



REGIONAL
DISTRICT
OF NANAIMO



GREEN BUILDING SERIES



Sustainable Site Planning Guide

FOR HOMEOWNERS AND BUILDERS
IN THE REGIONAL DISTRICT
OF NANAIMO, BRITISH COLUMBIA

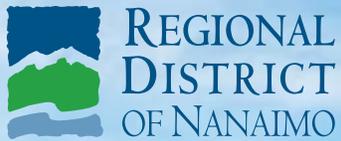


Table of Contents

MESSAGE FROM THE CHAIR	3
ABOUT THIS GUIDE	5
OVERVIEW OF SUSTAINABLE SITE PLANNING	6
What is Sustainable Site Planning?	6
Step 1 Local Context Evaluation	6
Step 2 Site Assessment	7
Step 3 Creating a Sustainable Site Plan	7
UNDERSTANDING NATURAL SYSTEMS	8
The Water Cycle	9
Wetlands and Riparian Areas	12
Marine Coastal Areas	16
Slopes and Soil Conditions	17
Wildfire	18
Vegetation	19
Wind and Solar	20
UNDERSTANDING SERVICING & SITE LAYOUT	21
Water and Wastewater Systems	21
Clustering Development	25
Green Buildings and Renewable Energy Generation	26
WORKING WITH THE RDN	30
Incentives and Rebates	30
Contacts at the RDN	30
RESOURCES	31
CHECKLISTS	34
Local Context Evaluation Checklist	34
Site Assessment Checklist	35
Sustainable Site Planning Checklist	36



Message from the Chair

On behalf of the Regional District of Nanaimo (RDN) Board of Directors, I'm pleased to present the RDN's third Green Building Best Practices Guide. This guide is an introduction to sustainable site planning with a focus on residential construction, landscaping and major renovation projects.

The guide encourages land use development that respects the unique natural character of the region. I would like to acknowledge the First Nations communities upon whose traditional territories the RDN is located.

Protecting and enhancing our natural environment is an important strategic priority of the RDN Board of Directors. Residential development can have a low impact on the environment when thoughtfully designed to work with natural systems. By understanding how natural systems work, we can preserve the health of our streams, aquifers, and coastlines and sensitive habitats when designing and building our homes.

This guide is a companion to the Rainwater Harvesting and the Residential Renewable Energy Guidebooks in the Green Building Series. Our hope is this work helps encourage more sustainable residential development throughout the RDN. We want our region to remain a healthy place to live for generations to come.



*Tyler Brown, Chair
Regional District of Nanaimo Board of Directors*

ALSO IN THE GREEN BUILDING SERIES

Rainwater Harvesting Best Practices Guidebook (2012)

Renewable Energy Introductory Guidebook (2013)



About This Guide

Click here/see page 31 for **RESOURCES**



This guide has been produced by the Regional District of Nanaimo (RDN) to encourage the use of sustainable site planning practices in residential areas. It's a tool to support homeowners and builders in a planning process that lowers the impacts of construction, landscaping, and major renovation projects have on the natural environment. In some cases, the use of sustainable site planning practices may even restore or enhance some natural functions.

Sustainable site planning helps land development support the integrity of the natural environment. This method of site planning develops a thorough understanding of the characteristics of the local area such as its water, soil and climate before design of the site begins. Sustainable site planning strategically reduces the impact of development, buildings and infrastructure on our natural ecosystems (such as wetlands and shorelines) and on our natural systems (such as the water cycle).

Benefits beyond the environment include the increased home comfort and the reduction of long-term costs and maintenance for owners.

The guide is intended to serve as a practical resource for RDN residents and is specific to the RDN's location, climate and community. Readers are encouraged to use this guide as a starting point and use other resources for more in-depth information on the topics most relevant to their site. Contact RDN for guidance to more resources.



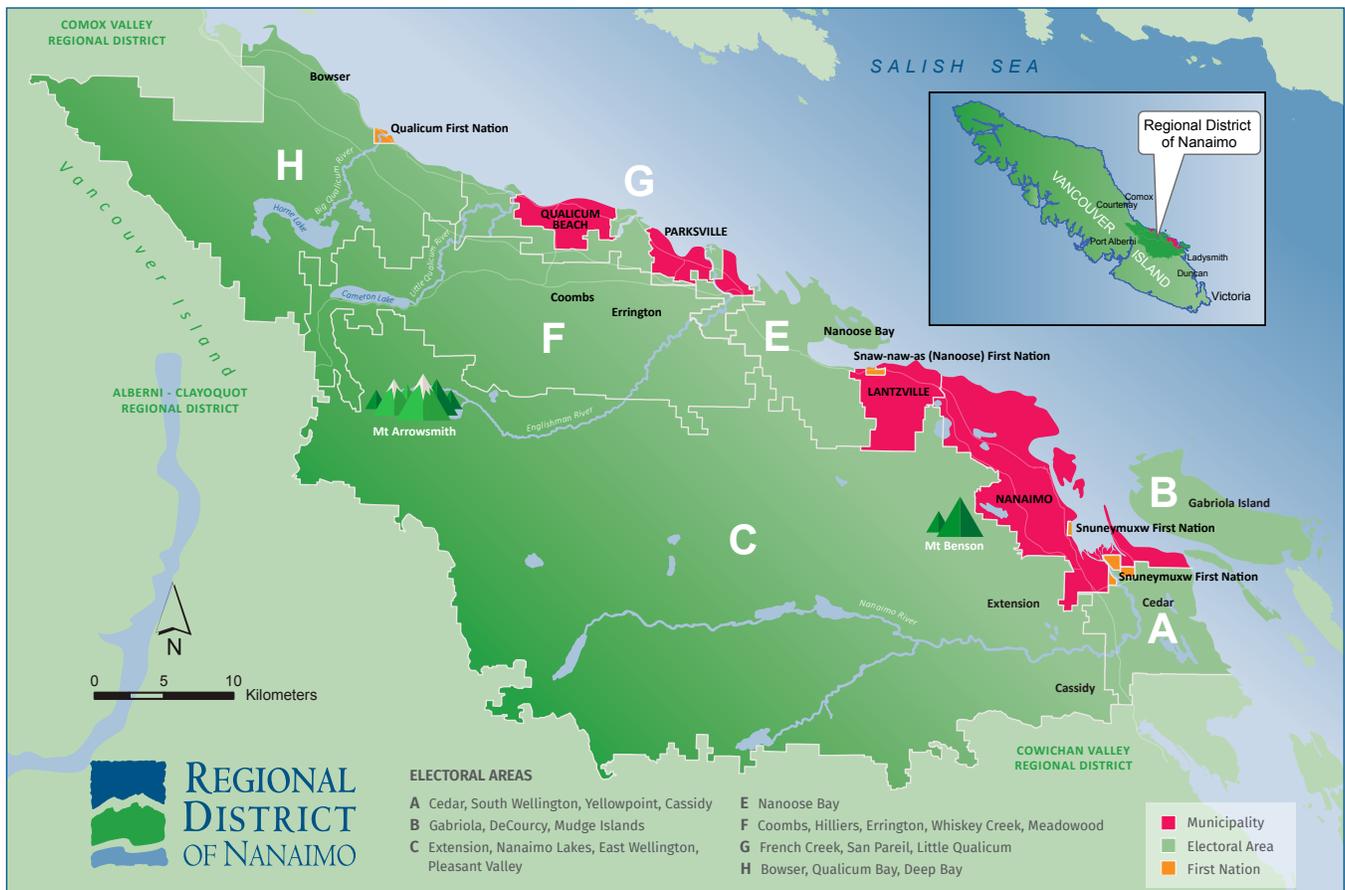
6300 Hammond Bay Road
Nanaimo, BC V9T 6N2



250-390-4111 or **1-877-607-4111** (Toll Free)



inquiries@rdn.bc.ca



Overview of Sustainable Site Planning

WHAT IS SUSTAINABLE SITE PLANNING?

The process of sustainable site planning recognizes natural characteristics of a site, analyzes natural processes, and respects the inherent qualities that make places special. The process helps you to develop your site without diminishing or interrupting natural processes and characteristics.

Sustainable site planning starts by understanding and mapping the local conditions around your property. It assesses and sketches existing conditions on the site itself, and in its final steps it creates a plan for developing the site. Sustainable site planning considers long- and short-term costs, human safety, and natural ecosystems. This approach is different from typical site planning because it puts a priority on how residential areas coexist with the land's natural features and systems.

Sustainable site planning helps reduce risk to you and your family by taking into account intense weather and other natural events, such as floods and fire. Making homes more resilient helps keep RDN residents safe and reduces the likelihood of costly repairs due to natural events.

Lastly, green buildings and renewable energy generation can complement the principles of sustainable site planning by decreasing our reliance on fossil fuels and centralized power generation. Further, some green building certification programs focus on choosing materials with a lower environmental impact in their extraction or manufacturing and provide safer indoor air quality for homeowners.

STEP 1 LOCAL CONTEXT EVALUATION

Understanding the area beyond your property boundaries is necessary to determine how your property is impacted by what is around it, providing what is known as the “local context”. Using your own observations and the online tools provided by *RDN Map*, you’ll identify features noted in the *Local Context Evaluation Checklist* (see page 34) such as local topography, watercourses, natural vegetation, prevailing winds, path of the sun, hazards, and proximity of service connections. Make a sketch of the site in its local context, including these features. An easy way to do this is to print off the map of your site through the RDN mapping application and mark noted features on the printed map.

During the *Local Context Evaluation*, look for examples of properties and homes in the area that are designed to adapt to local conditions. Also look for green building examples, as you may decide to consider building to a green building standard to complement your sustainable site plan. A good first step is to check the *RDN Green Building Resources*. The partnering of sustainable site planning and green building supports environmental health (such as improved air quality within the home), reduces negative impacts that affect our climate, and in turn helps to improve our quality of life. Gathering inspiration and seeing what works and what hasn't worked in other sustainable projects offers an opportunity to learn from similar projects to your own.

 [See page 34 for your Local Context Checklist](#)

 [RDN Green Building Resources](#)
www.rdn.bc.ca/green-building-resources

STEP 2 SITE ASSESSMENT

Assessing your site is the second important step in sustainable site planning. Using the *Site Assessment Checklist* (see page 35) will help you identify the most suitable areas for development—areas with the fewest risks often offer the most affordable option. Potential conflicts with existing or planned infrastructure are explored and addressed before they cost you time and money. RDN regulations such as setbacks, zoning and permitting requirements are considered at this early stage, prior to creating a plan for development.

When composing the Site Assessment, it's important to identify the changing patterns on the property throughout the year. This includes determining high water marks, seasonal flooding patterns, the sun's changing position and varying ground conditions in each season. Desirable window and deck views are identified to allow for views to be created or retained while removing a minimal amount of existing vegetation.

 [See page 35 for your Site Assessment Checklist](#)

STEP 3 CREATING A SUSTAINABLE SITE PLAN

Taking all the information from the Local Context Evaluation and Site Assessment, you are now ready to create a Sustainable Site Plan with the help of the *Sustainable Site Planning Checklist* (see page 36). Following your examination of what is present and influences the site's natural features, ecosystems and processes, the ideal location for buildings, structures and other development start to emerge. There may be trade-offs and multiple options for creating the sustainable site plan. Your final site plan and building and landscape designs should integrate with natural processes rather than diminish them.

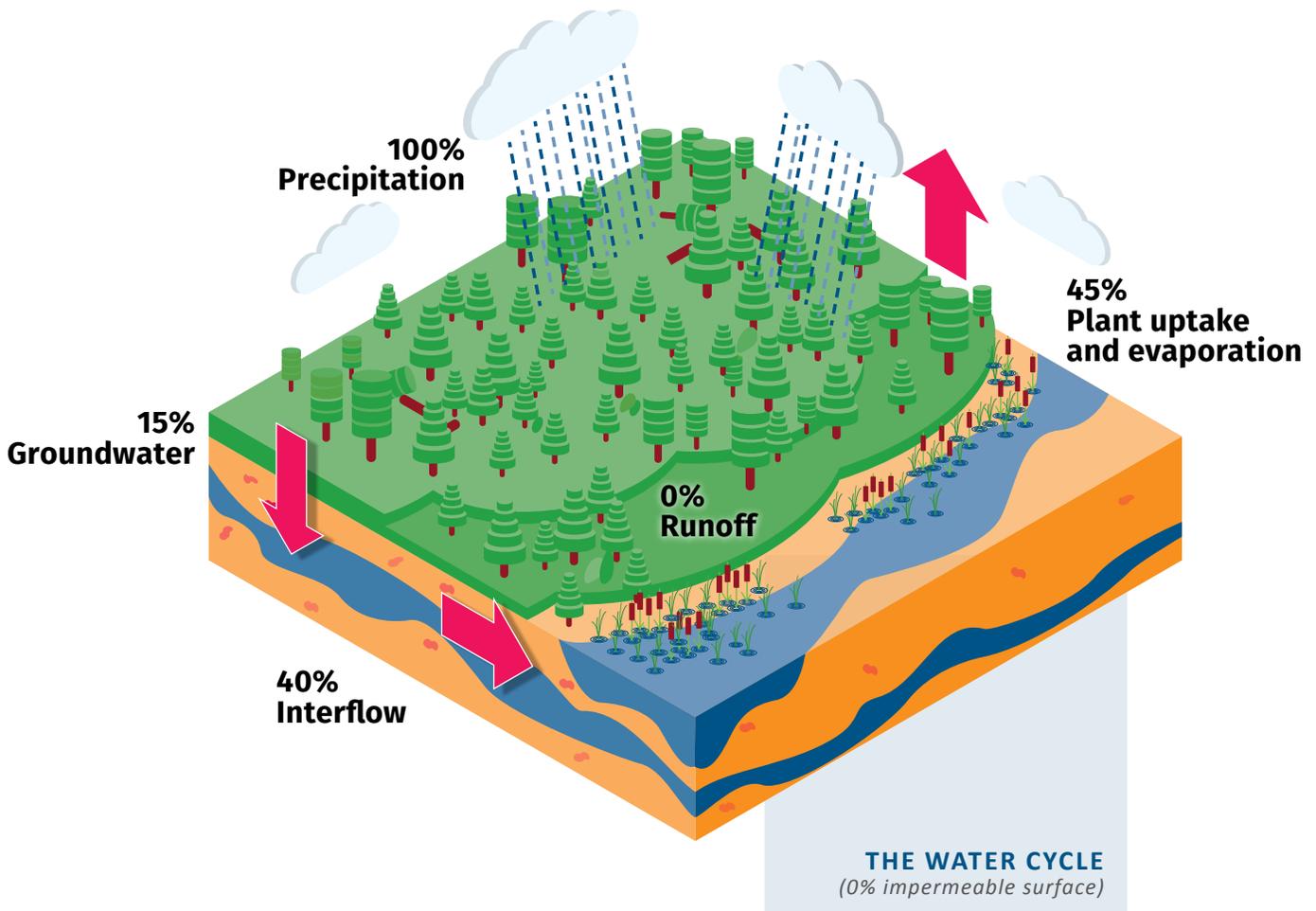
 [See page 36 for your Sustainable Site Plan Checklist](#)



Understanding Natural Systems

Natural systems and features such as freshwater, the marine coast, soils and slopes, vegetation, climate and solar radiation influence how land is developed.

Developing beyond the basic requirements set out in government land use regulations to achieve a higher standard of sustainability can result in benefits to the owner—reduced long-term property maintenance, reduced risk of damage from natural hazards and perhaps even a more pleasant place to live. Sustainable site planning works hand in hand with natural systems, conserving them and sometimes enhancing them, while living within the landscape. In addition, developments may be less costly to own and have a higher resale value as properties that retain natural features tend to have higher value.



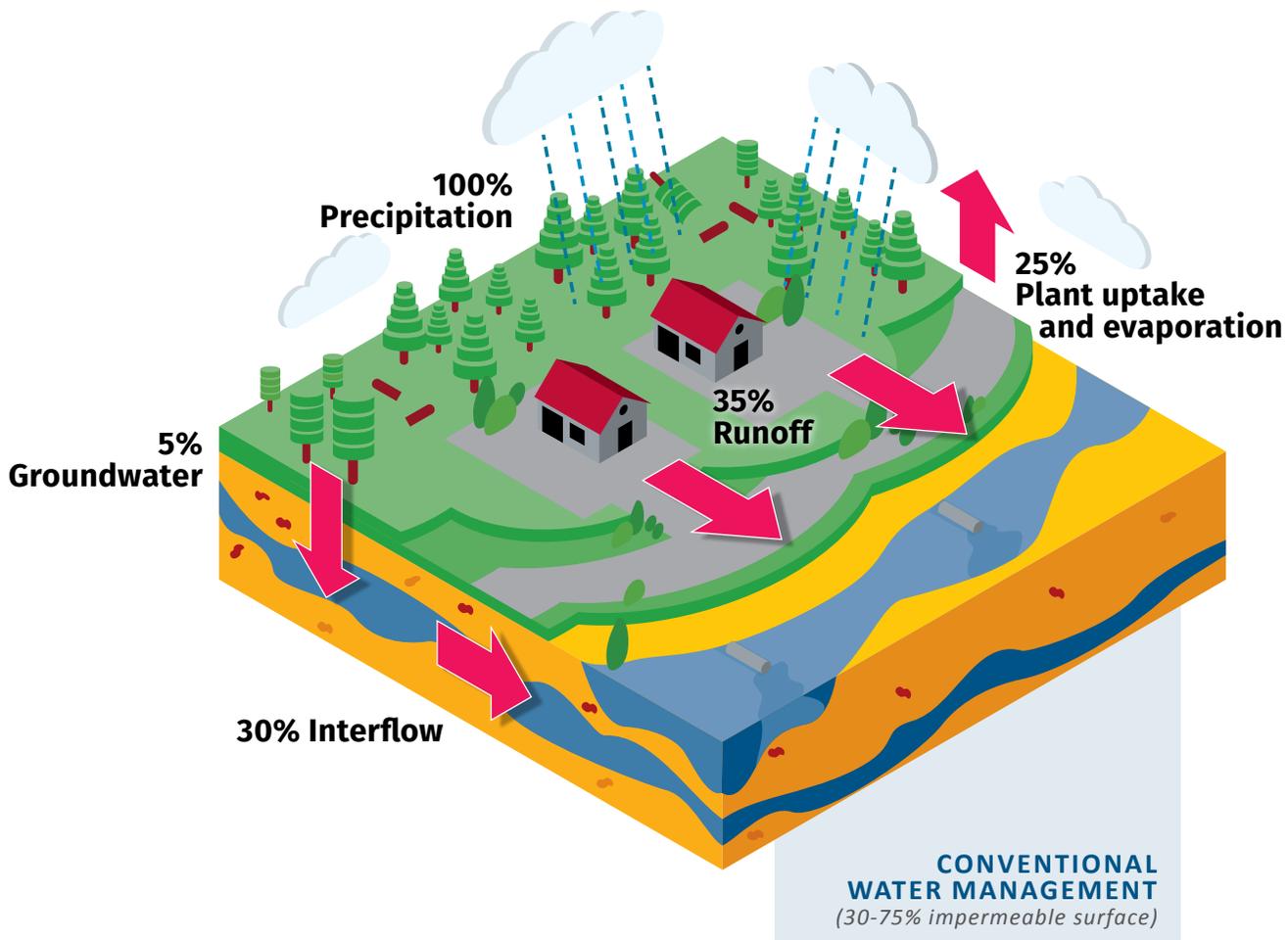
THE WATER CYCLE

Generally, less than 1% of precipitation flows directly over land. In a balanced system, about 55% soaks into the ground to become groundwater or travels in the subsurface as “interflow” to rivers, streams, lakes, or the ocean. The remaining 45% is absorbed by plants or transferred to the atmosphere through evaporation. Development can shift this balance, leading to increased overland water runoff. This increased runoff can displace topsoil, erode land, minimize the ability to replenish groundwater, and decrease the quality of water.

When water-absorbing topsoil is removed to create hard impervious surfaces, such as driveways and roofs, rainfall may be redirected. This can mean between 25% to 75% of rainfall directed into watercourses via storm drains, over land, or conveyed through ditches.

This can overwhelm downstream systems, cause flooding, diminish ground water reserves, increase water velocities leading to watercourse erosion, and affect water quality. When hard surface areas are increased so does the infrastructure required to manage the water runoff.

Alternatively, sustainable site planning works with water’s natural processes, reducing the potential for flooding while recharging groundwater and maintaining water quality. Many rural properties rely on well water for drinking, which makes managing rainwater a vital interest. Rather than simply redirecting rainwater off-site, managing water on-site allows rainwater to infiltrate the subsurface making it most efficient and beneficial to groundwater and streams.



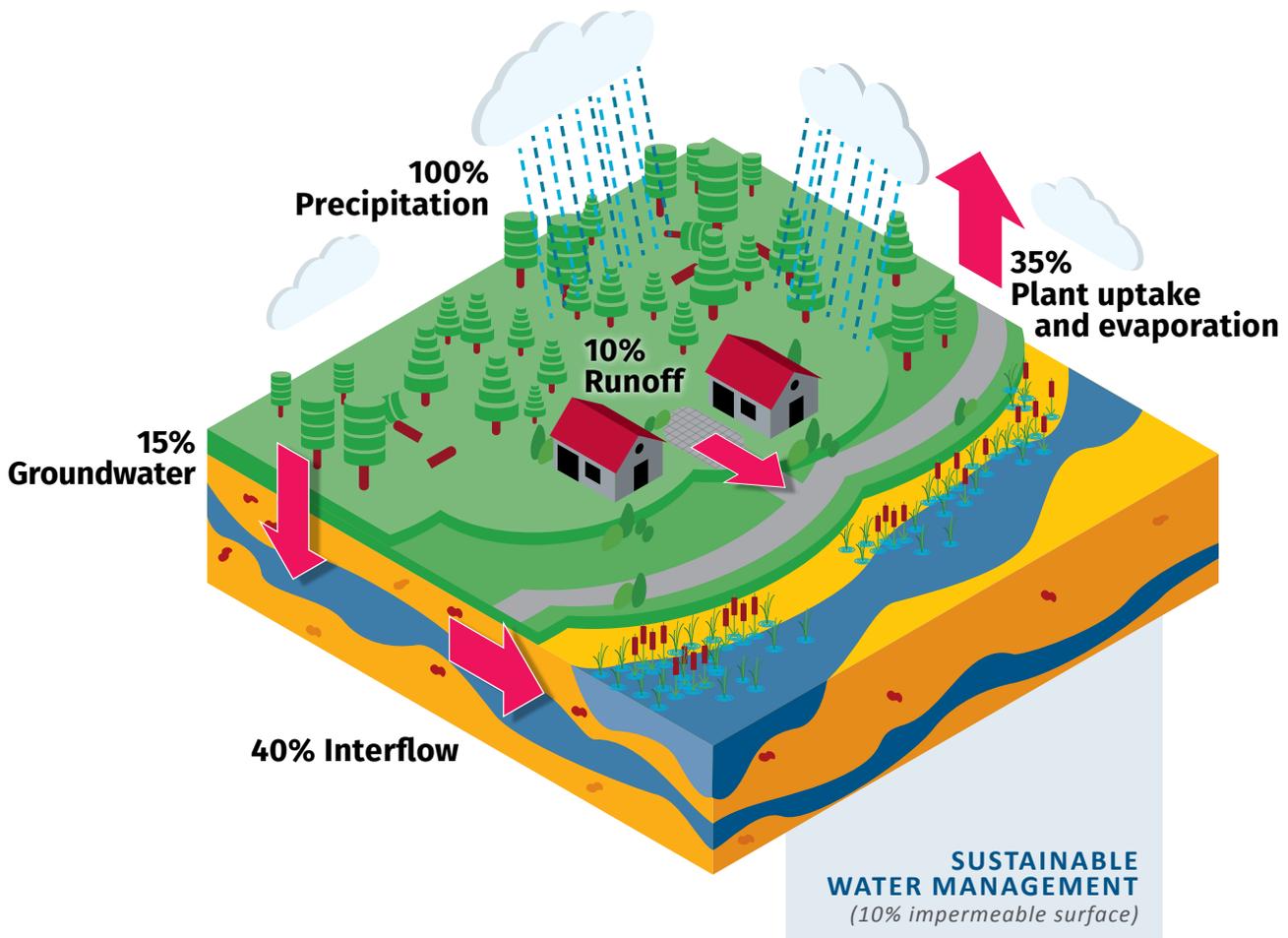
UNDERSTANDING NATURAL SYSTEMS

During the Local Context Evaluation, learn about the watershed your property resides within and the aquifer below.

The Site Assessment phase helps you understand how the water cycle impacts your property. Are areas of standing water apparent after heavy rainfalls? Look for tree and shrub species that thrive in either wet or dry conditions for an indication of areas with dry or wet soil. Ecosystems with trees, vegetation, and deep topsoil can absorb significant amounts of water.

Removal of vegetation and deep topsoil increases your need to manage the water flowing over your property and the risk of losing property to erosion. Constructed wetlands, bioswales, rain gardens, or retention ponds are measures that will slow the flow of water and control its runoff, allowing water to percolate into groundwater.

When making your Site Assessment, consider how excavation and the use of fill might impact where and how the water flows.



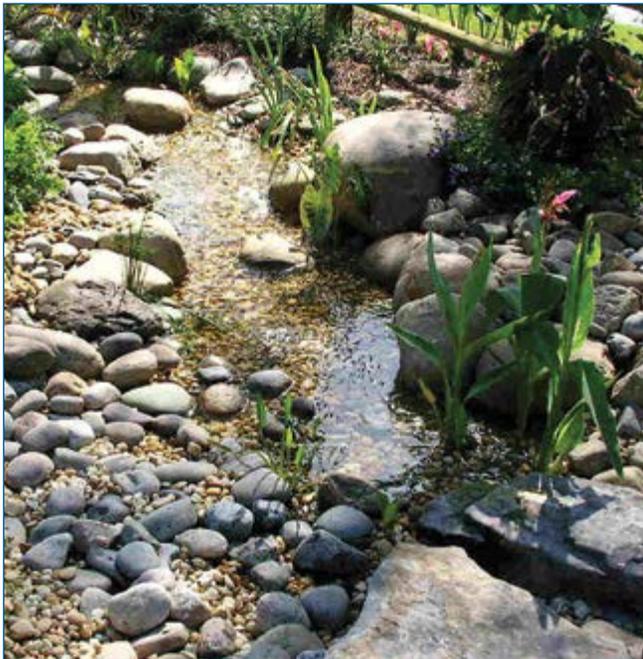
SAFEGUARDING GROUNDWATER DURING LAND CLEARING

Efficient management of all water on your site influences groundwater in your area to ensure a safe supply of drinking water from yours and your neighbours' wells. When clearing land, these are some ways to reduce your impacts:

- Keep as many trees and other vegetation as possible, particularly near wetlands, riparian areas, and seasonally wet areas
- Reduce the amount of soil being compacted by machinery
- Avoid the removal of valuable top soils



Land clearing for a new dwelling while retaining significant trees



Rain garden during wet season

WATER BALANCE EXPRESS, HOMEOWNER MODELLING TOOL:

waterbalance.ca/tool/water-balance-express

This easy-to-use tool allows landowners to locate their property on a map and add different rainwater management options to the map. Its ultimate goal is to restore the health of our waters. The tool helps you manage water on your property by finding the best solutions to increase infiltration of water into your soil. This helps to reduce runoff that may cause flooding and loss of topsoil.

A model specific to the RDN has not been developed, but the tool can be used with other Vancouver Island models that may provide similar results.

UNDERSTANDING NATURAL SYSTEMS

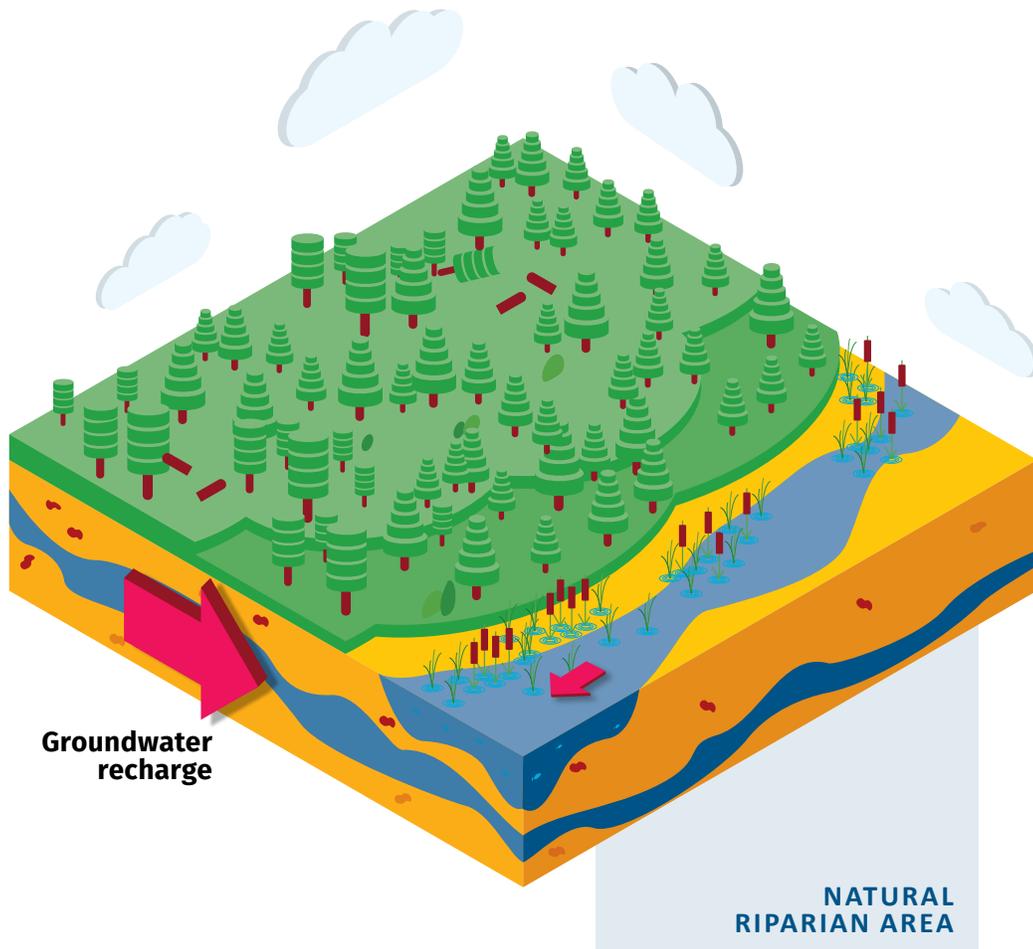
WETLANDS AND RIPARIAN AREAS

Riparian areas include the land that borders a body of water—the streamside or lakeside area that is the transition zone between land and freshwater. This can extend many metres inland from the body of water. Riparian areas are important to the water cycle as they store and drain water, and support important aquatic and terrestrial ecosystems. Riparian areas can be prone to flooding and erosion, which can cause damage to buildings and structures.

Learn about required setbacks from your riparian area before planning your development. Typically, an area 30 metres from the edge of the stream or lake will be assessed by a Qualified Environmental Professional who will determine the setback and any required restoration or protection measures.

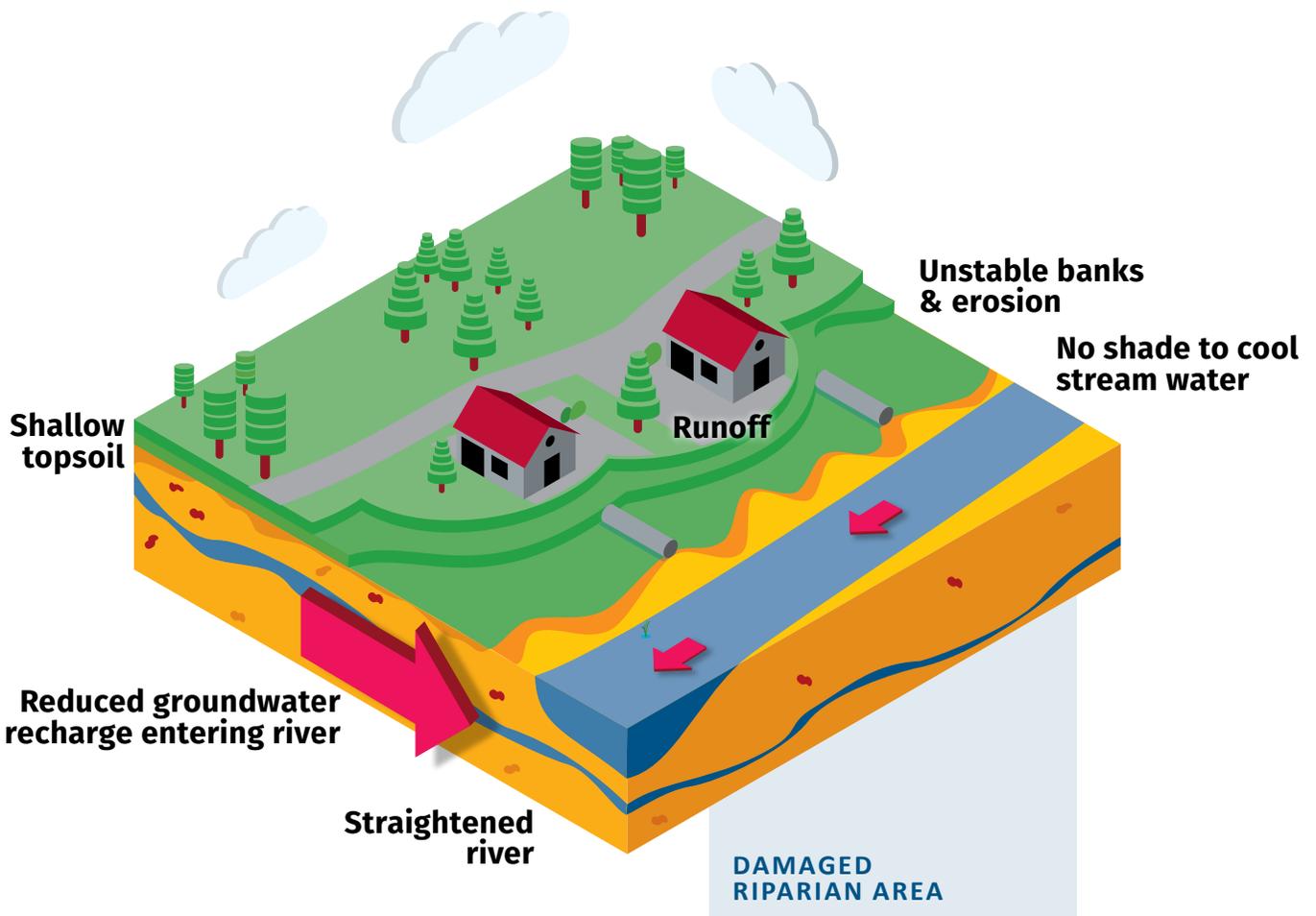
Maintaining healthy riparian areas is essential for filtering sediment and pollutants in water runoff from roads and other land uses, both of which are a particular threat to healthy streams, lakes and wetlands in our region. Riparian vegetation is vital to fish health because it provides shade that regulates water temperature while also stabilizing stream banks. Healthy riparian areas help to prevent flooding by buffering peak water flows and absorbing water.

When development significantly alters riparian areas, many of the benefits they provide are lost, and the health of the ecosystem decreases. Effects are far-reaching and include impacts on the salmon population for some streams, which in turn affects the ecosystem of the Salish Sea.



During the Local Context Evaluation, identify the watershed your property resides within. This will help you to understand where the water on your property comes from and what streams or lakes it flows into. Identify nearby creeks, streams, rivers, wetlands or lakes, and how they may affect your property. Determine if nearby riparian areas are subject to flooding or erosion and seek best practice solutions for these sensitive areas.

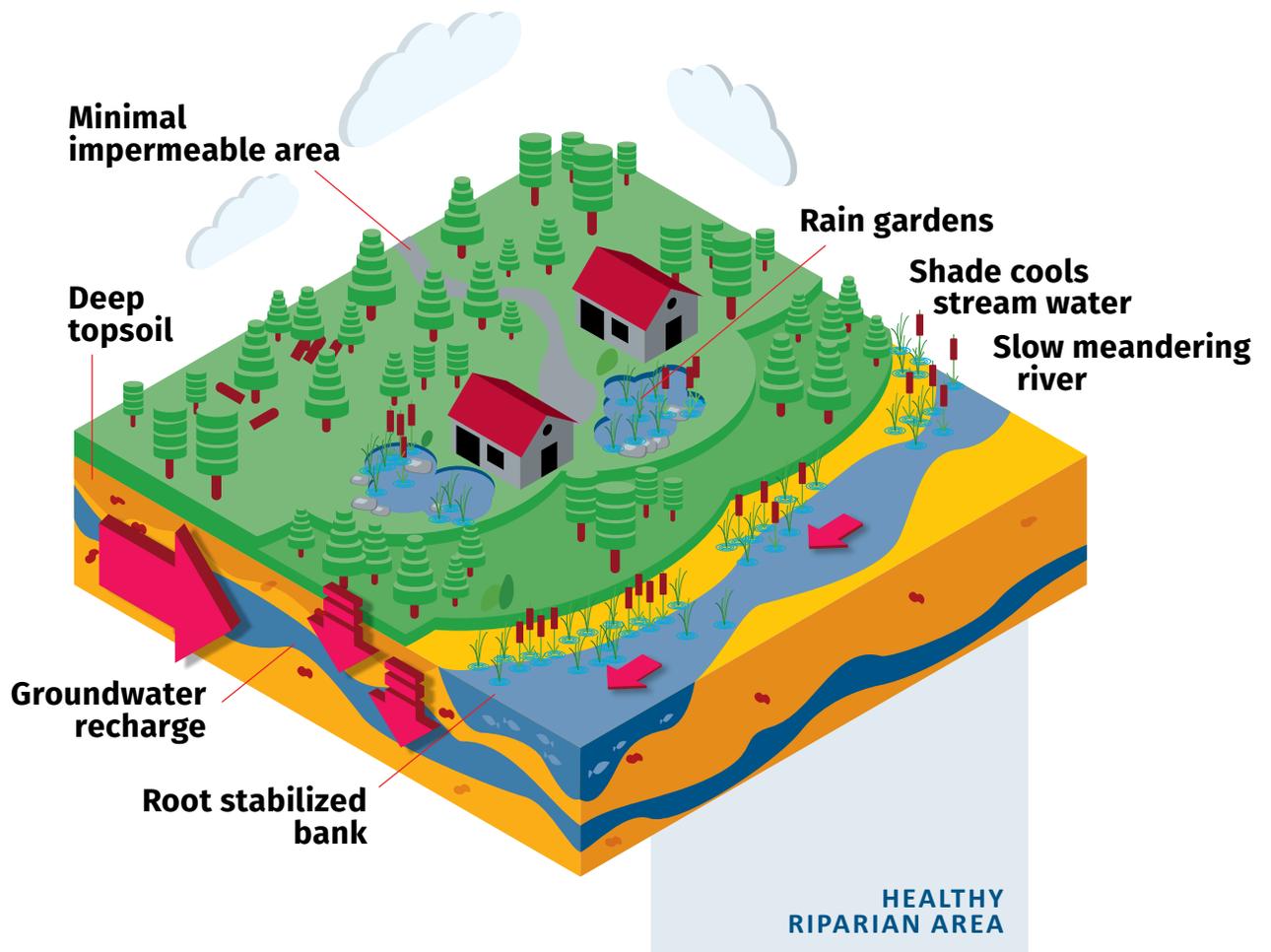
During the Site Assessment, consult with the RDN Planning Department to learn about required building elevations in the floodplain, setbacks for riparian areas, and other regulations that may affect your site design. Have a close look at the characteristics of riparian areas on your own property. Take an inventory of native vegetation. Determine if your property is at risk of flooding and if so, have a good understanding of elevations to anticipate the potential extent of floodwaters.



UNDERSTANDING NATURAL SYSTEMS

WETLANDS AND RIPARIAN AREAS

When creating your sustainable site plan, locate buildings and structures away from riparian areas. Elevate structures above the potential impact of floodwaters. Consider locating buildings farther away from the riparian area than required to allow sufficient space for a yard, while preserving or restoring the riparian area.





Permanent fencing to protect the riparian area of French Creek in place before residential construction began

UNDERSTANDING NATURAL SYSTEMS

MARINE COASTAL AREAS

The RDN's marine coast is highly varied. It includes bedrock, estuaries, and sand and gravel shorelines. Some areas of the coast are exposed to high wave energy, while others are more protected, such as the area within the Gulf Islands. Shorelines have high ecological value and need to be carefully managed to avoid the potential negative impacts of development. Understanding the coastal processes near your property and in the surrounding area is important to creating a sustainable site plan.

While bedrock is relatively stable, estuaries, and sand and gravel shorelines are actively changing. Some areas are eroding and others are accumulating sediment. This may change over time and is expected to be affected by sea level rise. Estuaries in particular may experience significant changes to the shape of the shoreline as rivers bring large amounts of sediment and high water flows during high rainfall events. Shorelines are particularly sensitive to structures that disrupt coastal processes, such as poorly designed and sited seawalls, the clearance of vegetation and upland development.

Upland development over the years has significantly altered our native coastal vegetation. In many areas, there is little natural erosion protection or habitat left. Back-shore vegetation, such as dune grass, and salt-adapted plants and shrubs, form a distinct habitat zone that prevents erosion and flooding by stabilizing upland sediments.

A changing global climate is causing sea levels to rise and is expected to bring more frequent and severe storms. This means that protecting and enhancing coastal ecosystems today is even more important for buffering the effects of storms and sea level rise.

During the Local Context Evaluation, identify shoreline characteristics and areas of erosion or accumulation. Consider how the impacts of waves, especially during storm events, may affect your property now and in the future with rising sea levels. A review of other properties in your area may help you find low impact solutions other landowners have used that protect and enhance the marine shoreline.



Completed Green Shores project in Parksville, BC, to regrade and stabilize eroding shore line

SLOPES AND SOIL CONDITIONS

During the Site Assessment, consult with the RDN Planning Department to learn about the required building elevations in the coastal floodplain, setbacks from the sea, and other regulations that may affect your site design. Have a close look at the shoreline characteristics on your own property. Take an inventory of native vegetation. Consider erosion and future sea level rise to identify areas that should be kept free of buildings and structures to protect them from the impact of flooding. Hard armouring of a shoreline with sea walls and other structures is considered an absolute last resort for small and challenging sites experiencing erosion.

When creating your sustainable site plan, locate buildings and structures away from marine shorelines and elevated above the potential impact of floodwaters. As with riparian areas, locate buildings further back from the marine shoreline than required to allow sufficient space for a yard, while preserving or restoring the coastal vegetation near the shore.

Understanding soil conditions will help you understand the local water cycle, drainage, suitable vegetation for re-planting, and the likelihood of steep slopes remaining stable or moving either slowly over time or suddenly.

RDN Map (www.rdn.bc.ca/gis-mapping) includes elevation data shown as contours that can be displayed over property lines, air photos, and other data. *RDN Map* is a useful tool to understand elevation changes and steep slopes when developing both the Local Context Evaluation and Site Assessment. At the Local Context Evaluation step, this may help in understanding overland water flow, shading, or slope risk in the area. At the Site Assessment step, any required setbacks from the crest or the toe of slopes should be identified with assistance from the RDN Planning Department.

GREEN SHORES FOR HOMES

Green Shores for Homes is an incentive-based, voluntary program similar to green building rating programs that will guide waterfront property owners through a detailed site assessment and result in a final rating. Following the *Green Shore for Homes* checklist is an excellent companion to this Sustainable Site Planning Guide for coastal properties. If erosion is a concern on your property, the *Green Shores for Homes* program will guide you through options for softer approaches to stabilize the shoreline as alternatives to hard armouring.

 www.stewardshipcentrebc.ca/green-shores-for-homes



Contours at 2 metre intervals
shown on RDN Map

UNDERSTANDING NATURAL SYSTEMS

WILDFIRE

Wildfires are a natural part of our ecosystems. Without the presence of wildfires, the landscape loses its diversity. Wildfires recycle nutrients, help plants reproduce, and create a mosaic of vegetation that serve as habitat for a variety of wildlife. When we choose to extend our lifestyles and communities further into forested areas, we become more exposed to the danger of wildfires.

Wildland urban interface is the area where structures and other human development meet with wildland areas containing flammable vegetation such as trees, brushes, and grasses. A fire in this area is called an “interface fire.” While most interface fires don’t significantly impact residential areas, the potential for urban interface fires remains a reality, and the risk can be reduced by choices you make on your property.

Living where wildfires can occur puts your home at risk, but it’s possible to live safely with this natural event. While wildfires are a known risk in many parts of the RDN, conscientious site planning and choices in building materials can help reduce that risk. *FireSmart Canada* publishes recommendations for landscaping, decks and porches, roof and siding materials, and ongoing property maintenance. Further reduce your risk by incorporating the *FireSmart* design guidelines during the Site Planning Phase.

www.firesmartcanada.ca

Many areas in the RDN have a medium to high interface fire hazard rating. *Community Wildfire Protection Plans* are available on the RDN website. Consult these protection plans for your proposed building area during the Local Context and Site Assessment phases so risks are understood. Use the *FireSmart* guidelines to modify your site plans during the Site Planning phase. Define risk areas for interface fires, identify possible measures to mitigate risks, and prepare an action plan for improving fire protection and prevention in the interface zone.

www.rdn.bc.ca/community-wildfire-protection-plans



Bow Horn Bay Volunteer Fire Department Deputy Chief Bill Lovegrove with the vegetation debris disposal bin during a community FireSmart preparedness event

VEGETATION

The coastal lowlands of the RDN are within the rare Coastal Douglas Fir ecosystem. Your property may have unique or rare species or plant communities that you can help protect through good site planning. Trees, shrubs, and other vegetation can be valuable assets to retain or to enhance a site. Trees and plants can add financial and personal value, protect groundwater, prevent erosion, act as a windbreak, provide natural summer cooling, and improve ecological functions. Healthy existing vegetation on site indicates that it's well adapted to the local soil, wind, and climate conditions. Removing this vegetation and replacing it may not be desirable when cost, requirement for irrigation and maintenance, and growth time to a desired size are considered.

The construction process inevitably requires that an area larger than the footprint of a building is cleared of vegetation and used for moving machinery and storing soil or building materials.

Identify areas to be left undisturbed on your site plan and before construction begins, install temporary fencing so all contractors know to stay outside of those areas. Prior to development, it's important to consult with the RDN to identify any development restrictions that may apply to specific ecosystems, or when specific wildlife such as nesting birds are present. Fencing those areas may be required by the RDN.

Where and how new landscaping is planned can support the water cycle, wildlife habitat, and hazard reduction. When re-vegetating disturbed areas, consider using native plants that are locally adapted to the site. For all plant choices, consider their water requirements and try to choose varieties that match the natural water availability of your site.

Find out about RDN rebates and incentives related to vegetation, such as the use of timber from the property.



UNDERSTANDING NATURAL SYSTEMS

WIND AND SOLAR

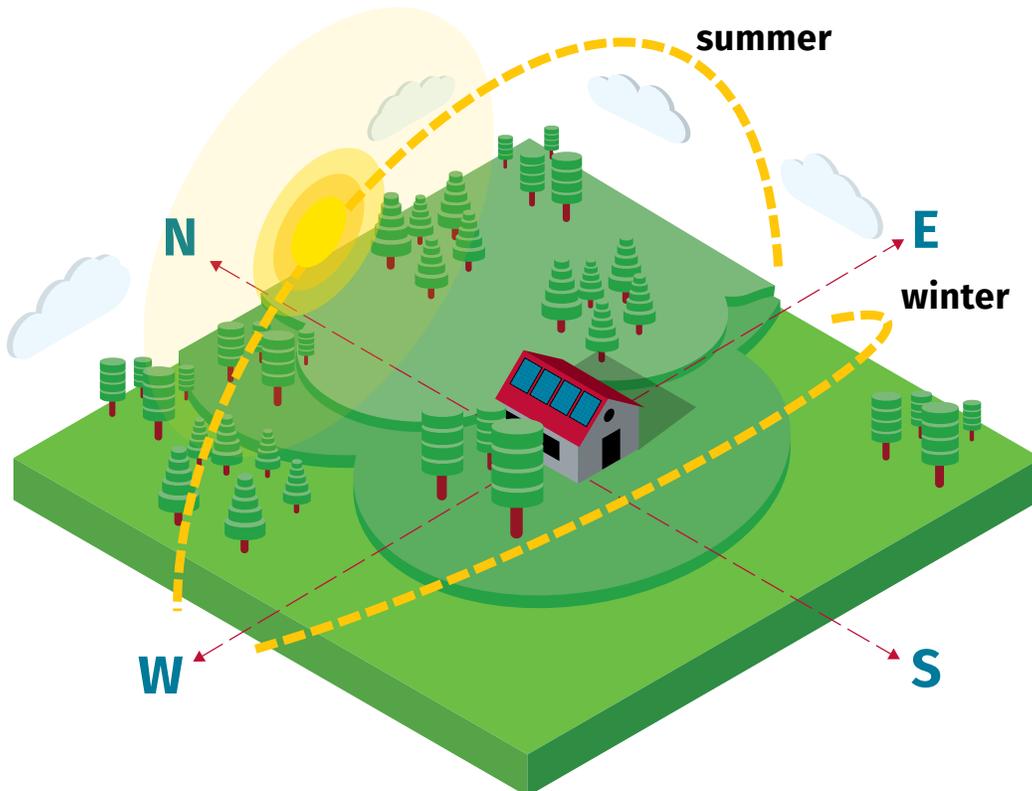
Knowing the sun's path on your property throughout the year will help you determine how to orient your house so that solar benefits are optimized. This can help minimize heating and cooling costs and ensure that your living space receives more sunlight during our grey and rainy coastal winters. Building orientation is also important if you plan to install solar panels.

Some aspects to consider in your sustainable site plan include: elongating your building design along the east-west axis (long sides facing north and south), maximizing southern exposure for wintertime solar heating and daylighting, placing north-facing windows only where daylighting is needed, minimizing east and west-facing windows, and orienting the rooms most used in the daytime towards the south side of the property.

Wind is also a factor to consider in reducing heating and cooling costs. Consider seasonal winds when designing and locating patios and decks for the most comfortable temperatures. Consider the effect of strong winds on vegetation when planning landscaping and garden areas.



Home in Black Creek, BC sited for maximum solar gain. Overhangs can be added to reduce solar gain in summer.



Understanding Servicing & Site Layout

Primary servicing considerations for a residential development include how potable water is delivered to the property and home, how wastewater is disposed, how drainage is managed, and how hydro, phone and Internet reach the home. Site layout includes locating the services and their off-site connections, and also includes the other constructed elements of the area and site such as roads, driveways, buildings, and structures.

Existing infrastructure is considered in the Local Context Evaluation and Site Assessment phases. The sustainable site planning process helps to make decisions about the type and location of new services, driveways, buildings and structures that best retain the integrity of the natural environment.

During the Local Context Evaluation, identify how water will be provided to your property. Will you connect to a community system or rely on a private well on your property? If using groundwater, what are the characteristics of the aquifer? Will you be required to conserve water during the dry summer months?

WATER AND WASTEWATER SYSTEMS

Providing water to a home and property, and disposing of wastewater are fundamental to site planning. Think about options for water and wastewater systems at the same time to make decisions based on efficiency and cost savings.

Regardless of whether a property is connected to community water supply and wastewater disposal or not, using harvested rainwater or re-using greywater can provide long-term savings.

Wastewater

Many rural areas of the RDN don't have community wastewater collection systems. Their on-site septic systems treat and dispose of all household wastewater, including water from toilets, showers, dishwashers, washing machines, and other household plumbing fixtures. The septic system's job is to treat the wastewater and safely return it to the groundwater and soil. Typically, a septic system includes a septic tank and drainfield.

Your Site Assessment will include locating existing systems. When a new septic system is required, contact a Registered Onsite Wastewater Practitioner for design and installation. Generally, a drainfield should be sited away from vehicle paths, receive plenty of sunlight, and be covered in a shallow-rooted vegetation that can be well maintained. While a traditional lawn is the most common vegetation used for drainfields, many other shallow-rooted ground covers can perform the same function of stabilizing the soil, while keeping the underground system protected from aggressive plant roots.

Under BC's Sewerage System Regulation, only an Authorized Person may install or repair a septic system. An authorized person may be a Registered On-site Wastewater Practitioner registered through the Applied Science Technologists & Technicians of BC or a Professional Engineer or Geoscientist Registered through the Engineers and Geoscientists of BC.

UNDERSTANDING SERVICING & SITE LAYOUT

Domestic Water

Potable water is water that meets *Canadian Drinking Water Guidelines*. Potable water is provided to homes in the RDN through a community water system, a small private water system, individual private wells, or sometimes by rainwater harvesting.

In all cases, consider how your non-potable water uses such as outdoor irrigation will be provided. Installing a rainwater collection system is easier when planned from the start and when design can integrate cisterns. Many residents in the rural areas of the RDN rely on wells for household water rather than community water systems. If a new well will be drilled for your development, consult a qualified professional early in your process. The location of structures on the property, particularly on smaller lots, is influenced by the location of the well. It's important to consider well location at the outset to determine where buildings, driveway, septic field and other services are located. A qualified professional will know the safe and required distances between neighbouring wells and between wells and septic fields, livestock, and other uses.

As part of your Site Assessment, locate existing wells and water connections. Speak to the RDN about any requirements for water supply, or rebates for well testing and decommissioning.

 www.rdn.bc.ca/wellsmart

Rainwater Harvesting

Many areas within the RDN are characterized by rock and soil conditions that possess limited ability to store surface and groundwater. In addition, our climate follows an annual cycle of rainy winters and long periods of summer drought. Harvesting and storing the rain that falls during wet winters (when up to 80% of rainwater runs off to the ocean) can reduce the volume of groundwater drawn from aquifers during dry summer months. Maintaining higher groundwater levels helps sustain a critical base flow in streams, and protects fish and aquatic health. Reduced groundwater extraction also helps to prevent salt water entering wells located in coastal areas.



Two 7,550L tanks with interconnecting piping and protective valve boxes (before final backfill).

Rainwater harvesting is the collection and storage of rainwater directed off roofs and buildings to be used at a later time and can complement or replace other freshwater sources. Rainwater is stored in a rain barrel or a larger cistern or tank above or below ground. This stored rainwater may be used outdoors for irrigation, as well as indoors if it's properly constructed with the appropriate treatment and plumbing. Most cistern owners use the water for non-potable applications like irrigation and toilet flushing, as there are additional treatment costs to ensure the water meets drinking water standards for potable use such as drinking, cooking, bathing or showering.

Areas with community water systems can reduce strain on the local system by harvesting rainwater. Where community water systems rely on groundwater, widespread adoption of rainwater harvesting systems can delay the need for new or expanded infrastructure, reducing associated costs for residents and improving local water security.

Wherever possible, position rainwater harvesting cisterns uphill to take advantage of gravity. An uphill cistern uses gravity to move the water downward to the point of use, avoiding the need for electric pumps.

This option is the least expensive and easiest to maintain, and continues to deliver water during power outages.

Think ahead about rainwater harvesting tanks you may wish to add in future. Set aside adequate space for them to ensure the tops of tanks are at the same elevation to simplify future system operation. Make sure your cistern and its overflow pipe are placed where excess water won't flow on to your neighbour's property and make sure the outflow is designed to prevent erosion. And when appropriate, screen cisterns to give neighbours a more pleasant view.

The RDN's **Rainwater Harvesting Best Practices Guidebook** is available on the RDN website. The Guidebook provides useful information for residents about the benefits and opportunities of rainwater harvesting for non-potable and potable purposes. Specific to our location and climate, the **Guidebook** is a resource for RDN residents who are building their own rainwater harvesting systems or working with professionals to do so.

The RDN continues to lead the way in protecting watershed health and promoting sustainable approaches to manage our most precious natural resources.

 [www.rdn.bc.ca/
green-building-series-guidebooks](http://www.rdn.bc.ca/green-building-series-guidebooks)

Greywater Re-Use

Greywater re-use is the diversion of gently used household water (e.g. shower drain water) for re-use in the home or outdoors. A greywater re-use system for toilet flushing can reduce your indoor water consumption by almost 30%.

Greywater is the previously used household water from baths, showers, bathroom basins and laundry, but does not include used water from toilets, kitchen sinks, or dishwashers. Greywater may be re-used for low-risk purposes, such as subsurface irrigation of lawns, ornamental gardens, or toilet flushing. Generally, grey water from the kitchen sink is not recommended for reuse due to the high levels of organic materials such as oils and fats.

 [www2.gov.bc.ca/assets/gov/environment/
waste-management/sewage/
onsite-sewerage-systems/what_is_grey_water.pdf](http://www2.gov.bc.ca/assets/gov/environment/waste-management/sewage/onsite-sewerage-systems/what_is_grey_water.pdf)

 www.rdn.bc.ca/indoor



Irrigation

The use of potable water for irrigation should be avoided when possible as potable water is a limited resource in our area and expensive to distribute. Harvesting rainwater and/or using greywater can replace or supplement potable water for irrigation.

Follow best practices for low water use in landscaping and gardening such as choosing plants and trees with low water demand, using mulch to retain moisture in the soil, using drip irrigation instead of sprinklers, and irrigating early in the morning for moisture retention. A programmable irrigation system can support irrigation at the right time of day. Adding a rain sensor can also help ensure irrigation only happens when needed.

Reducing the amount of water required for irrigation will allow stored rainwater to last longer, or re-used greywater to go further. If you are using potable water from a community water system for irrigation, reducing water used for irrigation also reduces your cost and the demand on the water system.

 www.rdn.bc.ca/outdoor



CLUSTERING DEVELOPMENT

The Local Context Evaluation and Site Assessment processes identify natural systems and map their features and required setbacks. This, in turn, helps determine what areas to leave free from development and where not to build. Taking this a step further, clustering development in a smaller area limits further impact on natural systems and features, and may help to reduce building and on-going costs.

Buildings and Driveways

When developing a rural property, the first thought may be to make use of all your space by spreading out home, garage, sheds and other outbuildings. Sustainable site planning considers the benefits of clustering development closer together for a smaller footprint. This can reduce the area of native or established vegetation being disrupted both during development and in the future by concentrating daily activities to a smaller area. There is potential for cost reductions when driveways and footpaths are shorter because less surfacing material is required and there is less area to maintain.

ALTERNATIVE FORMS OF RURAL SUBDIVISION

Until very recently, rural subdivision was concerned with plotting basic road layouts and regularly shaped square or rectangular lots of a size according to the applicable land use bylaws. The outcome of such an approach is regular spacing of properties — the more distant spacing of houses in rural areas creates what is sometimes characterized as “rural sprawl.” In 2012, the RDN published *Alternative Forms of Rural Development* — a study exploring more sustainable options for rural subdivisions. These options include design alternatives such as clustering lots and shifting density (the permitted number of dwellings) between lots.

Several sustainable subdivision design options are considered in the study that protect natural areas, working landscapes such as farms, or enable cooperative ownership models. If your property has the potential to subdivide, this is an excellent resource. Ask the RDN Planning Department about the regulatory process for implementing these alternative subdivision designs.



Most of the rural lots in this aerial photo minimized the developed area by clustering their buildings, minimizing land clearing, and retaining a vegetated buffer beside the wetland. This is in contrast to the centre lot that has cleared almost all of the vegetation.

UNDERSTANDING SERVICING & SITE LAYOUT

GREEN BUILDINGS AND RENEWABLE ENERGY GENERATION

Green buildings and renewable energy generation complement the principles of sustainable site planning. They reduce our reliance on fossil fuels or centralized power generation through BC Hydro. Further, some green building certification programs focus on choosing materials that have a lower environmental impact in their extraction or manufacturing, and lower toxicity content. The concepts and processes of sustainable site planning such as the consideration of site characteristics and that of the surrounding area, as well as how different systems work together can also be used for considering green buildings and renewable energy generation.

While working on your Local Context Evaluation, look for examples of green buildings or renewable energy generation in your local area. The RDN and local green builders will have examples to share. Passive House Canada also maintains a searchable map of completed projects. Contact the owners to find out how their homes are performing and any lessons learned that could assist in your decision-making. During the Site Assessment process, determine suitable locations and aspects for buildings and renewable energy generation infrastructure on your property. If you are not installing renewable energy generation systems immediately, consider future installation when creating your sustainable site plan and your building design.

 www.passivehousecanada.com

Green Buildings in BC

Homes accounted for approximately 14% of the province's energy use in 2017. This energy use is a cost to homeowners and in some cases, particularly where heating with oil or natural gas, is also a contributor to BC's greenhouse gas emissions. Energy always carries an environmental cost and minimizing energy use is an effective way of reducing the environmental impact of your home.

A "green" building is a building that is designed, constructed and/or operated to reduce or eliminate negative impacts to the environment while maximizing occupant health and comfort. Green building principles are integrated early in the design process and extend through all aspects of house construction and operation.

There are several recognized standards for green buildings including LEED, Built Green, Energy Star, Passive House, Living Buildings Challenge, and the BC Energy Step Code. There are also straightforward guidelines (e.g. *Pretty Good House*) that summarize general rules of thumb for more sustainable homes. You may choose to take elements from several of the standards, or choose to follow one standard and have your house certified under that system.

 www.prettygoodhouse.org

Renewable Energy Generation

Renewable energy is generated from the sun, wind, earth, vegetation and water. These energy sources are replenished naturally and reduce dependence on non-renewable energy sources such as natural gas and heating oil. Renewable energy systems can help homeowners reduce emissions, improve energy security, and save on energy costs.

Renewable energy systems are long-term investments, with multiple factors to consider to accurately forecast the return on investment, including projected BC Hydro rate increases and carbon tax savings. Investing in renewable energy systems can decrease reliance on regional utilities in favour of freely available renewable energy. The promise of energy independence in the face of increasing uncertainty through the use of renewable energy systems can provide security and peace of mind now and for future generations.

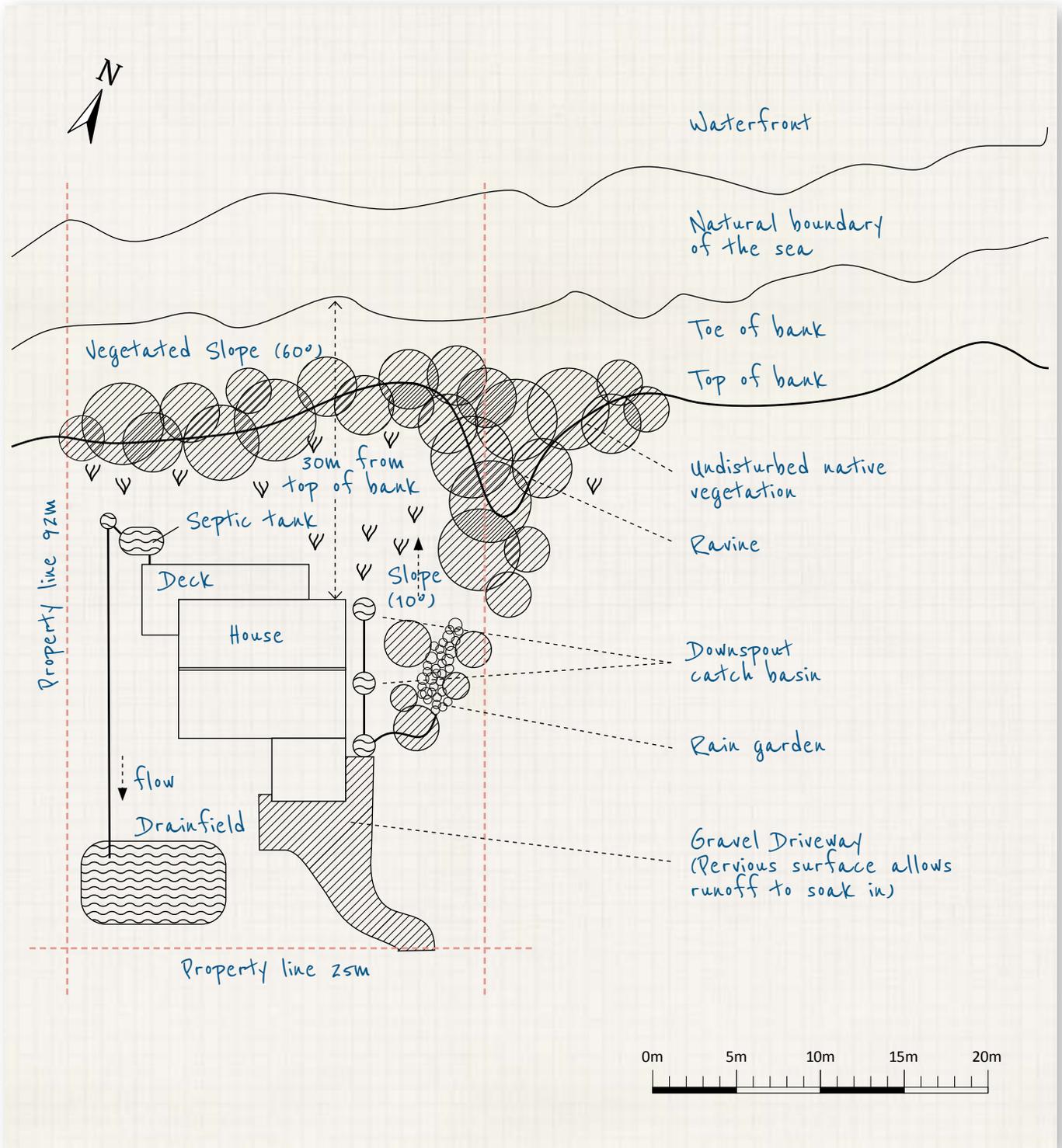
Review the **RDN Renewable Energy Introductory Guidebook** developed for homeowners in the RDN. The guidebook represents industry knowledge at the time of publishing in 2014. Readers are encouraged to use it as a starting point and consult qualified professionals to obtain the most up-to-date technical and pricing information.

 [www.rdn.bc.ca/
green-building-series-guidebooks](http://www.rdn.bc.ca/green-building-series-guidebooks)



UNDERSTANDING SERVICING & SITE LAYOUT

An Example of a Sustainable Site Plan Sketch





Working with the RDN

It's important to consider local government regulations and requirements when planning for any land alteration or site development as these will influence where and how development can occur. Contact the RDN to understand what regulations, such as zoning and development permit areas (DPAs) apply to your property and development plans. Understanding these requirements will help you establish the size and location of buildings and structures, and identify any other special features on or near the site that may need to be considered, such as floodplain areas, environmentally sensitive features, or farmland.

INCENTIVES AND REBATES

At the time of publishing this guide, the RDN has rebates and incentives for many of the sustainable development options described. They reduce the cost to homeowners for choosing sustainable alternatives to conventional practices. For example, there are rebates for home energy assessments, irrigation upgrades and soil improvements, rainwater harvesting, graded site-cut timber, renewable energy systems, and low impact, energy efficient homes.

Check for currently available rebates as they may change over time. Aim to apply for your rebate early in the year as there is a limit to the number of rebates issued annually. Rebates for specific actions and technologies may also be available from the BC government and utility providers. Search for rebates on www.rdn.bc.ca for the rebates and incentives available for development options described.

CONTACTS AT THE RDN

The RDN Planning Department	Information on zoning, DPAs, and size and siting of buildings and structure, and sustainable building rebates
The RDN Building Department	Building permits and inspections
RDN's Wastewater Services	Resources and rebates regarding onsite wastewater treatment through the <i>SepticSmart Program</i> , and connection to an RDN sewer system if within a sewer service area
The RDN Drinking Water & Watershed Protection Program	Resources and rebates regarding groundwater protection, well maintenance, and water conservation
RDN's Water & Utility Services	Connection to an RDN community water system if within a water service area

Resources

This is a list of select resources for further reading on topics covered in the Guide. Some RDN resources in this list are a starting point for understanding the policies and regulations that may affect your property. Consult the RDN interactive web map, “RDN Map,” for a preliminary understanding of your land use zone, setbacks, and applicable development permit areas. Speak with the Planning Department early in your project to identify other applicable regulations.

RDN General

- Interactive web map “RDN Map”:
www.rdn.bc.ca/gis-mapping
- Rebates: www.rdn.bc.ca/rdn-rebates

RDN Planning

- **Official Community Plans:**
www.rdn.bc.ca/bylaws-policies-forms-maps
Official Community Plan maps include background information related to sustainable site planning, and show development permit areas.

Sustainable Site Planning

- **Develop with Care 2014: Environmental Guidelines for Urban and Rural Development**, Province of BC
www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care
- **The Stewardship Series**, Stewardship Centre for British Columbia:
www.stewardshipcentrebc.ca/bc-stewardship-series
The informative and widely acclaimed Stewardship Series is made up of 19 guides published over the past 18 years. These guides educate British Columbians with scientific, legal and technical information on protecting BC’s natural heritage. They provide guidance on implementing stewardship practices, particularly in urban and suburban areas.
- **Landscape Planning: Environmental Applications.** William M. Marsh. Fifth Edition. 2010. Wiley.
- **Design with Nature, 25th Anniversary Edition.** Ian L. McHarg. 1995. Wiley.

- **The Countryside and You: Understanding what it means to live in a farming community.** BC Ministry of Agriculture.
www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/agricultural-land-and-environment/strengthening-farming/planning-for-agriculture/countryside_and_you_booklet.pdf
- **A Place in the Islands: How Private Landowners Shape the Future of the San Juan and Gulf Islands.** Second Edition. Islands Trust, Islands Trust Fund and the San Juan Preservation Trust. 2007.

Water

- **Brochures and Guides** from RDN Drinking Water and Watershed Protection
www.rdn.bc.ca/dwwp-brochures-and-guides
- **Water Balance Express: Homeowner Modelling Tool.**
www.waterbalance.ca/tool/water-balance-express
A model for the RDN has not been developed, but the modelling tool can be used with other Vancouver Island models that may provide similar results.
- **Riparian Areas Regulation Guidebook for Waterfront Homeowners and Property Developers.** Province of BC. 2016.
www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/fish-fish-habitat/riparian-areas-regulations/guidebook-proponents_web_final_aug_2016.pdf
- **Rain Garden Handbook for Western Washington: A Guide for Design, Installation and Maintenance.** Washington State University Extension. 2013.
fortress.wa.gov/ecy/publications/documents/1310027.pdf

RESOURCES

- **Working Around Water**, Province of BC:
www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water

Invasive Species

- **Grow Me Instead** brochure, Invasive Species Council of BC:
www.bcinvases.ca/documents/GMI-Booklet_2013_WEB.pdf

Marine Coast

- **Your Marine Waterfront: A guide to protecting your property while promoting healthy shorelines**
www.stewardshipcentrebc.ca/PDF_docs/greenshores/Resources/YourMarineWaterfront_CanadianEdition.pdf
- **Coastal Shore Stewardship: A Guide for Planners, Builders and Developers on Canada's Pacific Coast.** The Stewardship Series
www.stewardshipcentrebc.ca/PDF_docs/StewardshipSeries/Coastal.pdf
- **Green Shores Program.** Stewardship Centre for BC.
www.stewardshipcentrebc.ca/green-shores-home

Climate Change

- **Resources for Preparing and Adapting to Climate Change.** Province of BC.
www2.gov.bc.ca/gov/content/environment/climate-change/adaptation/resources
- **Getting Ready for Climate Change: Webinar Series.** BC Climate Action Toolkit.
toolkit.bc.ca/Program/Getting-Ready-Climate-Change-Webinar-Series

Services

- **BC 1 Call** www.bc1c.ca
Free underground utility locate before digging or excavating
- Registered Onsite Wastewater Practitioner (ROWP) Finder:
owrp.asttbc.org/rowp-finder
- **RDN wellSMART Program**
www.rdn.bc.ca/wellsmart
- **RDN SepticSmart Program**
www.SepticSmart.ca

Water Conservation

- **Greywater Management**, Regional District of Nanaimo:
www.rdn.bc.ca/indoor
- **Outdoor Water Conservation**, Regional District of Nanaimo: www.rdn.bc.ca/outdoor

Rainwater Harvesting:

- **Rainwater Harvesting Best Practices Guidebook**, Regional District of Nanaimo:
www.rdn.bc.ca/green-building-series-guidebooks

Wildfire

- **FireSmart Landscaping and Homebuilding Considerations.** Regional District of Nanaimo:
www.rdn.bc.ca/landscaping-and-homebuilding-considerations
- **FireSmart Canada.** www.firesmartcanada.ca

Clustering Development

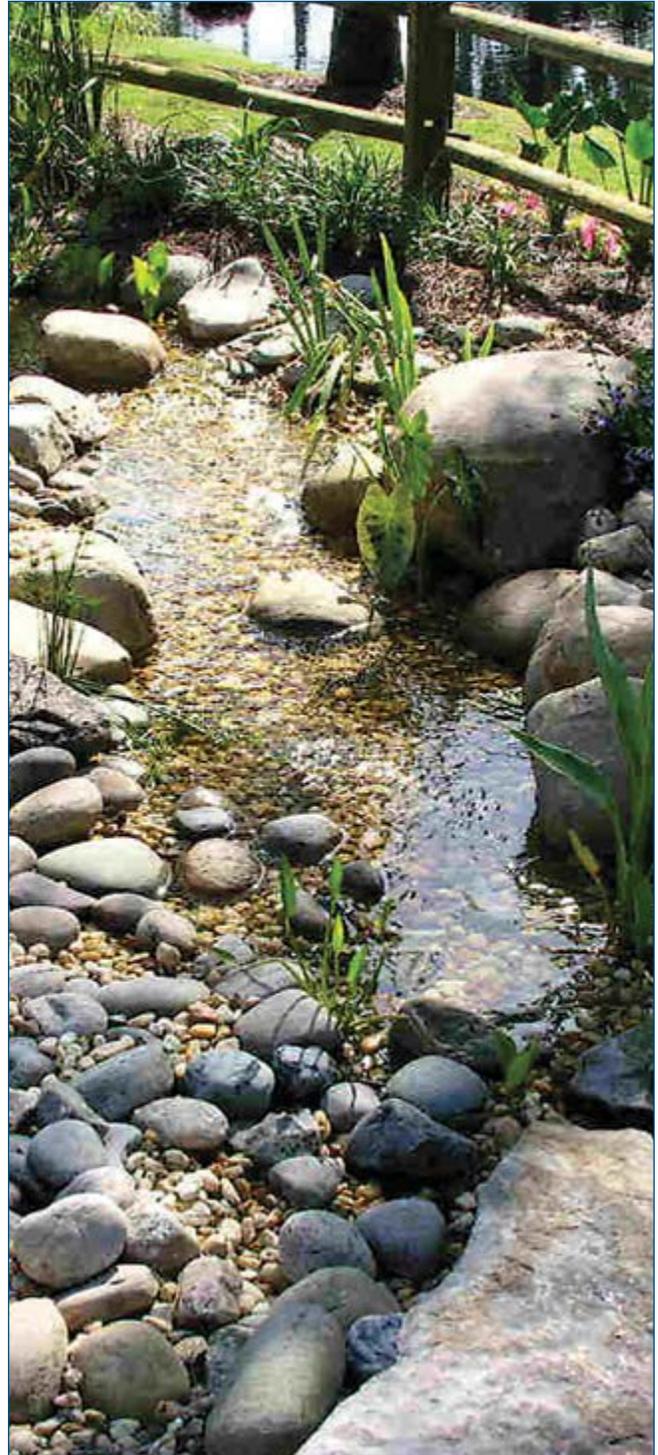
- **Alternative Forms of Rural Development.** An Implementation Project for the Regional District of Nanaimo's Regional Growth Strategy. A Suite of Options for Rural Residential Areas. Regional District of Nanaimo. 2012.
www.rdn.bc.ca/dms/documents/regional-growth-strategy/implementation-projects-and-reports/completed-projects/alternative_forms_of_rural_development_-_a_suite_of_options_for_rural_residential_areas_2012.pdf

Green Buildings:

- **Passive House Canada:**
www.passivehousecanada.com
- **Built Green Canada:**
www.builtgreencanada.ca
- **Canada Green Building Council:**
www.cagbc.org
- **BC Energy Step Code, Resources for Homeowners:**
www.energystepcode.ca/for-homeowners
- **Energy Efficiency for Homes, Natural Resources Canada:**
www.nrcan.gc.ca/energy-efficiency/energy-efficiency-homes/20546
- **EnerGuide Rating System for Homes, Natural Resources Canada:**
www.nrcan.gc.ca/energy-efficiency/energy-efficiency-homes/what-energy-efficient-home/welcome-my-energuide/16654
- **Living Building Challenge:**
www.living-future.org/lbc
- **City of Vancouver Passive Design Toolkit for Homes:**
www.vancouver.ca/files/cov/passive-home-design.pdf
- **The Pretty Good House:**
www.prettygoodhouse.org

Renewable Energy

- **Renewable Energy Introductory Guidebook:**
Regional District of Nanaimo:
www.rdn.bc.ca/green-building-series-guidebooks



Checklists

LOCAL CONTEXT EVALUATION CHECKLIST

When undertaking the Local Context phase, it's important to understand the local area beyond the site boundaries. The site is always part of a larger natural system and its features affect the development on individual sites.

- Access *RDN Map* online to locate your property and its boundaries
- Use *RDN Map* layers and field observations, identify the following features and characteristics of the surrounding area:
 - watercourses and ponds, including ditches and seasonally wet areas
 - the marine coast
 - the rise and fall of land (topography)
 - aquifers underlying your site
 - the watershed your site is within
 - trees, native plants and other vegetation
 - wildlife habitat, such as eagle nests or perch trees
 - significant views
 - roads and trails
 - prevailing winds
 - path of the sun throughout the year
 - planned development
 - hazards such as flooding, wildfire, and steep slopes
 - proximity of service connections such as power, water and sewer, where applicable
- Create a sketch of the site in its local context using the information above (see example on [page 28](#))
- Look for examples of properties in the area that are designed to adapt to local conditions and where natural vegetation and features are retained

SITE ASSESSMENT CHECKLIST

Consider many of the same things at the site level as you did in the Local Context Evaluation but this time focus on the site itself. Think about how to improve the location and design of outbuildings and your home, landscaping, gardens, and driveway.

- Sketch the property starting with the property lines and existing buildings, adding other features as you work through the following checklist

- Identify the following natural features and characteristics:
 - watercourses and ponds, including ditches and seasonally wet areas
 - the marine coast
 - trees and plants, making a note of native species
 - wildlife habitat such as eagle nests or perch trees and deer paths
 - ground and soil conditions
 - path of the sun throughout the year
 - prevailing winds
 - hazards such as flooding, wildfire and steep slopes

- Identify any of the following existing development:
 - buildings and structures
 - driveways and paths
 - septic tanks and fields
 - wells
 - underground services such as hydro, telephone, and water

- Consult with the RDN to identify the following as it is applicable to the site:
 - Zoning and permitted uses, buildings, and structures
 - Development permit areas
 - Well location
 - Septic field location
 - Setbacks from property lines and relevant features such as watercourses or the sea
 - Available incentives or rebates that may influence design decisions like related water conservation or green building options

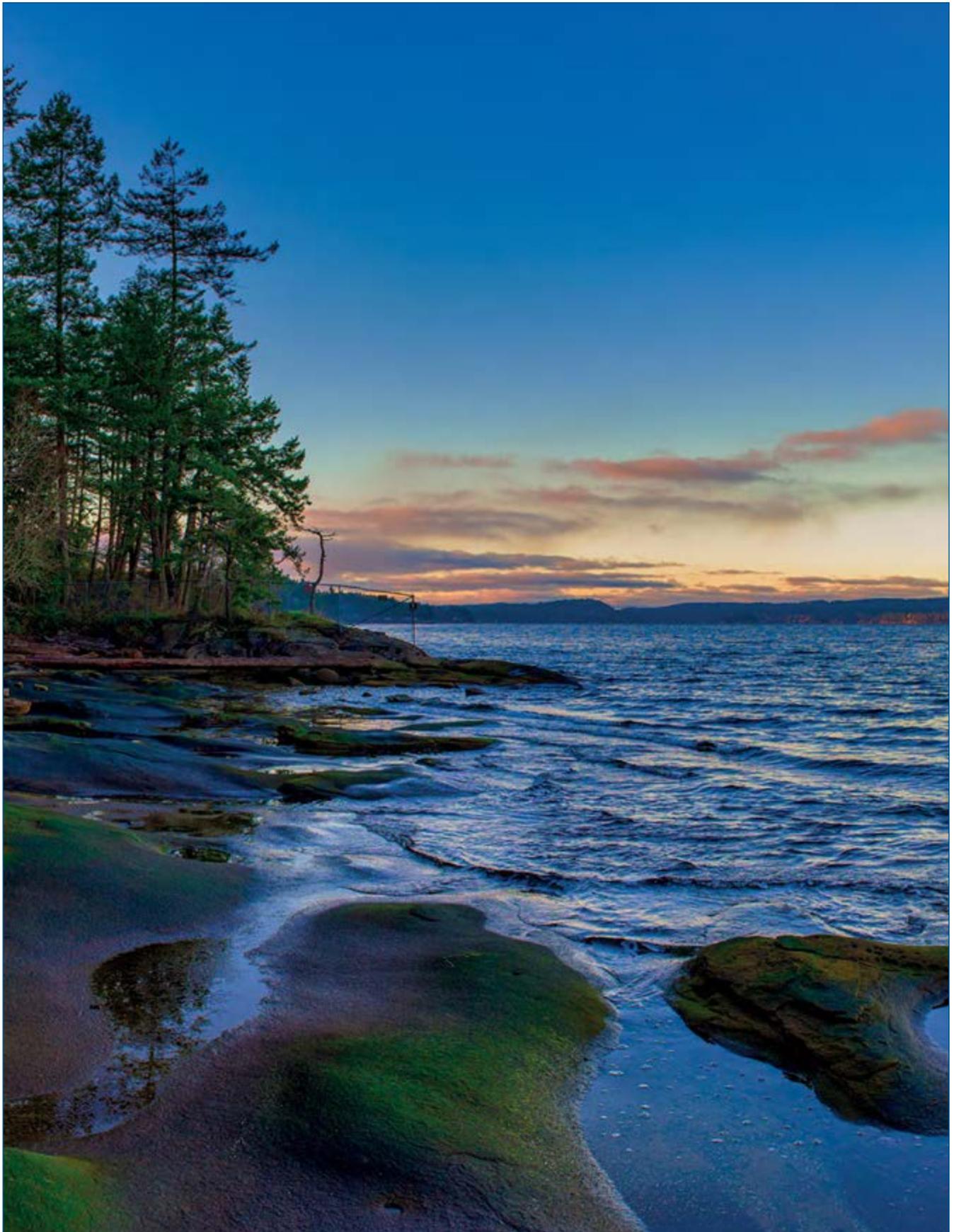
- Consult with professionals to complete your Site Assessment if needed:
 - BC Land Surveyor to determine property lines, easements or covenants, if unclear
 - Registered Professional Biologist to assess sensitive ecosystems or wildlife habitat
 - Professional Engineer to assess hazardous slopes or challenging soil conditions

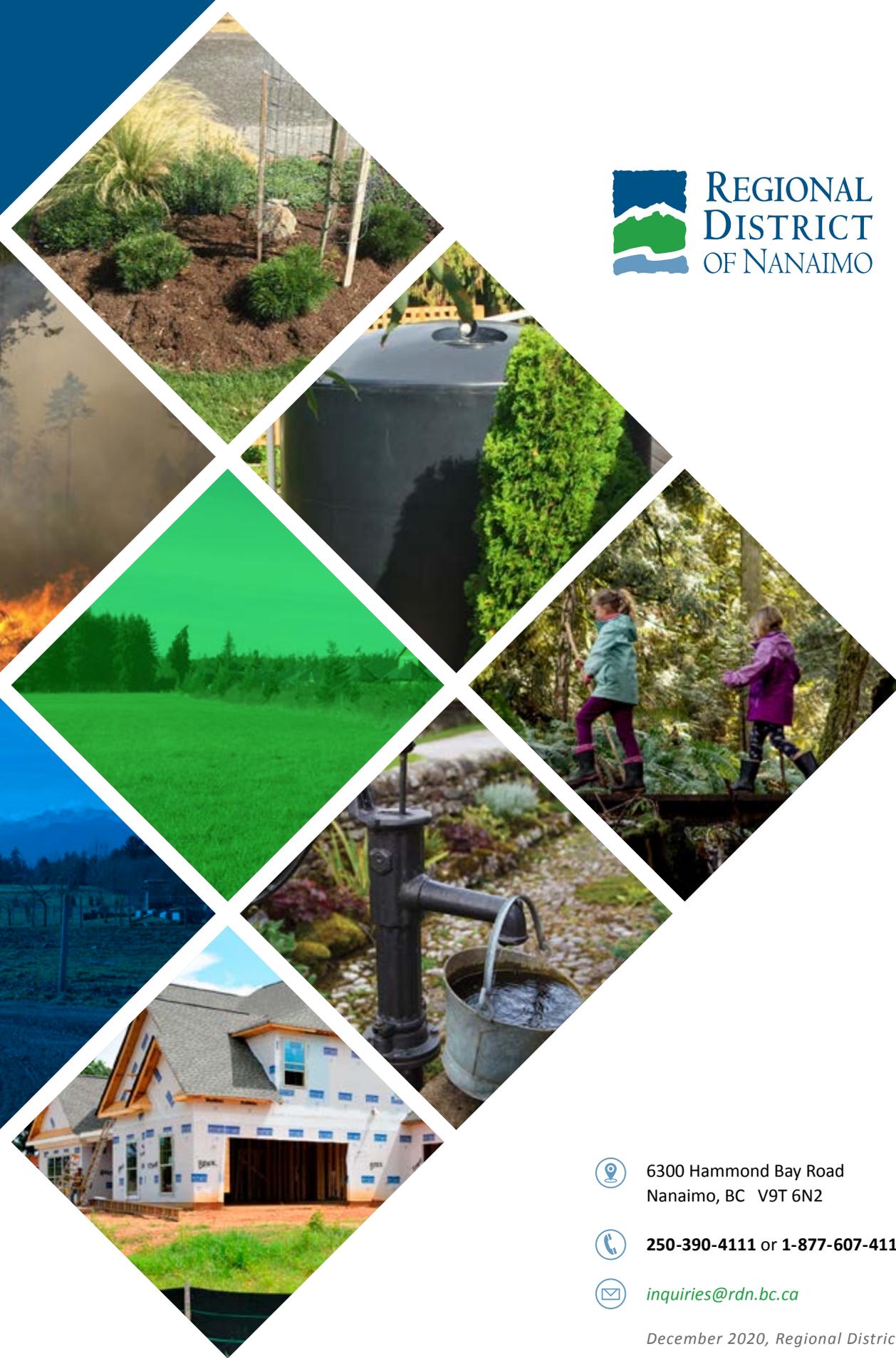
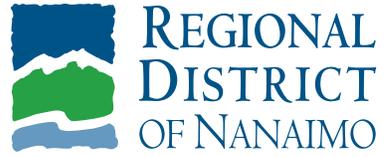
CHECKLISTS

SUSTAINABLE SITE PLANNING CHECKLIST

Now that you've completed your Local Context Evaluation and Site Assessment, you are ready to begin creating your sustainable site plan to design your buildings and landscaping.

- Determine locations for any new wells, septic fields and service connections
- Design rainwater harvesting for irrigation and/or indoor use
- Identify any RDN rebates that could be applicable to your planned development and consider contacting the RDN for pre-approval
- Consider generating renewable energy
- Consider orienting your house to maximize winter sunlight and solar heating potential
- Determine any green building standards or certification you wish to follow, such as LEED, Built Green, Energy Star or Passive House, or Energy Step Code
- If your property borders the marine coast, become familiar with Green Shores principles and consider following their credit rating system and having your property certified by Green Shores
- If your property is within an area of high wildfire hazard, follow *FireSmart* guidelines
- Locate buildings and other structures such as driveways, sheds and garden areas close to one another
- Set aside buffer areas around important natural features or habitat identified in your Site Assessment
- Limit impervious surfaces (e.g. the building footprint, roof size, paved surfaces)
- Consider rain gardens to slow absorption of rainwater into the soil
- Limit removal of native vegetation
- Consider using timber cut from the property for structural use in the construction phase
- Design a planting plan using native species suitable to the local conditions, or plants with low water usage requirements





6300 Hammond Bay Road
Nanaimo, BC V9T 6N2



250-390-4111 or **1-877-607-4111** (Toll Free)



inquiries@rdn.bc.ca

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