HEARTLAND TRANSMISSION PROJECT

ALTALINK | EPCOR

January 2010

Underground/Overhead Option

In addition to the proposed preferred East TUC (Transportation/Utility Corridor) Route and the alternate West Route (west and north of Edmonton), the Heartland Project Team will include a stakeholder-requested underground option in its Facility Application* if the Alberta Electric System Operator (AESO), through its underground study, determines that underground transmission is a technically feasible option for this project. The underground option could consist of a 20 km section of underground transmission line within the East TUC, and 45 km of a 500 kilovolt (kV) double circuit overhead line. The map to the right shows the location of the overhead and underground sections of this option.

Preliminary estimates indicate that the capital cost of a 20 km underground line with 3,000 megawatts capacity would be five to eight times the capital cost of an equivalent 20 km overhead transmission line.

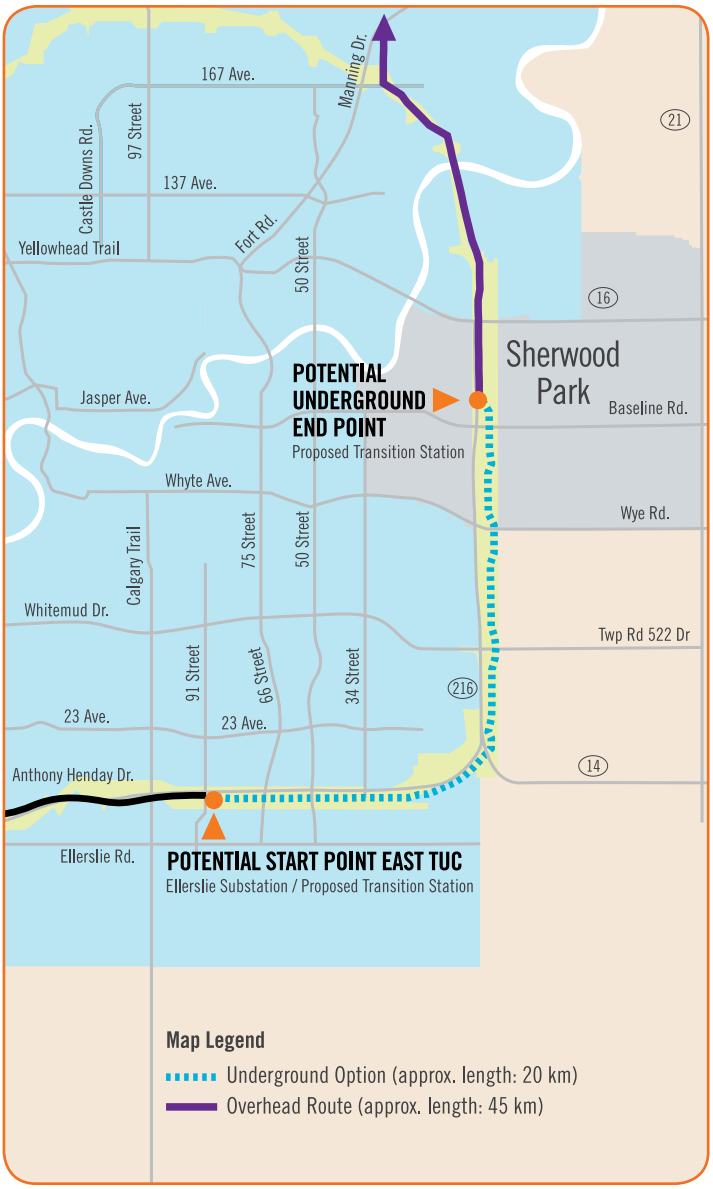
When comparing the estimated cost of the underground/overhead option with the preferred East TUC option, which is overhead only, the estimated cost of the underground/overhead option is two to three times the East TUC overhead option. The estimated costs will vary pending final transmission line design.**

Ultimately, the Alberta Utilities Commission (AUC) will decide whether the transmission line should be approved and, if so, whether any portion of the line should be underground.

Please refer to the January 2010 Stakeholder Information Package for additional information about the preferred and alternate routes.

* To be filed with the AUC.

**These preliminary cost estimates are based on the specific route described above, using a combination of underground and overhead transmission, and do not represent a per kilometre cost factor.



This map has been updated since initial printing to correct a graphical error related to the position of the southern part of the TUC.

What's Involved in the Underground Section of the Line?

The 20 km underground portion could start next to or near the existing Ellerslie substation (south of the Anthony Henday Drive near 91 Street) and it could end north of Baseline Road, east of the Anthony Henday Drive. The underground/overhead option requires transition stations where the underground section connects to overhead lines. We are currently considering two technical options for the transition stations, which are similar to substations. At the Ellerslie substation, the new transition station equipment could be located within the substation easements. The second transition station could be located near Baseline Road.

More information about the transition stations will be available at our Open Houses, Information Centres, and on the Heartland website in the first quarter of 2010.

How Many Cables are Needed for the Underground Section?

To match the operational performance and capacity of the proposed 500 kV double circuit overhead line, each underground circuit must operate at up to 1,500 megawatts (MW) under normal operating conditions, and be capable of carrying up to 3,000 MW in a system emergency.

It is expected that 12 cables, buried in four separate trenches, would be needed to provide the required capacity. The number of cables and trenches will depend on the depth at which the cables are installed as well as transition station design.

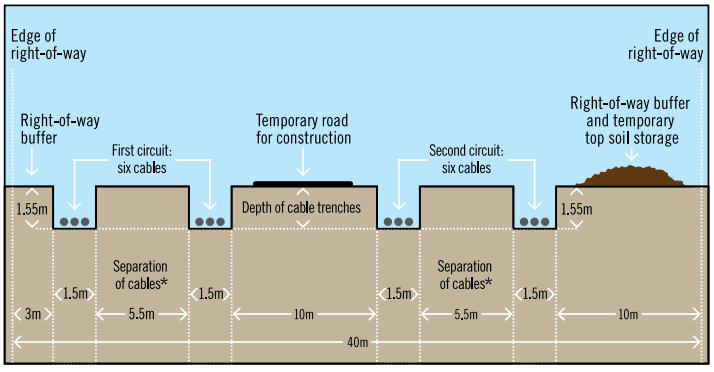
How Would the Underground Transmission Line be Installed?

About 70 per cent of the 20 km underground section could be installed by excavating a trench and directly burying the cables. The cables would be laid in groups of three each in a trench, which would be approximately 1.5 metres wide and about 1.5 metres deep.

This photograph above shows an example of trenching for a direct burial transmission line in the U.K.

In locations where it is necessary to cross obstructions such as pipelines, roads, railway lines or surface water, ducts would be installed beneath the obstruction to provide protection to the cable and minimize potential impacts on the surrounding area.

The illustration below is an example of a direct burial installation.



* Separation of cables required to dissipate heat and for reliability. For example, if an excavation accidentally damages one set of cables in one trench, cables in the other trenches will likely remain unharmed.

Note: The underground installation could require a minimum 40 metre easement corridor. This would increase in areas where the cable would be installed at greater depths to avoid obstacles such as roads, water bodies and pipelines.

What is the EMF Associated with Underground Transmission Lines?

The electric fields from underground cables are shielded by the wire's insulation and the surrounding ground, but the magnetic fields are not. Based on the example of an underground installation (see illustration at the bottom left on this page), the magnetic field would be higher immediately above the buried transmission line, than below the proposed overhead line. However, the magnetic fields from an underground line drop off more quickly as you move away from the buried cable. Magnetic fields drop off quicker when the buried cables are placed closer together which results in the magnetic fields diminishing more quickly with distance, compared to an overhead line where the cables are farther apart. Other factors such as how the lines are arranged, and number of circuits in the line also influence the magnetic field levels.

Potential effects associated with the electric field (audible noise, radio and TV interference, and electrostatic induction) would be eliminated with underground installation. The Heartland Project Team notes however that the design of the overhead line will ensure these effects are effectively mitigated and will meet applicable guidelines.

EMF Profiles

	Underground	Overhead
Maximum directly over cables or under lines	80.9 mG	54.7 mG
50m from the centre of the right-of-way	0.3 mG	11.1 mG
75m from the centre of the right-of-way	0.1 mG	4.9 mG
100m from the centre of the right-of-way	0 mG	2.7 mG
150m from the centre of the right-of-way	0 mG	1.2 mG
250m from the centre of the right-of-way	0 mG	0.4 mG
500m from the centre of the right-of-way	0 mG	0.1 mG
800m from the centre of the right-of-way	0 mG	0 mG

Profiles are based on average line loading over the next decade and 12 cables in four trenches. Predicted values are shown to one decimal point.

The EMF (Electric and Magnetic Fields) levels produced by the Heartland Project are expected to be well below the exposure guidelines established by the International Commission on Non-ionizing Radiation Protection (ICNIRP) for public exposure (833 milligauss) and are well within the range of magnetic field levels that we are exposed to in our everyday lives. Neither Health Canada nor the World Health Organization has recommended that the general public need to take steps to limit everyday exposures to EMF.

Contact Us

Copies of the January 2010 Stakeholder Information Package newsletter, maps and other project information are available on the project website at **www.heartlandtransmission.ca** or call us at **1-888-441-7192** or e-mail us at **publicconsultation@heartlandtransmission.ca.**