticipate filing the balance of the 2015 projects in a subsequent application in Q4 of this year. With the completion of these applications, the final chapter for the bulk of the projects which constituted the "Big Build" will be complete.

Thanks you again for the opportunity to comment on the report. Please feel free to contact me if you require any additional information.

Regards,

Johanne Picard-Thompson
SVP Projects, AltaLink

cc Jerry Mossing, VP AESO

Transmission Facility Owners Responses



2000 – 10423 101 St NW, Edmonton, AB
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epcor.com

April 28, 2017

Henry Yip, Chair
Transmission Facilities Cost Monitoring Committee
Email: heyip@telus.net

Dear Mr. Yip:

RE: TFCMC December 2016 Report

EDTI appreciates the opportunity to review and comment on the December 2016 Report from the Transmission Facilities Cost Monitoring Committee (the "Committee").

As stated in our comments to previous reports, EDTI remains supportive of the Committee and its efforts to understand Alberta transmission infrastructure projects and the various factors that can impact the cost, scope and schedule of these projects.

If you have any questions about EDTI's comments, please do not hesitate to contact me at 780-441-7109.

Regards,

<original signed>

Saqib Chaudhary
Director, Regulatory Affairs & Business Planning
EPCOR Distribution & Transmission Inc.

Notes

Notes

DECEMBER 2016 REPORT
TFCMC@gov.ab.ca

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ucahelps.alberta.ca/regulatory-reporting.aspx

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