

# City of Edmonton Transmission Reinforcement Project

SPRING 2024

In January 2023 we sent out information on planned new transmission facilities to support a growing need for electricity and replace aging infrastructure in northeast Edmonton. Since then, we have been working to refine the transmission line route options based on factors such as the environment, constructability, cost and public input.

## PROJECT BACKGROUND

The Alberta Electric System Operator (AESO) has identified a need to reinforce the electric system in northeast Edmonton and replace aging infrastructure. To meet this need, the AESO has directed EPCOR to plan the following transmission facilities:

- new 240 kV transmission lines
- new 72 kV transmission lines
- a new substation

This package includes details about the proposed project. For ease of reading, we have separated the information into different sections:

### Project Overview (this booklet)

- Project background
- Open house details
- Approval process & contact information
- Next steps & schedule

### Transmission Line Information

- Route options
- Structure details
- Right-of-way details
- What we heard from the community

### Substations and Existing Equipment

- Planned new substation
- Removal of existing transmission lines
- Removal of the Kennedale Substation

## OPEN HOUSES

Come join us to discuss the project, ask questions and provide feedback to the project team.

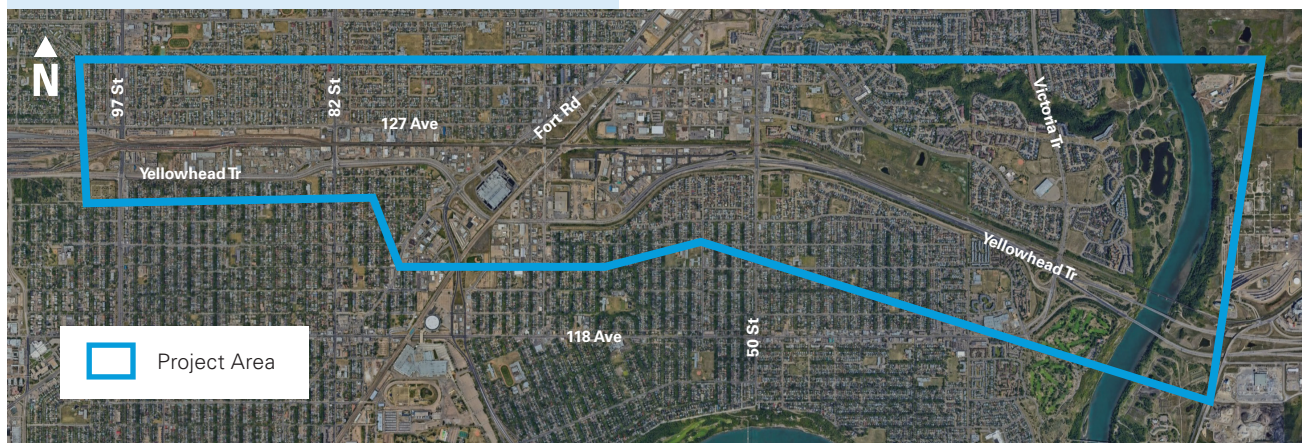
- **Tuesday, April 30, 2024** - drop in from 3:00 p.m. - 8:00 p.m. at the Delton Community League (12325 88 St)
- **Thursday, May 2, 2024** - drop in from 3:00 p.m. - 8:00 p.m. at the Montrose Community League (5920 119 Ave)

## CONTACT US!

Your feedback is an important part of our planning process:



**Phone:** 780 412-8800  
**Email:** CETR@epcor.com  
**Webste:** epcor.com/cetr



## WHAT IS THE APPROVAL PROCESS?

Transmission projects in Alberta require approval from the Alberta Utilities Commission (AUC) before they can be built. This ensures that the transmission development is needed and planned in a way that reduces overall impacts and is in the public interest.

There are two approvals required for this project: **the need for the project** and **the routing and siting of the new facilities to be built**.

The **need for new transmission projects** in Alberta is identified by the **Alberta Electric System Operator (AESO)**.

- The preferred option to meet the need for growing demand for electricity in northeast Edmonton is to build a new substation, new 240 kV transmission lines and new 72 kV transmission lines.
- The AESO submitted their Needs Identification Document (NID) Application to the AUC for approval in December 2023. The AUC is currently reviewing that application (proceeding number 28633).

For more information on the AESO and the need for this project contact:

**Phone:** 1 (888) 866-2959

**Email:** [stakeholder.relations@aeso.ca](mailto:stakeholder.relations@aeso.ca)

**Website:** [www.aeso.ca](http://www.aeso.ca)

EPCOR is responsible for **planning the location** of the new substation and **proposing route options** for the new transmission lines.

- Right now, EPCOR is evaluating route options for the transmission lines. This includes getting feedback from area residents, Indigenous Nations and communities, businesses and government agencies.
- Once we have determined preferred and alternate route options and received direction from the AESO, we will apply to the AUC for approval. This is called our Facility Application.

The AUC will review the Facility Application and, if approved, they will also select which route to build (preferred or alternate). Once EPCOR submits its Facility Application, you can also provide feedback directly to the AUC.

## NEXT STEPS

- You're invited to provide feedback to EPCOR on the proposed route options.
- EPCOR will assess the route options based on your feedback and other considerations. We will then determine preferred and alternate route options to propose to the AUC.
- EPCOR will submit a Facility Application to the AUC for approval.

## SCHEDULE

- January 2023 - Project initiation
- April 2024 – Project update (we are here)
- **July 31, 2024 – Deadline to provide feedback\***
- Fall/Winter 2024 – EPCOR will submit its application to the AUC
- Fall 2025 – If approved, construction will begin.
- 2028 – Transmission facilities built and operating.

*\*EPCOR would like to include your feedback in our Facility Application and can do so if received by July 31, 2024. If you are not able to respond by then, you can still provide your feedback directly to the AUC once the Facility Application has been filed.*

The EPCOR logo consists of the word "EPCOR" in a bold, white, sans-serif font, positioned to the left of a circular icon. The icon features a stylized sun or wave pattern in white against a dark blue background.

# Substation and Existing Equipment




## CITY OF EDMONTON TRANSMISSION REINFORCEMENT PROJECT

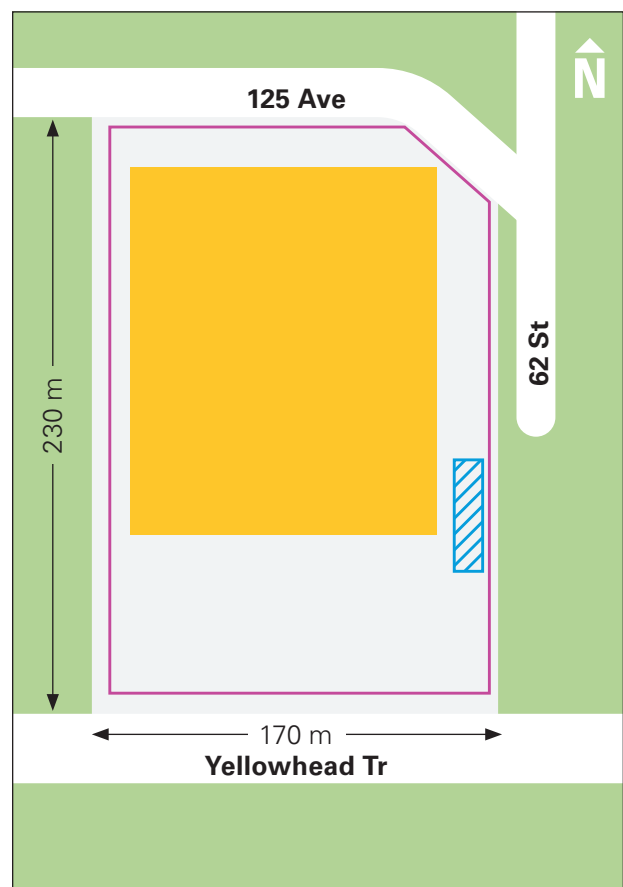
Spring 2024

### PLANNED NEW SUBSTATION

A new substation is being planned in a new location to replace the existing Kennedale Substation, which does not have the space to accommodate the required upgrades. We have identified a possible site at the intersection of 62 Street and 125 Avenue. If approved, the new substation will be approximately 230 by 170 metres in size and include the following major equipment:

- Six (6) 240 kV circuit breakers
- Two (2) 240/72 kV transformers
- Four (4) 72 kV circuit breakers
- Two (2) 240/15 kV transformers
- Substation building

LEGEND	
	Substation equipment
	Substation building
	Fence line



## REMOVAL OF EXISTING TRANSMISSION LINES

If this project is approved, the existing underground 72 kV transmission lines to the Kennedale Substation will be removed from service (shown in pink on the map). The new transmission lines will replace this infrastructure and increase the capacity and reliability of the system.

The existing underground transmission lines/cables are contained in fluid filled pipes. To remove the transmission cables from service, the fluid will be drained from the pipe and the cables will be pulled out. Once the cables are removed, the pipes will be inspected and cleaned so that they can potentially be reused for other future purposes, such as containing communication cables.




## REMOVAL OF THE KENNEDALE SUBSTATION

Once the new substation is built and operating, the Kennedale Substation located at 5035 126 Ave will be removed from service (shown in yellow on the map). Once that is complete, the site will be repurposed for other EPCOR uses or prepared for sale.

As a part of this work, the distribution power lines will be reconnected to the new substation. Distribution lines are the power lines that provide electricity to homes and businesses.



### LEGEND

-  Planned new substation
-  Kennedale Substation
-  Existing EPCOR underground 72 kV transmission line to be removed from service

# 240 kV Transmission Line

## CITY OF EDMONTON TRANSMISSION REINFORCEMENT PROJECT

Spring 2024

You are receiving this information because you are in the 240 kV transmission line project area. Visit our website or contact us if you would like information on the 72 kV transmission line route options.

### ROUTE OPTIONS

A new double circuit 240 kV transmission line is being planned to reinforce the electrical transmission system in northeast Edmonton. We are trying to determine the best route from an existing transmission line to a planned new substation located west of 62 Street and 125 Avenue.

After careful consideration, we have narrowed down the above ground transmission line route options and developed an underground route option. An underground route option was developed due to potential technical challenges with the above ground options. We are seeking input on these route options as we continue to assess and compare the routes based on constructability, social, economic and environmental considerations.

### OVERVIEW MAP



### WE WANT YOUR INPUT

We encourage everyone who is interested in the project to contact us and provide feedback.

#### Contact Us

**Phone:** 780-412-8800

**Email:** CETR@epcor.com

**Website:** [epcor.com/CETR](http://epcor.com/CETR)

#### Mail

A feedback form and postage-paid envelope is included in this package for you to mail back your feedback.

#### Online

Fill out our online feedback form on our website at [epcor.com/cetr](http://epcor.com/cetr)

#### Open Houses

We will be hosting two in-person open houses. These will be an opportunity to ask questions and provide feedback to the project team.

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Scan the QR code to visit the project website.

[epcor.com/cetr](http://epcor.com/cetr)



All three 240 kV route options connect to an existing AltaLink owned transmission line (shown in green on the route map). AltaLink will need to alter their transmission line to allow this connection (either Connection A or Connection B). For more information about alterations to the existing transmission line contact AltaLink at:

**Phone:** 1-877-267-1453

**Email:** [stakeholderrelations@altalink.ca](mailto:stakeholderrelations@altalink.ca)

## RIGHT-OF-WAY

A **right-of-way** is the area we need to safely operate and maintain our power lines. EPCOR manages the right-of-way for above ground power lines to prevent objects from contacting the wires, this includes trees and other vegetation. Our tree maintenance program monitors vegetation in the right-of-way and ensures that trimming is completed when required. In some situations, this could extend outside of the right-of-way.

The right-of-way for an above ground 240 kV transmission line would vary based on the structure type. Structure type A would require a 28 metre right-of-way (14 metres on each side of the structures). Structure type B would

be used in areas where there is limited space and requires a 20 metre right-of-way (10 metres on each side of the structures).

The right-of-way for an underground 240 kV transmission line would be 10 metres. A right-of-way for underground transmission lines ensures access for maintenance and keeps the area clear to prevent damage to the duct bank.

Areas where the right-of-way overlaps with private property will require an easement between EPCOR and the property owner. You will be contacted directly if your property overlaps with the right-of-way. There are no development restrictions outside of the right-of-way.

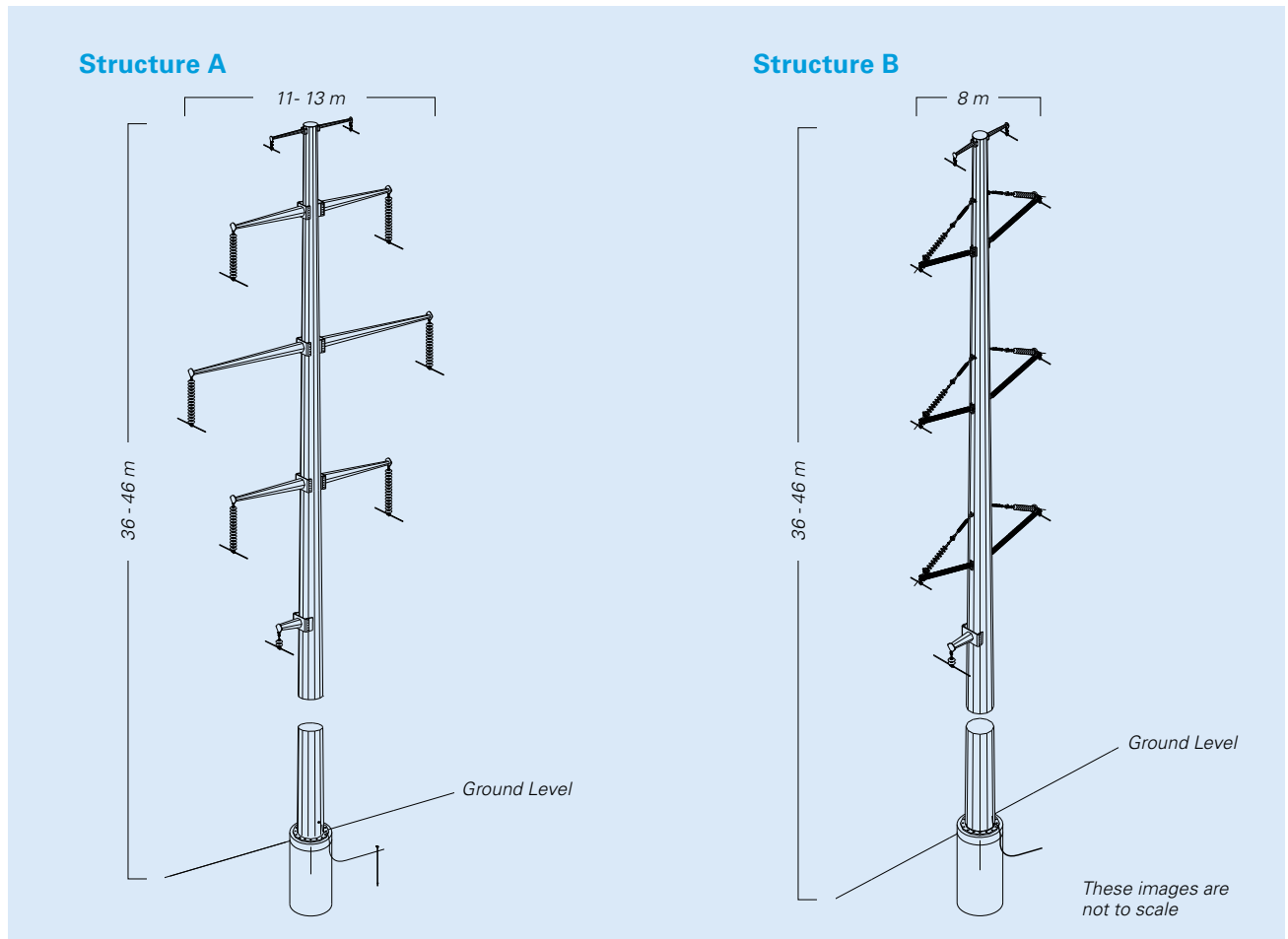
# ABOVE GROUND TRANSMISSION LINE OPTIONS

The above ground transmission line route options are shown in **purple**. There are multiple paths we could take to get from the existing transmission line to the planned new substation. These are shown in four segments on the Route Map: N1, N2, S1 and S2. Combinations could include:

- S1 to S2
- N1 to N2
- S1 to N2
- N1 to S2.

This will be a double circuit transmission line, which means there are two transmission lines using mostly one set of structures. The structures will have six transmission wires (three on each side), one or two shield/fibre optic wires strung on top and one wire below the transmission wires. Structures would be installed along the route using drills, excavators and other equipment. A crane would be used to attach the wires in stages to reduce impacts to roadways.

Two main structures would be used for an above ground transmission line: Structure A and Structure B (shown below). These are steel monopole structures ranging in height from 36 to 46 metres.



*Different structures such as steel lattice structures, double poles, and poles with wider bases may be required at certain locations along the route. This includes where the route turns corners or has to span longer distances. To view these structures, please visit [epcor.com/cetr](http://epcor.com/cetr).*

## Visual Rendering

To see more visual renderings visit [epcor.com/cetr](http://epcor.com/cetr)



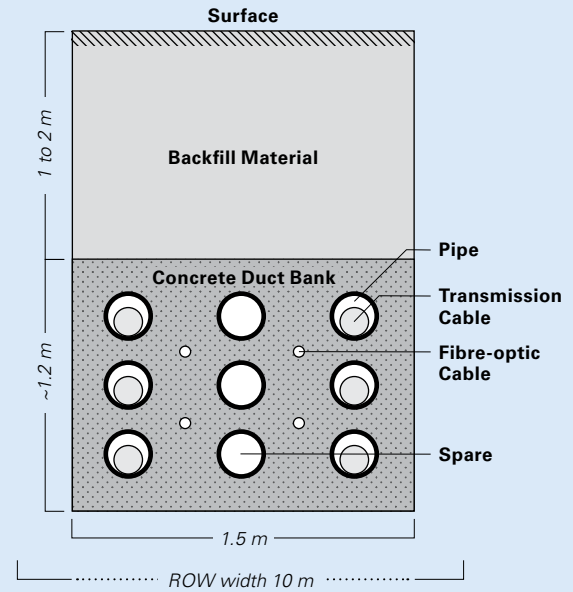
*Please note that the visual renderings include the maximum amount of vegetation removal required. We are working to minimize the amount of vegetation removal or identify alternate vegetation options that would be compatible with a transmission line to increase screening. The colour of the steel structures may vary.*

## UNDERGROUND ROUTE OPTION

The underground route option follows the north side of Yellowhead Trail as shown in **orange**. The underground transmission line would require the construction of a duct bank approximately 1.5 metres wide and 1.2 metres deep. A duct bank is an underground concrete container that protects power cables from getting damaged. This would be installed approximately 1-2 metres deep with utility access points constructed along the route for maintenance and repairs.

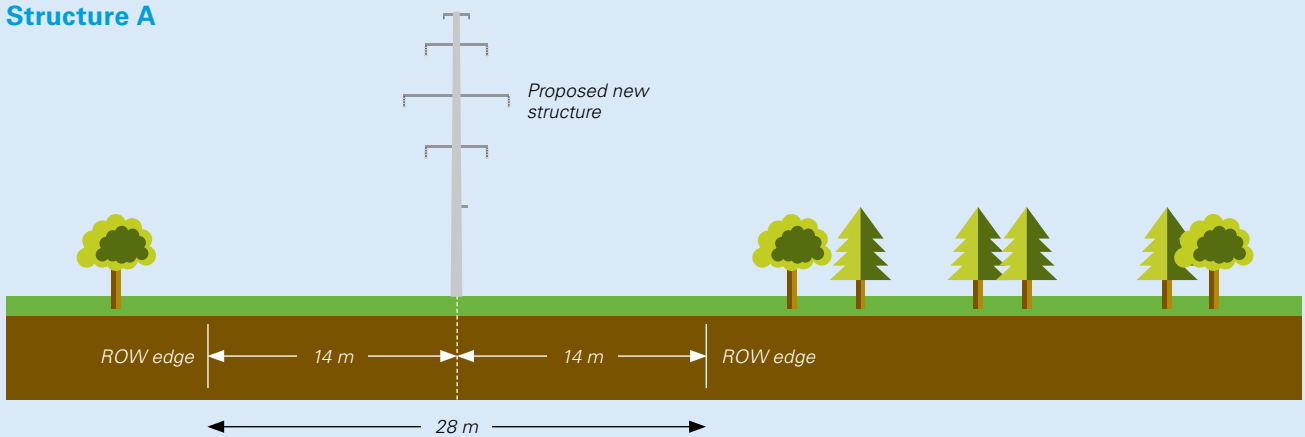
The installation of the duct bank would involve open cut trench excavation for most of the route and a trenchless method would be used for major road and railway crossings.

## EXAMPLE OF A DOUBLE CIRCUIT DUCT BANK

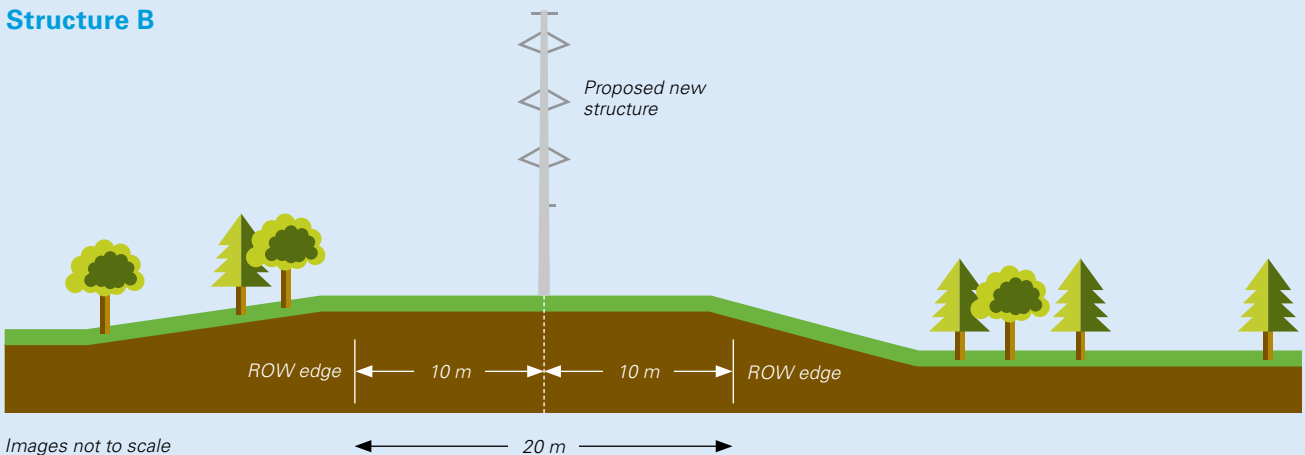


## RIGHT-OF-WAY (ROW) EXAMPLES

### Structure A



### Structure B



Images not to scale



# WHAT WE HEARD

Public feedback is an important part of our planning process. So far, we have had over 500 conversations, which helped us refine our route options. Below is a summary of the feedback on the 240 kV transmission line and what we did with that information.

## Underground

We received inquiries on an underground route option.

In early 2023, we developed above ground route options as they are less costly for Alberta ratepayers, faster to build, and easier to access for maintenance and repairs. However, due to potential technical challenges with the above ground 240 kV line routes options, we have developed an underground option (shown in **orange** on the map). This underground route will be assessed along with the above ground route options on constructability, social, economic, and environmental factors.

We will evaluate all route options in the next few months to identify preferred and alternate routes to propose to the Alberta Utilities Commission in our application. The Alberta Utilities Commission will decide which route will be built for this project taking into account a variety of factors, including costs paid by Alberta ratepayers.

## Property Value

We heard concerns that the transmission line would impact property value.

As a part of our project planning, we aim to identify route options that minimize potential impacts to property value. This is done by proposing options that follow existing features, such as highways and berms, and by increasing distances between the structures and residential properties when possible.

As a part of our project planning, we reached out to a third-party specialist for a property value study specific to this project. This study is being developed and information from this report will be available prior to submitting our Facility Application.

## Cost

We received questions about increases to power bills and the cost of the project.

The Alberta Electric System Operator oversees the planning, maintenance and operation of the transmission grid and the cost for this is paid for by all Alberta electricity consumers. These costs are identified as the transmission charge on your power bill and includes costs associated with system projects such as the City of Edmonton Transmission Reinforcement Project. To find out more about transmission costs in Alberta you can contact the AESO at **1-888-866-2959** or **stakeholder.relations@aeso.ca**.

Transmission development is regulated by the Alberta Utilities Commission to ensure reasonable rates along with safe and reliable service. With this in mind, EPCOR plans projects to minimize costs to ratepayers.

High level cost estimates for this project are shown below.

Route Type	Estimated Cost
Project cost with an Above Ground 240 kV Route	\$272 million
Project cost with an Underground 240 kV Route	\$337 million

*Please note, these estimates are provided at a feasibility study level and may change as planning progresses.*

For this project, it is estimated that an underground 240 kV route would cost approximately \$65 million more than an above ground transmission line route. Cost is just one of the factors we consider when selecting preferred and alternate routes. It is also a factor the Alberta Utilities Commission considers when deciding which route to approve.

## Safety

We heard general safety concerns, including proximity to Yellowhead Trail and fire risk.

EPCOR puts safety first in everything we do. We are working with the City of Edmonton to identify areas near Yellowhead Trail that may require mitigation measures, such as a barrier system. We will follow all required design guides and roadway requirements.

*Continued on the next page*

Specific impacts, including potential traffic disruptions, would be identified ahead of construction. EPCOR will work closely with the City of Edmonton to mitigate construction impacts as much as possible.

We heard concerns about increased fire risk. We do not anticipate increased fire risk as a result of the proposed above ground transmission line. Sparks may occur if vegetation comes in contact with a power line. To prevent this, EPCOR has a tree/vegetation maintenance program to ensure branches and other vegetation remains a safe distance from the wires.

## Health and Electric and Magnetic Fields (EMF)

We heard questions on EMF and health.

Power lines use power frequency (60Hz), which is classified as extremely low frequency EMF. This is the same frequency used by most household appliances and the wiring in your home. In Canada, Health Canada monitors the science on electric and magnetic fields (EMF), conducts research on potential health effects, and contributes to the World Health Organization's research on EMF. The position of Health Canada is:

*The potential health effects of extremely low frequency EMF has been studied extensively. While some people are concerned that long term exposure to extremely low frequency EMF may cause cancer, the scientific evidence does not support such claims. —Health Canada 2022*

To provide additional information, we reached out to a third-party specialist to provide a summary of the research and to develop projections for both the above ground and underground options. The results show that the projected electric and magnetic fields for this project are well below the exposure guideline levels recommended for the general public. This information by Exponent Health and Scientific Consulting is included in this package entitled *Electric and Magnetic Fields and the City of Edmonton Transmission Reinforcement (CETR) Project*.

## Noise

We heard questions about noise from the transmission line.

Generally, noise is not noticeable from a 240 kV above ground transmission line. You may hear a faint buzzing noise from the line during rainy weather, however it is typically only audible within the right-of-way corridor.

## Environment

We received questions about potential impacts to the environment and recreational areas.

Environmental assessments for this project are underway to identify potential impacts. These assessments will be used to create an Environmental Protection plan, which contains site specific mitigation measures. We also aim to minimize impacts by identifying route options that follow existing linear developments such as roadways, berms and trails.

We heard concerns about impacts to trails and recreational areas. Potential impacts to recreational areas will be assessed to develop the appropriate mitigation measures. We do not anticipate impacts to recreational areas and trails once the transmission lines are constructed.

## Maximize distance from residences

We heard feedback to increase distances from residential properties.

We have provided various route options that maximize distances from residences. We worked with the City of Edmonton to find solutions to remain as close to Yellowhead Trail as road allowances and safety would allow.

## Visual impacts

We received questions about what the transmission line would look like.

To show what the transmission lines could look like, visual renderings were completed at various points along the route options. An example is shown on the next page. Visit [epcor.com/cetr](http://epcor.com/cetr) for additional images.

# 72 kV Transmission Line

## CITY OF EDMONTON TRANSMISSION REINFORCEMENT PROJECT

Spring 2024

You are receiving this information because you are in the 72 kV transmission line project area. Visit our website or contact us if you would like information on the 240 kV transmission line route options.

### ROUTE UPDATE

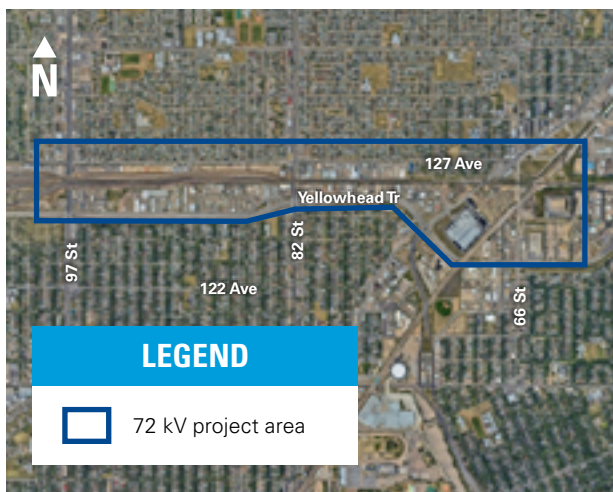
A new double circuit 72 kV transmission line is being planned to reinforce the electrical transmission system in northeast Edmonton. We are trying to determine the best route from the existing Namao Substation to the planned new substation west of 62 Street and 125 Avenue.

After careful consideration, we have narrowed down the route options. These route options are shown on the route map inside of this booklet.

### Double Circuit Transmission Lines

These will be a double circuit transmission line, which are two transmission lines using mostly one set of structures. By using double circuit transmission lines, we can meet the demand for electricity in the area with the least amount of transmission line routes and structures.

### OVERVIEW MAP



### WE WANT YOUR INPUT

We encourage everyone who is interested in the project to contact us and provide feedback.

#### Contact Us

**Phone:** 780-412-8800

**Email:** CETR@epcor.com

**Website:** [epcor.com/CETR](http://epcor.com/CETR)

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#### Online

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#### Open Houses

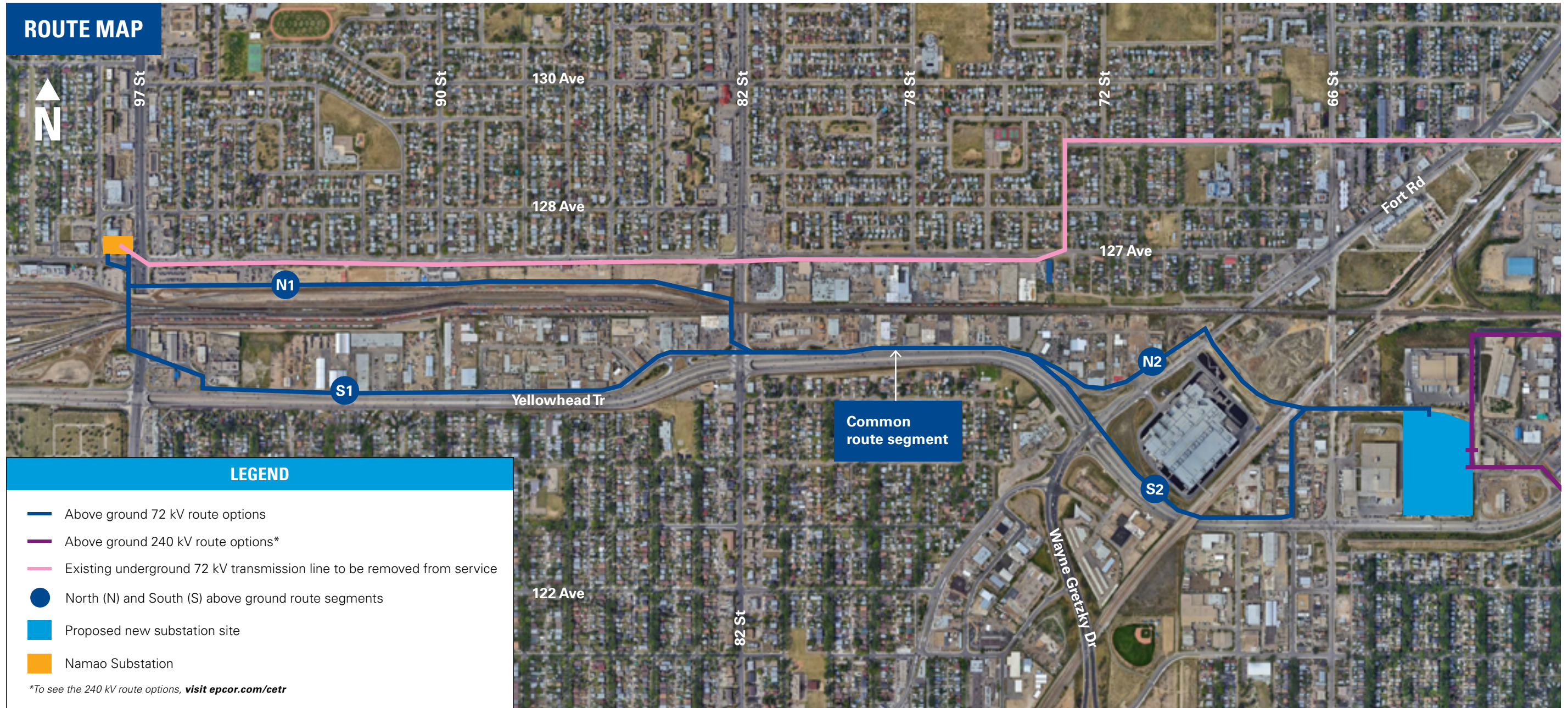
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# ROUTE MAP

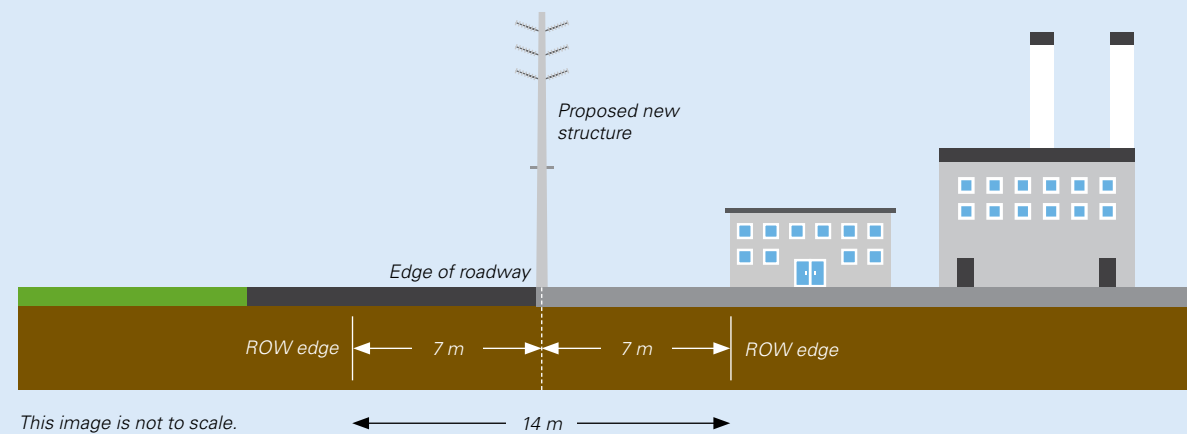


## LEGEND

- Above ground 72 kV route options
- Above ground 240 kV route options\*
- Existing underground 72 kV transmission line to be removed from service
- North (N) and South (S) above ground route segments
- Proposed new substation site
- Namao Substation

\*To see the 240 kV route options, visit [epcor.com/ctr](http://epcor.com/ctr)

## RIGHT-OF-WAY (ROW) EXAMPLE



## RIGHT-OF-WAY

A **Right-of-way** is the area we need to safely operate and maintain our power lines. EPCOR manages the right-of-way to prevent objects from contacting the wires, this includes trees and other vegetation. Our tree maintenance program monitors vegetation in the right-of-way and ensures that trimming is completed when required. In some situations, this could extend outside of the right-of-way.

The right-of-way for the 72 kV transmission line would be 14 meters (7 metres on each side of the structure).

Areas where the right-of-way overlaps with private property will require an easement between EPCOR and the property owner. You will be contacted directly if your property overlaps with the right-of-way. There are no development restrictions outside of the right-of-way.

## ROUTE OPTIONS

There are multiple paths we could take to get from the existing Namao Substation to the planned new substation. These routes are shown in **dark blue** on the map. These are shown in four segments: N1, N2, S1 and S2. Combinations could include:

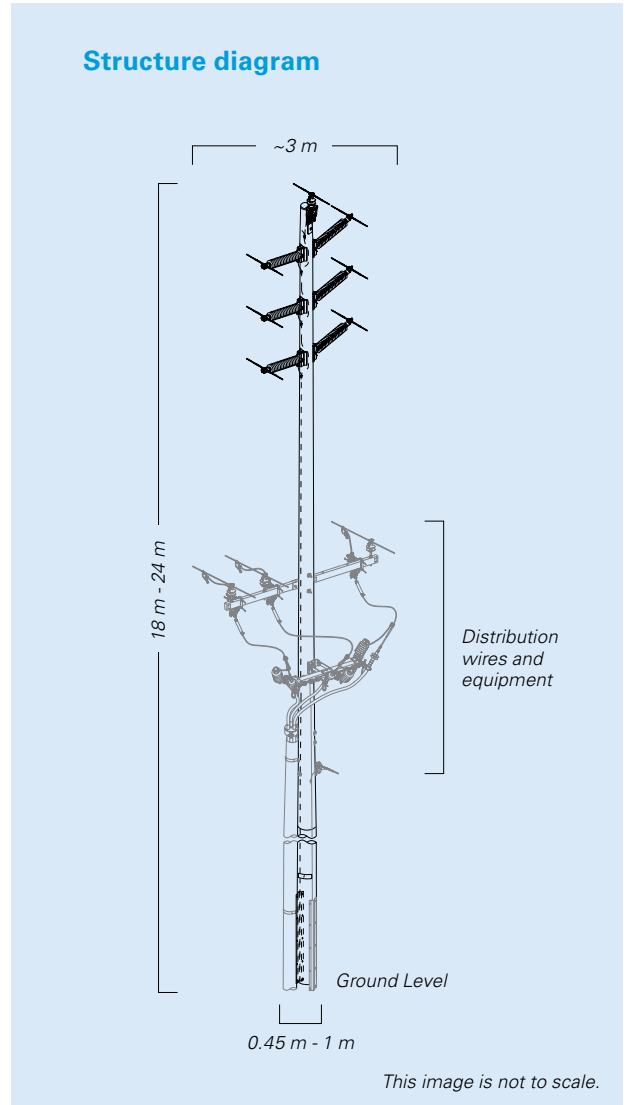
- S1 to S2
- S1 to N2
- N1 to N2
- N1 to S2

## STRUCTURE DETAILS

If approved, the 72 kV transmission line will be built using mostly composite fiberglass or steel poles ranging in height from 18 to 24 metres. Some of the route options follow existing distribution power lines. In these areas, every second or third distribution pole would be replaced with a transmission pole.

This will be a double circuit transmission line, which means there are two transmission lines using mostly one set of structures. The structures will have six transmission wires (three on each side) with one or two shield/fibre optic wires strung on top.

Structures would be installed along the route using drills, excavators and other equipment. A crane would be used to attach the wires in stages to reduce impacts to roadways.



*Non-typical structures such as double poles and poles with wider bases may be required at certain locations along the line, including where the line turns corners or spans longer distances.*

### Visual Rendering

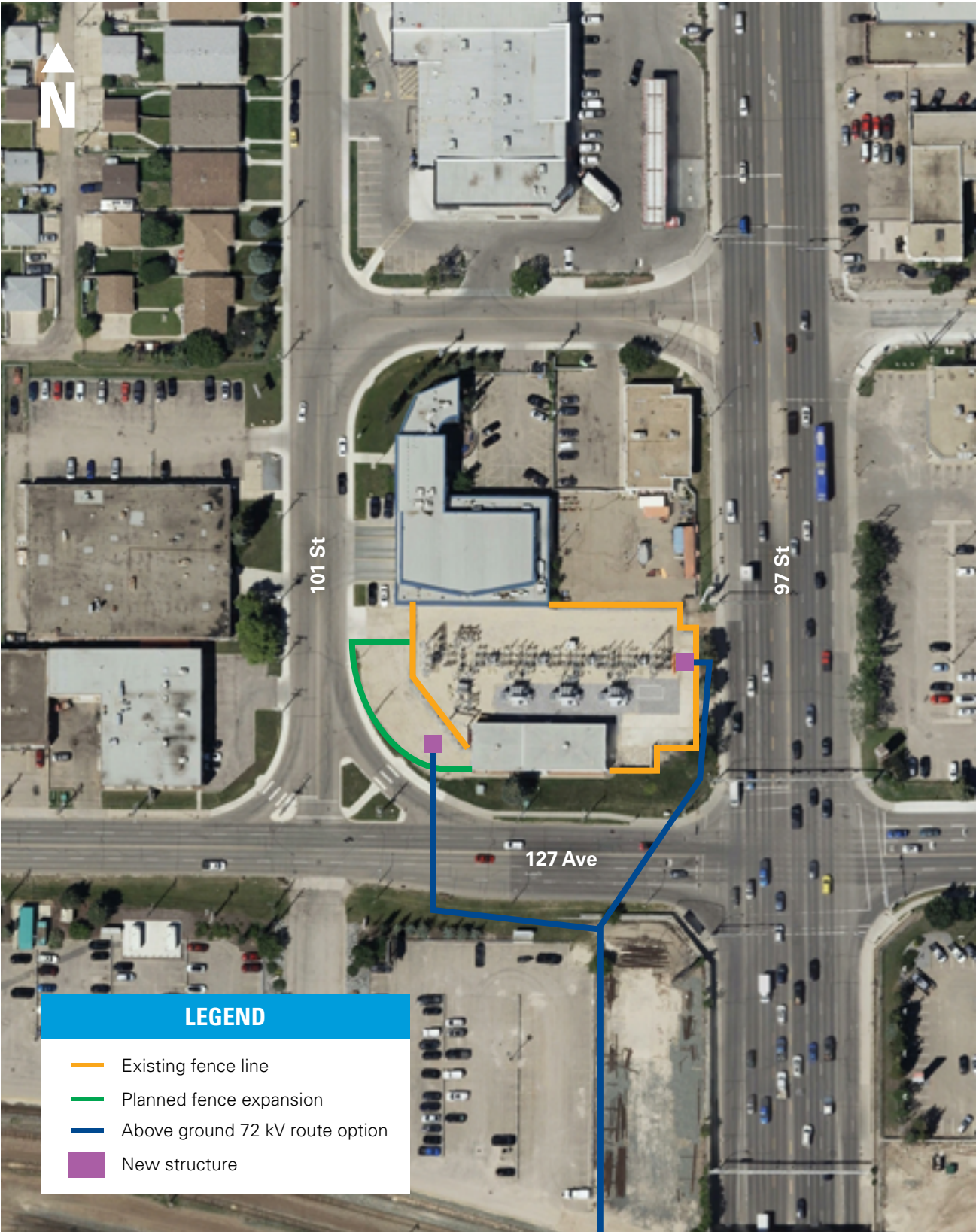
To see more visual renderings  
visit [epcor.com/cetr](http://epcor.com/cetr)



*Please note that the visual renderings include the maximum amount of vegetation removal required, where applicable. We are working to minimize the amount of vegetation removal or identify alternate vegetation options that would be compatible with a transmission line to increase screening.*

# NAMAO SUBSTATION

This project would require changes to the Namao Substation. If approved, the substation fence will be expanded approximately 15 metres to the west (as shown in green). Two new structures would also be installed within the substation to connect the new transmission lines to existing equipment.



# WHAT WE HEARD

Public feedback is an important part of our planning process. So far, we have had over 500 conversations, which helped us refine our route options. Below is a summary of the feedback on the 72 kV transmission line and what we did with that information.

## Power Outages

We heard concerns about power outages.

During construction, temporary power outages may be required to allow us to complete the work safely. The timing and extent of outages would be determined prior to construction. We understand outages are an inconvenience and we will work with affected customers to minimize the impact of the outages and ensure customers are notified in advance.

## Property Value

We heard concerns that the transmission line would impact property value.

As a part of our project planning, we aim to identify route options that minimize potential impacts to property value. This is done by proposing options that follow existing features, such as highways and berms, and by increasing distances between the structures and residential properties when possible.

As a part of our project planning, we reached out to a third-party specialist for a property value study specific to this project. This study is being developed and information from this report will be available prior to submitting our Facility Application.

## Cost

We received questions about increases to power bills and the cost of the project.

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Transmission development is regulated by the Alberta Utilities Commission (AUC) to ensure reasonable rates along with safe and reliable service. With this in mind, EPCOR plans projects to minimize costs to ratepayers.

High level cost estimates for the project are provided here. The first shows the estimated cost with above ground transmission route options and the second estimate shows the cost with an underground 240 kV route option. A 240 kV underground route option was developed due to potential technical challenges with the above ground route options. The 72 kV transmission line does not have the same constraints, therefore we are not considering an underground 72 kV option at this time.

Route Type	Estimated Cost
Project cost with Above Ground Routes	\$272 million
Project cost with an Underground 240 kV Route	\$337 million

*Please note, these estimates are provided at a feasibility study level and may change as planning progresses.*

Cost is just one of the factors we consider when selecting preferred and alternate routes. It is also a factor the Alberta Utilities Commission considers when deciding which route to approve.

## Health and Electric and Magnetic Fields (EMF)

We heard questions on EMF and health.

Power lines use power frequency (60Hz), which is classified as extremely low frequency EMF. This is the same frequency used by most household appliances and the wiring in your home. In Canada, Health Canada monitors the science on electric and magnetic fields (EMF), conducts research on potential health effects, and contributes to the World Health Organization's research on EMF. The position of Health Canada is:

*The potential health effects of extremely low frequency EMF has been studied extensively. While some people are concerned that long term exposure to extremely low frequency EMF may cause cancer, the scientific evidence does not support such claims. —Health Canada 2022*

To provide additional information, we reached out to a third-party specialist to provide a summary of the research and to develop projections for both aerial and underground options. The results show that the projected electric and magnetic fields for this project are well below the exposure guideline levels recommended for the general public. This information by Exponent Health and Scientific Consulting is included in this package entitled *Electric and Magnetic Fields and the City of Edmonton Transmission Reinforcement (CETR) Project*.

## Maximize distance from residences

We heard feedback to increase distances from residential properties and place the route near industrial/commercial areas.

We have provided various route options that maximize distances from residences. This includes retiring the route option along 127 Avenue. The current route options follow existing distribution lines, fence lines and roadways in commercial and industrial areas.

## Visual impacts

We received questions about what the transmission line would look like.

To show what the transmission lines would look like, visual renderings were completed at various points along the route options. An example is shown on the next page. Visit [epcor.com/cetr](http://epcor.com/cetr) for additional images.

## Noise

We heard questions about noise from the transmission line.

Generally, noise is not noticeable from a 72 kV transmission line. You may hear a faint buzzing noise from the line during rainy weather, however it is typically only audible within the right-of-way corridor.



## CONTACT US!

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**Webste:** [epcor.com/cetr](http://epcor.com/cetr)



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## What are EMF?

EMF refer to extremely low frequency (ELF) **E**lectric and **M**agnetic **F**ields associated with the delivery and use of electricity. EMF surround anything that generates, transmits, or uses electricity. These sources include power lines, the electrical wiring in our homes and buildings, and household electrical appliances. The strength of both electric fields and magnetic fields declines quickly as the distance from the source increases.

Electric fields are generated by voltage and are measured in units of kilovolts per meter (kV/m); devices operating at higher voltages produce higher electric fields. Magnetic fields are generated by the movement of electricity, known as a current, and are measured in units of milligauss (mG). Electric fields are blocked by everyday objects like trees, fences and buildings while magnetic fields are not blocked by these objects. Consistent with both public and scientific interest, magnetic fields and the related health research are the primary focus of this fact sheet.

Since electricity is such an integral part of our infrastructure and everyday life, people living in modern societies are surrounded by EMF. Our daily exposure depends on where we spend time and the sources we encounter in those locations. Indoors, the primary sources of EMF in most homes and buildings are the electrical wiring and the electrical appliances and equipment we use, such as vacuum cleaners, electric lamps, and hair dryers. Other residential EMF sources include nearby power lines and currents on water pipes. EMF levels from all of these sources diminish quickly with distance.

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## Have scientists conducted much research on EMF and health?

Yes. Research evaluating whether EMF have the potential to cause adverse health effects has been on-going for close to 50 years. International and national scientific and health agencies have reviewed this body of research, including Health Canada, the World Health Organization (WHO), and the International Agency for Research on Cancer (IARC), among others. These agencies have weighed the evidence from all three study types (epidemiologic, animal, and laboratory studies). The conclusions of these reviews have been quite consistent in that the research does not confirm that EMF has any adverse effect on human health at the levels we are exposed to in our everyday lives.

Health Canada's conclusions are consistent with other scientific and health agencies, in that it too has not found reliable evidence for harmful effects of EMF at levels found in homes or communities. Health Canada states:

*"The potential health effects of extremely low frequency EMF has been studied extensively. While some people are concerned that long term exposure to extremely low frequency EMF may cause cancer, the scientific evidence does not support such claims." (Health Canada, 2022)*

## Do EMF harm wildlife?

In addition to research on human health, a substantial number of studies have been conducted to evaluate the potential effects of EMF exposure on the health of wildlife, including deer, elk, birds, and bees. Overall, the research does not conclude that EMF from transmission lines or the presence of power lines and structures results in adverse effects on the health, behavior, reproductive performance, or productivity of these animals.

This information was prepared by scientists and engineers at Exponent, Inc., an international scientific and engineering firm, to present a current summary of the status of EMF research as reflected in reviews by science and health organizations. This brochure is limited to the scientific literature reviewed and may not include all information in the public domain.

Prepared by Exponent for EPCOR Distribution & Transmission Inc. © March 2024.



# Electric and Magnetic Fields and the City of Edmonton Transmission Reinforcement (CETR) Project

Exponent is a scientific and engineering firm whose professionals are experts in areas including epidemiology, electrical engineering, exposure assessment, biology, toxicology, and public health. The information in this brochure has been prepared for EPCOR Distribution & Transmission Inc. for the City of Edmonton Transmission Reinforcement (CETR) Project to provide an overview of current research on the electric and magnetic fields (EMF) associated with the use of electricity.

## Are there EMF Exposure Standards and Guidelines?

In Canada, there are no national or provincial limits for extremely low frequency electric and magnetic fields. Health Canada has not concluded that EMF at the levels found in homes and communities are harmful to human health. As a result, Health Canada states there is no need for protective measures to limit exposure to ELF EMF as:

*“Extremely low frequency EMF exposures in Canadian homes, schools and offices are far below the limits recommended in [international] guidelines. You don’t need to take precautions to protect yourself from these kinds of exposures.” (Health Canada, 2022)*

Guidelines for public and occupational exposure to ELF EMF have been set by two international scientific organizations based on their review of the relevant health research and review by other health and scientific agencies. These guideline limits were set to prevent the only known and established health effects of exposure, which are short-term effects, such as stimulation of nerves and muscles and annoyance by spark discharges, that occur at levels much higher than what is experienced in our everyday lives. Both organizations determined that the scientific evidence does not establish a causal relationship between ELF EMF and long-term health effects, including cancer or other diseases. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommends exposure limits for the general public of 2,000 mG for magnetic fields and 4.2 kV/m for electric fields. The International Committee for Electromagnetic Safety (ICES) recommends limits for the general public of 9,040 mG for magnetic fields and 5 kV/m for electric fields (10 kV/m on right-of-way [ROW]).

## What EMF levels are projected for the Edmonton Transmission Reinforcement Project?

The City of Edmonton Transmission Reinforcement Project has proposed two types of transmission power lines: a 72 kilovolt (kV) double circuit transmission line and a 240 kV double circuit transmission power line. The Project electric fields are very low (about 1 kV/m or less) directly beneath the transmission line and decrease rapidly with distance to <0.5 kV/m or less.

Projected values of the **magnetic fields at varying distances from the centreline of structures** are shown in **Figure 1**.

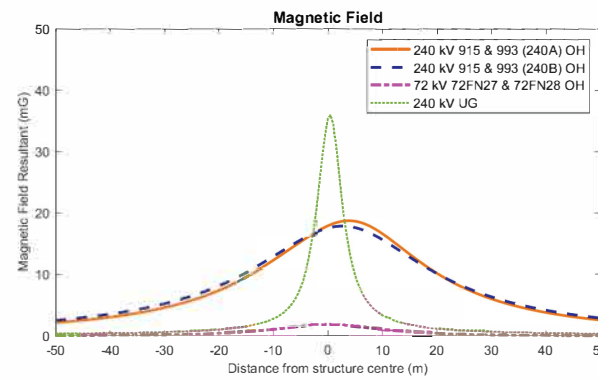


Figure 1. Calculated magnetic field profile for 240 kV and 72 kV overhead (OH) lines and 240 kV underground (UG) cables at 2032 projected average loading. Distances shown from centreline of the structures (0 m) at 1m above ground. The magnetic field values are highest near the centreline but diminish rapidly with distance. Calculations performed using computer algorithms developed by the U.S. Department of Energy.

Based on EPCOR Distribution & Transmission Inc. (EDTI)'s projected line loadings over the next 10 years, the calculated magnetic field for the 72 kV overhead line will vary little,  $\pm 0.1$  mG for 2023-2033 at average loading, with the magnetic field calculated to be 1.3 mG at 7.5 m from the centreline for 2032 average loading. Over that same decade, the variation in the magnetic field for the 240 kV overhead lines also is calculated to be small ( $\pm 2$  mG), with the magnetic field calculated to be  $\leq 13$  mG at 15 m from the centreline for 2032 average loading. For limited periods of a few hours or days each year (< 30 hours in 2022), the loading and hence the magnetic fields on both lines can increase slightly, i.e., by 0.7 mG for the 72 kV lines at 7.5 m from centreline and by 1 mG for the 240 kV lines at 15 m from the centreline, for 2032 peak loading. For the 240 kV underground cables, although the maximum magnetic field at the centreline is higher than the 240 kV overhead lines (35 mG UG vs 19 mG OH), the magnetic field at 15 m and further from the centreline is calculated to be much lower for the underground lines than the overhead lines (1.8 mG UG vs 13 mG OH) for 2032 average loading. This occurs because the magnetic field from the 240 kV underground cable drops more rapidly with distance from the centreline, compared to the 240 kV overhead lines for 2032 average loading. During peak loading, the change in magnetic field from the underground cables, compared to average loading, is small ( $\pm 0.1$  mG at 15 m). **Both the electric and magnetic field levels calculated for the CETR project including at peak line loading are well below the exposure guideline levels recommended by ICNIRP and ICES for the general public.**

## How does the scientific review process evaluate research?

The scientific process involves looking at all the evidence on a particular issue in a systematic and thorough manner. A single study is not sufficient to reach a scientific conclusion because every study has its own strengths and weaknesses that need to be considered when interpreting findings. When many studies are considered together, the strengths of some may be weaknesses in others and vice versa. Findings that are replicated by independent methods and researchers provide the most reliable data. Therefore, all of the studies are evaluated together to arrive at a conclusion. This is referred to as a weight-of-evidence review.

Three types of research studies are considered in a weight-of-evidence review:

**Epidemiologic studies:** Scientists use statistical methods in epidemiologic studies to evaluate whether an exposure (e.g. physical, chemical, or biological) is associated with health outcomes observed in human populations in their normal daily lives. Regarding EMF, many epidemiologic studies have investigated whether people with a disease had a higher magnetic field exposure in the past, compared to people who do not have the disease.

**Animal studies:** Scientists have exposed laboratory animals under controlled conditions to magnetic field levels as high as 50,000 mG and as long as their entire lifetime. They then looked to see if these animals had higher rates of disease compared to a group of animals with no exposure.

**Laboratory studies:** Researchers expose cells or tissues to magnetic fields under controlled conditions and observe any changes that may occur. These studies can be used to investigate whether magnetic fields affect biological mechanisms related to diseases, such as cancer, at the cellular level. They usually have limited value, though, because the behavior of isolated cells and tissues may not be the same as the behavior of the same cells and tissues in intact animals or humans.

To determine whether an exposure (like EMF) poses a health risk, scientists look at the available data from all three study types. Epidemiologic, animal, and laboratory studies complement one another, as the limitations of one study type are addressed in another. Each type of study can be thought of as a puzzle piece; when placed together, the evidence from all three study types gives us an understanding of possible health effects. Taken together, epidemiologic, animal, and laboratory research studies on EMF do not support the conclusion that EMF causes harm to human health. (NIEHS, 1999; IARC, 2002)



## Participating in the AUC’s independent review process to consider facility applications

[www.auc.ab.ca](http://www.auc.ab.ca)

### The AUC regulatory review process to consider facility applications for utility projects



The AUC uses an established process to review social, economic and environmental impacts of facility projects to decide if approval of a project is in the public interest.

The AUC considers applications requesting approval of the need for transmission development and facilities applications seeking approval to construct, operate, alter and decommission electric and natural gas facilities. Applications, as specified in AUC Rule 007, are required for:

- The need for transmission upgrades.
- The route and location of transmission facilities.
- The siting of power plants.
- The construction of a battery storage system.
- The designation of an industrial system.
- The need for and siting of natural gas utility pipelines.

Sometimes the Alberta Electric System Operator’s needs identification document application is considered together with a facility application in a single proceeding; sometimes separate proceedings are held to consider each application.

### Application review process



- Step 1: Public consultation prior to applying to the AUC
- Step 2: Application filed to the AUC
- Step 3: Public notice
- Step 4: Public submissions to the AUC
- Step 5: Consultation and negotiation
- Step 6: The public hearing process
- Step 7: The decision
- Step 8: Opportunity to appeal
- Step 9: Construction, operation and compliance

### Application review process

#### Step 1: Public consultation prior to applying to the AUC



An applicant seeking approval of a proposed utility development project is required to engage in a participant involvement program prior to filing an application with the AUC. The public involvement program involves consultation with persons whose rights may be directly and adversely affected by the proposed project so that concerns may be raised, addressed and, if possible, resolved.

The application guidelines and requirements for facility applications can be found in AUC Rule 007: *Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines*.

Potentially affected parties are strongly encouraged to participate in the public consultation, also called a participant involvement program. Early, active and ongoing discussions with an applicant may lead to greater influence on project planning and what is submitted to the AUC for approval.

#### Step 2: Application filed to the AUC



When the applicant has concluded its consultation with potentially affected parties and the participant involvement requirements have been completed, the applicant files its application through the AUC online public filing system, called the eFiling System.


AUC staff members review each application submitted to verify that all of the application requirements in Rule 007 have been met before an application is deemed complete. If all of the required information is not provided, the application may be closed or missing information will be requested of the applicant. Rule 007 specifies, among other requirements, that applicants must submit the results of a public involvement program in its application that includes information about how applicants consulted and notified stakeholders and Indigenous groups and identifies any unresolved objections and concerns about the project.

#### Step 3: Public notice



When the AUC receives an application it is assigned a proceeding number and the AUC generally mails a notice of application directly to those who live, operate a business or occupy land in the project area who may be directly and adversely affected if the AUC approves the application. The notice initiates the opportunity for formal intervention in the proceeding to consider an application or applications. The notice of application will also set out important dates and information about where to find the application and other items being considered. The five-digit eFiling System proceeding number in the notice is the most efficient way to find information about a proposed project through the AUC website.

#### Step 4: Public submissions to the AUC



Prior to the submission deadline provided in the notice, formal submissions of outstanding concerns and unresolved objections about a project may be submitted to the AUC. To submit a concern, participants will need to register to participate in the proceeding, which involves providing a brief written statement called a statement of intent to participate. Submissions are filed electronically through the eFiling System. The information filed becomes part of the public record and is an important part of the process to ensure that outstanding concerns are heard, understood and considered.

The AUC uses the information gathered through statement of intent to participate submissions to decide whether to hold a hearing on the application(s). The AUC must hold a hearing if a concerned person can demonstrate that they have rights that may be directly or adversely affected by the AUC’s decision on the application. Such a person is said to have standing before the AUC. If the AUC decides to hold a hearing, the AUC will provide further opportunities for participants with standing to ask the applicant questions on the public record and present their position on the application either in writing or in person. Hearings may

be held in writing, in person or virtually through web-conference software.

### AUC eFiling System

The eFiling System is the online tool that the AUC uses to manage applications and submissions in its proceeding-based review. The eFiling System gives access to all public documents associated with an application. The system is also used to submit your concerns and provide input to the AUC and can be used to monitor related proceeding filings. Those who do not have access to the internet can send submissions, evidence and other material by mail and the AUC will upload the submission on their behalf.

### Step 5: Consultation and negotiation (if applicable)



The AUC supports efforts to reach a mutually agreeable outcome among the applicant and affected parties. The AUC encourages the applicant and those who have filed a statement of intent to participate to continue to attempt to resolve any outstanding issues. If all concerns can be satisfactorily resolved this may eliminate the need for a formal hearing. However, if there continues to be unresolved issues, those matters will typically be addressed in an AUC hearing.

### Step 6: The public hearing process



The AUC will issue a notice of hearing if a person with standing continues to have legitimate unresolved concerns with the application. The notice of hearing will provide a hearing date and location, or specify if the hearing will be held in writing or virtually. When the AUC holds a public hearing, registered parties are given the opportunity to express their views directly to a panel of Commission members. Any member of the public can listen to an in-person or virtual oral hearing. An oral public hearing operates similar to a court proceeding.

Participants in a hearing can either represent themselves or be represented by a lawyer. In addition, participants may hire experts to assist in preparing and presenting evidence to support their position.

### Cost assistance



A person determined by the AUC to have standing or a local intervener can apply for reimbursement of reasonable costs. Those who hire a lawyer or technical experts must be aware that while reimbursement for the costs of legal and technical assistance is available under AUC Rule 009: *Rules on Local Intervener Costs*, recovery of costs is subject to the AUC's assessment of the value of the contribution provided by the lawyer and technical experts in assisting the AUC to understand the specifics of the case. It is also subject to the AUC's published scale of costs.

People with similar interests and positions are expected and encouraged to work together to ensure that expenditures for legal or technical assistance are minimized and costs are not duplicated.

### Step 7: The decision



The AUC's goal is to issue its written decision no more than 90 days after the close of record. The AUC can approve, or deny an application and can also make its approval conditional upon terms or conditions. AUC decisions are publicly available through the AUC website at [www.auc.ab.ca](http://www.auc.ab.ca).

### Step 8: Opportunity to appeal



An applicant or participant in a proceeding may formally ask the Court of Appeal of Alberta for permission to appeal an AUC decision. An application for permission to appeal must be filed within 30 days from the date the decision is issued.

An applicant or participant in a proceeding can also ask the AUC to review its decision. An application to review a decision must be filed within 30 days from the date the decision is issued and satisfy the limited grounds described in AUC Rule 016: *Review of Commission Decisions*.

### Step 9: Construction, operation and compliance



An applicant that receives approval to build and operate a facility from the AUC is expected to follow through on any commitments it has made to parties and must adhere to any conditions that were set out in that approval. If concerns about compliance with approval conditions and post-construction operations cannot be resolved with the applicant, they can be brought to the AUC's attention for consideration. The AUC has significant compliance and enforcement powers for all approved applications. Additional information is available on the AUC website.

The Alberta Utilities Commission is an independent, quasi-judicial agency of the government of Alberta that ensures the delivery of Alberta's utility services take place in a manner that is fair, responsible and in the public interest.

We are committed to ensuring that Albertans whose rights may be directly and adversely affected by a utility development project are informed of the application and have the opportunity to have their concerns heard, understood and considered.



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