



Strathcona Forestry Consulting

**Preliminary vegetative management and environmental impact review:
Lot 1, DL 208, Plan VIP 86955, Sayward Land District
Quadra Island, BC**

draft



Prepared for:
Mr. Richard Schellinck

As part of a proposed rezoning application to:
THE STRATHCONA REGIONAL DISTRICT



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Photo. Goose Greek streamside vegetation.





1.0 INTRODUCTION

1.1 General

Strathcona Forestry Consulting was retained by Richard and Cheryl Schellinck ("the developers") to conduct a preliminary vegetative management and environmental impact assessment of Lot 1, SL 208, Plan VIP 86955, Sayward Land District, Quadra Island. The developers are making application to the Strathcona Regional District (SRD) to rezone the subject property for a country residential development to be known as Gowlland Harbour Views (GHV) (Figures 1, 2, and 3).

This report contains preliminary assessment results based on a general overview of the property and foreshore areas. The report provides general recommendations about ecological features of the Site and addresses proposed parkland dedication and greenspace.



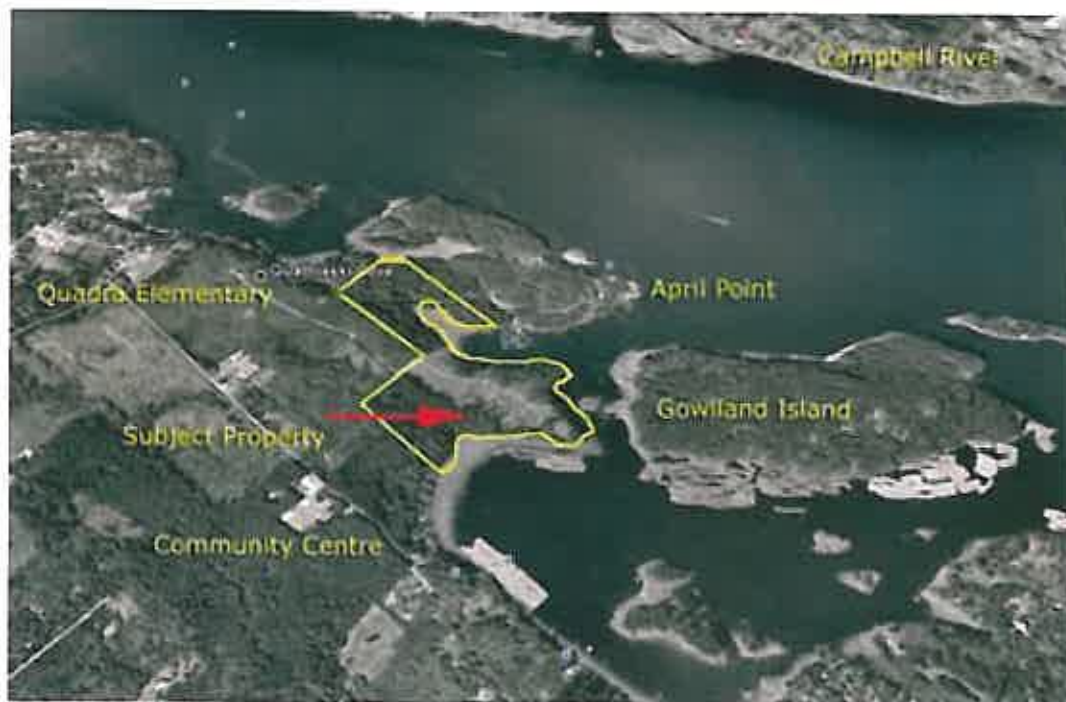
Figure 1. Proposed Gowlland Harbour Views (Chameleon Creative, 2009).

1.2 Scope of Work

The scope of work included ecological classification, detailed site analysis, and an overview of sensitive ecosystems. Wildlife species and aquatic resources were noted, but not specifically inventoried. The prime focus of this study was to define various vegetative groups as per the Ministry of Environment (MoE) Sensitive Ecosystem Inventory (SEI). A detailed environmental study did not fall within the scope of work.



Figure 2. Project area (Thorconsult, 2009).



Figures 3. Site overview (Chameleon Creative, 2009).



2.0 SITE CONDITIONS

2.1 Site Description

District Lot 208 (the Site) is located at the southern end of Quadra Island, near Quathiaski Cove (BC Ferry terminus for ferry travel between Quadra Island and Campbell River). The Site encompasses over 3,000 m of ocean frontage at Gowlland Harbour and Unkuk Cove. Foreshore areas range from low, subdued banks in the north and west to steep, coastal bluffs in the southwest and northeast. Gently rolling terrain between coastal boundaries includes a relatively flat plateau dominating the northern portion of the Site. To the south, the terrain inclines gradually to a relatively small cove (Goose Creek Cove).

The majority of the Site is mature second growth forest cover. The central plateau was recently salvaged logged to recover heavy blowdown from winter storm events in recent years.

Current zoning is Silviculture (Quadra Island Official Community Plan, Bylaw # 1840). The Site bordered by partially developed rural (RU-1) properties to the east, by partially developed residential (R-1) properties to the south, by partially developed commercial (C-2) properties to the west, and Gowlland Harbour to the north.

The Site is located in the Strathcona Regional District (SRD).



Photos. Older/mature forest cover (left, right); central plateau (centre).



3.0 GOWLLAND HARBOUR VIEWS DEVELOPMENT

3.1 Description of Proposed Development

The developers are making application to rezone the 65-ha (185-acre) Site to a Country Residential 2 Zone with rural lot designation. A range of lot configurations and sizes will be available (fee simple and strata lots; waterfront and upland sites). Lot sizes will range from 1 to 15 acres. One Commercial 2 recreational lot of 5 acres is proposed on April Point Road. A significant portion of the development will have a density of the Country Residential Zone with 1 lot per 1.0 ha (2.5 acres).

Approximately 30 acres at the Site is in the Agricultural Land Reserve (ALR), of which half is planned for park dedication. The remainder of the ALR will be considered for organic community farming and/or Silviculture greenhouse operations.

The developers plan to protect and preserve over 50% of the Site as green space through retention of natural vegetation in conservation covenants and two dedicated forested parks (Goose Creek Park and Gowlland Harbour Park). Interconnecting trails will extend through forested areas between parklands, beach areas, and existing community facilities.

The project will involve some blasting in the central, western portion of the property to meet access requirements.



Photo. The Site contains 3,000 m of foreshore area.



3.2 Regulatory Provisions

Development of the Site is governed by local development permits, and provincial and federal regulations. Quadra Island's Official Community Plan (OCP) (Bylaw #1840) provides long-term direction for development with associated goals for environmental direction.

The federal Fisheries Act (1985) prohibits the deposition of a deleterious substance (including sediment) in water frequented by fish. Any storm water discharges must not exceed water quality guidelines for the protection of aquatic life. The federal guidelines are administered by the Canadian Council of Ministers of the Environment (CCME) and provincial guidelines are administered by the BC Ministry of the Environment (MoE).

Additional provincial regulations include the Riparian Area Regulations (RAR) for management of watercourses. The RAR Assessment Report completed by GAIA Environmental Consulting Services identified five watercourses at the Site draining into Goose Bay/Unkak Cove or Gowlland Harbour. The only fish-bearing stream (Lone Fish Stream) drains into Goose Bay through proposed waterfront parkland.

Section 3.4 of the British Columbia Wildlife Act prohibits the destruction of an egg or an active nest of any bird species and prohibits the destruction of a nest of a Bald Eagle, Osprey, Peregrine Falcon, Gyrfalcon, Great-blue Heron or Burrowing Owl, regardless of whether it is occupied. Several known Bald Eagle nests were observed at the Site.

An Archaeological Site Potential Assessment (April, 2009) was conducted by Baseline Archaeological Services Ltd.

Lewkowich Engineering Associates Ltd. conducted a Preliminary Geotechnical Assessment (August, 2009).

3.3 Field Assessment

Strathcona Forestry Consulting conducted a field visit to the site on December 1, 2009. Mr. Rick Schellinck was present at the site visit.

Thorconsult Limited provided site plan mapping.



Photo. GHV Site.



4.0 BIOPHYSICAL

4.1 Overview

A review of existing biological and physiographic information was done in conjunction with the field assessment.

4.2 Biogeoclimatic Ecosystem Classification

Biogeoclimatic Ecosystem Classification (BEC) is a land classification system that groups similar segments of the landscape (ecosystems) into hierarchical categories based on climate, vegetation, and soils (Land Management Handbook 28, BC MoF, 1994). For the purposes of this study, an ecosystem is considered to be a portion of the landscape with relatively uniform dominant vegetation. Vegetation of mature ecosystems is a useful tool in BEC as it is considered the best integrator of the combined influences of the environmental factors affecting a site. More stable vegetation from later successional stages ("late seral") is most useful for classifying ecosystems; BEC can also be applied to earlier successional stages.

The BEC system designates the Site in the very dry Coastal Western Hemlock Biogeoclimatic Subzone (CWHxm). The CWHxm occurs at lower elevations along the east side of Vancouver Island, and on the islands around southern Johnstone Strait. Elevational limits range from sea level to approximately 700 m. The CWHxm has warm, dry summers and moist, mild winters with relatively little snowfall. Growing seasons are long, and feature water deficits on zonal sites (intermediate in soil moisture and nutrients).

Forests on zonal sites in the CWHxm are dominated by Douglas-fir, with lesser components of western hemlock and western redcedar. Major understorey species include salal, dull Oregon-grape, red huckleberry, *Hylocomium splendens* (Step-up moss), and *Kindbergia oregana* (Oregon beaked moss). Less common species include twinflower, and bracken fern. On rich, moist sites (i.e., proposed Gowlland Harbour Park) the forest floor is covered with a dense growth of sword fern, vanilla leaf and foamflower.



Photo. CWHxm forest.



4.3 Sensitive Ecosystem Inventory

Sensitive ecosystems are those which are fragile and/or rare, or those ecosystems which are ecologically important because of the diversity of species they support.

In 1997 the Sensitive Ecosystem Inventory of the east coast of Vancouver Island was completed to identify, classify, and map sensitive terrestrial ecosystems along the coastal lowlands and adjacent islands. The goal of the SEI is to encourage informed land-use decisions that will conserve sensitive ecosystems.

According to the SEI, the Site contains four MoE SEI polygons (6649, 6521, 6666, and 6732). Table 1 summarises the characteristics of the sensitive ecosystems represented by the polygons in Figure 4.

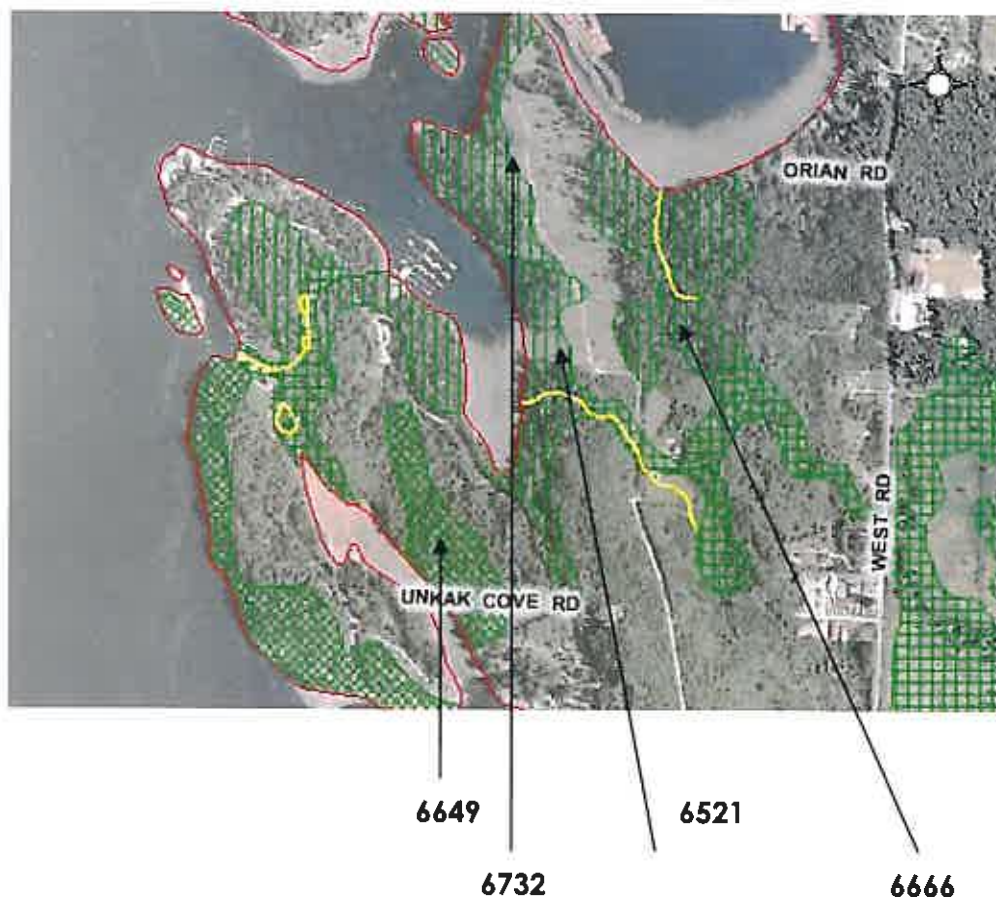


Figure 4. Designated SEI (Sensitive Ecosystem Inventory) Polygons at GHV Site.

**Table 1: Characteristics of Sensitive Areas Identified at the GHV Site**

SEI Polygon #	Area (ha)	Ecosystem Type	Description
6649 (April Point) (Includes proposed greenspace covenant areas)	8.2	Woodland	-App. 70% of polygon is occupied by Woodland (mixed coniferous/deciduous forest 40-70 yrs old) major site type: Douglas-fir/lodgepole pine/Cladina (moist) -Remainder of stand is comprised of conifer-dominated Mature Forest with Douglas-fir/salal
6521 (Gowlland Harbour) (includes proposed Goose Creek Park)	9.9	Older Forest	-Over half of polygon is occupied by conifer-dominated Mature Forest (80-250 yrs since last disturbance) major site type: western redcedar and snowberry (moist) -age of stand > 80 yrs -Remainder of polygon is occupied by more open Mature Forest (coniferous with deciduous component) in narrow linear communities at riparian areas
6666 (Gowlland Harbour) (includes proposed Gowlland Harbour Park)	15.7	Older Forest	-Approximately 40% of polygon is occupied by conifer-dominated Mature Forest major site type: western redcedar/snowberry (moist) -age of stand generally > 80 yrs -Remainder of polygon is occupied by more open Mature Forest (coniferous with deciduous component) in narrow linear communities along riparian areas and along foreshore
6732 (Gowlland Harbour) (includes proposed greenspace covenant areas)	9.9	Older Forest	-Approximately 80% of polygon is occupied by conifer-dominated Mature Forest (generally 80-250 years since last disturbance) site type: Douglas-fir/lodgepole pine/Cladina (moist) -Remaining 20% of site occupied by Woodland (mixed coniferous/deciduous) in narrow linear communities major site types: western redcedar/snowberry western redcedar/foamflower



4.4 Physiography

The Site occupies variable aspects between sea level (0 m asl=above sea level) and approximately 45 m asl.

The Site contains a variety of slope gradients and relief, ranging from the gentle inland plateau to steep coastal cliffs. Soils in the area were derived from deep (generally > 1 m thick) morainal deposits, overlying extrusive bedrock. Gravelly loamy sand is the common soil texture. Pockets of glaciofluvial material found in morainal sediments contain rounder coarse fragments. Coarse fragment content is relatively high. Shell fragments in selected soil profiles show evidence of historical use of the Site by First Nations.

Drainage ranges from moderately dry at coastal bluffs to very moist at seepage areas on lower-sloped seasonal drainages. Soil types include Dystric Brunisols and Humo-Ferric Podzols with poorly developed B horizons. Humus types vary from lignomors (Woodlands) to leptomodors (mixed, Older Forest) and rhizomulls (rich, moist mixed forest).



Photo. Shell fragments in soil profile.



5.0 METHODOLOGY

5.1 Site Reconnaissance Methodology

The Site was stratified according to natural and property boundaries. Stratified polygons were surveyed by walking arbitrary transect lines, so that the entire property was covered. Ecological data were collected at random sample plot locations within each polygon, as per Land Management Handbook #47 (Silviculture Prescription Data Collection Field Handbook, BC MoF, 2000). Data collection was distributed to provide even coverage over the entire site. At each sample plot location the following information was recorded:

- UTM location and approximate elevation
- Slope
- Aspect
- Slope Position
- Vegetation Layers and % composition by layer
- Structural Stage(s)
- Canopy closure
- Drainage
- Aeration
- Tree attributes (stem density, average height, average diameter, leading species, condition class, %live/dead)
- Site series
- Coarse woody debris (# pieces, average decay class, diameter range)

Throughout the assessment, comments regarding wildlife usage at the Site were noted. Representative photographs were taken.

Data collected in the field were used to support the delineation of ecosystem polygons.



6.0 ECOSYSTEM ASSESSMENT

Site assessment specifically addressed Environmentally Sensitive Ecosystems designated by the MoE (Fig. 3). SEI polygons totaled approximately 65% of the Site. The entire Site was assessed during the field review.

6.1 Ecosystem types

The MoE SEI identified three terrestrial ecosystem types at the Site: Older/Mature Forest; Woodland; and Riparian.

1. Older/Mature Forest

Forest cover at the Site was dominated by mature second-growth forest ranging in age from 80 to 250 years (since last disturbance). Average age range was 80-100+ years.

It should be noted that a significant portion of the original forest cover at the Site was logged by European settlers on Quadra Island over 100 years ago. After the original old-growth stands were logged, many areas (including the central plateau) regenerated naturally with western hemlock. Western hemlock tends to be shallowly rooted, and is very susceptible to blowdown. Recent harvesting in the centre of the GHV property was done by the developers to recover heavy hemlock blowdown from winter storms. Minor blowdown occurred on sloping foreshore areas where the mature forest stands included a mix of species more sheltered from prevailing winds.

The predominant natural disturbance factor in the CHWxm is wildfire, with a mean interval event cycle of approximately 200 years. Old-growth Douglas-fir stumps found throughout the Site indicate the original forest stand was dominated by Douglas-fir.

Forest stands at the Site were generally coniferous-dominated, with Douglas-fir and/or western hemlock as leading species, together with western redcedar, and a lesser component of Sitka spruce and grand fir. Scattered deciduous species (bigleaf maple, red alder) were found in scattered, seepage sites.



Photos. Older/mature forest ecosystems.



Site series encompass sites capable of producing similar late seral or climax plant communities within a biogeoclimatic subzone (or variant). A site series is specific to a subzone (or variant).

A range of site series occurred within each of the forest ecosystems at the Site (Table 2). Zonal sites (representing conditions intermediate in moisture and nutrients) and somewhat dry to fresh, richer sites predominated. Structural stage 6 (Mature Forest) was dominant (see Appendix 1 for explanation of structural stages).

Table 2. Major site series encountered in Older/Mature Forest Ecosystems at the GHV site

Site series	Classifier	Description
CWHxm – 03	FdHw – Salal	Moderately dry, poor to medium nutrients
CWHxm – 01	HwFd - Kindbergia	Zonal: somewhat dry to fresh; poor to medium nutrients
CWHxm – 06	HwCw – Deer fern	Moist to very moist; poor to medium nutrients
CWHxm – 04	Fd – Sword fern	Moderately dry; rich to very rich nutrients
CWHxm – 05	Cw – Sword fern	Somewhat dry to fresh; rich to very rich nutrients
CWHxm - 07	Cw - Foamflower	Moist to very moist; rich to very rich nutrients



Photos: Site series examples: CWHxm-05



CWHxm-04



CWHxm-03

Proposed parkland dedication (Gowlland Harbour Park and Goose Creek Park) and greenspace contained Older/Mature Forest Ecosystems, with a wide representation of plant communities from the CWHxm.

Older second growth forests function as both essential habitat areas for many wildlife species, and as primary connections between different types of ecosystems. In older second growth stands such as those found in proposed parkland dedication at the Site, wildlife diversity is relatively high. Coarse woody debris (snags and downed logs) in stands older than 80 years provides important habitat for small mammals and cavity nesting birds. The biodiversity values of second growth forest generally increase with age, resulting in an increased capacity to support more and larger species of plants and animals.



2. Woodland

A lesser portion of the Site contained dry, open forests, with 10-50% tree cover. These areas of exposed bedrock close to the shoreline contained conifer-dominated and/or mixed conifer and deciduous stands with non-forested openings, often with shallow soils and bedrock outcroppings. A range of structural stages (1 – 5) was present.



Photos. Woodland ecosystems at GHV Site.

Coastal bluff ecosystems are naturally rare on southeast Vancouver Island and the adjacent islands. Undisturbed sites are very rare. Coastal bluffs occupy less than 0.3% of east Vancouver Island and the Gulf Islands (SEI Inventory, 1996).

Coastal bluffs provide nesting sites for a number of birds. Coastal bluff ecosystems provide important micro-habitats for a number of plants that flower for a limited time in the spring before moss outcrops dry in the summer.



3. Riparian

Areas adjacent to water bodies (ocean, wetlands, streams) are influenced by a variety of factors – erosion, sedimentation, flooding and/or subterranean irrigation – due to the proximity to the water body.

Riparian ecosystems at the Site included small seasonal wetlands, seasonal watercourses, and narrow linear communities along foreshore areas where there is little or no flooding. Saltine marshes along the Gowlland Harbour foreshore were also included in the riparian ecosystem category. Saltine and estuarine marshes have declined to less than one third of their extent in the early 1900's due to coastal dyking and conversion of marshes to agriculture (SEI Inventory, 1996). More recently, impacts have occurred from activities such as log handling and marina construction.



Photos. Riparian ecosystems at the GHV Site encompass small wetlands, stream courses, and foreshore areas.

Riparian ecosystems vary greatly according to different structural stages based on age and form of the vegetation. Riparian ecosystems provide a wide variety of habitat types that contribute to high levels of biodiversity. Structural stage 6 dominated at the GHV site; a variety of earlier structural stages occurred at small, natural openings.



7.0 RESULTS

The subject property is classified in the CWHxm subzone. Overview of the Site focused on vegetative units identified by the MoE SEI: Mature/Older Forest, Woodland, and Riparian Areas. Vegetation at the Site is characteristic of the CWHxm. Douglas-fir and western hemlock were the dominant tree species at the Site. A lesser component of western redcedar was present. Minor components of grand fir and Sitka spruce were present.

Lodgepole pine was found at drier sites (moss-covered coastal bluffs). Bigleaf maple and alder were found in wetter areas (lower seepage slopes). Minor occurrences of western yew and bitter cherry were observed.

The understorey shrub layer in coniferous-dominated forest stands was dominated by salal, snowberry, dull Oregon-grape, and red huckleberry. The herbaceous layer in coniferous-dominated forests was comprised largely of sword fern and foam flower. Common mosses were Oregon beaked moss and red-stem feather moss. Moister sites along seasonal watercourses supported salmonberry and various nitrophytic plant species.

Drier, moss-covered rocky outcrops along the foreshore area contained a variety of moss species, including *Cladonia* spp.

7.1 Site Series and Structural Stage Representation

A wide range of site series was represented, particularly in the Older/Mature Forest ecosystems. Structural Stage representation was dominated by Structural Stage 6 (Mature Forest); a range of earlier structural stages occurred throughout the Site.



Photo. Old growth Douglas-fir stump provides a "nurse log" for second growth hemlock tree.



8.0 DISCUSSION

Biological diversity (or biodiversity) is the diversity of plants, animals, and other living organisms in all their forms and levels of organisation, and includes the diversity of ecosystems, and the functional processes that link them. Biodiversity is based on ecological principles.

The historical fire cycle in the CWHxm would have resulted in a landscape of even-aged stands with snags and veteran trees, and small areas encompassing a range of seral types. The landscape was dominated by extensive areas of mature forest surrounding patches of younger forest. Across much of the Pacific Northwest, natural disturbance has largely been supplanted by human activities, such as urban development, logging, and agriculture. Stand conditions that mimic the natural disturbance patterns that occurred over thousands of years generally provide optimal habitat for native species. Habitat needs of forest organisms can be best met by:

- maintaining patchy stands with a variety of forest stand attributes and structures across a variety of ecosystems and landscapes
- maintaining connectivity of ecosystems to ensure continued dispersal and movement of forest-dwelling organisms across the landscape
- providing forested areas of sufficient size to maintain forest interior conditions and to prevent the formation of excessive edge habitat
- maintaining snags, veteran trees, and coarse woody debris
- maintaining old seral stages

Forest stands at proposed Goose Creek Park and Gowlland Harbour View Park contain important attributes that contribute significantly to biological diversity:

- stand structure – a high degree of horizontal and vertical structure (patchiness) provides a mix of foraging, nesting, and resting habitat
- wildlife trees – a significant number of wildlife trees (standing or dead or live trees with characteristics that provide valuable habitat for the conservation or enhancement of wildlife) includes various species (Douglas-fir, Sitka spruce, grand fir, western redcedar, western hemlock, bigleaf)
- coarse woody debris – moderate to high levels of fallen branches and old blowdown on the forest floor provide feeding, breeding, and shelter substrate for invertebrates, small mammals, and amphibians, in addition to carbon storage and erosion control
- forest floor – a range of humus types and decomposing materials (including freshly deposited leaf litter from bigleaf maples) provide varied habitat for invertebrates, soil fungi, bacteria, and saprophytic plants
- special habitats – inclusion of small wetlands, stream courses, rock outcrops, and Woodlands provide unique and less common stand features that are associated with specific flora, fauna, or microhabitat processes less common in landscape

Proposed preservation of the Site's ecosystems will effectively mimic natural disturbance conditions in a "seminatural landscape", promoting plant and animal diversity.



Timing of the assessment in late fall precluded some sampling opportunities. Spring/summer field work is recommended to gather data on breeding birds (including owl species), and herbaceous plant species.

While the Site is classified in the CWHxm, it may be considered somewhat transitional between biogeoclimatic units, as it contains attributes of both the drier moist maritime Coastal Douglas-fir subzone (CDFmm) – to the southeast – and the wetter Submontane very wet maritime Coastal Western Hemlock variant (CWHvm1) to the north. A minor component of grand fir is aligned with the CDFmm. Western hemlock is associated with the CWHxm. Sitka spruce is found on moist, rich sites in the CDFmm, CWHxm, and CWHvm1.



Photo. Fungal brackets on a forest snag.



9.0 RECOMMENDATIONS

The preliminary overview provided a number of recommendations in support of the developers' goals to manage high biodiversity levels at the Site.

1. Marine foreshore - These areas provide high quality habitat features (including a number of nesting/perching trees) for bald eagles. Maintain integrity of the shoreline to by establishing a 15m buffer from the high water mark along the marine foreshore.
2. Woodland sites - Moss-covered coastal bluffs generally have little or no soil, and vegetation is prone to erosion. Where possible, use buffers of woodland vegetation or other native vegetation to help to slow the spread of non-native species, and help reduce access.
3. Invasive species - Invasive species (i.e., Scotch broom, thistle) can spread rapidly and crowd out native species. Encourage homeowners to landscape with native species.
4. Nesting/breeding sites - Prevent disturbance of nesting or breeding areas. Establish a permanent protective buffer around eagle nest trees. The BC Wildlife Act does not set out specific buffer distances. In other areas of British Columbia a buffer of 60 m is necessary to provide adequate protection. Consultation with local government is recommended. During the nesting season (app. February to August), no development activities should occur within 150 m of active nests. During nesting season, no blasting should occur within 1 km of the nest.
5. Erosion and Sediment Control Plan - Prior to construction develop a detailed Erosion and Sediment Control Plan, and ensure it is followed through all phases of construction.
6. Environmental monitoring - Monitor construction activities to ensure that the Erosion and Sediment Control Plan is carried out in an effective manner. Weekly inspections (by the Qualified Environmental Professional or a designate) are required at a minimum during periods of heavy activity, in addition to more frequent inspections during times of heavy rainfall. Monitoring and reporting should be done for the duration of the project.
7. Proposed parkland dedication - Proposed Goose Creek Park and Gowlland Harbour Park provide a wide range of habitats highly suitable for long-term biodiversity protection. Retention of healthy, older second growth forest stands is ideal for old growth recruitment; high biodiversity values that will increase as the stands age.
8. Proposed greenspace covenant west, central portion of Site - A moderate to high windthrow hazard was observed in this stand of tall, shallowly rooted hemlock trees. A significant portion of the trees are infected with mistletoe. Conduct a danger tree assessment prior to construction.
9. Wildland - rural interface fire hazard - Reduce the potential for interface fire by following FireSmart guidelines for vegetation management, fire retardant construction



materials, and infrastructure (i.e., looping access routes with adequate fireflow) (FireSmart, Protecting Your Community from Wildfire. Partners in Protection. 2003).

10. Trails - Develop interconnecting nature trails with careful consideration to sensitive ecosystems. Avoid wetland areas; use designated creek crossings; incorporate switchback turns on slopes to reduce erosion; and minimise disturbance to root systems of trees in advanced Structural Stages.

11. Wildlife Trees – Conduct an inventory of Wildlife Trees to ensure safety and wildlife issues are addressed.



Photo. Wildlife Tree.



10.0 EXECUTIVE SUMMARY

The developers of Gowlland Harbour Views are proposing to protect and preserve over fifty percent of the Site as upland green space and waterfront parks. A general overview of the property and foreshore areas was conducted in December, 2009 to assess ecological site characteristics of the site, with a specific focus on sensitive ecosystems identified by the Site by the Ministry of Environment Sensitive Ecosystem Inventory.

As detailed in this report, the Gowlland Harbour Views site contains considerable diversity and structural complexity. I was impressed with the developers' consideration of sustainable concepts. Proposed dedication of parkland and green space will capture a range of forest stand attributes and structural stages across the landscape.

In my professional opinion, with recommendations above addressed, development plans as proposed for Gowlland Harbour Views provide opportunities to enhance biodiversity by providing a "seminatural" landscape that mimics natural disturbance conditions. Dedication of parkland and green space will preserve structural richness and a wide diversity of plant and animal species at the stand and landscape level. Management strategies based on ecological relationships will maintain and/or revive native species biodiversity.

In summary, the development affords effective environmental protection and additionally, provides special value for the community.



9.0 Limitations

This report provides a general overview of the ecological characteristics at the site, with a focused assessment on sensitive ecosystems. Evaluation is based on professional judgment. The investigation involved a field observation. Recommended treatment pertains only to the particular property as disclosed at the time of inspection. The report was prepared considering site-specific circumstances and conditions. It is intended only for use by the client for the purpose for which it was commissioned and for use by local government regulating the activities to which it pertains.



Appendix 1

Structural stages and codes

From Standards for Terrestrial Ecosystems Mapping in British Columbia. 1998. Ecosystems Working Group of the Terrestrial Ecosystems Task Force, Resources Inventory Committee.

Structural stage

Description

Post-disturbance stages or environmentally induced structural development

1 Sparse bryoid Initial stages of primary and secondary succession

Substages

1a Sparse <10% vegetation cover
1b Bryoid Bryophyte- and lichen-dominated communities

Stand initiation stages or environmentally induced structural development

2 Herb Early successional stage or herbaceous communities
Maintained by environmental conditions or disturbance;
time since disturbance <20 yrs for normal forest succession

Substages

2a Forb-dominated Herbaceous communities dominated by non-graminoid herbs
2b Graminoid-dominated Herbaceous communities dominated by grasses, sedges, reeds,
and rushes
2c Aquatic Herbaceous communities dominated by floating or submerged
aquatic plants
2d Dwarf shrub Communities dominated by dwarf woody species

3 Herb/Shrub Early successional stage or shrub communities maintained by
environmental conditions or disturbance; dominated by shrubby
vegetation; seedlings and advanced regeneration may be
abundant

Substages

3a Low shrub Communities dominated by shrub layer vegetation < 2m tall;
seedlings and advanced regeneration may be abundant; time
since disturbance <20 yrs for normal forest succession
3b Tall shrub Communities dominated by shrub layer vegetation that are
2 – 10 m tall; time since disturbance <40 yrs for normal forest
Succession



Stem exclusion stages

4 Pole/Sapling

Trees > 10 m tall, typically densely stocked, have overtopped shrub and herb layers; time since disturbance usually <40 yrs for normal forest succession; up to 100+ yrs for dense (5 000-15 000+ st/ha) stagnant stands

5 Young Forest

Self-thinning has become evident; forest canopy has begun differentiation into distinct layers (dominant, main canopy, and overtopped); time since disturbance generally 40-80 yrs, but may begin as early as age 30

Understorey reinitiation stage

6 Mature Forest

Trees established after the last disturbance have matured; time since disturbance generally 80-250 yrs for CDFmm

7 Old Forest

Old, structurally complex stands composed mainly of shade-Tolerant and regenerating tree species; snags and coarse woody Debris in all stages of decomposition typically, as are patchy understoreys; time since disturbance generally >250 yrs