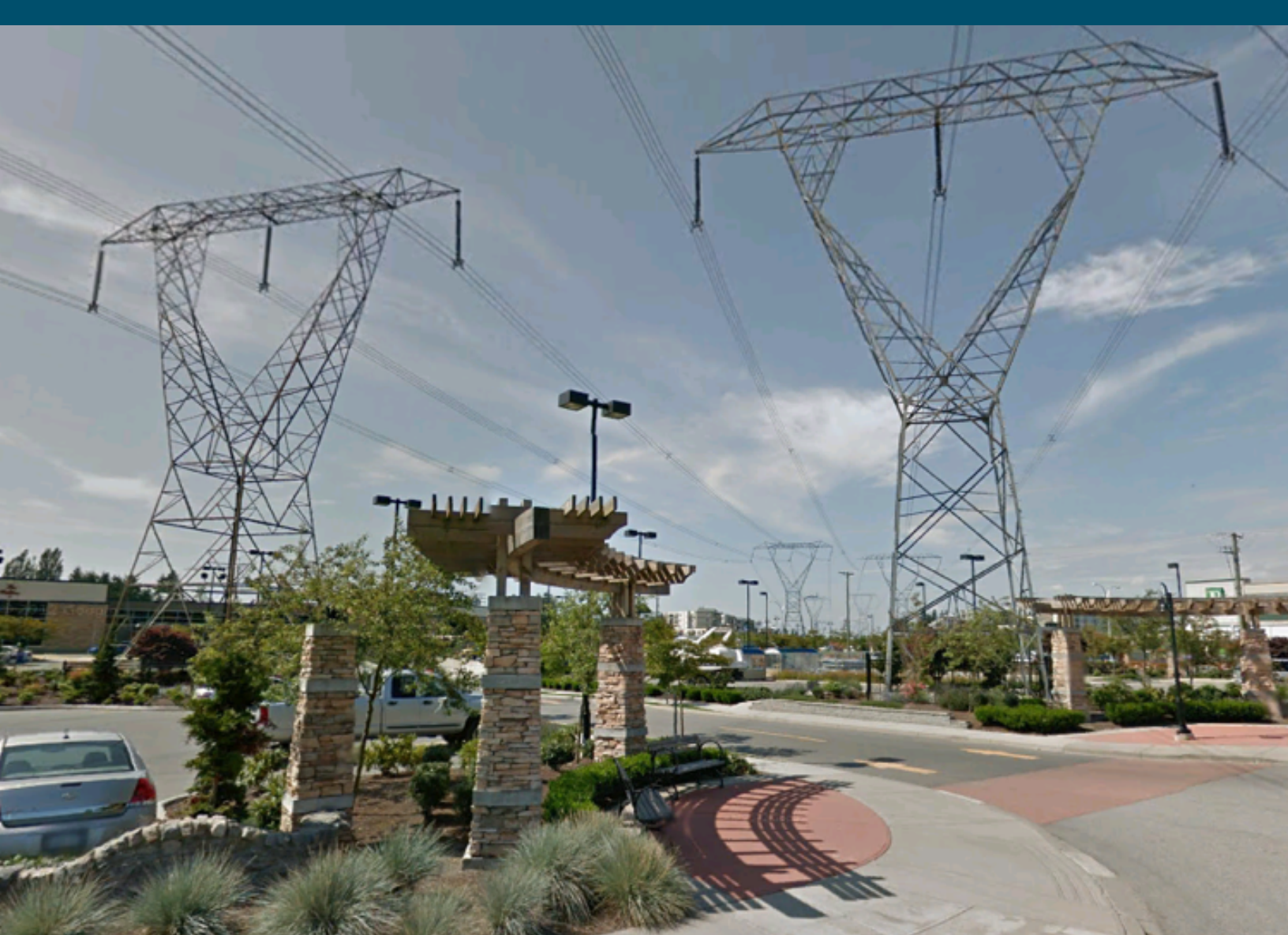




BC Hydro Rights of way Guidelines

Compatible uses and development
near power lines

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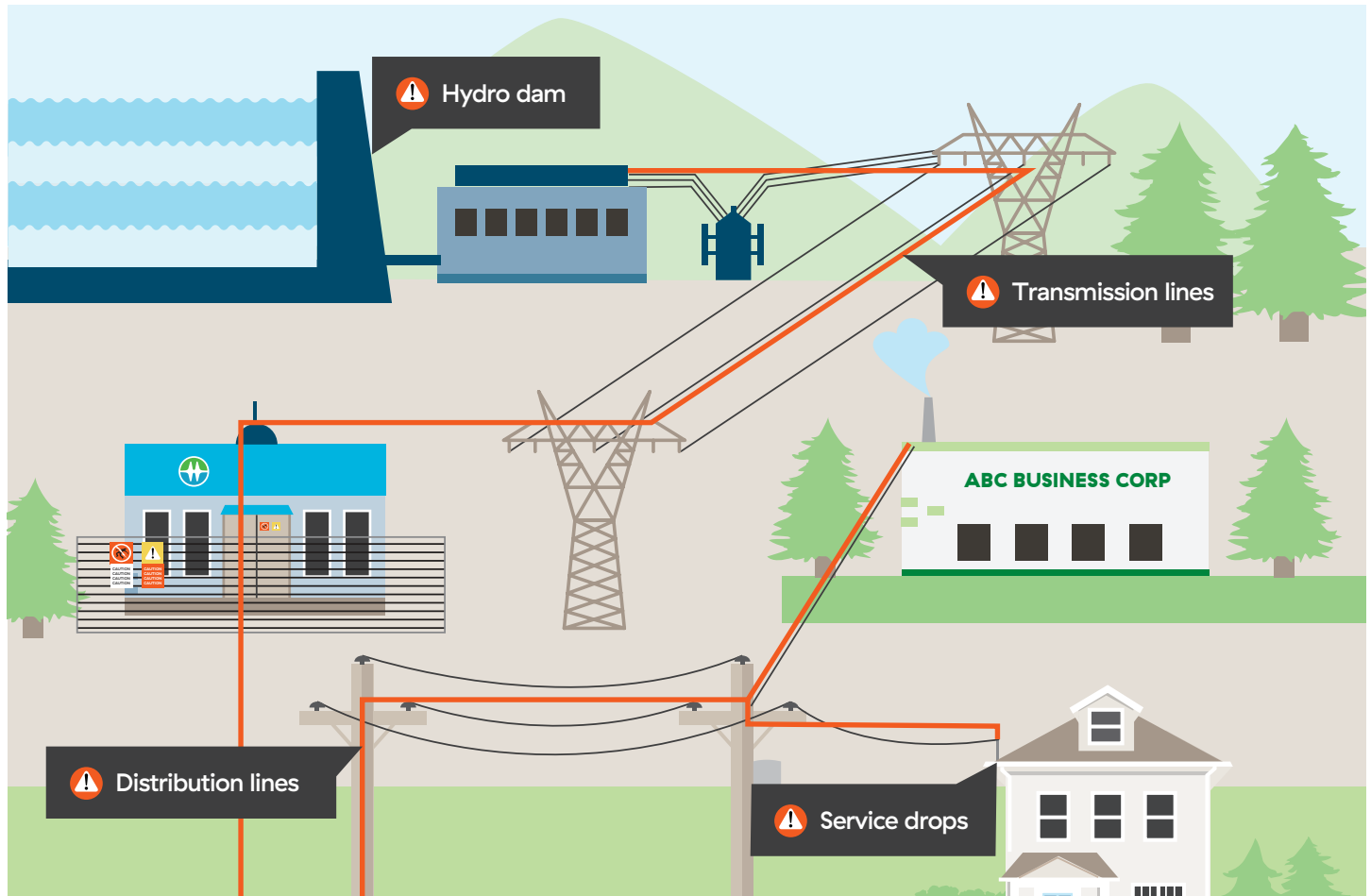
Contact our province—wide Properties helpdesk at:

BC Hydro and Power Authority
Properties Division
12th Floor, 333 Dunsmuir Street
Vancouver, BC V6B 5R3

Phone: **604 623 3637** or outside the Lower Mainland, call toll-free: **1 800 667 1517**
Fax: 604 623 3951
Email: **properties.helpdesk@bchydro.com**

Overview

BC Hydro delivers reliable, clean energy to homes and businesses across British Columbia. We depend on our extensive transmission and distribution system to ensure the power gets to where it's needed. Power lines, whether overhead or underground, are designed to be safe. But electricity can still be dangerous, so it's vital to learn to be safe around power lines.



Rights of way

Our network of power lines spans across the province to bring power from remote dams and generating stations to customers. We negotiate with the land owner(s) to acquire Statutory Rights of Way (ROW) that allow us to construct, operate, and maintain power line(s), and give us the right to keep the area under and around power lines clear of anything that may interfere with our work. By working with landowners, local governments, public agencies and interest groups, we can help ensure that the power supply remains safe, secure, and reliable. In some cases, ROW may not yet have power lines in them and are being reserved for the placement of future projects.



Inter-River Park, North Vancouver
Photo: Google 2016

While land owners have the right to use their property within the ROW boundaries, they must do so in a way that doesn't put them or the public at risk, interfere with our operations, or contradict the ROW Agreement in place. It's vital to contact us early in the planning process to make sure what you propose to do is safe, and to prevent costly delays or design changes to your proposal.

Title and Statutory Right of Way Agreements

A copy of your Title and any registered Statutory Right of Way Agreements can be obtained from the Land Title Office. More information can be found at itsa.ca/cms/general-public.

These guidelines are meant to help landowners and developers create proposals that meet all safety and operational requirements. They should be read together with the Statutory Right of Way Agreement registered against the specific property. The Agreement is registered on the Title of the property and remains on the Title when the ownership of the property changes.

When developing next to power lines (whether there is a ROW registered or not) certain Canadian and International electrical standards and regulations must still be met. All proposed uses within a ROW must be submitted to our Property Rights Services group for review and approval.

If you have questions or require consultation on a proposal, give us a call at 1 800 667 1517 or send an email to properties.helpdesk@bchydro.com

Who are these guidelines for?

PROPERTY OWNERS

In seeking to maximize use of their land along ROW, property owners rely on our safety guidelines and a set of recommendations for appropriate land use.

LOCAL GOVERNMENTS

Local governments have the potential to develop and improve ROWs, so we provide supplementary planning guidance on the development of lands within our ROWs. These guidelines provide a basis for analyzing and approving land development located in close proximity to our works, and help communities plan for growth.

DEVELOPERS AND DESIGNERS

Good design is vital to proper development. Our guidelines provide awareness and clarity about the design constraints posed by ROWs.

THIRD PARTY USERS

Third parties – which can include private and Crown land lessees, independent power producers, loggers, recreational users, and other ministries – rely on these guidelines for guidance and approval of proposed uses for ROWs.

How to prepare and submit a proposal

PRE-APPROVAL IS REQUIRED WHEN USING RIGHTS OF WAY

Pre-approval is required anytime you're proposing to use our rights of way, including:

- When you wish to work within the ROW or cross it with machinery or vehicles
- You're discussing development on or adjacent to the ROW
- You're subdividing a property with our ROW registered on the Title

Take note that our rights aren't always registered under "BC Hydro." Sometimes our rights are included in other ROW agreements (e.g. City ROW, or Restrictive Covenants) registered on your Title. If you're unsure about your Title or ROW Agreement, are unable to locate it, or have questions, call 1 800 667 1517 across B.C. or 604 623 3637 in the Lower Mainland, or email us at properties.helpdesk@bchydro.com.

START WORKING EARLY ON YOUR PROPOSAL

Send in your proposal at least six weeks ahead of when you need it approved. The more detailed and complete your submission is, the faster you will receive a response. Send your proposal and any attachments to your regional Properties office or send by email to properties.helpdesk@bchydro.com. You can also apply online using the Compatible Use Application, available at bchydro.com/rowapplication. A link to the printable application form is available at bchydro.com/row.

Please include:

- The legal description or property identification number (PID).

You'll find these on your tax assessment notice or Certificate of Title. If you can't locate either of these, your street address may be sufficient.

- A detailed description of your proposal, including:
 - a. A map or legal plan of the property
 - b. A drawing of an appropriate scale showing:
 - The location of the proposed installations or uses in relation to existing roads and adjacent legal boundaries
 - The horizontal and vertical clearances, or distances, from what you're proposing to build to any adjacent BC Hydro works (e.g. tower legs, poles, anchors, cable) and ROW boundaries
 - The dimensions of the proposed installations, changes in grade or elevation, uses and maximum heights (including load and reach) of any vehicles
 - Include electrical drawings and landscaping plans
 - Equipment to be brought onto the ROW
 - Details of materials to be used (e.g. wood, metal, ductile iron, PVC).
- All necessary consents
It's your responsibility to get the written consent of any land owner and other parties with an interest in, or jurisdiction over, the proposed use and/or the property. This includes other charge holders and regulators (eg. Agricultural Land Commission, local/regional governments, etc).

APPROVALS, DOCUMENTS & TIMELINES

If your proposal is approved, a Compatible Use Letter containing all terms and conditions of the approval will be sent to you and/or the owner. You and/or the owner will be required to sign and return the Compatible Use Letter to us by the deadline specified, in acceptance of the specific terms and conditions.

Note that if your approved proposal calls for any modification or relocation of our infrastructure, the relocation could take up to one year or more and you will be responsible for the associated costs.

Don't start construction activity on the ROW until you've received, signed and returned (if required), the Compatible Use Letter and, if necessary, have an on-site meeting with a BC Hydro representative(s) to review the safety procedures. All necessary forms must be signed off by BC Hydro Field Operations staff before you're allowed to start work.

It's important to understand that each location and development has many different variables. For example, each BC Hydro structure can vary in both design of the structure and height of the wires, and buildings can vary in height, length and proximity to the power lines. As a result, each development is reviewed on a site-specific basis.

Potential compatible uses of our Rights of Way

Any proposal within the ROW should be designed to ensure you are a minimum of 10 metres (33 feet—the length of a school bus) away from our structures (e.g. poles, towers, anchors). If you want to be closer than that, we'll review proposals for reduced clearances on an individual basis.

Some examples of compatible activities that may be approved:

- Multi-use trails, paths and walkways
- Non-permanent, non-metallic small sheds less than 3.6 metres (11.8 feet) in height and a floor space of not more than 36 square metres (387.5 square feet) with no wiring or plumbing
- Driveways and access roads
- Fencing
- Golf courses
- Farming
- Tree farms



Inter-River Park, North Vancouver
Photo: Google 2016

Some examples that aren't compatible in ROWs, unless expressly authorized in writing by us:

- Burning, blasting or log decking
- Stock piling of excavated, building or other material
- Storage or handling of flammable or explosive material
- Fueling of vehicles and equipment
- Deposit of any fill material
- Organized parking of vehicles
- Buildings or portions of buildings, including foundations and eaves

ROW USER EXPECTATIONS

As a user of the right of way, you must:

- Comply and ensure compliance with all applicable legislation, regulations, guidelines, orders and standards, including without limitation all environmental laws and Part 19 Electrical Safety of the Occupational Health and Safety Regulation (a copy of this regulation is available at WorkSafeBC.com).

- Release BC Hydro from any liability arising from the proposed use of the ROW.
- Be responsible for any damage to BC Hydro's works due to your proposed use of the ROW.
- Assume the costs of any required modifications, protection or relocations of BC Hydro's works to accommodate the proposed use.
- Ensure non-metallic and/or non-conductive materials, non-flammable and non-toxic materials are used.
- Not inhibit or interfere with BC Hydro's access to, and maintenance of, our towers, poles and other infrastructure.
- Don't assume your Compatible use request will be approved – it may be denied for safety or operational reasons.

For your safety

WORKING SAFELY AROUND ELECTRICITY

Electricity is always trying to get to the ground by the fastest route possible. If something that conducts electricity gives that electrical current an easy path to the ground, it will take it.

Contact or near-contact with electrical equipment and power lines is extremely dangerous. Approaching electricity lines too closely can be fatal.

The necessary distance will depend on the operating voltage of the line, construction and design of the line, topography of the location where the power line is built and the type of development proposed.

Nothing should ever be attached to BC Hydro's works, whether temporary or permanent, unless expressly authorized in writing by BC Hydro.

Site safety plans, including restricted access and designated work areas dumping, storing, etc. may need to be submitted for review and approval. The plan will need to meet both BC Hydro and WorkSafeBC requirements.

BC HYDRO WORKS WITHIN ROAD ALLOWANCE

Many of our works are installed in road allowance. Proposed buildings should not breach safety clearance zones required around existing utilities. The Canadian Electrical Code (and local adoptions), Canadian Standards Association and WorksafeBC stipulate minimum clearances of power lines and equipment from buildings for safety and safe working clearances.

It's the responsibility of the developer and/or the electrical engineer of record to ensure compliance with all the various codes. Contact the Properties Help desk if you have questions.

3 keys of electrical safety



Look up and down

Identify overhead and underground power lines. Follow safe work procedures at: bchydro.com/besafe, worksafebc.com, and bconeccall.ca.



Stay back

Keep at least 10 metres back from fallen power lines. Treat all power lines as live and extremely dangerous.



Call 911 for help

Stay put and do not attempt a rescue. If your vehicle catches fire, jump clear of the vehicle, land with feet together, and shuffle 10 metres away keeping your feet close together.

Learn about free electrical safety training at bchydro.com/besafe.

ELECTRIC AND MAGNETIC FIELDS

Electric and magnetic fields (EMF) are present everywhere that electricity flows. All power wires and the devices they supply are sources of electric and magnetic fields.

On a daily basis you're exposed to EMFs generated by household wiring, lighting and electrical appliances such as microwave ovens, hair dryers, and computer equipment. Levels of EMF in transmission and distribution lines depend on the electrical load, which is how much electricity is being used at a given time, configuration of the wiring and distance from the line.

For more information, visit bchydro.com/emf or call toll free 1 866 647 3334.

Planting and logging near power lines

Landscaping within the ROW is restricted to low growing trees, shrubs and plants. The maximum allowable height for vegetation, at maturity, depends on the height and voltage of the power line. We maintain, and remove when necessary, trees and plants that grow around our facilities and power lines in order to keep your service reliable and our works secure.

When planting outside the ROW, we recommend not planting anything that will grow to be very tall, or that has weak root systems that might be prone to falling on power lines or structures. We call these "hazard trees" and we have the right to remove them from under and around our power lines.



Richmond pollination corridor

PLANTING NEAR POWER LINES

While we restrict trees in our ROW, we do allow for some low-lying vegetation and other ecological enhancements, such as pollinator fields.

Pollinators are an integral part of a healthy ecosystem and are important to food production.

We support pollinator-friendly habitat and encourage the creation of pollinator fields in our ROWs, in consultation with BC Hydro. To ensure system operation and public safety, please contact us with your plans for the pollinator corridors.

LOGGING NEAR POWER LINES

If a tree growing within Limits of Approach must be removed it can only be taken down under the supervision of a certified utility arborist. The same applies to logging operations where trees can be prevented from falling within the Limits of Approach.

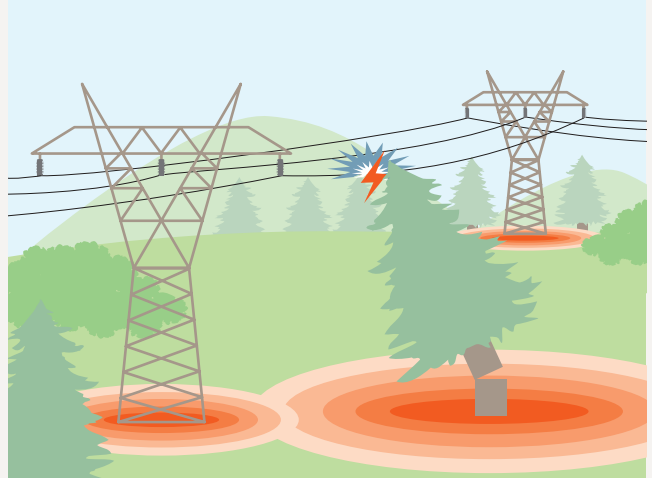
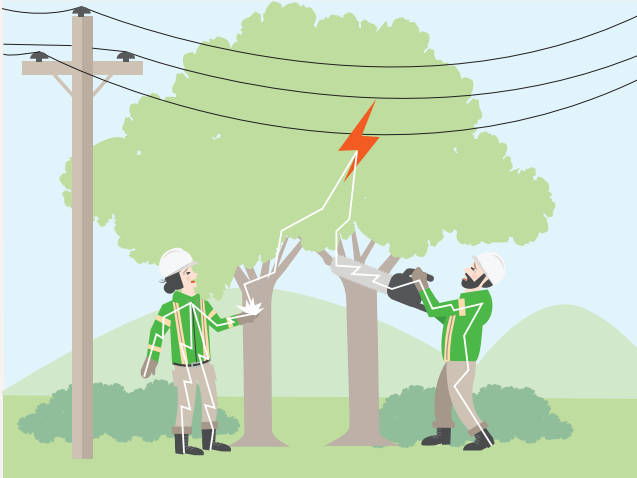
Helicopter logging around power lines is extremely dangerous and can't be done at all within the ROW. Contact your regional Properties office before any helicopter logger near our power lines begins and always ensure that no helicopters fly over power lines carrying logs.

High lead logging, also known as cable logging, uses steel spars or cables and creates significant electrical induction hazards near power lines.

No edge trees strips are to be left adjacent to the ROW as they have the potential to fall onto the power lines. The storage of logs and debris and slash burning is not permitted within the ROW.

Did you know?

- Trees are full of sap and moisture, which makes them conductive. That's why they conduct lightning and why they create a danger when electrical wires are nearby.
- That power line wires can move as much as four metres (over 13 feet) vertically on a high voltage line, depending on electrical load and weather conditions. They also swing in the wind.
- Trees falling near and onto power lines pose extreme safety hazards. They also cause power outages to large areas and many customers.
- Wooden ladders and tool handles offer no protection at all. Wood is not a safe electrical insulator for any voltage of electricity



Other underground installations

We have power lines both above ground and underground. It's vital to position anything you build underground (e.g.: sewers, water lines, other utilities, or other conduits) to avoid the safety risk of fault transfer when electricity arcs from a power line/cable into the ground and/or surrounding equipment.

Any underground infrastructure proposals within our ROW must be reviewed and approved by us. The proposed works should be designed:

- To be a minimum 10 metres (33 feet) from power lines or infrastructure, both overhead and underground, with the exception of metal/ductile iron pipe or gas installations, which require a 30-metre separation.
- With non-conductive materials.
- When buried, to withstand use by a BCL-625 truck, per specifications set out in the BC Ministry of Transportation and Infrastructure Supplement to the Canadian Highway Bridge Design Code S6-O6. Where duct banks are already installed, further restrictions on weight and/or equipment over the top of duct banks may be identified.
- To be identified, either by permanent above-ground markers, or by non-conductive underground electronic ID markers.
- To not be located between a BC Hydro guy wire anchor and one of our poles or tower structures.

You'll need our written approval for all proposed installations within a ROW or within the required minimum separation distances, and one of our inspectors may be required to be on site.

If you want to seek an exception to our allowable minimum distances, your proposal will require specific review and we may require an induction and/or soil resistivity study be completed.

CALL BEFORE YOU DIG

Call BCOneCall 1 800 474 6886 or *6886 (cell) for information about underground utility infrastructure before any digging work begins.

Buried power lines, regardless of voltage, present a different kind of hazard to people than overhead power lines. The ultimate responsibility for any damaged underground infrastructure rests with the person performing the work. Hand-digging may be required to ensure safety.

BCOneCall drawings designate high voltage transmission lines in orange and distribution lines in pink and blue colors.

Pipelines

Any pipeline works proposed within 30 metres of BC Hydro power lines, facilities or ROW require that you submit to us a detailed proposal for review.

Installation and operation of the pipeline must be in accordance with CAN/CSA-22.3 No. 6 – Principles and Practices of Electrical Coordination between Pipelines and Electrical Supply Lines.

Pipelines must not make it more difficult for us to access, maintain and operate our power lines or other works. Permanent crossing options within or across access roads and tracks may need to be provided.

It's best if non-metallic piping can be used for the installation within the ROW. A ground fault between a metal/ductile iron pipe and any of our works could transfer dangerous levels of electricity to the pipe.

MARKING AND IDENTIFYING PIPELINES

To mark the location of a buried pipeline, regulations sometimes call for a tracer wire to be installed. However, a tracer wire poses safety and reliability issues when close to electrical infrastructure, as it's hardly any different than a metallic pipeline in the ground. The safer option when near a power line is to use an electronic identification marker.

Be aware of recommended safe distances, which vary by power line voltage, away from power lines. The limits are in place to allow us to maintain our works, but also to prevent arcing to a pipeline or tracer wire due to a power line fault.

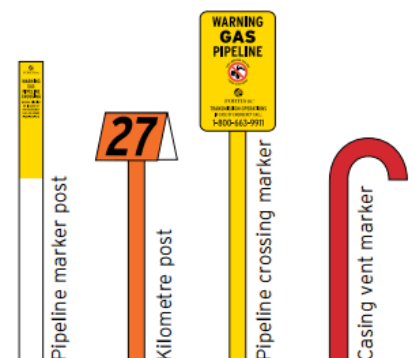
SPECIAL CASES AND CONSIDERATIONS

In general, the minimum distance between pipelines and power lines to prevent arcing is 30 metres, based on average lightning currents and conditions in B.C. For us to agree to reduce the minimum separation, a soil resistivity test will need to be performed at the specific location. This test analysis must be reviewed and accepted by us, and signed by a Professional Engineer registered in B.C.

We understand that placing limitations such as a 30 metres separation in built-up areas can be challenging for you. That's why our studies will consider the shielding effect of buildings, trees, etc., as we decide whether to reduce that minimum separation distance in your proposal.

Unless a study is completed and a change approved, we still require a minimum of 30 metres separation. Non-compliance with this requirement can result in damage to pipelines and/or injury or death, for which BC Hydro can't accept responsibility.

For more information, please contact us at properties.helpdesk@bchydro.com or 1 800 667 1517 or 604 623 3637.



Designing around BC Hydro rights of way

With effective planning and design, land owners can benefit from power line corridors. Good design can also lead to better, more aesthetically pleasing communities near our rights of way.

Individual property owners can take advantage of a private property ROW to enjoy a larger lot, potentially with a large garden and additional outdoor space. Public ROW corridors can accommodate walking trails, playing fields and bike paths.

Before beginning design, you should conduct a thorough survey of the site and the surrounding area, including a detailed analysis of views of power lines from the site. You should also review the ROW Agreement to clarify rights, responsibilities and restrictions.

Here are some tips that can help reduce the visibility of towers, poles, and power lines:

- Place non-residential buildings nearest to our infrastructure, to help block the view from most public and residential areas.
- With new subdivisions and communities, vary the alignment of streets and paths.
- Try, wherever possible, to design communities on ground higher than neighbouring transmission towers, as towers on hills can appear far more prominent.
- Keep in mind that towers set across the ridge 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 development behind them. Even subtle level changes across a development site can make a significant difference.
- Use landscaping outside of the ROW boundaries, such as groups of strategically placed trees, to block or diffuse views of towers and other works. This can create a more pleasing series of silhouettes that help to reduce the visual impact of towers.



Aligning homes between towers (as shown in photo on left) as opposed to right in front of a tower (as shown in photo on right) helps to reduce the visual impact of power lines.

Photo: Google 2016



In this image, the visual impact of power lines is very strong, as little attention has been paid to varied orientation or the use of landscaping to 'hide' the towers. Photo: Google 2016.



This image illustrates how screening and landscaping can diminish the visual impact of power lines in residential neighbourhoods.

Photo: Google 2016.

Relocating of BC Hydro works

At times it may be possible to relocate or modify the existing power lines, equipment, or ROW, depending on your proposal. If the project initiator, developer, or property owner wishes to relocate existing works, or if the proposed use changes protection, and/or relocation of existing works and if the relocation or modification is approved by BC Hydro, you'll be required to enter into one or more agreements with BC Hydro and provide the required prepayment. The process may take over a year and, if applicable, work requiring a power outage is subject to scheduling and availability, which may extend the schedule.

The request is a four-step process: Initiation (first meeting), Feasibility (study to determine possible options) Definition (determining the scope of required work), and lastly, Implementation (agreement for the detailed design and construction of the work). These agreements must be signed and returned to us, along with applicable prepayment.

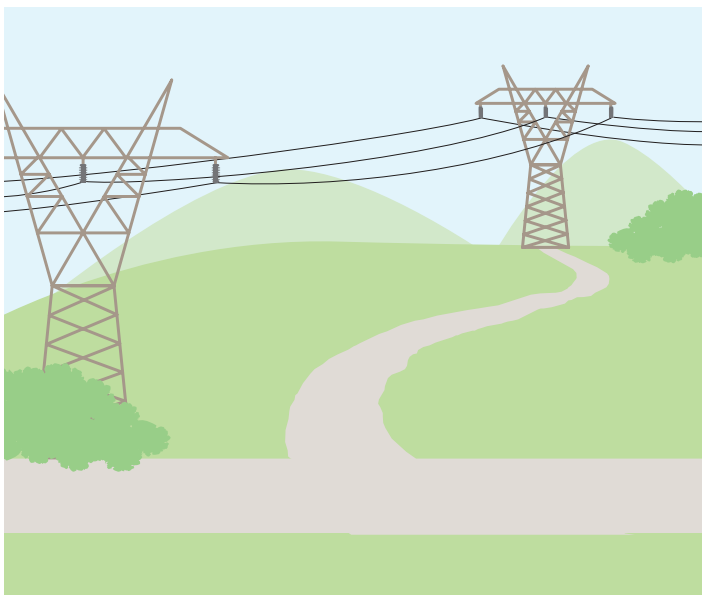
No planning or work will be scheduled until we receive the signed agreements and pre-payment. After the change, relocation, and/or protection job is completed, you'll be billed for the actual cost of the work, minus the amount of your prepayment.

Paths, roads and parks

Outdoor recreation paths, roads, biking trails and walkways can be built under high voltage overhead lines, subject to our review. Always seek to orient a path or trail alignment at least six metres (20 feet) away from our towers or other works.

We'll review proposed trails to ensure crews can still access the equipment for maintenance. ROW must still be accessible by large trucks or tracked machinery, and we reserve all rights for future rebuilding of access roads over top of installed trails.

A proposed park as part of a development within a ROW must not be dedicated, but must remain land with a registered title in the Land Title Office. The area will be subject to our ROW rights and conditions.



A path with an end point towards a transmission tower gives prominence to the tower.

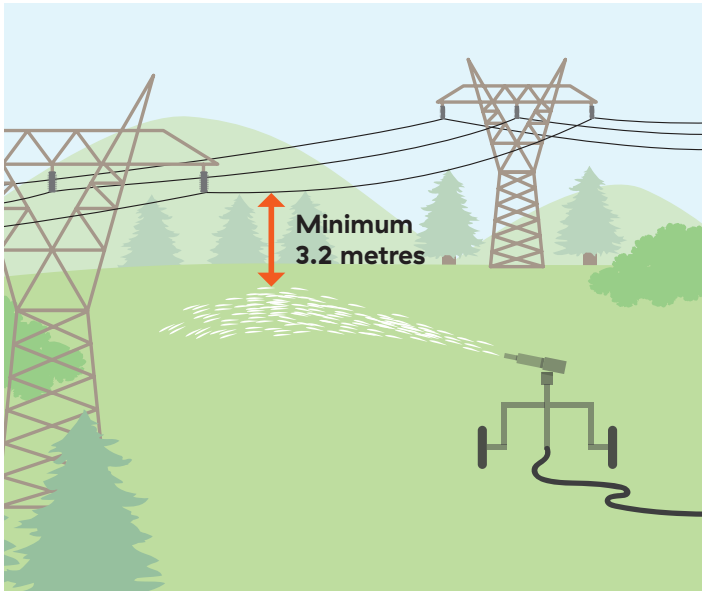


By altering the path, the visual effect of the tower is minimized.

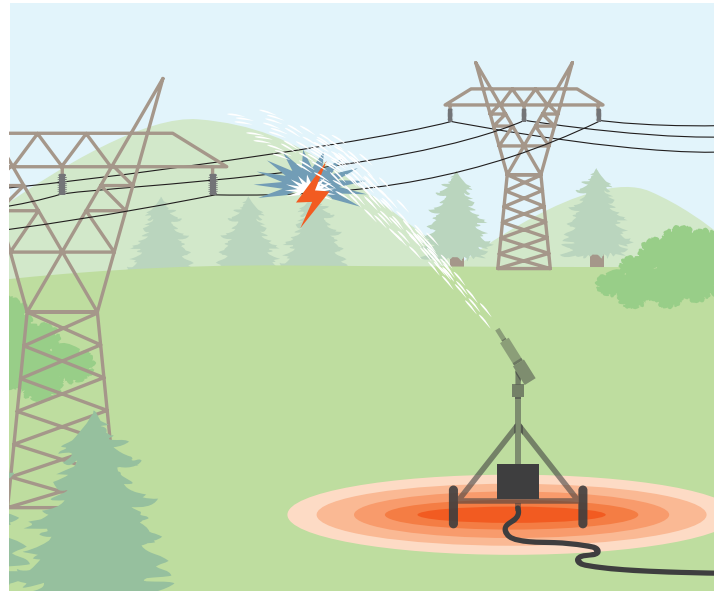
IRRIGATION AND WATERING UNDER POWER LINES

Water and electricity are a dangerous mix. Never allow water to spray on power lines. A hose or pipe spraying a power line can create a direct current through the watering equipment. Use low-angle irrigation equipment to maintain a safe clearance between the water jet and wires.

Before moving irrigation equipment, look up and around you and note any power lines that could be close enough to come into contact with equipment—and stay clear. Any contact between the long equipment and nearby electrical lines could be fatal or cause serious injury.



A safe, low-angle irrigation equipment that maintains safe clearance between the water jet and the live wires.



An unsafe high-angle irrigation equipment that sprays water on or near the live wires.

Building next to 500 kV rights of way

While no part of any building is allowed within the ROW boundaries, typically you can build up to the ROW edge. This is not the case when adjacent to 500,000 volt (500kV) transmission lines.

To help developers, we've produced a technical guideline (Engineering Standard ES 41-K 3.3.1) that outlines minimum setback requirements for developments adjacent to 500 kV ROWs. To obtain a copy of the document, contact properties.helpdesk@bchydro.com.

If your proposal is for a building that's inside the minimum setback requirement (as outlined in the technical guideline), you'll be required to use a professional consultant with expertise in calculating electric fields and recommending mitigation strategies during construction and after completion. It's up to you, as the developer, to ensure that no part of the building (including outer walls, balconies and roof) is exposed to electric fields over 5 kV/m (IEEE Standard C95.6-2002).

Our role is to review proposals to ensure the building is constructed so that it's safe from electric fields, but we have no involvement in respect to your overall project design. Safety requirements of the overall project are the developer's responsibility.

All proposed electrical services within a ROW should be designed, where possible, perpendicular to the power line conductors.



A building located at the edge of the ROW poses a high risk of induction as the upper levels of the building are closer to the power line.