



DEVELOPING NEAR TRANSMISSION LINES?

**A little planning can go a long way in
minimizing their impact.**

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Lands under power lines and transmission towers, though primarily owned by private landowners, are subject to specific rights contained in the statutory right of way agreements referred to as rights of way. The agreements restrict owners' rights to activities that do not impact public safety, interfere with the operation of the lines, cause a hazard, or interfere with the rights granted. They also generally allow for the construction and maintenance of the existing facilities, including tree cutting and their replacement with future lines.

BC Transmission Corporation (BCTC) is a Canadian company established in 2003 as a provincial Crown corporation to focus on building and maintaining a safe, reliable and cost-effective power grid. BCTC recently published guidelines for development adjacent to its transmission corridors. The guidelines will assist landowners, designers, planners, developers and communities who are working within or beside power lines and transmission towers to minimize their impact and promote a quality environment.

BCTC was formerly the transmission group within BC Hydro, another provincial Crown corporation which continues to be responsible for generation and distribution services in much of BC. While BC Hydro retains ownership of the physical assets and the legal tenure for the rights of way, BCTC is responsible for operating, planning and maintaining the province's publicly owned high-voltage electric transmission grid. Transmission voltage power is delivered through

an interconnected system of more than 18,000 kilometers of transmission lines to substations which in turn step down the voltage for distribution. BCTC manages 20,500 steel towers, 75,000 wood poles, and 287 substations.

Designing Around Power Lines: Draft Guidelines

Landowners and developers often see proximity to power lines and rights of way as a factor that may affect property values. However, with effective planning and design, transmission corridors can provide benefits to landowners and create better, more aesthetically pleasing communities. A right of way on private property can create opportunities for individual property owners to enjoy larger lot sizes with the potential for large gardens and outdoor spaces, while the use of public right of way corridors for public amenities such as walking trails, playing fields and bicycle paths contributes to attractive communities which in turn serves to enhance neighborhood appeal and residential property values.

The Design Elements

It is important to create a harmony between density, alignment, orientation and landscaping, in order to create an aesthetically appealing community.

Topography

The location of towers can have an enormous impact on public perception. When towers are set in an elevated position and are viewed from lower ground, the scale and visual impact of the towers is emphasized. Conversely, where towers are viewed from an elevated position the visual impact is reduced. Towers set across the brow of a hill will be silhouetted against the sky and will appear more prominent than towers set in a similarly elevated position but with rising land or built development behind them.

Density

The density of property surrounding the tower can also affect its visual impact and perception in the community. By placing buildings with higher heights closest to the overhead power line, views of the line from public areas can be minimized. Higher densities close to power lines, particularly in residential areas with lower heights, can typically have a negative perception.

Alignment and Orientation

The alignment of streets and paths can reduce the number of direct views of towers, minimizing their impact and reducing the impression of a linear corridor.

Buildings should be oriented to minimize direct views of towers. Some developments may face towards the overhead power lines, rather than towers, as part of a variety of design responses to the transmission route. Development blocks adjacent to overhead power lines can also be left open ended, using the resultant space to create public gardens, squares or parking courts. The use of buildings oriented perpendicular to the lines, offers the opportunity to minimize direct views towards the route, significantly reducing the visual impact from streets, buildings and gardens. This orientation is best suited for high and medium density developments usually in the form of high rise condominiums, apartments and town homes.

The orientation of homes parallel to the right of way does little to minimize the visual impact of the lines from inside the homes. One solution is to locate cul-de-sacs on the edges of the right of way and between towers. Curving streets and paths, even by relatively small degrees, can significantly reduce the visual impact of towers. Views toward towers may occur at some distance from the tower, and can also be framed by new street scenes and public open spaces at some distance from the towers, particularly where there may be changes in topography.

The arrangement of buildings, boundaries, fences, paths and planting parallel to the transmission route over long distances will tend to highlight the presence of overhead power lines and the linear nature



Typical residential development backing onto two 230 kV H-frame lines in Delta, BC.

“Landscaping provides one of the most effective methods to diffuse the effects of power lines”

of the route and will make them more obtrusive. However, where one or more of these elements is varied (and not parallel), the linearity of the transmission route and its overall prominence can be diminished.

Distance

Varying the distance of development from transmission facilities is an important design tool. Buildings are not permitted within the right of way. Auxiliary buildings should be kept, as a minimum, at the edge of the right of way or set back to allow uses not otherwise permitted to take place within the right of way (e.g. in-ground swimming pools, greenhouses, garages, etc). In commercial and multi-residential settings, the area of the lot within the right of way can be used for parking and other amenities.

Landscaping and Screening

Landscaping provides one of the most effective methods to diffuse the effects of power lines and use the space within and adjacent to the right of way in a manner which is aesthetically pleasing and an amenity to homeowners. Screening can enhance the quality and intimacy of the immediate setting by creating the perception that towers have receded into the distance. The effectiveness of any screening depends on the distance of the viewer from the overhead power line and from the screening.

Within the right of way, trees and shrubs generally cannot exceed three meters in height at maturity. Appropriately low growing vegetation can be located within the right of way, while larger species can be planted near the edge, thereby reducing the visual impact of the lines and enhancing the overall environment.

Outside of the right of way, strategic screening can enhance the quality and intimacy of the area, giving the impression that towers and lines are further away. Mature trees planted along streets can effectively screen views and enhance the residential environment. Layers of planting create a series of silhouettes into the distance, creating a depth in the field of vision that helps to reduce the visual impact of overhead power lines. In this way, views of towers can be effectively screened without the need for continuous belts of planting. When branches of mature trees actually arch over the street, then views of towers can be obscured for much of the year. Consideration should be given to the use of screening in layers with varying heights to match site circumstances.

Community Amenities within the Right of Way

Most public amenity uses are on municipal lands. While use of the right of way has some restrictions, the presence of long corridors of clear, open, space provides the opportunity to develop significant private and community amenities. Consent of the owner and the local government as well as BCTC will be required for any public use of a right of way.

In order to best use this space, it is worth considering design ideas, such as:

- Breaking the transmission route into cells using roads, bridges, etc.
- Creating places with a variety of uses such as garden squares and parking lots
- Creating meandering paths and varied planting
- Providing a mix of activities beneath and adjacent to overhead power lines

Compatibility

The following are examples of compatible uses within the right of way, subject to maintaining safety clearances.

Public Open Space and Playing Fields - active recreational uses may take place close to overhead lines subject to the nature of the activity, layout of playing fields and the level of supervision. The location and type of lighting used for playing fields within rights of way need to be reviewed by BCTC where high voltage overhead lines are present.

Nature and Conservation - the retention or creation of nature conservation areas may be particularly suitable where public access to the area is restricted or prevented.

Circulation Paths - active recreation paths, roads, cycle paths and walkways can be successfully accommodated beneath high voltage overhead lines.

Allotments and Community Orchards - using rights of way for allotments and community orchards

Parking - accommodating ancillary parking beneath high voltage overhead lines.

Private Gardens - using rights of way for gardens and planting.

Power Line Safety and Maintenance

Contact, or near contact, with high voltage equipment is extremely dangerous and must be avoided. Objects that approach overhead electricity conductors too closely can cause fatal or severe shocks and burns. In order to prevent such incidents, minimum safety clearances for all overhead power lines are prescribed, which must be maintained between conductors and the ground, trees, buildings and any other structures, such as street lighting.

Care must be taken in unloading, stacking or moving material underneath conductors and in the construction of buildings or other structures in the vicinity of an overhead power line. Generally, buildings located outside of the right of way are safe from any of these concerns.

Emergency access to large buildings that are being constructed adjacent to transmission rights of way also must be considered. For example, the crew on a fire truck attempting to extinguish a fire in a multi-story development at the edge of a right of way must have adequate clearance from the transmission lines.

1. Induced Currents

Induction is the transfer of electric current or charge to an object that is not directly in contact with power lines. Induction can be an issue with buildings that are more than two stories, or long buildings that are parallel and located adjacent to high voltage (generally 230 kV and higher) lines and rights of way. As the height of a building increases, it comes into closer proximity to the high voltage wires with greater exposure to induced currents. While there is no direct public safety risk, it does significantly increase nuisance or micro-shocks. Developers should retain a professional consultant with expertise in calculating electric and magnetic fields, mitigation strategies and safety issues during construction and after occupancy if they plan to build in close proximity to high voltage transmission lines.



Playing fields and tennis courts underneath 230kV and 500 kV lines in Coquitlam, BC.



Townhouse development built on angle to 500 kV lines with trees screening right of way in Surrey, BC.

2. Electric and Magnetic Fields (EMF)

Power frequency (also referred to as extremely low frequency or ELF) electric and magnetic fields are present everywhere that electricity flows. All electric wires, and the lighting, appliances and other electrical devices they supply, are sources of electric and magnetic fields. Scientists have been researching EMF and possible health effects for more than 30 years, and this extensive research has yet to establish a link between health risks and EMF. Health Canada and the BC Centre for Disease Control state that there is no reason to be concerned about exposure levels in typical Canadian homes and workplaces, regardless of the proximity to power lines.

3. Changes to Ground Level

Changes to the ground level are not permitted without approval, as there must be a minimum distance between the lowest point of the transmission line and the ground. When ambient temperature is high and transmission lines are operating at maximum capacity, the lines will sag.

Conclusion

Transmission towers and lines are a necessary part of the infrastructure that enables us to provide electricity to our homes and businesses. Many transmission lines built in what were formerly rural areas are now being “encroached” upon by development. Hopefully this article, and the guide it is based upon, will provide some helpful guidelines on how to best consider transmission lines when developing lands within and nearby. By doing so, the owner, developer and community will all benefit. ⚡

These guidelines were approved and placed on the BCTC website in April of this year. Visit them at: www.bctc.com/the_transmission_system/rights_of_way_prop_rights/

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