



City of Richmond

Report to Committee

To: Parks, Recreation and Cultural Services
Committee

From: Mike Redpath
Senior Manager, Parks

Re: **Grauer Lands Habitat Enhancement Works**

Date: October 15, 2013

File: 01-0107-04-01/2013-
Vol 01

Staff Recommendation

That the report "Grauer Lands Habitat Enhancement Works," from the Senior Manager Parks, dated October 15, 2013 be received for information.

Mike Redpath
Senior Manager, Parks
(604-247-4942)

Att. 2

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Engineering Sustainability	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	
REVIEWED BY DIRECTORS	INITIALS: DW	APPROVED BY CAO

Staff Report

Origin

At the September 24, 2013 Parks Recreation and Cultural Services Committee there was discussion and questions regarding work that was occurring within the Grauer Lands which lead to the following referral from Committee:

“That the matter be referred to staff for a report on any work being completed or proposed along the sea berm of the West Dike.”

The purpose of this report is to respond to the above referral.

Background

In June 2011 Council endorsed the joint purchase of the Grauer Lands, in partnership with Ducks Unlimited Canada (DUC); 51 hectares (127 acres) of valuable tidal wetlands critical to waterfowl, fish, and other wildlife. The City and DUC would own the land as tenants in common (2/3 - City; 1/3 - DUC), and the City would gain a unique park that preserves natural habitat, recognizes the area's heritage, and provides a range of environmental benefits while DUC would undertake fisheries enhancement works in the intertidal area (**Attachment 1**). A condition of the purchase was that prior to finalising the purchase agreement, Staff were to complete an ownership agreement detailing the management and other terms of use of the property once acquired, including access, maintenance and operations, and enhancement works. The ownership agreement also required that a management plan for the lands be developed.

To that end Staff worked with DUC and Department of Fisheries and Oceans Canada (DFO) to develop the management plan. The Plan proposed fish habitat enhancements that minimized impacts to bird habitat and considered long term sea level rise flood protection requirements for the West Dike. This was particularly important considering the Grauer Lands sit adjacent to the globally significant Sturgeon Bank Wildlife Management Area (WMA), and the resident and migratory waterfowl that depend on the WMA. The 'Management Plan for Grauer Property' was completed in June 2012 (**Attachment 2**), and the land acquisition was completed later in 2012.

Between August 20, 2013 and September 20, 2013 DUC, working within the framework of the management plan, and with support from the City and DFO, installed the first phase of enhancement measures identified in the management plan. The majority of the enhancement activities are located in the north portion of the Grauer Lands and cover approximately 5.0 hectares (12.35 acres) or 10% of the land.

Analysis

The enhancement works installed by DUC have focused on the following activities:

Consolidating Log Debris:

Extensive areas of log debris that have displaced native marsh vegetation for many years have been collected into secure 'log islands' to create opportunities to restore marsh habitat. The new log islands are located away from existing tidal channels to prevent logs from re-mobilizing.

Logs that provide fish and other wildlife habitat values (e.g., logs with natural root wads, logs lodged securely in the substrate providing cover/refuge for fish and other wildlife, or logs with roots/branches of sufficient height to serve as raptor perches, etc.) have been retained as-is.

Field Contouring and Wetland Enhancement

Areas previously covered by log debris, have been re-graded/contoured to encourage productive mid-marsh wetland habitat to develop.

Channel Widening and Construction

Some existing channels have been widened slightly (approximately 1-2m) and deepened (approximately 1m), and new channels have been added. The existing dendritic pattern of channels has been enhanced with these modifications to establish a higher level of complexity and functionality for improved fish habitat, particularly favouring juvenile Chinook. In addition, channel widening has been undertaken on the foreshore side of the Blundell Road Pump Station to improve City drainage outflow conditions from the pump house into the foreshore marshlands.

Native Planting

Native grasses, shrubs and trees will be added to the foreshore area, and large areas of the marsh will be seeded with native grasses, sedges and rushes. Collectively these areas will enhance habitat for fish and resident and migratory bird populations, including: song birds; raptors; and waterfowl.

Monitoring

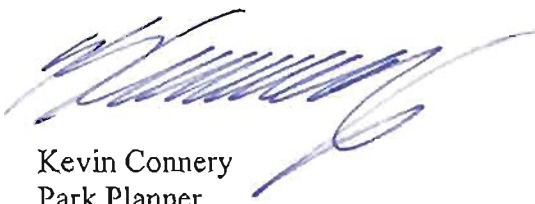
DUC will monitor the enhancement work annually to ensure that the ecological value of the property is maintained. Long-term monitoring by DUC and the City will track both physical (channel location, bank erosion, sedimentation rates, vegetation monitoring and movement of log debris) and biological (vegetation, fish/wildlife use) changes to quantify the benefits of the habitat enhancement works for fish, waterfowl and other wildlife over time.

Financial Impact

There are no financial implications as a result of this report. The habitat enhancement works that have occurred have been funded by DUC.

Conclusion

The enhancement works installed at the Grauer Lands are a collaborative effort between the City of Richmond, DUC and DFO and represent innovative habitat restoration opportunities for foreshore lands within the region.



Kevin Connery
Park Planner
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Attachment #1

Grauer Lands Habitat Enhancement Work 2013



North Area

- Consolidate logs into 'log islands' to open up underlying marsh.
- Widen existing tidal channels and construct new channels for fish habitat.
- Field contouring to enhance marsh and wetland function.
- New foreshore and intertidal native planting to enhance habitat for resident and migratory birds.
- Monitoring.

Central Area

- Consolidate logs into 'log islands' to open up underlying marsh.
- Restore high marsh.
- Monitoring.

South Area

- Widen existing channel to improve stormwater flow from Blundell Rd Pump Station.
- Monitoring.

Enhancement Area: 5 ha
Total Area: 51 ha

Management Plan for Grauer Property – (Sturgeon Bank, Richmond)

Prepared by Ducks Unlimited Canada & City of Richmond
June 2012

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Introduction

General Location

The property is located in Sturgeon Bank, west of Lulu Island in the City of Richmond. Westminster Hwy and Blundell roads provide access to the West Dyke located adjacent to the property. UTM Zone 10N, Easting: 485520, Northing: 5445900.

Purpose

The purpose of the management plan is to provide the general direction for the management of the property and identify the primary goals and issues for the project. Subsequent more detailed plans or updates may be required over time.

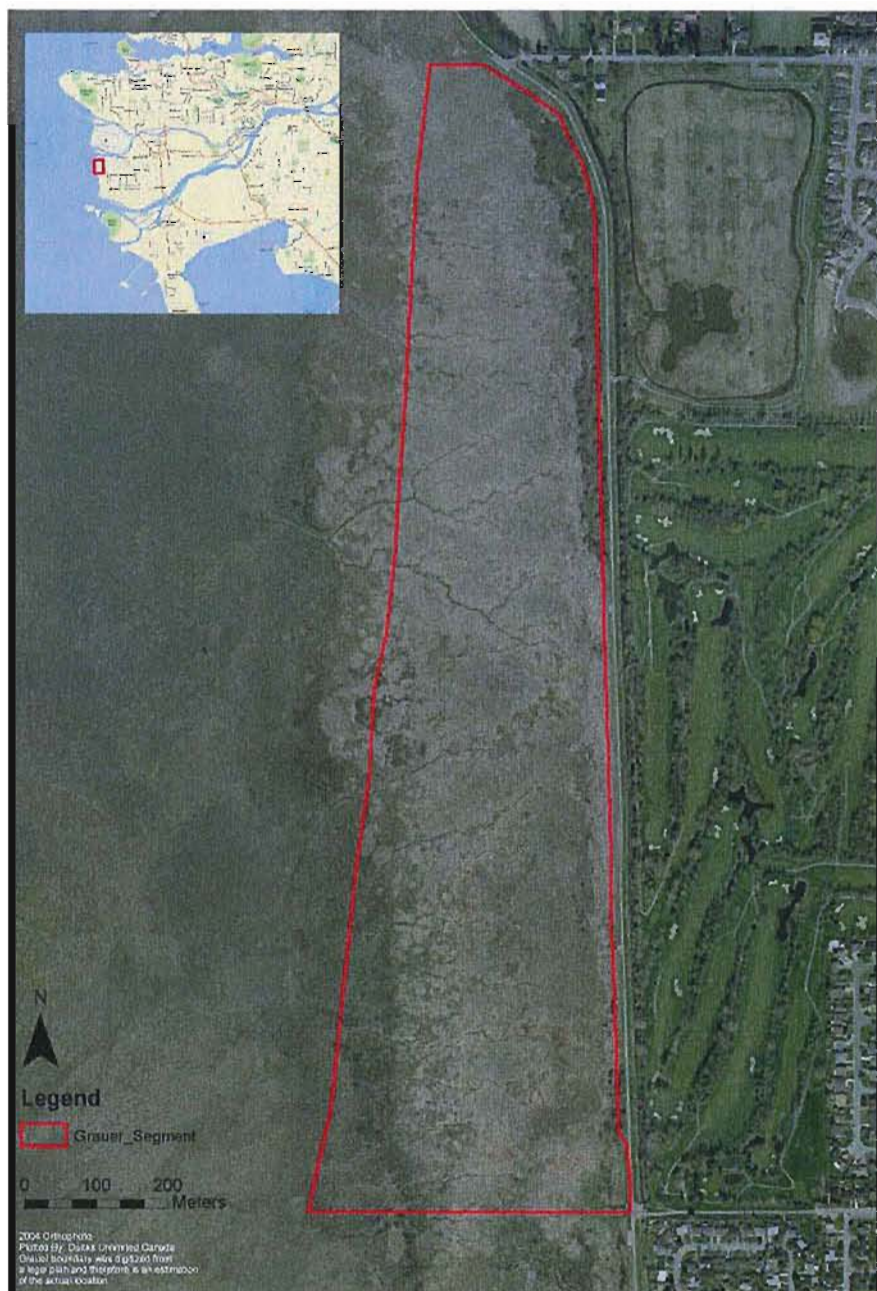


Figure 1. Property Boundary of the Grauer Property

Acquisition DUC and City of Richmond

Ducks Unlimited Canada (DUC) and the City of Richmond (CoR) have negotiated a purchase and sale agreement with the owners to acquire the property and DUC and CoR will hold the property as Tenants in Common. As part of the purchase, the sellers have agreed to an \$850,000 donation. The south property qualified as an Ecological Gifts under the program administered by Environment Canada. A management plan will be completed by both parties and will be provided to Fisheries and Oceans Canada (DFO) and Environment Canada – Canadian Wildlife Service (CWS) staff for comments and include a provision for future restoration opportunities and a management plan review term (e.g. 10 years).

Management Plan

DUC and CoR agree that it is important to preserve, conserve, maintain and enhance the natural state of the Lands and its amenities in perpetuity as habitat for waterfowl, fish, and wildlife. The land will be managed by the City of Richmond as a public park that will provide public education and passive recreation opportunities that are consistent and compatible with the conservation purposes for which the Lands was purchased. The park will be classified as a Natural Area to conserve natural features of regional significance and provide opportunities for passive recreational activities such as walking, hiking, and nature appreciation.

This interim management plan identifies the known property uses, values and issues, confirm conservation goals, and set out general management considerations. This management plan will be attached to a management agreement that will be signed between DUC and CoR that identifies the duties of each party. The manager (CoR) may prepare or update subsequent management plans throughout the term of the management agreement with DUC and other stakeholders. As the south property is the subject of an Ecological Gift, any dispositions or changes in use of the property require an authorization from the Federal Minister of the Environment.

Property Overview

Legal Description

The property consists of two parcels (Figure 2):

1. Parcel "B" (Reference Plan 77), Sections 9 and 16, Block 4 North, Range 7 West, New Westminster District (PID 013-107-704)
2. Portion Section 9, Block 4 North, Range 7 West, Lying North of Parcel "B" (Reference Plan 77) and West of the Dyke, New Westminster District; except Part on Bylaw 2992 (PID 013-107-798).

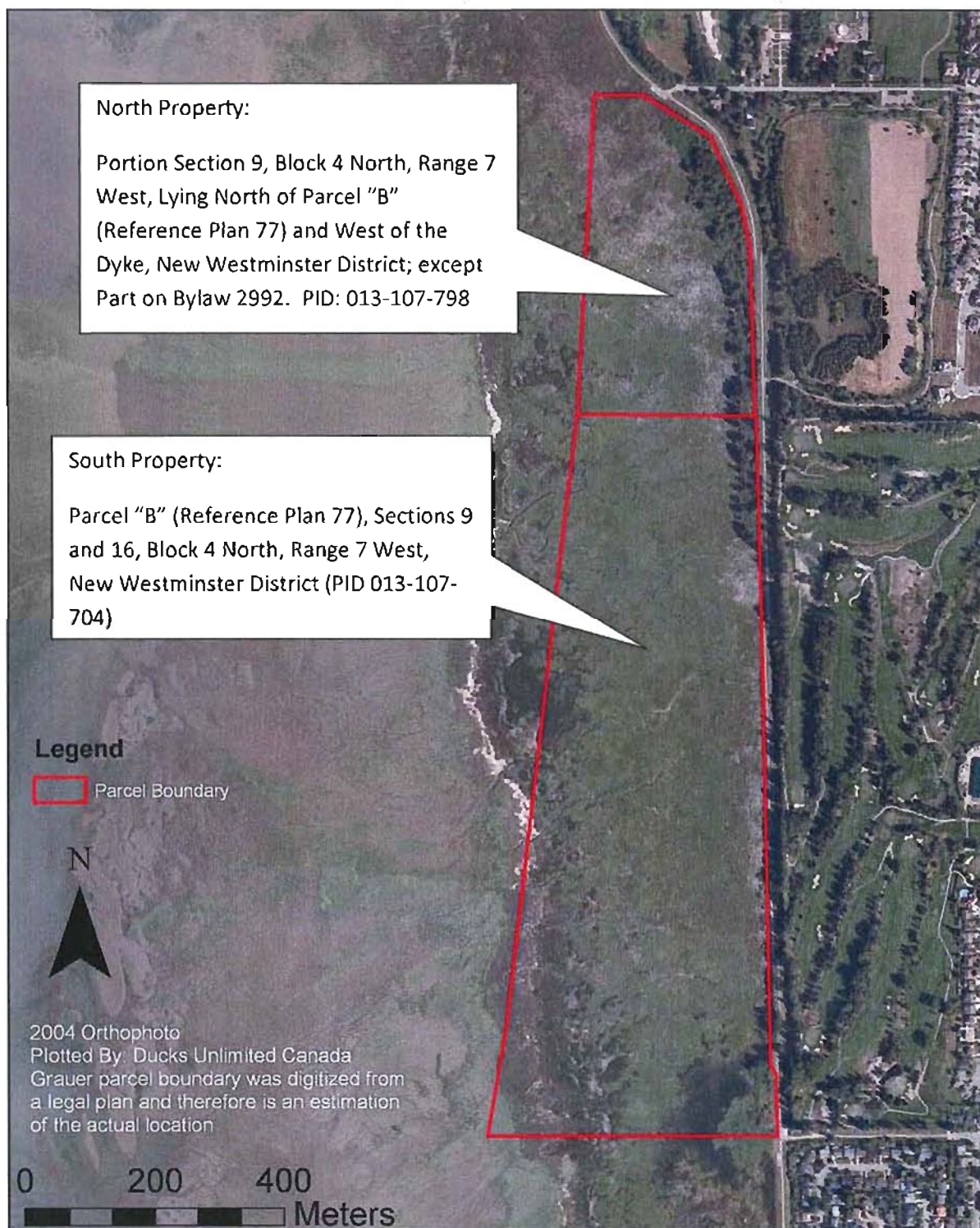


Figure 2. Legal Parcel Boundaries

Historical Ownership And Management

Sturgeon Bank is located on the western perimeter of the City of Richmond and extends from the North Arm of the Fraser River at Iona Island to the South Arm near Steveston. This includes the area adjacent to Lulu Island, where this proposed project is located. Given the high value of these tidal lands for wildlife, the Province purchased some of the private tidal lands in the late 1977 and in 1998 designated them as the Sturgeon Bank Wildlife Management Area including much of the Intertidal zone (over 5000 hectares). However, several tidal properties remained in private ownership. The Grauer family has owned this 51 hectare property for several generations and is the largest private holding remaining outside the dike along Lulu Island. For the last few decades, it has remained as natural habitat with very little human disturbance. The property is adjacent to the West Dyke Trail in Richmond, which is an active recreation area for locals and visitors. It is also located near the Terra Nova Park and Natural Area. DUC, City of Richmond and other conservation partners have had a long involvement in attempting to secure the Grauer Property since 1988, when an action plan for Sturgeon Bank area identified the purchase of the Grauer Property as a priority.

Land Use

The property is zoned as AG-1 although it is not in the Agricultural Land Reserve and is designated as an Environmental Sensitive Area (ESA). AG-1 zones permits farm business (e.g. growing, producing, raising or keeping animals or plants including mushrooms, turf, raising keeping game), equestrian centre, kennel, hobby dog and housing, single detached. In the Official Community Plan (OCP), ESAs include natural environmental features and their associated lands such as woodlots, waterways, riparian vegetation, mudflats, marshes, fallow fields, grasslands etc that include valuable habitat for birds, fish, reptiles, amphibians, and other wildlife.

Ecogift Designation

The Ecogift designation on the property is conferred by Environment Canada for the purposes of conservation and protection of Canada's environmental heritage. The south property was certified as ecologically sensitive land and donated to DUC and City of Richmond. The donor receives a taxation benefit for the donation. As the recipient of the Ecogift, DUC and City of Richmond must protect the land in perpetuity and have a responsibility to maintain the biodiversity and environmental heritage of these properties. The biological value of the ecogift was justified under the following criteria:

1. Areas identified, designated or protected under a recognized classification system
 - Property is identified under the Fraser River Estuary Management Program (FREMP) as high productivity and Conservation Habitat. Within the Boundary Bay - Roberts Bank - Sturgeon Bank Important Bird Area and Fraser River Estuary Western Hemisphere Shorebird Reserve.
2. Sites that have significant current ecological value, or potential for enhanced ecological value, as a result of their proximity to other significant properties;

- Property is adjacent to Sturgeon Bank Wildlife Management Area and contiguous with the tidal habitat that exists in the WMA. Near to Terra Nova rural park (City of Richmond) and Swishwash Island, owned by the Nature Conservancy Canada.
 - Proposed enhancement works are proposed for the property within 2 years that would improve habitat for fish and other aquatic dependent species.
3. Private lands that are zoned by municipal or regional authorities for the purpose of conservation
 - City of Richmond has designated the property as Environmentally Sensitive Area
 4. Natural buffer around environmentally sensitive areas such as water bodies, streams, or wetlands

Property Values

Physical

The Fraser River delta contains approximately 50% of all the tidal wetlands along the BC coast. As part of this delta, the physical characteristics of Sturgeon Bank area are affected by the quantity, quality and timing of the flow of fresh water from the Fraser River as well as by the tides and the winds of the Strait of Georgia. The less dense freshwater flow above the salt water creating a salt water wedge, the location and depth changes throughout the year based on flows of the Fraser River as well as tides. There is an approximate two week cycle in the tidal ranges as well as a seasonal cycle, that result in low tides at night during the winter, and mid-day during the summer (BC Ministry of Environment, 1996).

Within the intertidal area, the majority of the sediments are mud, with sand lobes existing within the channels of the north arm of the Fraser River (BC Ministry of Environment, 1996). The main processes that distribute sediments are wind-generated waves, longshore and tidal currents (Luternauer 1980). However the natural migration of sediments from south to north has been modified by the construction of jetties and causeways such as North Arm Jetty (1917; extended 1935, 1951; repaired 1994), North Arm Breakwater (1951) and Iona Island Causeway (1958) (BC Ministry of Environment, 1996). Since 1964, evidence supports a significant decline in sedimentation rates suggesting marsh erosion is occurring with a cause likely due to dredging in the Fraser River rather than jetty construction (Williams and Hamilton 1995).

The property contains approximately 1700 meters of diked frontage along Sturgeon Bank. There are no creeks or streams that enter the property, however many tidal channels exist on the property.

The extensive tidal flats of Sturgeon Bank (along with the jetties at Iona and north and south arm of the Fraser River) protect Richmond from wave action in the Georgia Strait and thus form a critical element of The City's natural flood protection system.

Ecological

Habitat and Site Characteristics: Tidal wetland with small amount of shrub and trees

Ecosection: Fraser Lowland (Ecodistrict) in the Georgia Depression (Ecoprovince)

Biogeoclimatic zone: Coastal Douglas-fir

Species Present through site mapping and Sturgeon Bank WMA Plan:

Fish: Pacific herring, staghorn sculpin, starry flounder, shiner perch, Pacific sand lance, and juvenile chinook salmon

Plants: cattail, Lyngby's Sedge, Bent Grass, Seacoast Bulrush, American Bulrush, eelgrass, reed canary grass, Common orache, seashore saltgrass

Mammals: not documented

Birds: snow geese, blue heron, northern harrier, dabbling ducks (pintail, green-winged teal, mallard, wigeon), marsh wren

The estuary habitat along Sturgeon Bank of Lulu Island was formed from silts deposited by the Fraser River. The deposition of sediments has changed in recent times with the addition of jetties and dredging activities. The east edge of the property is bordered by the Richmond primary dike (West Dyke). These intertidal areas are partially brackish as a result of the water flows from the arms of the Fraser River. The property consists of marsh vegetation as well as tidal channels and areas of mudflat.

There were eleven plant communities described by Raincoast Applied Ecology in a vegetation assessment completed in July 2011 (Figure 3). These included three terrestrial communities and eight wetland communities. The terrestrial communities were found along the dike, and in an area of approximately 3 ha (8 acres) of fill beside the dike, and consists of mixed forest/shrub with native and non-native species. Although frequently weedy, these sites provide songbird habitat and riparian areas for the intertidal lands. The wetland area has some sparsely-vegetated mudflats but is mostly covered with vegetation including seacoast bulrush, American bulrush, cattail, Lyngby's sedge, seashore saltgrass, spiked bentgrass and reed canary grass. The seashore saltgrass community is present on this site and is a red-listed community in BC. Pure Lyngby's sedge communities, which are provincially blue-listed, do not exist on the Grauer site due to the intermixing with spike bentgrass and coast silverweed. Lyngby's sedge communities are locally abundant on the Fraser River but are provincially rare. No rare plant species were recorded during the vegetation assessment. The wetland area has very few non-native species plants (i.e. invasive). They include yellow flag iris, purple loosestrife and cut-leaf blackberry, which were common at the dike/marsh habitat edge.

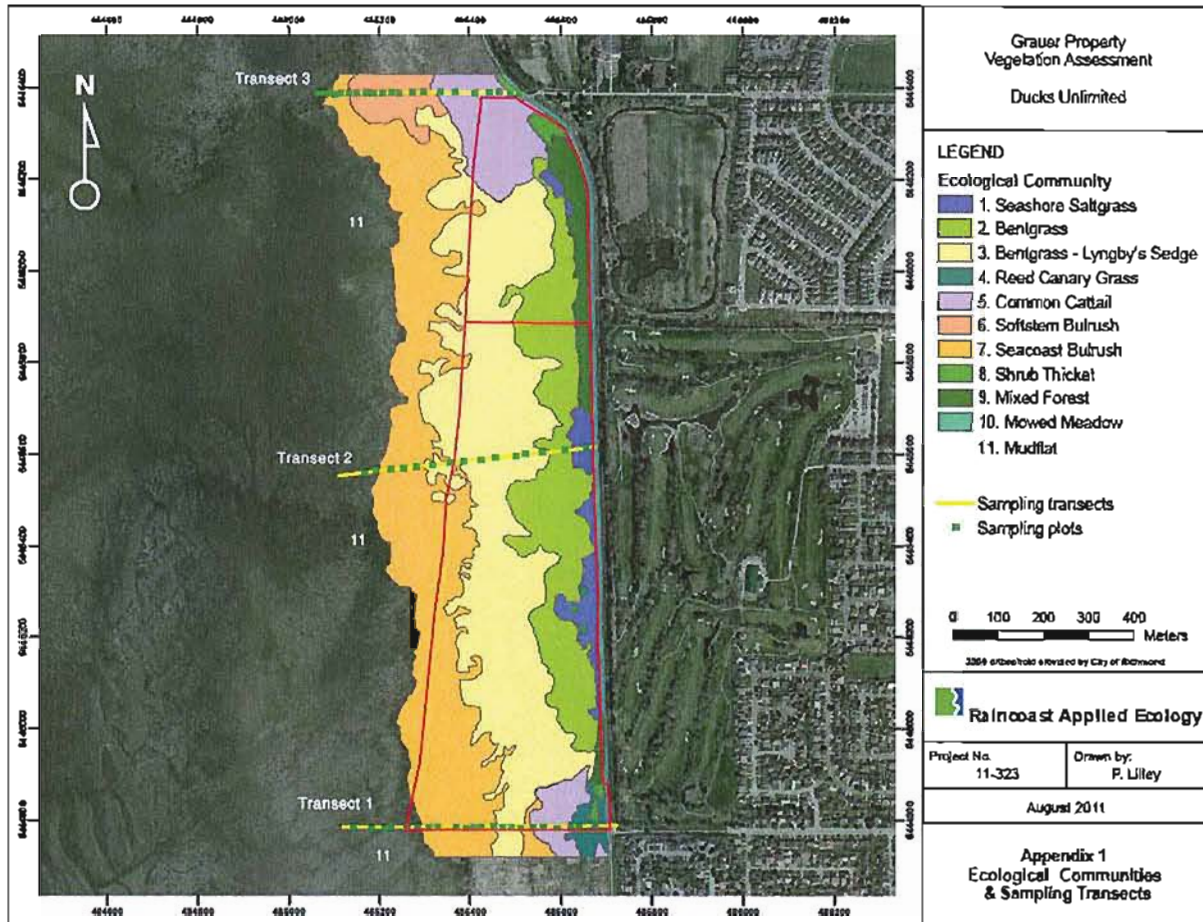


Figure 3. Ecological Plant Communities

The property forms part of the tidal foreshore that is under the management of the Fraser River Estuary Management Program (FREMP). FREMP, in cooperation with the City of Richmond, has designated the area, which includes the Grauer property, as Conservation Habitat where the primary use is the maintenance of continued biological productivity. Other activities can occur but cannot impair the continued biological productivity of the area. As part of the FREMP shoreline designation (high, medium, low), the shoreline along the Grauer Property is identified as high productivity (Figure 4). A habitat inventory conducted by FREMP identifies the habitat as graminoids and forbs.

The property is also designated as an Ecological Sensitive Area (ESA) under the Official Community Plan in the City of Richmond. ESAs in Richmond include valuable habitat for birds, fish, reptiles, amphibians, and other wildlife. Activities impacting ESA values can trigger an ESA development permit.



Figure 4. FREMP Second Order Habitat Mapping

Existing Infrastructure

Three significant pieces of City infrastructure are located on the property.

1. The Blundell Road West Drainage Pump Station Outlet Structure

Located at the south end of the Grauer Property, at the west end of Blundell Road, three (3) 300 mm diameter pipes extend into the property and terminate at a concrete headwall structure. The headwall is located completely on the property. To the west of the headwall the pipes discharge into a drainage channel on the property, and into a wetland area. Although it has a naturalized look, the channel was likely excavated at the same time as the original pump station was built in the early 1970's. The continued operation of this outlet and drainage channel is essential to providing drainage services for the local area. Under certain circumstances the drainage channel is known to surcharge. The City is planning to increase the channel's capacity in the near future.

2. The West Dyke

The West Dyke extends into the Grauer Property approximately eight (8) metres, between Westminster Highway and Blundell Road. The dike provides the City with essential flood protection against high tides, and storm surges. In the future, with sea levels expected to rise, the dike may need to be raised to maintain adequate flood protection levels. This would likely require widening the dike's footprint within the eastern portion of the property.

3. The West Dyke Trail

The West Dyke Trail is located upon the dike's crest and, consequently extends into the Grauer property approximately one (1) meter. The trail is one of the City's premier recreational trails for pedestrian and cyclists. It is part of a 5.5 km path between Terra Nova and Garry Point Parks and provides spectacular views of Sturgeon Bank marshes, the Gulf Islands and distant mountains on Vancouver Island and Howe Sound.

In addition to infrastructure within the property, the West Dyke parallels the entire property and provides critical flood protection for the City. Vehicle access along the West Dyke is limited to City vehicles for access and maintenance purposes.

In addition to the West Dyke, the extensive tidal flats of Sturgeon Bank protect Richmond from wave action in the Georgia Strait and form a critical ecosystem service element of the City's flood protection system and natural infrastructure.

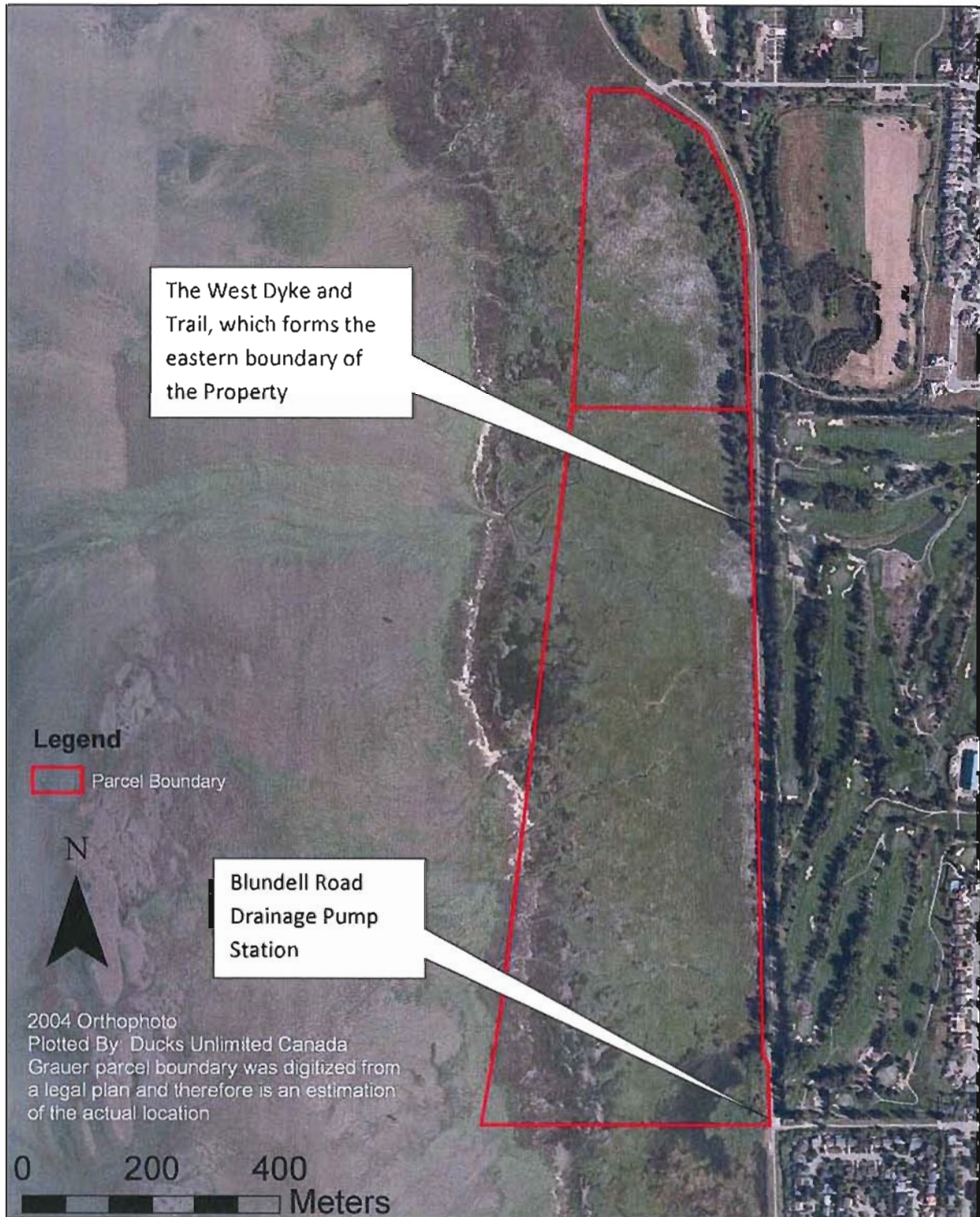


Figure 5. Existing Infrastructure on the Property

Strategic Planning

The following documents relating to conservation and management should be considered in the preparation of the management plan. The extent of information includes a provincial level document (Provincial Biodiversity) and several regional and city scale initiatives (Sturgeon Bank, Metro Vancouver, City of Richmond). While these documents do not have specific, prescriptive management strategies for the Grauer property, there are opportunities for the management of the property to support their goals.

Provincial Biodiversity Directions

In 2008, a BC provincial status report on biodiversity was completed Taking Nature's Pulse - the Status of Biodiversity in British Columbia (Austin et al., 2008). There were 23 major findings that identify what components of biodiversity are the most important, where impacts have occurred and where our greatest vulnerabilities are in the future. Below are the relevant major findings that are applicable to this site to direct management activities:

- Of the species assessed to date in British Columbia, 43% are of provincial conservation concern and are concentrated in the four biogeoclimatic zones of conservation concern (Coastal Douglas-fir, Interior Douglas-fir and Ponderosa Pine).
- At the fine scale, more than half of the ecological communities described in British Columbia are of provincial conservation concern. The Coastal Western Hemlock zone has the greatest number of communities of concern. The highest percentages of communities of concern occur in the four biogeoclimatic zones of conservation concern and in the Coastal Western Hemlock zone.
- Significant areas of wetlands in British Columbia have been converted or degraded.
- The flow of water in lakes, streams, wetlands and groundwater systems is being seriously impacted in British Columbia by dams, water diversions, logging, stream crossings and climate change.
- British Columbia has many significant seasonal concentrations of species [e.g., migratory birds, spawning salmon] that are vulnerable to human impacts.
- Alien species are seriously impacting British Columbia's biodiversity, especially on islands and in lakes.
- Climate change is already seriously impacting British Columbia and is the foremost threat to biodiversity.
- The cumulative impacts of human activities in British Columbia are increasing and are resulting in the loss of ecosystem resilience.
- Gaps in our knowledge of biodiversity in British Columbia create major challenges for effective conservation action.

Metro Vancouver Biodiversity

In 2007, The Framework for Action was prepared for the Biodiversity Conservation Strategy in the Metro Vancouver area. Below are the 3 Goals and applicable objectives that the property can support.

1. Goal 1 - Protect a regionally connected network of habitats for biodiversity.
 - a. Protect marine foreshore and intertidal areas including expanding the use of FREMP zoning in Burrard Inlet and wildlife management areas in the Fraser River estuary by 2020.
 - b. Develop effective riparian protection requirements to protect regionally important rivers, streams and other waterways and their riparian areas by 2015.
 - c. Expand formal protection measures for freshwater wetlands by 2015.
 - d. Reduce isolation of large natural habitats by identifying, protecting or restoring linkage habitats such as stepping stone habitats or corridors by 2027.
2. Goal 2 - Enhance and restore the quality of habitats across the region.
 - a. Include biodiversity enhancement and restoration actions in all park management plans by 2015.
 - b. Adopt invasive species management and control plans for all municipal lands where biodiversity values are highest by 2010.
 - c. Develop riparian and littoral biodiversity enhancement plans by 2015.
 - d. Establish and enhance buffers adjacent to significant biodiversity areas by 2015.
 - e. Increase participation in biodiversity enhancement and restoration programs that focus on private lands ranging from golf courses to backyards by 2010.
3. Goal 3 - Protect and recover plant and animal species and populations.

Metro Vancouver's Ecological Health Action Plan articulates goals for advancing ecological health and connectivity through the region. Two of the Plan's key goals are advancing a regional Green Infrastructure Network and supplementing Ecosystem Services, which are both directly supported by this project given the location and Biodiversity significance of the subject lands (the subject area is rated "Very High" relative biodiversity on Metro Vancouver's 2006 Biodiversity Mapping).

A key supporting component of the Plan is the Metro Vancouver commissioned Sensitive Ecosystem Inventory, currently underway. The Sensitive Ecosystem Inventory has a key goal of "protecting endangered wetlands". As the Grauer land purchase offers a rare opportunity to both directly expand the Green Infrastructure Network and preserve the significant ecosystem services provided by the wetland, the purchase complements the goals and intent of the Ecological Health Action Plan.

Sturgeon Bank Wildlife Management Area Plan

A large part of the productive capacity of the Fraser River estuary for fish and wildlife is sustained by Sturgeon Bank area. However the ecological integrity of Sturgeon Bank is dependent on maintaining nearby agricultural land uses and other land use designations (e.g. Sea Island Conservation Area, Iona Beach Regional Park). Applicable Management Objectives relating to the project include:

1. Maintain wildlife populations through protection of wildlife habitat, restoration of natural processes and, where possible, enhancement of wildlife habitats.
2. To design and implement wildlife management practices which recognize that aviation safety associated with operation at Vancouver International Airport is a fundamental concern.
3. Provide a variety of opportunities for the use and enjoyment of wildlife and natural features.
4. Promote awareness, education, research and enhancement activities.
5. Monitor water quality.
6. Control human activities within the Wildlife Management Area to ensure they are compatible with the overall management goal.
7. Monitor public uses within the WMA to ensure the overall management goal and management objectives are fulfilled.
8. Ensure that the public are consulted regarding broad management issues pertaining to the use of the WMA by the public.

City of Richmond Strategic Directions

City of Richmond Flood Protection Policy

The City of Richmond is committed to maintaining and improving public safety and property protection against storm surge, freshet and extreme rainfall flood events. The 2008-2031 Richmond Flood Protection Strategy provides a framework to improve flood protection and respond to related Provincial Legislation changes. Upgrading existing dike and drainage infrastructure, including along the West Dyke is an important part of the strategy. There is currently much uncertainty about how fast sea levels are and will rise due to global warming. Schedules for West Dyke improvements will be developed as the science around sea level rise becomes more certain.

City of Richmond Parks and Recreation

Richmond's waterfront is the defining feature of its island city identity and a tremendously popular recreational destination for residents and visitors alike. The City's objective for the property is to provide public access for the purposes of recreation, education and research while protecting its ecological integrity. The 2009 Waterfront Strategy identified a series of goals to be applied to the planning, design and management of the waterfront, some of which are applicable to this site;

1. To create a world-class waterfront experience of vibrancy, excitement and beauty through a series of linked destinations, landmarks, programs, and activities that promote and celebrate our island city legacy.
2. To create an environmentally sustainable waterfront through the protection, enhancement and restoration of ecological health.

In addition, the vision for the West Dyke Trail in the 2010 Richmond Trail Strategy is “to maintain the tranquil and natural experience of the trail by ensuring sensitive and appropriate development that focuses on enriching the public’s awareness and appreciation of the environmental value and richness of the area”.

Management Plan

Management Goals

Management of the Grauer property is envisaged to conserve the property and its biodiversity values in a natural state, augmented with enhancement activities. The key management goals will be:

1. Environmental Conservation (Primary Value)
 - a. The Project will conserve, maintain and enhance the natural state and its amenities as habitat for fish and wildlife.
 - b. All other values, principles, goals and actions must not compromise this primary value or the Certification of the land as Ecologically Sensitive under the Ecological Gifts Program.
2. Education and Passive Recreation
 - a. The Project will provide interpretive and educational opportunities to foster public appreciation for the values and benefits, with an understanding of protecting sensitive values.
 - b. Physical structures to support education and recreation e.g. small trails, boardwalks and signage will be designed and located in a manner that minimizes habitat impacts.
3. Cooperative Management
 - a. DUC and City of Richmond will hold title in this property as "Tenants in Common" and manage the property through a management agreement and management plan. The City of Richmond may in the future develop more refined management plans.
4. Coastal Zone Management
 - a. Dikes and drainage infrastructure within or adjacent to the Property's eastern boundary require regular maintenance and refurbishment, and will intermittently require improvement in response to the anticipated impacts of climatic change.
 - b. The Project and Sturgeon Bank WMA play important roles in the oceanography and sedimentation processes of the Fraser River delta and provide the ability to adapt to sea level rise and will have implications to wildlife habitat and populations.

Management Zones

The property is divided into two main management zones (Figure 6) based on intended management activities:

Zone 1 (70m buffer area adjacent to the West Dyke).

- The area contains sites of historical landfill and the ecological communities #8 (shrub thicket), #9 (Mixed forest), and #10 (Mowed Meadow), the majority of ecological community #1 (seashore saltgrass) as well as small portions of #5 (cattail), #4 (Reed Canary), #3 (Bentgrass – Lynby's Sedge) and #2 (Bentgrass).
- Based on 2011 Provincial Sea Dike Guidelines, future dike upgrades to accommodate sea level rise would be contained within this area.
- The City is planning to modify and increase the capacity of the drainage channel that is located at the south end of the property. The channel is the discharge point for the Blundel Road West Drainage Pump Station.

Zone 2 (Tidal wetland and remainder of the property).

- Contains the majority of ecological communities #2 (Bentgrass), #3 (Bentgrass – Lynby's Sedge), #5 (cattail), and #7 (seacoast bulrush).
- The majority of enhancement activities are proposed in this area, with most of the work occurring in the northern portion of the property in the current cattail area.

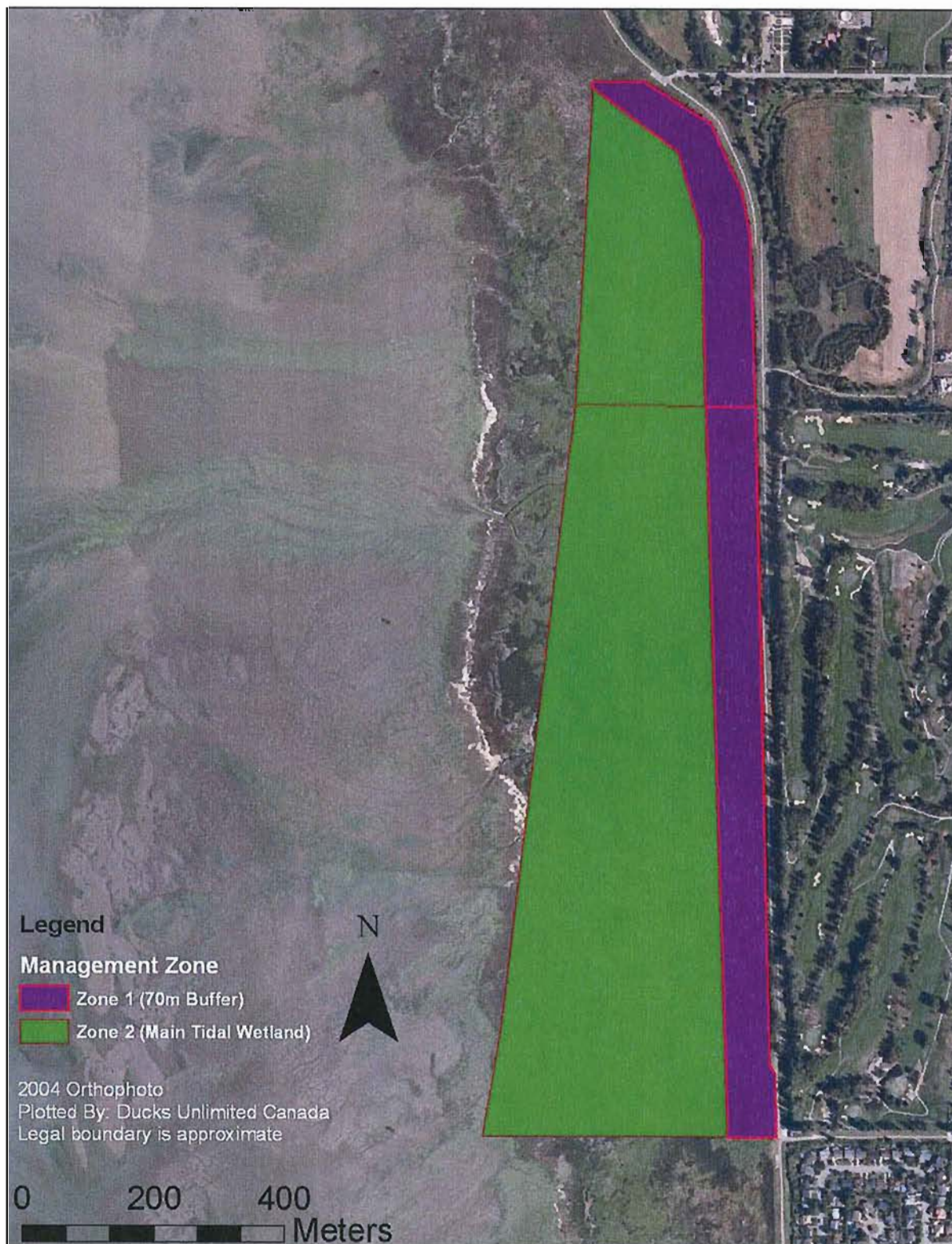


Figure 6. Property Management Zones

Management Considerations

The known physical, ecological and cultural information combined with the strategic planning information, provides the following recommendations for future action on the property:

Ecological Gift Designation

The key attributes important for the Ecological Gift designation are the tidal wetlands of Sturgeon Bank area. The areas must remain intact in perpetuity, in order to avoid taxation pursuant to section 207.31 of the Income Tax Act. As DUC and City of Richmond are the recipients of the Ecological Gift, annual monitoring will be completed to track the ecological attributes. Human activities that result in the ecosystem conversion (direct and complete conversion of natural landscapes, such as wetlands to human uses e.g. buildings, houses, parking lots, agricultural fields) or ecosystem degradation (change to the structure of a natural system e.g. water diversion, impacting an ecosystem's composition and function) cannot be allowed to negatively impact the ecological functions of the project.

Habitat Conservation

Maintaining the existing tidal wetlands and groundwater will be important to maintain the biodiversity of the property. Therefore activities that reduce the hydrological flow such as ground water pumping should be avoided. Conserving the existing habitat should also protect the existing assemblage of ecological communities and maintain areas for seasonal concentration of migrating species such as birds and salmon.

Habitat Enhancement and Channel Modifications

In the short term (2012 – 2014), initial enhancement activities will cover approximately 5.0 ha of habitat that will improve fish and wildlife habitat through the use of channels and other features to reduce dense monotypic stands of cattail and reed canary grass, and increase the production of sedge and bulrush. The majority of the proposed activities will be located in the north parcel (non ecogift parcel), while some work will also be completed in the southern portion of the south property (ecogift parcel) in conjunction with the proposed works of the City of Richmond to improve outflow channel from the pump house at the end of Blundell Road. Additional enhancement or restoration activities may also be carried out to restore historical estuarine function, or address other management issues such as invasive species.

Invasive Species

Maintaining the integrity (resilience) of the natural areas will reduce the opportunities for invasive species. Several invasive species exist within the historically filled areas along the dike and include Himalayan blackberry, Japanese knotweed, and some yellow flag iris and purple loosestrife although rare do exist along the edge habitat between filled and natural tidal areas. These species should be removed and replaced with native vegetation or other vegetation that supports better ecological functions of the property.

Monitoring

Monitoring of tidal enhancement areas is proposed to be completed within 5 years of the physical works. Longer term monitoring should also be completed to monitor trend in change of ecological function of the property in terms of the enhancement works as well as part of a broader Fraser Delta scale. DUC will conduct annual inspections of the property.

Access

Access occurs primarily along the West Dyke with some informal walking trails to the filled areas within Zone 1. Access control will be a key priority for the property to minimize disturbances to wildlife by vehicles and people. Safety and waste management should also be considerations in determining access points and areas.

Education and Recreation

The opportunity to provide public access for recreation, education, and research activities is unparalleled on Sturgeon Bank. That access could take the form of physical structures, like boardwalks or bird blinds that would allow people to more directly experience Sturgeon Bank than is possible now. The City will conduct a planning and design process to achieve its goals of public access and protection of ecological health that will include consultation with stakeholders and the community.

Any new facilities will be sited outside of the main tidal wetland (Zone 2) of the south parcel (ecogift designated area). Activities that already exist along the West Dyke such as biking or walking along with interpretation signage may occur within the ecogift designated area as long as strategies are incorporated to minimize habitat and wildlife impacts.

Cooperation

DUC and City of Richmond will develop a process to manage the site, identify the process to address issues and coordinate public communication of the site. The City of Richmond would be responsible for the day to day operation of the project, with more explicit duties of both parties outlined in a cooperative management agreement. As well, the management of the property should complement the adjacent Sturgeon Bank Wildlife Management Area.

West Dyke Improvements

The West Dike is part of the City's 49 km long diking system and is a primary component of the City's flood protection system. The City of Richmond's 2008-2031 Flood Protection Strategy provides a framework for long term dike improvement in response to climate change related sea level rise anticipated over the next 100 years. The City Council endorsed Dike Master Plan – Phase 1 specifically recognizes the West Dike as a long term defence that will be raised in the future as predicted sea level rise is realized. The master plan also promotes barrier islands on Sturgeon Banks as wave attenuation structures. Any DUC improvements must be compatible with future construction of these barrier islands. Figure 6 depicts Zone 1, a 70 metre wide area that will be large enough to accommodate any future dike improvements.

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