AUC
Alberta Utilities Commission

ENMAX Power Corporation

Southeast Substation Safety Enhancement Project

August 30, 2022

Alberta Utilities Commission
Decision 27193-D01-2022
ENMAX Power Corporation
Southeast Substation Safety Enhancement Project
Proceeding 27193
Application 27193-A001

August 30, 2022

Published by the:
Alberta Utilities Commission
Eau Claire Tower
1400, 600 Third Avenue S.W.
Calgary, Alberta T2P 0G5

Telephone: 310-4AUC (310-4282 in Alberta)
1-833-511-4AUC (1-833-511-4282 outside Alberta)
Email: info@auc.ab.ca
Website: www.auc.ab.ca

1 Decision summary

1. In this decision, the Alberta Utilities Commission approves the preferred option of ENMAX Power Corporation's application for the Southeast Substation Safety Enhancement Project, which is to modify ENMAX No. 32 Substation. The Commission approves the alternate flood mitigation option of the implementation of 350-year flood mitigation measures in the form of a bank armouring and self-launching apron design.

2 Application

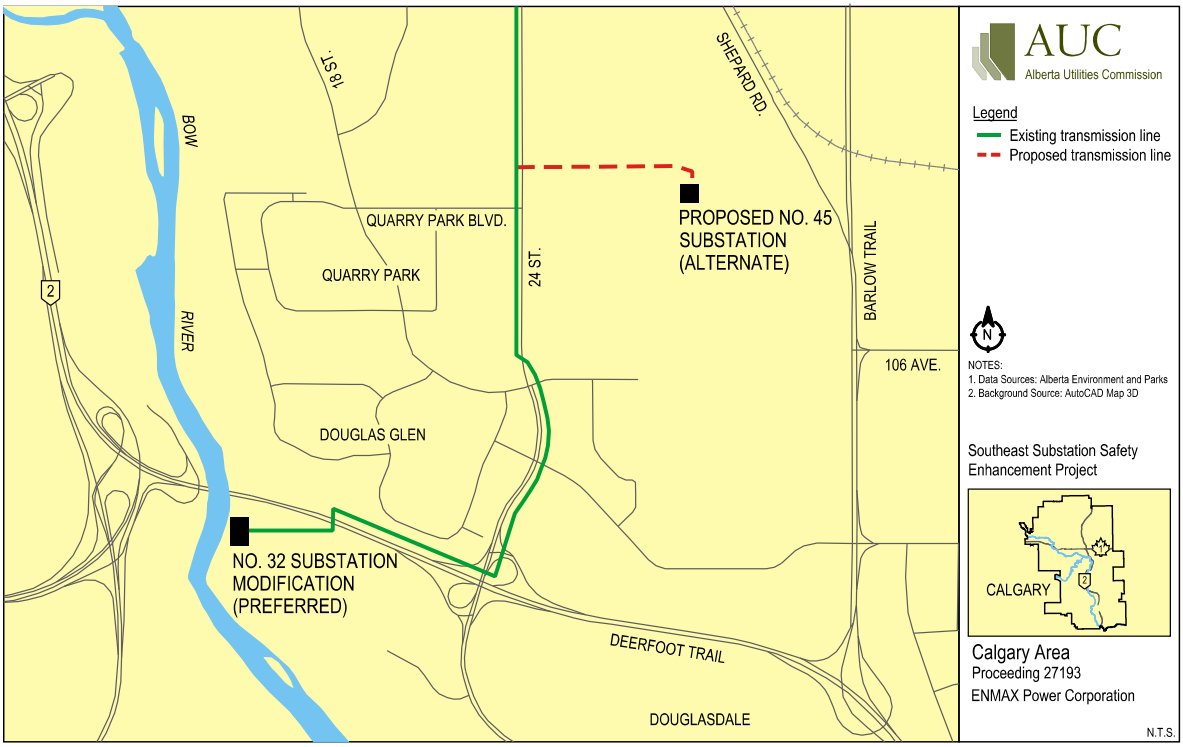
2. ENMAX identified an arc-flash hazard from existing outdoor switchgear at its No. 32 Substation, which presents a safety concern to employees working at the substation. The substation is located in southeast Calgary and within the floodway of the Bow River. ENMAX filed an application with the Commission in which it proposed two options to address the hazard, and to mitigate flood risks at the substation:

- **No. 32 Substation modification (preferred):** replace the existing switchgear with indoor arc-resistant switchgear located inside a new building at No. 32 Substation and implement 350-year flood mitigation measures.

- **New No. 45 Substation (alternate)**: remove the existing switchgear and one of the existing transformers from No. 32 Substation and build a new No. 45 Substation with indoor arc-resistant switchgear and connect it to the Alberta Interconnected Electric System with a new 800-metre, 138-kilovolt (kV), double-circuit transmission line. This alternative also includes the implementation of 100-year flood mitigation measures at No. 32 Substation to protect the remaining equipment.

3. The proposed facilities are shown on the map in Figure 1.

Figure 1. Proposed facilities



4. The Commission issued a notice of application. The Commission received one submission from Judith Parker, a long-time resident of Diamond Cove, located on the opposite bank of the Bow River from No. 32 Substation. The Commission denied J. Parker standing because it found that she had not established that her legal rights may be directly and adversely affected by the proposed project. However, the Commission granted J. Parker the ability to further participate by supplementing her initial submission and allowing ENMAX the opportunity to reply.[1]

5. As discussed in more detail below, J. Parker was concerned that past repairs and expansion of the No. 32 Substation following the floods of 2013 had altered the course of the river, which she believed had affected a strip of land between her property and the riverbank. J. Parker was concerned that the proposed changes by ENMAX would further adversely affect that riverbank.

3 Background

6. No. 32 Substation was flooded in 2013; water got into the manholes and duct banks of the substation and drained into the basement of the substation building. The flood also altered the bank of the Bow River such that the substation is now closer to the river as shown in Figure 2.

[1] Exhibit 27193-X0044, AUC ruling on standing.

Figure 2. Current and pre-2013 bank at No. 32 Substation[2]

7. ENMAX had previously filed a similar application regarding the arc-flash hazard at No. 32 Substation, which the Commission denied in Decision 25934-D01-2021.[3] In that application, ENMAX did not propose an option to replace the equipment on site (i.e., at No. 32 Substation). Rather, it asserted that The City of Calgary's Land Use Bylaw prevented the construction or expansion of buildings within floodways and that "even if the Bylaw does not apply to the substation, it would not be prudent to make a major investment at No. 32 Substation because it is located in a floodway and was completely isolated by water during the 2013 Calgary flood event."

8. While the Commission acknowledged that a safety issue existed at the substation, it found that given the potential for significant cost savings and that ENMAX intended to install flood mitigation measures at the substation to protect the remaining equipment, ENMAX should have taken additional steps to clarify whether the bylaw applied and to conduct additional analysis to determine the optimal time to relocate the substation. The Commission denied ENMAX's application without prejudice to any future application in which ENMAX proposes to resolve the arc-flash hazard at No. 32 Substation and encouraged ENMAX to address this safety issue in another application as soon as reasonably practicable. In response, ENMAX filed the present application.

[2] Exhibit 27193-X0002, 2022-03-01-EPC-Southeast Substation Safety Enhancement Project Facility Application, PDF page 14. The orange solid line shows the Predicted Potential Maximum Bank Recession, and the adjacent unlabeled orange dashed line shows the best estimate of recession during a 100-year flood event.

[3] Decision 25934-D01-2021: ENMAX Power Corporation - Southeast Substation and Transmission Line Development Project, Proceeding 25934, Applications 25934-A001 to 25934-A004, March 2, 2021.

4 Discussion and findings

9. For the reasons outlined below, the Commission finds that approval of ENMAX's preferred option, to replace the equipment at No. 32 Substation and to implement 350-year flood mitigation measures, under its alternate flood mitigation option of a bank armouring and self-launching apron design, is in the public interest having regard to the social, economic, and other effects of the project, including its effect on the environment.

10. Contrary to its previous application, ENMAX has now not only included an option of replacing the equipment on site with the intention of maintaining No. 32 Substation in the long term, it has selected this as the preferred option. ENMAX submitted that The City of Calgary's Land Use Bylaw restricting new buildings in a floodway does not apply to the substation, as the *Planning Exemption Regulation* states that Part 17 of the *Municipal Government Act*, under which the city's land use bylaw is made, does not apply if the development is effected solely for the purpose of a transmission line/substation as defined in the *Hydro and Electric Energy Act*. The Commission is satisfied that the *Planning Exemption Regulation* exempts the facilities proposed by ENMAX in its preferred option from the city's bylaw that restricts new buildings in a floodway.

11. ENMAX's preference for the No. 32 Substation modification option is conditional on approval of the recommended 350-year flood mitigation measures. Without this level of flood mitigation ENMAX does not support a further significant investment at Substation No. 32 and its preferred option would be the new No. 45 Substation option. It stated that a higher level of flood protection is warranted for the No. 32 Substation modification option because it involves a significant new investment at the substation and that more customers would experience an extended outage if the substation were damaged by a flood under this option.[4]

12. ENMAX estimated the cost of the preferred option to be $48.1 million, including $8.8 million to implement 350-year flood mitigation measures. The estimated cost of the No. 45 Substation alternative is $76.2 million, including $6.5 million for 100-year flood mitigation measures at No. 32 Substation.[5]

13. The Commission accepts that a safety issue exists at the substation and that equipment needs to be salvaged and replaced to eliminate the hazard. ENMAX explained that a study had identified an arc-flash hazard beyond acceptable limits with the outdoor switchgear, which poses a safety risk for ENMAX personnel performing maintenance activities.[6] ENMAX provided that (i) Section 8.3.1 of the *CAN/ULC-S801 Standard on Electrical Safety for Generation, Transmission and Distribution* states that arc-flash hazards should be eliminated or controlled through engineered solutions; and (ii) subsection 9(2) of *the Occupational Health and Safety Code 2009* states that "if reasonably practicable, an employer must eliminate or control a hazard through the use of engineering controls."

---

4 Under the new No. 45 Substation option, some customers currently served from No. 32 Substation would be served by No. 45 Substation.

5 Both preferred and alternate option estimates assume flood mitigation costs are for the steel sheet pile wall option.

6 To date, this risk has been mitigated through the use of personal protective equipment and administrative controls.

14. The Commission also accepts that flood risks exist at the substation and need to be addressed, either through mitigation measures or through relocating the substation. The potential for damage is evident from the 2013 flood and modelling has indicated the substation would likely be undermined (i.e., damaged or weakened by washing out the ground under the substation) in a 100-year (or greater) flood.

15. ENMAX stated that fully decommissioning No. 32 Substation cannot currently be reasonably justified and did not propose such an alternative, which would require rebuilding the substation at a new location. Major upgrades occurred at the substation approximately 10 years ago and much of the equipment still has a considerable lifespan remaining. While the location of the substation within a floodway is far from ideal, the Commission finds that the costs of fully decommissioning and salvaging the substation (and having to completely rebuild it in a new location) are not in the public interest when weighed against the more reasonable costs of mitigating flood risks through flood mitigation measures.

16. ENMAX submitted that based on the advice and recommendations it received from Golder Associates Inc., it is satisfied that implementing the proposed flood mitigation measures will reduce the risk of flood damage to an acceptable level and that with those measures, new investment in the substation is prudent.

17. The Commission finds that ENMAX's preferred option, to replace the existing outdoor medium voltage switchgear with indoor arc-resistant switchgear inside a new building at the No. 32 Substation site is in the public interest. To approve the installation of flood mitigation measures requires that the Commission be satisfied that they will adequately mitigate risks. The Commission is persuaded by the evidence of ENMAX and Golder in this matter. The alternative option, to relocate equipment away from the substation, would, in the Commission's view, result in inefficiencies and additional cost. The approximately $28.1 million in costs savings for the preferred option is considerable and a significant factor for the Commission in making its decision.

18. Further, the Commission approves installing 350-year flood mitigation measures. The incremental costs to implement 350-year flood mitigation measures relative to 100-year flood mitigation measures is not significant in the context of the overall cost of the project and is prudent given the additional risks associated with new equipment and that a greater number of customers would be affected than under the alternate option in the event of flood damage to the substation.

4.1 Flood mitigation measures

19. ENMAX retained Golder to assess the flood risk and recommend flood mitigation measures to protect the existing and potential new equipment at No. 32 Substation. Golder assessed 12 flood mitigation options (three different flood mitigation measures and four different levels of flood protection) using a multi-criteria decision analysis that was supported by a cost-benefit analysis and a net present value calculation.

20. Based on the outcomes of that assessment, ENMAX presented two flood mitigation options for both 100- and 350-year levels of flood mitigation. ENMAX's preferred flood

mitigation option is to construct a steel sheet pile wall.[7] The alternate flood mitigation option is to install bank armouring with a self-launching apron design.[8]

21. ENMAX stated that the steel sheet pile wall can be constructed from the riverbank, while the bank armouring option must be constructed in the Bow River. As a result, the steel sheet pile wall can be permitted and constructed more quickly, as indicated in Golder's multi-criteria decision analysis[9] and is preferred from an environmental perspective because it has the least amount of impact on fish habitat.

22. ENMAX estimated that for 350-year protection levels, the cost of the steel sheet pile wall would be $8.8 million, while the cost of the bank armouring and self-launching apron would be $4.0 million. However, as the bank armouring option must be constructed instream, there are potential fish habitat offsetting requirements. ENMAX submitted that the cost of these requirements can be significant (e.g., from $100,000 to over $1 million) but that specific fish habitat offsetting requirements cannot be determined at this time, and therefore estimates for the bank armouring option do not include these costs.

23. Golder conducted an environmental evaluation of the flood mitigation protection options and concluded that the potential adverse effects associated with the options can be mitigated with standard mitigation measures and industry best practices. Golder identified potential effects to fish and fish habitat from the bank armouring and self-launching apron option but that overall, those effects are considered not significant. It stated that "Although a measurable change in fish habitat is expected within the area of the riprap in-channel footprint, the habitat alteration is not expected to result in a change that will alter the status or integrity of fish habitats or any fish populations in the Bow River."[10] The Commission is satisfied that the environmental effects of the bank armouring and self-launching apron option will not be significant.

24. The Commission finds in favour of implementing the bank armouring and self-launching apron. The Commission finds that the additional time to permit and construct this option, estimated at an additional five months, is not a significant factor given the overall timelines for the project.[11] Considering the relatively minor time difference, the Commission does not agree with the discrepancy in score the two options were given in Golder's multi-criteria decision analysis.

25. Given that other factors for comparing the flood mitigation measures are not significant, the lower cost of the bank armouring and self-launching apron option is a determining factor for the Commission. While the cost of potential fish habitat offsetting requirements may reduce the

---

7 A steel sheet pile wall involves driving steel piles into the riverbank to create an interlocking wall to protect the shoreline from overland flooding and erosion.

8 Bank armouring protects the shoreline of the river from erosion through the placement of large rock (riprap) or human made materials along the riverbank, immediately adjacent to the shoreline. Additional riprap would be placed to form the self-launching apron at the toe of the bank. During the design flood event the riprap from the apron will launch (i.e., roll towards the shoreline) to fill the voids caused by scour.

9 On a scale from one to five, with one being the most favourable and five being the least favourable, Golder gave the steel sheet pile wall option a score of one and the bank armouring and self-launching apron option a score of five for the criteria of permitting timeline.

10 Exhibit 27193-X0008, Appendix F Environmental Assessments, PDF page 129.

11 The proposed in-service date for the overall preferred option is April 2026, however, ENMAX indicated the steel sheet pile wall would be completed by March 2024 while the bank armouring with self-launching apron would be completed July 2024.

relative cost savings of the bank armouring and self-launching apron below the current estimate of $4.8 million,[12] the cost savings of this option outweigh the other factors.

4.2 Effects to the Diamond Cove riverbank

26. J. Parker has resided in the community of Diamond Cove, located on the opposite bank of the Bow River from No. 32 Substation, for over 20 years. J. Parker submitted that the repairs and expansion of the substation following the 2013 flood appear to have altered the course of the river to push it more onto the Diamond Cove side. She indicated that trees along the ridge have become more sparse, that the ridge shows evidence of sliding, and that the distance from the edge of the ridge to the pathway is becoming narrower. Photographs showing the area were included with her submissions. J. Parker expressed that the proposed flood mitigation measures at No. 32 Substation would result in additional erosion impacts to the riverbank in Diamond Cove. She stated that expanding the substation may be more cost efficient in the short term but will only result in greater cost and damage in the not-too-distant long term.

27. ENMAX engaged Golder to undertake a hydraulic assessment of the Bow River to assess the effects of the flood mitigation options presented in the application (bank armouring and steel sheet pile wall, both at 100- and 350-year flood protection levels). Golder concluded that the flow velocity, water level, and flow pattern impacts on the Diamond Cove riverbank under the 100-year and 350-year floods, with either flood mitigation measure implemented at No. 32 Substation, are considered negligible and are not expected to affect erosion and recession of the Diamond Cove riverbank.[13] ENMAX indicated it provided the results of the hydraulic assessment to J. Parker.

28. The Commission acknowledges J. Parker's concern about impacts to the Diamond Cove riverbank but is satisfied by the evidence of Golder. In the Commission's view, avoiding the flood mitigation measures at the No. 32 Substation would not be in the public interest.

5 Decision

29. The Commission has reviewed the application and has determined that the information requirements specified in Rule 007: *Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines* have been met.

30. ENMAX conducted a participant involvement program to "ensure all stakeholders have a clear understanding of the Project, and that all issues and concerns regarding the Project could be identified and communicated in a timely fashion."[14] The program included providing a project information package to stakeholders as well as personal engagement with stakeholders, including online information sessions. ENMAX also consulted with Indigenous groups and confirmed that

[12] ENMAX estimated that for 350-year protection levels the cost of the steel sheet pile wall and bank armouring and self-launching apron would be $8.8 million and $4.0 million, respectively.

[13] Exhibit 27193-X0050, 2022-06-03 EPC Response to Judith Parker. During a 350-year flood event, Golder concluded the maximum effect that Concept 1 (Bank Armouring and Self Launching Apron) and Concept 3 (Steel Sheet Pile Wall) would have on increasing flow velocities and water levels along the Diamond Cove riverbank is 0.21 metres per second and 0.01 metres, respectively.

[14] Exhibit 27193-X0002, 2022-03-01-EPC-Southeast Substation Safety Enhancement Project Facility Application, PDF page 83.

its consultation with Indigenous groups is complete and there are no outstanding concerns and that it has applied to the Aboriginal Consultation Office for an assessment of adequacy.[15] The Commission finds that ENMAX's participant involvement program satisfies the requirements of Rule 007. The Commission attaches the following as a condition of approval:

a. ENMAX Power Corporation shall file a copy of the Aboriginal Consultation Office Adequacy Assessment with the Commission no later than 30 days prior to the start of construction.

31. The Commission considers the application to be in the public interest in accordance with Section 17 of the *Alberta Utilities Commission Act.*

32. Pursuant to sections 14, 15, 19 and 21 of the *Hydro and Electric Energy Act*, the Commission approves Application 27193-A001 and grants ENMAX Power Corporation the approval set out in Appendix 1 – Substation Permit and Licence 27193-D02-2022 to alter and operate ENMAX No. 32 Substation.

33. The appendix will be distributed separately.

Dated on August 30, 2022.

Alberta Utilities Commission

(original signed by)

Cairns Price
Commission Member

[15] Exhibit 27193-X0052, EPC-AUC-2022JUN21-001, PDF page 2.