

# WETLAND HABITAT MANAGEMENT STRATEGY

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Planning and Development Services

### **Acknowledgements**

The Wetland Habitat Management Strategy was initiated by City Council and was prepared by City of Kelowna staff in conjunction with Urban Systems Ltd. and Summit Environmental Consultants Ltd. Additional guidance was received from the Wetland Habitat Features Committee, an advisory committee of community interests represented by the following members:

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## Section 1 Introduction

### 1.1 Background

In December 1991, the City of Kelowna completed a *Natural Features Inventory* which identified a number of special natural features within the city, including lakes, ponds, wetlands, watercourses and other features. This study assessed the relative significance of natural features in the city and developed management strategies to protect and enhance them. In addition, this study recommended that the city continue to assess features, including wetlands, identified but not examined in the Natural Features Inventory, and also to add additional features as they are identified.

The *Kelowna Official Community Plan (1994-2013)*, adopted by Council in June 1995, identifies properties within the City containing Natural Environment/Hazardous Condition Development Permit Areas. It was recommended that more detailed work be completed to add additional inventoried features, including wetlands, and to more accurately identify the environmentally sensitive portions of properties which would be subject to Development Permit Designation.

### 1.2 Purpose

The purpose of this *Wetland Habitat Management Strategy* is to provide the City of Kelowna with a definitive information base for future planning, particularly where urban development could potentially impact on natural wetland areas, and to provide for policies which will enhance protection of significant wetland features.



## 1.3 What is a Wetland?

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or where the land is covered by shallow water. Wetlands must have one of the following criteria (adapted from Cowardin, *et al*, 1979):

- at least periodically, the land supports predominantly hydrophitic (i.e. water-loving) vegetation;
- the substrate is predominantly undrained hydric soil;
- the substrate is saturated with water or covered by shallow water at sometime during the growing season of each year; and
- a water body less than 2.0 metres in depth.

### 1.4 Why Protect Wetlands?

Wetlands are unique ecosystems and integral parts of larger ecosystems in the City of Kelowna. They provide environmental, social and economic benefits to the city, its people and the natural environment. Wetlands:

- provide essential habitat;
- contribute to biodiversity;
- minimize flooding by storing and controlling surface water;
- maintain and improve water quality;
- capture and settle sediments;
- immobilize or degrade some harmful contaminants;
- provide recreation and education opportunities; and
- are an open space amenity.



# Section 2 Inventory

This section summarizes the inventory methodology and the results thereof. The inventory was planned to ensure that sufficient information was collected to assess both the ecological and community values associated with each wetland site.

The inventory was conducted in five components, as follows:

- Location
- Biophysical
- Urban Development
- Drainage
- Open Space

The inventory work was conducted by Summit Environmental Consultants, in September and October of 1997. Inventory work began with identification of sites for consideration as wetlands through the use of aerial photograph interpretation, the input of naturalist organizations and interviews with local residents, the general public and the Wetland Habitat Features Committee. For each site the consultants reviewed existing documented information and undertook on-site inventories and assessments. It was not possible to inventory all the sites so a priority for site inventory and assessment was established with the Wetland Habitat Features Committee.

Sample data forms for a wetland site are provided in Appendix B. The complete inventory is of substantial size and in the interests of paper conservation has been provided in digital form (*Microsoft Access* software) to the City of Kelowna Planning and Development Services Department under separate cover.

The wetland database uses the wetland site numbers identified on the *Wetland Habitat Management Strategy Map* (ref: Appendix A). Each database form relies on the wetland site number as the common link between different database forms. A wetland name is also provided where one is known to exist.

Each of the five wetland site components was examined as follows:



## 2.1 Location

Wetlands are located throughout the City. Knowledge of their actual location and density of occurrence is important to understanding their context within the City and in identifying patterns of distribution and scarceness.

#### 1. Inventory Criteria

The Location database is comprised of the following fields of information:

#### · LOCATION

The approximate location of the wetland is described. The *Wetland Habitat Management Strategy Map* (ref: Appendix A) illustrates these locations.

#### • LEGAL DESCRIPTION

An entry field for the legal descriptions of properties potentially affected by the wetland site is provided for the City to complete as appropriate.

#### . SECTOR

A geographic reference to which of the 10 sectors of the City a wetland site is located in.

#### • MAP No.

The map number indicates which City cadastral map the site may be found on.

#### 2. <u>Methodology</u>

The primary methodology used in performing the inventory was to consult with the Wetland Habitat Features Committee, examine aerial photographs and maps, review existing documentation and visit each inventoried wetland site.

Results of the assessment work regarding wetland location are provided in Section 3.1.



## 2.2 Biophysical

#### 1. Inventory Criteria

Information collected in the field has been summarized in the *Wetland Habitat Management Strategy* database (*Microsoft Access* software). The following are descriptions of each database field and how the information was collected.

#### . SITE #

This refers to the identity number assigned to each wetland. The range 1-51 includes wetland sites originally inventoried as part of the *Natural Features Inventory*. The 100-series site numbers refer to potential wetland sites identified at the start of this assignment and inventoried during it. The 200-series site numbers refers to potential wetland sites identified at the start of this assignment but not yet inventoried.

#### • WETLAND NAME

Known wetland names are from the *Natural Features Inventory* or were provided by the Wetland Habitat Features Committee. The remaining sites are not known to have names.

#### • TOTAL AREA AND OPEN WATER AREA

Area of open water refers to an area where little or no emergent vegetation was growing. Areas were estimated by a combination of field observations and aerial photographs.

• WATER QUALITY (pH, Temperature, Salinity, Specific Conductance) Water quality was measured at most sites visited in autumn 1997. Measurements were typically taken in three locations around the wetland perimeter and averaged. Water pH was measured with a Hanna field pH meter (model pHep 3). Salinity, specific conductance, and temperature were measured with a YSI meter (model 30).

#### • NUMBER OF INLETS AND OUTLET CONTROL

Number of surface inlets and types of outlet control were determined by field observations, aerial photographs and the *Natural Features Inventory* files. Inlets and outlets were classified as being artificial (ditch, culvert, weir, flume, tap) or natural. When inlet and outlet information could not be determined from aerial photographs and the *Natural Features Inventory* files, "n/a" (not available) was entered into the database. If there were no inlets and outlets, "none" was entered into the database.



#### **GEOMORPHIC POSITION**

Geomorphic position describes the location of each site in the valley landscape. For the purpose of this inventory, the geomorphic position of wetlands was grouped into four categories: floodplain, lakeshore, stream shore and upland depression. Wetlands in the Okanagan Valley bottom were considered to be on the floodplain if the elevation difference was less than 20 metres between the closest stream bank and the wetland. Sites on Okanagan Lake directly influenced by lake levels were classified as lake shore. Stream shore refers to sites where stream water connects directly to the wetland. Upland depression, the most common wetland found, refers to sites where a catchment area has contributed to an accumulation of water in a basin.

#### ADJACENT SURFICIAL GEOLOGY

Surficial geology was determined from observations of local road cuts and other exposures, as well as from surficial geology mapping of the Okanagan Valley (*Nasmith*, 1962).

#### SUBSTRATE

Substrate refers to the texture of the wetland bottom based on visual observations.

#### WETLAND CLASS

Wetland Class follows the Canadian Classification System (*National Wetlands Working Group, 1988*). Two additional wetland classes were added, wet meadow and shrub carr, based on a modification of the system used in British Columbia (*MacKenzie and Banner, 1995*). Definitions are provided here and additional information on classification is outlined in Section 3.2.

#### WETLAND FORM

Wetland Form follows the Canadian Classification System (*National Wetlands Working Group, 1988*). Definitions are provided here and additional information on classification is outlined in Section 3.2.

#### WETLAND TYPE

Wetland Type follows the Canadian Classification System (*National Wetlands Working Group, 1988*). Definitions are provided here and additional information on classification is outlined in Section 3.2.



WETLAND	
CLASS	DESCRIPTION
Bog	A wetland with organic soil (predominantly poorly to moderately decomposed sphagnum moss peats) and a water table at or near the surface. Waters are generally acidic and low in nutrients. Bogs are usually carpeted with sphagnum mosses and shrubs, and may be treed or treeless.
Fen	A wetland with organic soil (mainly moderately to well- decomposed sedge and non-sphagnum moss peats) and a water table at or near the surface. Waters are mainly nutrient rich with a near-neutral to slightly acid pH. The dominant plants are sedges, grasses, reeds, mosses and some shrubs. Scattered trees may be present.
Marsh	A wetland with mineral or sometimes well-decomposed peat soils, and surface water levels that fluctuate seasonally, exposing matted vegetation or mudflats when low. Waters are nutrient rich with near-neutral to basic pH. Emergent vegetation, including grasses, cattails, sedges, rushes and reeds, covers at least 25 percent of the surface.
Shallow Open Water	Wetlands that are intermittently of permanently flooded with open expanses of standing or moving water up to 2 m deep. Open water, with no emergent vegetation, covers 75 percent or more of the wetland surface.
Swamp	A wetland with mineral or occasionally peat soils and a water table at or near the surface. Waters are nutrient rich. Vegetation is typically dominated by coniferous or deciduous trees or dense shrubs and herbaceous plants.

#### COMMENTS AND MODIFICATIONS

Comments and modifications are based on field observations recorded in 1997, and the *Natural Features Inventory* files.

#### • PLANTS, BIRDS, WILDLIFE

Plant, bird and wildlife lists are provided in the wetland database, with scientific and Latin names for each species. These lists were primarily compiled from *Natural Features Inventory* and Central Okanagan Naturalist Club files, supplemented with field observations in 1997. The lists are not comprehensive, since detailed surveys were not part of either the *Natural Features Inventory* or the current wetland inventory, but can be updated as information becomes available. A "red-listed" species is any indigenous species or subspecies that is extirpated, endangered or threatened in British Columbia. A "blue-listed" species is any indigenous species considered to be vulnerable in British Columbia. The majority of plants, birds and wildlife identified in the inventory were neither red-listed nor blue-listed.



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#### MODIFICATION RATING

The modification rating varies from 0 to 3. Modification rating criteria are described in Section 2.2.2.

#### • WETLAND RATING

Wetland Rating is a product of the inherent biophysical values of a wetland site and the degree to which the site has been modified. Wetland Rating may have a rating of HIGH, MODERATE or LIMITED.

WETLAND	
RATING	CRITERIA
HIGH	Wetlands meeting one of the 5 following criteria and not heavily
(H)	modified:
	• Connected to a fish-bearing stream or a tributary of a fish-
	bearing stream; or
	• Confirmed presence of a "red-" (endangered/threatened) or
	"blue-listed" (vulnerable) species; or
	• Rated as "unmodified" (0), or "slightly modified" (1) with
	$\geq$ 75% of the riparian zone intact; or
	• Water $pH \ge 8.0$ ; or
	• Is currently used for environmental/natural history education.
MODERATE	Wetlands not rated as "HIGH" or "LIMITED" in this table.
(M)	
LIMITED	"Heavily modified" with low probability that natural restoration
(L)	processes will restore wetland function.

#### 2. <u>Methodology</u>

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The Kelowna Wetlands Inventory included: i) a review of existing information from the Kelowna Natural Features Inventory files; ii) a review of 1996 1:15,000 scale colour aerial photographs and identification of wetlands not previously inventoried (minimum size 0.1 ha); and iii) field surveys in autumn 1997. Wetland location and assigned site numbers are shown on the Wetland Habitat Management Strategy Map (Appendix A). Site numbers for wetlands identified during the Natural Features Inventory have remained unchanged except where one number referred to more than one wetland. In these cases, the number remained the same but "a", "b", "c" were added (e.g. three wetlands assigned the number 10 were re-numbered 10a, 10b & 10c). Sites surveyed during the fall of 1997 were assigned numbers 101-134. Site 135 was originally surveyed by EBA Engineering Consultants Ltd. (1997), with follow-up by Summit Environmental Consultants Ltd. in autumn 1997. Unconfirmed wetland sites identified during the aerial photograph survey have been assigned numbers 201-257. An additional six (6) unconfirmed wetland sites were added in September 1998 after receiving feedback from the general public at an Open House. The Wetland Habitat Management Strategy Map (Appendix A) also shows ditches observed to have wetland characteristics (e.g. aquatic macrophyte growth).



Given the large number of known and potential wetlands within the City of Kelowna, it was necessary to establish priorities for the field inspection. The list of priority wetlands was provided by the Central Okanagan Naturalist Club based on the Club's understanding of information gaps. Thirty-five new sites (both simple and complex) as well as Site 10 and Site 17 from the previous *Natural Features Inventory* were inspected during 1997. Data collected included wetland class, form and type, wetland area, water quality, plant species, site modifications, and other physical characteristics.

Potential wetland sites were identified on aerial photographs. Wetland location was estimated by placing a  $10 \times 10$  grid over each aerial photograph (e.g. "6a, 4d" indicates 6 grids across and 4 down). Other information collected from the air photos are approximate wetland size, location with respect to roads, and adjacent habitat.

MODIFICATION RATING	DEFINITION
0	<b>Generally unmodified</b> . Non-native plant species may be present but do not dominate the wetland
1	<b>Slightly modified</b> . Majority of impacts are confined to the riparian zone.
2	<b>Moderately modified</b> . May have in-filling, or a large number of non-native plant species. However, these wetlands still have wetland values and functions.
3	<b>Heavily modified</b> wetland lacking most wetland characteristics. Wetland function is compromised.
X	Created wetlands.

All modified wetlands have the potential to regain wetland function through natural restoration processes and/or enhanced restoration. However, in heavily modified wetlands that potential is severely constrained.

## 2.3 Urban Development

Wetlands tend to occupy land that is undeveloped or under-developed; land that often has potential for land development and other community values. An understanding of the potential for urban development throughout the City will help identify where the interests of urban development and wetland protection may overlap.

#### 1. Inventory Criteria

The methodology for inventorying urban development-related issues uses a number of criteria to evaluate land use and the potential for development on each site. The inventory criteria for the Urban Development database and a brief statement regarding the reasons for including them, are set out below:



#### LAND OWNERSHIP

Land ownership has a bearing on the probability of a site for urban development. In addition, if the land is owned by the City or other government agency more options are available to protect the area than if it is privately owned.

#### • EXISTING LAND USE

The existing land use of the site can influence future land uses.

#### ADJACENT LAND USE

The existing land use of surrounding lands can influence the probability and/or land use of the site being developed. High density residential development surrounding a wetland site will have a different influence than undeveloped forested areas and grasslands.

#### . ZONING

The current zoning sets out the permitted land uses and regulations that apply to the site. Regardless of the current use, the zoning indicates the permitted uses that owners could develop on the site without having to rezone. Urban land uses (e.g. Commercial, Industrial and urban Residential) will generally indicate a higher potential for urban land development than non-urban uses (e.g. rural residential, agricultural, natural open space).

#### OCP DESIGNATION

The City of Kelowna's *Official Community Plan* (OCP) sets out the future land uses for the city, strongly influencing the potential for future development. The OCP designation can be used as a general indicator of potential for future urban development.

#### SECTOR PLAN

If a Sector Plan has been completed for the area in which the wetland site is located, the name of the Sector Plan is provided in the database for reference.

#### SECTOR PLAN DESIGNATION

The Sector Plan sets out more detailed land uses and policies for an area. It outlines the City's policy for future development in and around a site, in conjunction with the OCP.

#### ALR DESIGNATION

If the site is within the Agricultural Land Reserve (ALR), the range of future uses and the development potential will likely be limited to agricultural and some rural residential uses. For the purposes of this study, ALR status has a direct bearing on the potential of a parcel of land for urban development; however, ALR status does not translate to wetland protection.



#### DP AREA DESIGNATION

If the site is designated as a Development Permit (DP) Area specific guidelines may apply to development of the site. The guidelines will be particularly relevant if the area is designated as a Natural Environment/Hazardous Condition Development Permit (NE/HC DP) Area.

#### • POTENTIAL ACCESS to/from EXISTING ROAD

The proximity of existing roads may have a bearing on possible development of a site, though this field is not used to assess urban development potential.

#### • POTENTIAL ACCESS to/from EXISTING UTILITIES

The proximity of existing sewer and water services may have an impact on the potential for future development of the site, though this field is not used to assess urban development potential.

#### · OCP ROAD NETWORK THROUGH/NEAR SITE

The OCP and Sector Plans will set out the proposed future road network. A future road corridor through or around the site may have an influence on the potential for development, though this field is not used to assess urban development potential.

#### OCP SEWER/WATER STAGING WITHIN 10 YEARS

The OCP and Sector Plans will set out the future sewer and possibly water staging, which may influence the timing and potential for development. However, because of the inability to accurately predict development patterns and utility staging, this field is not used to assess the potential of a wetland site for urban development.

#### · RELEVANT OCP POLICIES

The OCP has specific policies that may be relevant to the site. These policies may set the direction for future development or protection of the site.

#### RELEVANT SECTOR PLAN POLICIES

The Sector Plan may set out specific policies relevant to the site. These policies may set the direction for future development or protection of the site.

#### POTENTIAL for URBAN USE or DEVELOPMENT

This data field is an assessment based on the data entries provided under some of the above criteria. It is used to identify whether wetland sites have a HIGH or LIMITED potential for urban development.



#### 2. <u>Methodology</u>

The primary methodology used in conducting the inventory was to review existing documents and extract information for each site. The relevant materials and documents included:

- Official Community Plan policies and maps
- Sector Plan policies and maps
- Zoning Bylaw text and maps
- Legal property mapping
- Agricultural Land Reserve regulations and maps
- Land ownership mapping, or queries by City staff on the GIS system
- Aerial photographs

The existing land use of the site and the surrounding area was identified by drawing from information provided through the initial site visit and a review of aerial photographs.

Results of the assessment work regarding urban development values are provided in Section 3.3.

## 2.4 Drainage

Wetlands are inherently related to drainage and/or stormwater management. They are often located within a watershed that has urban uses, as part of or connected to natural drainage courses used as routes for the movement of surface water. Wetlands, whether natural or manufactured, may play an important role in controlling stormwater quantity and quality.

#### 1. <u>Inventory Criteria</u>

The following is a list of the inventory criteria related to drainage, and discussion as to why these criteria were chosen:

#### • WATERSHED NAME

This provides a convenient reference to the common name of the watershed within which the wetland is located.

#### BASIN MANAGEMENT PLAN REFERENCE

This data field links the wetland and its associated watercourse to one of the several basin management studies, as per the City of Kelowna *Master Drainage Plan* (1989). This data field is included because many of the plans recommend stormwater quality or quantity control functions for some existing wetland areas. Furthermore, some studies recommend the channelization of wetland areas as part of the overall stormwater management strategy, without consideration of other values associated with wetland areas.



#### DRAINAGE AREA

This data field identifies the size of the watershed upstream of the wetland. This contributing area is one of the key factors in the viability of the wetland. That is, the larger the contributing area, the more likely there is a consistent source of water for the wetland. The drainage area should also consider groundwater flows to the extent possible, although this is often difficult to determine without extensive investigation.

#### EXISTING UPSTREAM URBANIZATION

This data field identifies the percentage of the area upstream of the wetland that is currently urbanized. Urbanized areas affect the hydrology of watersheds by causing more rainfall to appear as surface runoff, and less to appear as groundwater flow. The result can be changes to the nature of existing wetland areas, or even their destruction by cutting off the source of water. The percentage of the upstream area that is developed is an indicator of the likelihood that the wetland will change in the future.

#### FUTURE POTENTIAL UPSTREAM URBANIZATION

Similarly, the percentage of the upstream area which will be urbanized in the future is an indicator that the wetland will undergo some sort of change as a result of the development. If the percentage of the upstream area that will be urbanized in the future is great, measures can be taken to promote groundwater infiltration and preserve the wetland.

#### PROPOSED DRAINAGE SYSTEM IMPROVEMENTS

The noted basin management plans make recommendations with respect to drainage system improvements to better serve development. The most common recommendations which affect wetlands are the use of these areas as detention ponds, and the channelization of these areas in order to improve stormwater conveyance. In both cases, the recommended works can have a serious impact on the viability of the wetland. This data field is an indicator that a stormwater management function has been identified for the specified wetland.

#### STORMWATER QUALITY CONTROL FUNCTION

The most recent basin management plans prepared for the City of Kelowna recognize the importance of wetlands as natural habitat and recommend their preservation. At the same time, the wetlands are sometimes identified for use as water quality control facilities. This data field identifies whether or not a wetland has been identified in a basin management plan as a facility to control water quality.



#### LAND OWNERSHIP

Land ownership has a bearing on the probability of a site being developed for a stormwater management (SWM) facility. If the all of the land required for an SWM facility is owned by the City or a single landowner/developer, more options are available to develop the facility than if the land is shared by several owners.

#### • COMPATABILITY of SWM FACILITY WITH OTHER USES

In the area of stormwater management, current professional practice and City opinion generally considers SWM and other uses to be mutually compatible. The detailed planning and design phase of an SWM facility determines more precisely how compatibility is assessed and dealt with.

#### SWM NEED vs. NEEDS of OTHER USES

Like the issue of compatibility, current practice and opinion is that stormwater management needs are not an issue of "either/or" but rather one of recognizing the opportunity for multiple use benefits. A more detailed comparison of need can be clearly determined during the planning and design phase of an SWM project.

#### POTENTIAL for DEVELOPMENT of a DRAINAGE FACILITY

This data field is an assessment based on the data entries provided under some of the above criteria. It is used to identify whether wetland sites have a HIGH or LIMITED potential for use or development as some form of stormwater management facility.

#### 2. <u>Methodology</u>

The methodology for this portion of the inventory consisted of a review of the basin management plans to extract the specified information where available. As previously noted, the earlier basin management plans do not consider the impacts of development on wetlands to the same extent that the later plans do. As a result, their proposed use as stormwater management facilities varies.

Results of the assessment work regarding drainage and stormwater management values are provided in Section 3.4.



## 2.5 Open Space

The predominant trends in parks and recreation are toward increasing pedestrianism, and a growing demand for experiences within the context of the natural environment. The location, biological diversity and scenic quality of wetlands means that the open space values of a wetland will likely overlap the biophysical ones.

#### 1. Inventory Criteria

The following is a list of the inventory criteria related to open space values, and discussion as to why these criteria were chosen:

#### • EXISTING PARK STATUS

This data field determines if the wetland is located, in whole or in part, in an existing park. Wetlands located in parks are on publicly-owned land and are therefore under a land use designation which is generally more compatible with protection and management of wetlands than other urban land uses. Furthermore, location in an existing park will generally place increased demands on the wetland to fulfill recreation and education opportunities associated with the park.

#### . EXISTING PARK NAME

If the wetland is located in an existing park, the name of that park is provided in this field.

#### DESIGNATION for MAJOR PARK or OPEN SPACE USE

This data field identifies those wetland sites that are designated in the OCP or a Sector Plan as "Major Park or Open Space" use. The implications of this are similar to those described above for Existing Park Status.

#### • POTENTIAL LINKAGE to PARK/OPEN SPACE

This data field indicates if the wetland site is located along a designated linear route or provides a possible linkage to or from a park or open space. Such a linkage provides the opportunity to conjointly realize wetland goals and open space goals.

#### DESCRIPTION of POTENTIAL LINKAGE

If there is a potential park or open space linkage, this data field provides a description of it.



#### SCENIC QUALITY

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Scenic quality is a relative measure of how scenic or picturesque a wetland site may be to typical members of the community. The public tends to place a higher perceived environmental quality on landscapes that are more scenic. Though this does not necessarily correlate with open space values it can be used as a potential measure of public attachment to a wetland site and their potential reaction to any alteration of it. This data field assigns a High, Moderate or Low visual value to the wetland. Higher values are characterized by standing or running water, large size, a "tidy" appearance, and complimentary background and foreground scenery.

#### VISIBILITY

Visibility refers to how visible a wetland is to the general public. Scenic wetlands that are highly visible have a higher public value than those which are not seen. Visibility is affected by such issues as land ownership, proximity, duration of view and screening (e.g. structures, topography or vegetation). Like Scenic Quality, a relative scenic value of High, Moderate or Low is assigned to this data field.

#### POTENTIAL for OPEN SPACE USE or DEVELOPMENT

This data field is an assessment based on the data entries provided under some of the above criteria.



# Section 3 Assessment

This section provides an evaluation of the significance of the wetland habitat features identified in Section 2 – Inventory. It is recognized that wetland features, and their attendant values, represent one of many values that land may have within the City of Kelowna. In addition to its value as a wetland, each wetland feature has a range of other community values including urban development, stormwater management and park and recreation uses.

The background research and aerial photograph interpretation identified 145 potential wetland sites. Of these, 82 were prioritized for inventory work and mapping while the remaining unconfirmed sites were mapped only. Of the inventoried sites, 1 was determined to not be a wetland (#51 - Jack Smith Lake) and is therefore not included in any assessments or recommendations contained in this report.

### 3.1 Location

#### 1. <u>Wetland Location</u>

The Glenmore/Clifton/Dilworth (20%), McKinley (14%) and Belgo-Black Mountain (14%) sectors of the city contain almost half of the inventoried wetlands and nearly half of the total wetland sites (i.e. the sum of inventoried and potential sites). The majority of wetlands in each of these sectors are located in more upland topography.

It is reasonable to expect that, prior to settlement and development, the other

	WETLAND SITES	
CITY SECTOR	Inv′d	Uncon'd
Belgo-Black Mountain	11	7
Central City	1	1
Glenmore/Clifton/Dilworth	16	1
Highway 97	8	6
McKinley	11	24
North Mission/Crawford	6	5
Rutland	7	5
South Pandosy/KLO	9	5
Southeast Kelowna	8	9
Southwest Mission	4	-
SUB-TOTALS	81	63

sectors of the City had a higher occurrence of wetlands historically. This would be particularly true for the flatter lowlands (e.g. Central City and South Pandosy/KLO sectors) where the water table is higher and soil permeability lower. There is a high incidence of wetland occurrence associated with the creeks of the City, either as part of the drainage route or as tributaries.



## **3.2 Biophysical Values**

Wetlands provide a range of important ecological functions and values. These vary from wetland to wetland. Wetland ecosystems are used by fish, wildlife and birds for feeding, nesting, breeding and cover. Wetlands are part of larger drainage systems and play a role in slowing water flow velocities, reducing channel erosion and temporarily storing flood waters. In addition, wetlands play a role in water quality by absorbing nutrients and toxic chemicals and by providing a settlement trap for sediment. Wetlands also provide opportunities to people for education and nature appreciation. Wetlands in the Kelowna database were assessed and given a preliminary value rating (i.e. "HIGH", "MODERATE", or "LIMITED") according to their existing biophysical values. The criteria for assessment were set based on the following biophysical goals for wetland management:

#### TO PROTECT FISHERIES HABITAT

This criterion is grounded in legislation. Under the federal *Fisheries Act*, it is unlawful to carry out work resulting in harmful alteration, disruption or destruction of fish habitat. It is also unlawful to deposit or permit the deposition of a deleterious substance (including sediment) into water frequented by fish, or into waters that could carry that substance to waters frequented by fish. Under the new (July 1997) *B.C. Fish Protection Act*, the province intends to protect and enhance riparian areas in urban settings. Specific regulations are still in development, but will include a combination of "carrot" (e.g. tax breaks for landowners voluntarily protecting habitat) and "stick" (e.g. fines) mechanisms.

#### • TO PROTECT ENDANGERED/THREATENED/VULNERABLE SPECIES

The "red" (endangered/threatened) and "blue" (vulnerable) lists maintained by the B.C. Conservation Data Centre provide guidance on which species are at risk in the province. Habitat loss is the largest single factor contributing to a species being "atrisk" in B.C. Thus the presence of "red" or "blue" species in a wetland is a rationale for rating a wetland as HIGH.

#### . TO MAINTAIN BIODIVERSITY

Wetlands with more than 75% of the riparian zone being intact are considered high value for two reasons: i) riparian zones, as transition environments, have different assemblages of plants and animals than either the adjacent wetland or upland, and thus add to local biodiversity; and ii) a generally intact riparian buffer can filter out sediments and pollutants from upland runoff, and is thus indicative of a wetland that is more resilient to environmental change than a wetland lacking a buffer. In other words, wetlands with intact buffers have a greater potential to retain their biophysical values than wetlands lacking buffers.



#### TO MAINTAIN BIOLOGICALLY/CHEMICALLY UNIQUE WETLANDS

Alkaline wetlands are considered high value because they are relatively rare in southern B.C. and even in the Okanagan, being primarily limited to small-catchment areas with low flushing rates (*J. Curtis, personal communication, 1998*). Water with a pH $\geq$ 8.0 is a simple screening criterion for chemically and biologically unusual wetlands. Only six wetlands where data was available met this criterion and five of those, all located in the Glenmore Highlands, were also identified as high value by some other criteria. Alkaline wetlands generally also have high dissolved solids, salt, and nutrient levels, and their biota are adapted to these conditions. Few details are known about the relationship between water chemistry and wetland biology in these wetlands, and additional research is needed to evaluate to what degree they are actually unique. This would include seasonal (spring, summer, fall) measurements of water quality (pH, conductivity, salinity, alkalinity, ions, etc.) and inventories of plants and aquatic invertebrates.

• TO MAINTAIN OPPORTUNITIES FOR NATURAL HISTORY EDUCATION Some wetlands are currently used for environmental and natural history education in Kelowna. Such wetlands are given a HIGH rating based on the assumption that they have characteristics that are well-suited to education purposes. Where follow-up assessments take place, educational values could be assessed and compared against alternative wetland sites.

The Wetland Ratings are considered preliminary since the wetland inventory was completed as either reconnaissance inspections or by reviewing existing information. Thus there is no guarantee that all information needed to meet the criteria is available, and the lists are subject to modification. For example, if evidence of the presence of "red-listed" species becomes available, a MODERATE value wetland could be upgraded to HIGH value.

Information on a total of 81 wetlands (including complexes, e.g. Sites 117a, b, c and d) within the City of Kelowna was collected for this inventory. Of these, 52 were inventoried for the first time in 1997 while information on the remaining wetlands was obtained from existing data files assembled during the Natural Features Inventory completed by the City of Kelowna in 1991. Descriptions of each of the 81 wetlands are provided in the report by Summit Environmental Consultants, prepared under separate cover.



WETLAND HABITAT MANAGEMENT STRATEGY

A flow chart illustrates how these criteria were used to determine the Wetland Rating of an inventoried wetland site. On the data form for each wetland site (ref: Appendix B) a relative rating of HIGH, MODERATE or LIMITED, determined from the flowchart, is assigned in the field designated as Wetland Rating. The flow chart and the HIGH, MODERATE or LIMITED data fields are intended to help provide guidance in establishing the degree of protection that a wetland site may warrant. They are not intended to determine how a wetland site should be protected or developed. In addition, it is intended that the same criteria and flowchart be used to assess additional wetlands in the future.

There are a total of 81 inventoried wetlands in the community. An additional 63 unconfirmed wetland sites were identified on aerial photographs; however these sites were not inventoried as part of this project due to limited funds and the priority for inventory established by the Committee.



#### 1. <u>Wetland Rating</u>

The sites have been classified for their inherent value as wetlands. Approximately half (49%) of inventoried sites have a Wetland Rating of HIGH. The remainder are split between MODERATE (42%) and LIMITED (9%).



#### 2. Distribution of Wetland Rating

A breakdown of the quantity, wetland rating and general location of wetlands in the City is as follows:

Almost half (49%) of the inventoried wetlands have а Wetland HIGH Rating. Of these, 25% are located in Glenmore the /Clifton/Dilworth sector of the City, and the majority of those are in the area referred to as the

	WETLAND RATING			SUB-T	OTALS
CITY SECTOR	High	Mod.	Ltd.	Qty.	%
Belgo-Black Mountain	5	6	-	11	14
Central City	-	1	-	1	1
Glenmore/Clifton/Dilworth	10	4	2	16	20
Highway 97	2	6	-	8	10
McKinley	8	2	1	11	14
North Mission/Crawford	2	2	2	6	7
Rutland	1	5	1	7	8
South Pandosy/KLO	7	2	-	9	11
Southeast Kelowna	3	5	-	8	10
Southwest Mission	2	1	1	4	5
SUB-TOTALS (Quantity)	40	34	7	81	-
SUB-TOTALS (%)	49	42	9	-	100

Glenmore Highlands. The remainder of the HIGH rating wetland sites are distributed throughout the city, with 20% located in the McKinley sector and 18% located in the South Pandosy/KLO sector.

MODERATE rating wetlands account for 42% of the inventoried wetlands. These are distributed relatively evenly throughout the community.

LIMITED rating wetlands account for only 9% of all inventoried.

#### 3. Wetland Class

Of the 81 wetlands in the database, 36 are classed as predominantly shallow open water, 36 are predominantly marshes, 4 are swamps, 4 are wet meadows, and there was 1 shrub carr. Many of the wetlands are complexes (some combination of two or more classes; e.g. marsh/swamp), and the classification summary is based on the dominant

WETLAND CLASS	Qty.	%
Shallow Open Water	36	44
Marsh	36	44
Wet Meadow	4	5
Swamp	4	5
Shrub Carr	1	1
TOTAL	81	100

class. The number of shallow open water wetlands should be treated with caution, since the key parameter defining a water body as a wetland as opposed to a pond or lake is summer water depth, which must not exceed two metres (*National Wetland Working Group*, 1988). Therefore, where the depth of a water body may be greater than 2 metres the wetland characteristics should be assessed for the fringe areas of the water body only, where water depth is typically more shallow. The overview nature of the field inventory did not permit sufficient time for depth measurements.



#### 4. Wetland Form

Among the marshes, the most common form is shallow basin (n=22), which is defined as a marsh occurring in a uniformly shallow depression or swale, having a gradual gradient from edge to the deepest part. There are three seepage track marshes (occupy springs at the base of slopes), three kettle marshes (occupy well-defined basins in glaciofluvial terrain), three stream marshes (occupy shores, islands or bars of streams), and one each of channel, floodplain, and shore marshes.

MARSH FORMS	Qty.	%
Shallow basin marsh	22	61
Seepage track marsh	3	8
Kettle marsh	3	8
Channel marsh	1	3
Floodplain marsh	1	3
Shore marsh	1	3
Stream marsh	3	8
Insufficient info'n	2	6
TOTAL	36	100

The most common form of shallow open water wetland is shallow basin water (n=25), which is similar in form to shallow basin marshes with the greater expanse of open water. There are five stream water (bordering streams and subject to flooding), four oxbow water (old abandoned channels), and two kettle water shallow open water wetlands.

There are two flat swamps (occur in poorlydrained lowlands and lack well-defined boundaries), one shore swamp, and one stream swamp.

SHALLOW OPEN		
WATER FORMS	Qty.	%
Shallow basin water	25	69
Stream water	5	14
Oxbow water	4	11
Kettle water	2	6
TOTAL	36	100

SWAMP FORMS	Qty.	%
Flat swamp	2	50
Shore swamp	1	25
Stream swamp	1	25
TOTAL	4	100

#### 5. <u>Wetland Type</u>

Wetland Types are based on the general physiognomy of the vegetation cover (*National Wetland Working Group, 1988*). There are eight basic types (treed, shrub, forb, graminoid, moss, lichen, aquatic, and non-vegetated) with several specific types within some of the groups. The most common wetland type is tall rush (graminoid) at 35%, which are wetlands dominated by cattail (Typha sp.) and bulrush (Scirpus sp.) This is followed by submerged aquatic (26%) which are wetlands dominated by plants with leaves that are mostly sub-surface.

WETLAND TYPES	Qty.	%
Tall rush (graminoid)	28	35
Low rush (graminoid)	1	1
Forb	1	1
Submerged aquatic	21	26
Grass (graminoid)	7	9
Non-veg' (open water)	7	9
Hardwood treed	4	5
Floating aquatic	2	2
Mixed shrub	1	1
Unknown (n/a)	9	11
Total	81	100



#### 6. Wetland Size and Geomorphic Position

The median (middle value) wetland size of the wetlands in the database is 0.7 ha, and the wetlands ranged from 0.01 ha (the minimum included in the survey) to 23 ha. Median area of open water is 0.16 ha (range 0 to 21 ha). Of the wetlands surveyed, 48 (59%) are located in upland depressions, 26 (32%) are within floodplains, six are stream shore, and two are located on lakeshore.

#### 7. <u>Water Quality</u>

Water column pH was measured in 41 of the wetlands surveyed in 1997. Of these, 14 had pH values less than 7.0, signifying acidic conditions, and 27 had pH values above 7.0, indicating alkaline conditions. However more than half (24) of the wetlands surveyed had near-neutral pH (6.5-7.5). Specific conductance ranged from 210 to 3584  $\mu$ S/cm and salinity ranged from 0.1 to 1.9 ppt. The wetlands were classified for water quality based on specific conductance (EC), which is a surrogate for total salinity (*Cowardin et al., 1979*). Of the 41 wetlands with data, 13 are "fresh" (EC < 800  $\mu$ S/cm), 22 are "moderately fresh" (EC 800-2000  $\mu$ S/cm), and six are "moderately saline" (EC 2000-15,000  $\mu$ S/cm). None were found the be "saline" (15,000-45,000  $\mu$ S/cm) or "hypersaline" (>45,000  $\mu$ S/cm).

#### 8. <u>Wetland Modification</u>

The table at right illustrates the distribution of wetlands by modification rating, ranging from 0 (unmodified) to 3 (heavily modified). Only four (5%) of the wetlands inventoried were found to be unmodified by human activity. Thirty (37%) were slightly modified, 33 (41%) were moderately modified, and 12 (15%) were heavily modified. One was a created wetland (X), and the degree of modification could not be determined for one wetland.

MODIF'N		
RATING	Qty.	%
0	4	5
1	30	37
2	33	41
3	12	15
Х	1	1
Unknown	1	1
TOTAL	81	100

Typical features of "slightly modified" (i.e. Modification Rating = 1) wetlands include:

- Presence of noxious weeds
- Some riparian disturbance, but most of the riparian zone is intact



Typical features of "moderately modified" (i.e. Modification Rating = 2) wetlands include:

- Partial in-filling
- Removal of significant amounts of natural riparian vegetation
- Significant invasion of noxious weeds
- Evidence of recreational vehicle (e.g. 4-wheel drive) passage
- Direct stormwater inputs in combination with any of the above

Typical features of "heavily modified" (i.e. Modification Rating = 3) wetlands include:

- Dredging to create ponds
- All natural riparian vegetation removed
- Large stormwater control structures in wetland

## **3.3 Urban Development Values**

As urban development in the city continues, increasing value is put on land for a variety of purposes, including urban development and protection of remaining wetlands. The majority of undeveloped land in the city, as well as the majority of land upon which wetland features are located, is privately owned. Much of this has the potential for urban development.

In order to understand the potential for conflict or complement between wetlands and proposed urban development projects, it is necessary to understand the relative value of each. Section 3.2, above, describes the biophysical valuation of wetland sites. For urban development values the key criteria used to assess wetland sites, including their assumptions, are as follows:

#### . ALR DESIGNATION

The probability of developing land designated as ALR is much less than for non-ALR land.

#### . ZONING

Land zoned for Commercial, Industrial and non-rural Residential uses are available for urban development.

#### • OCP DESIGNATION

Similar to Zoning, land designated in the OCP for urban uses are more likely to be the focus of urban development pressure.



A flow chart illustrates how these criteria are used to determine the potential value of a wetland site for urban use or development. On the data form for each wetland site (ref: Appendix B) a relative rating of HIGH or LIMITED, determined from the flowchart, is assigned in the field designated as Potential for Urban Use or Development. This entry is intended to identify wetland sites with higher potentials for urban development. In that way it is possible to place priority for management and planning activity on these sites first and on sites with a lower potential second. The flow chart and the HIGH or LIMITED data field are not intended for use in determining if a property should be developed or how it should be developed. Rather, based on existing documentation they are intended to help identify wetland sites which may be impacted



by urban development. In addition, it is intended that the same criteria and flowchart be used to assess additional wetlands in the future.

The results of the inventory and assessment revealed the following findings:

#### 1. Urban Development Potential

Of the 81 inventoried wetland sites, 19 (approx. 23%) have a HIGH Urban Development Potential and 62 (approx. 77%) have a LIMITED Urban Development Potential.

#### 2. Distribution of Urban Development Potential

Of the inventoried wetland sites, 19 (23%) have a HIGH Urban Development Potential. Most of these (13, or 68%) are located in the Glenmore/Clifton/Dilworth sector of the city and the rest are sparsely distributed through the remainder of the city.

	URB. DEV.		
	POT'L		
CITY SECTOR		% of	
	HIGH	TOTAL	
Belgo-Black Mountain	-	-	
Central City	-	-	
Glenmore/Clifton/Dilworth	13	16	
Highway 97	1	1	
McKinley	-	-	
North Mission/Crawford	1	1	
Rutland	1	1	
South Pandosy/KLO	1	1	
Southeast Kelowna	-	-	
Southwest Mission	2	2	
SUB-TOTALS	19	23	



#### 3. Wetland Value and Development Potential

Of particular relevance to this study is the identification of wetland sites that are significant from a biophysical point of view and may have a high potential for being impacted by urban development.

Of the 81 inventoried wetland sites, there are 12 (15%) that were found to have both a HIGH Wetland Rating and a HIGH potential for urban development.

The majority of these sites (9, or 75%) are located in the Glenmore/Clifton/Dilworth sector of the City.

Similarly, of the sites with a MODERATE Wetland Value only 4 have a correspondingly HIGH potential for urban development.

No.	WETLAND NAME
10 a, b & c	-
12	Carney Pond
15	Rio Terrace Pond
35	Wilson Creek Slough
101 b & c	-
103	-
104 a & b	-
134	-

No.	WETLAND NAME
101 a & d	-
113	-
132	Hill's Spring

The assessment identified 3 sites with a LIMITED Wetland Rating and a HIGH Urban Development Potential.

#### 4. <u>City Ownership</u>

The City owns a portion or all of 10 of the 81 (12%) inventoried wetland sites. Of these, 5 have a Wetland Rating of HIGH. Furthermore, there are 2 sites owned by the Regional District of Central Okanagan, 4 by the Province and 8 sites by one of the local Irrigation Districts.

No.	CITY-OWNED SITES	Rating
15	Rio Terrace	Н
18	Chichester Bird Sanct.	М
31	Oasis Marsh	Н
35	Wilson Creek Slough	Н
108	Valley Glen Wetlands	L
109	-	М
114	Redlich Pond	L
128a	Michaelbrook Marsh	Н
128b	Michaelbrook Marsh	Н
129a	-	L

#### 5. Agricultural Land Reserve (ALR)

In assessing Urban Development Potential, a positive ALR status results in a LIMITED rating for Urban Development Potential. A majority of the inventoried wetland sites (47, or 58%) are located partially or entirely on land designated as ALR land. Of these, 18 (38%) have a HIGH Wetland Rating, 26 (55%) a MODERATE rating and 3 (6%) a LIMITED rating. It is clear from this that the ALR plays an important role in limiting the potential impact of urban development on wetland sites. However, there may still be impacts on wetlands as a result of agricultural practices (e.g. irrigation, filling of wetlands, Right-to-Farm legislation).



#### 6. <u>Zoning</u>

The 81 inventoried wetland sites are associated with approximately 100 different properties, and a range of zoning designations. Rural and Public land use zones account for a considerable majority of designations

	ZONES
Rural	A-1, A-2, A-3, A-4, A-5, A-6, A-7
Public	P-2, P-3, P-4
Residential	R-1, R-1c, R-2a, R-8, R-12
Commercial	C-10

on properties associated with wetland sites. The urban land use zones (i.e. Residential and Commercial) associated with inventoried wetland sites tend to be located in the Central and Glenmore/Clifton/Dilworth sectors of the City.

Two of the inventoried sites (#3 Ellison Lake, #127 Maude Roxby Bird Sanctuary) are identified with waterbodies and do not have zoning associated with them.

#### 7. <u>Development Permit Areas</u>

A majority of inventoried wetland sites (66, or 76%) are located in areas of the city designated as Development Permit (DP) Areas; 65 of them are located in a Natural Environment/Hazardous Condition (NE/HC) DP areas. Maude Roxby Bird Sanctuary (#27) is not included in the NE/HC DP Area because it is not a legal parcel of land.

WETLAND	NE/HC	% of
RATING	DP	DP
	Area	Area
High	39	60
Moderate	21	32
Limited	5	8
TOTAL	65	100

#### 8. Existing Protection Opportunities

Analysis of inventoried wetland sites that have potential for being protected under existing designations or policies reveals that almost all the sites can be categorized under one or a combination of DP Area, ALR designation and/or City ownership.

	WETI	AND RA	TING	
SITE CONDITION	High	Mod.	Ltd.	Total
NE/HC DP & ALR	16	14	0	30
NE/HC DP only	19	5	3	27
ALR only	-	11	1	12
NE/HC DP, ALR, City	2	1	1	4
NE/HC DP & City	4	0	1	5
City-owned only	-	-	1	1
SUB-TOTALS	41	31	7	79

Of the 81 sites assessed in this strategy, two wetlands do not currently fall under one of the protection measures listed above - site #113 (unknown) and site #135 (Cook/Lakeshore).



## 3.4 Drainage Values

In general terms, wetlands, as elements of drainage systems, have several values related to surface water management. First of all, they are sometimes viewed as constraints which restrict the conveyance capacity of the drainage system. As such, wetlands have no value and are often channelized or enclosed.

Second, wetlands can be viewed as areas suitable for storm water quantity or flood control. This function can be to protect existing development areas downstream of an existing wetland, or as a stormwater management (SWM) facility downstream of existing or new development to control the impact of urbanization related to peak flow rates of runoff. In either case, the wetland is typically altered by excavation so that it provides only a flood control function.

Finally, wetlands have value in terms of pollution control in that they are known to improve surface water quality which has been degraded as a result of urban development. Such wetlands can either be existing natural wetlands, or manufactured wetlands. However, existing wetlands typically must be modified to control the fluctuation in water quantity which typically result from urbanization.

In order to understand the potential for conflict or complement between wetlands and potential surface water quality functions, it is necessary to understand the relative value of each. Section 3.2, above, describes the biophysical valuation of wetland sites. For surface water quality values, the key criteria for assessing a wetland, including their assumptions, are as follows:

#### • REQUIREMENT FOR A SWM FACILITY

The basin management plans identify stormwater management improvements (e.g. detention basins, channelization, etc.), some of which may have an impact on wetland viability.

#### · OWNERSHIP

Where an SWM facility is required, it is more likely to be developed if the land is owned by the City or the developer/proponent than if it is owned by a neighbouring or downstream property owner with limited interest in seeing their land used for such a facility.

#### COMPATABILITY WITH OTHER USES

In general, a proposed SWM is or can be made compatible with other uses (e.g. urban development, parks, utilities, etc.), except where the wetland is associated with roadside ditches or a water body that functions as a source of drinking water.



#### • RELATIVE NEED FOR A SWM FACILITY

Due to the multi-functional aspects of drainage corridors, in many instances the need for a SWM facility at a particular site must be compared with the need for other opportunities at the same site.

A flow chart illustrates how these criteria are used to determine the potential value of a wetland site for urban development. On the data form for each wetland site (ref: Appendix B) a relative rating of HIGH or LIMITED, determined from the flowchart, is assigned in the field designated as Potential for Development of a Drainage Facility. This entry is intended to identify wetland sites with higher potentials for use as a stormwater management facility. In that way it is possible to place priority for management and planning activity on these sites first and on sites with a lower potential second. The flow chart and the HIGH or LIMITED data field are not intended for use in determining if a facility should be developed or how it should be developed. Rather, based on existing documentation they are intended to help identify wetland



sites which may be impacted by stormwater management facilities. In addition, it is intended that the same criteria and flowchart be used to assess additional wetlands in the future.

The results of the inventory and assessment revealed the following findings:

#### 1. Potential for Development as a Drainage Facility

Of the inventoried wetland sites, 16 (20%) have a HIGH Potential for Development of a Drainage Facility. These wetland sites represent a variety of drainage basins and there is no discernable pattern with respect to their location or the name of their watershed.

Of the sites with a HIGH Potential for Development of a Drainage Facility, 4 have a HIGH Wetland Rating.

No.	CITY-OWNED SITES
12	Carney Pond
15	Rio Terrace
27	Maude Roxby Sanc.
31	Oasis Marsh



#### 2. <u>Compatibility with Other Uses</u>

In general, any proposed stormwater management facility is compatible with other uses (e.g. urban development, parks, utilities, etc.), except for McKinley Reservoir (#6), where the wetland is associated with a water body that is a source of drinking water. Other instances where a stormwater management facility is not compatible with other uses are wetland sites are associated with roadside ditches (i.e. #115a and b, #130a and b).

#### 3. <u>Needs Comparison</u>

It is determined that the need for a stormwater management facility does not generally supersede the inherent biophysical or drainage values of a wetland and can usually be integrated with proposed park use or urban development. In this study the only exception to this is Valley Glen Wetland (#108), a constructed detention basin that is intended to function primarily as a SWM facility and secondarily as a park and wetland.

## 3.5 Open Space Values

Kelowna's remaining wetlands typically exist as open space. Open space often has value for park and recreation uses, especially where it provides linkages between parks or community features, has a high scenic quality, or is located within an existing or future park. Open space values were identified and assessed as part of this study to determine they may potentially conflict with or mutually benefit wetland features.

In order to understand the potential for conflict or complement between wetlands and open space values it is necessary to understand the relative value of each. Section 3.2, above, describes the biophysical valuation of wetland sites. For open space values the key criteria used to assess wetland sites, including their assumptions, are as follows:

#### • EXISTING PARK

A wetland site that is located in whole or in part in an existing park is consequently determined to have a higher value for parks and recreation than other sites.

#### • OCP DESIGNATION

Wetland sites located on parcels of land designated in the OCP for future park and open space use are considered to have a higher value for parks and recreation than other sites.

#### POTENTIAL OPEN SPACE LINKAGE

Wetland sites located on or near an existing or proposed linear route, or that can provide a connection between two significant destinations, generally have a higher value for park use or development.



#### • SCENIC QUALITY and VISIBILITY

In general, the public places a high perceived value on wetland sites that are both scenic and highly visible.

A flow chart illustrates how these criteria are used to determine the potential value of a wetland site for open space use or development. On the data form for each wetland site (ref: Appendix B) a relative rating of HIGH or LIMITED, determined from the flowchart, is assigned in the field designated as Potential for Open Space Use or Development. This entry is intended to identify wetland sites with higher potentials for use as open space. In that way it is possible to place priority for management and planning activity on these sites first and on sites with a lower potential second. The flow chart and the HIGH or LIMITED data field are not intended for use in determining if an open space should be developed or how it should be developed. Rather, based on existing documentation they are intended to help identify wetland sites which may be impacted by open space use. In addition, it is intended that the same criteria and flowchart be used to assess additional wetlands in the future.



The results of the inventory and assessment revealed the following findings:

#### 1. Potential for Park Use/Development

Of the 81 inventoried wetland sites, 58 (72%) have a HIGH Potential for Open Space Use or Development. This proportion of sites with HIGH potential is attributed principally to one or a combination of the following:

- The site has potential for contributing to the existing or future open space linkages in the community.
- The site has both a HIGH Visual Quality ranking & HIGH Visibility ranking.
- The site is within lands designated in the OCP as Parks and Open Space.
- The site is partially or completely within an existing park site.



#### 2. Park Potential and Wetland Value and Distribution

The 58 inventoried wetland sites with a HIGH Potential for Open Space Use or Development have a range of Wetland Value ratings and locations throughout the city, as follows:

	WETI	LAND RA	SUB-TOTALS		
CITY SECTOR	High	Mod.	Ltd.	Qty.	%
Belgo-Black Mountain	5	5	-	10	17
Central City	-	1	-	1	2
Glenmore/Clifton/Dilworth	8	-	2	10	17
Highway 97	2	3	-	5	9
McKinley	8	2	1	11	19
North Mission/Crawford	2	-	-	2	3
Rutland	1	1	-	2	3
South Pandosy/KLO	7	2	-	9	16
Southeast Kelowna	3	2	-	5	9
Southwest Mission	1	1	1	3	5
SUB-TOTALS (Quantity)	37	17	4	58	-
SUB-TOTALS (%)	64	29	7	-	100

Of the 58 sites with a HIGH Potential for Open Space Use or Development, a majority (37, or 64%) also have a HIGH Wetland Rating. Furthermore, 5 of these 37 wetlands (14%) are contained, in whole or in part, within an existing park. The Glenmore/Clifton/Dilworth and McKinley sectors have the greatest proportion of HIGH Wetland Rating sites that also have a HIGH Potential for Open Space Use or Development.



# Section 4 Wetland Strategy

## 4.1 Strategy Framework

#### 1. <u>Rationale</u>

Wetlands are unique ecosystems and integral parts of larger ecosystems in the City of Kelowna. They provide environmental, social and economic benefits to the city, its people and its natural environments. Wetlands:

- provide essential habitat for a variety of plants and animals;
- are part of food chains and ecosystems that contribute to biodiversity;
- play an important role in storing and controlling surface water and in minimizing flooding;
- help maintain and improve water quality in downstream lakes and streams;
- capture and settle sediments that would otherwise affect downstream watercourses;
- immobilize or degrade some contaminants and nutrients, making them less harmful to the environment;
- provide recreation and education opportunities for people; and
- are an open space amenity that contribute to scenic quality and landscape character.

#### 2. <u>Principles</u>

The recommendations of the wetland management strategy are based on a framework of principles developed during the preparation of this document, including:

- Wetlands are a valued ecological resource that contribute to the biodiversity and sustainability of the natural and urban landscapes.
- Wetlands are important to the natural heritage of the community.
- Not all wetlands are the same; their types and characteristics may vary.
- Wetlands and the land associated with them may have multiple values (e.g. urban development, agriculture, public open space, stormwater management).
- The responsibility for wetland protection is a shared one, between the City and the landowner, and the general public.
- Value-added benefits (e.g. aesthetic features, enhanced property values).



#### 3. Definitions

In order to clearly understand and apply the terms and conditions of the wetland management strategy, the following definitions are provided:

#### BUFFER (RIPARIAN) ZONE

Areas of land adjacent to and above the natural boundary of a wetland or wetland complex that needs to remain in a largely undisturbed state in order to maintain a healthy wetland environment.

#### COMPENSATION

The provision by a landowner or developer of land and/or wetland habitat as recompense for lost or damaged wetland habitat.

#### DEVELOPMENT

Making changes to the designated use or intensity of use of any land, water, building or premises. Activities include the construction, clearing, filling, excavation or similar actions in, on, over or under land.

#### ENVIRONMENTALLY SENSITIVE AREA (ESA)

An area that is important to the natural heritage of the municipality for biological, geological or hydrological reasons, and whose character can be easily damaged or destroyed by development or human use. Some of these areas may also be hazardous to human use, due to steep slopes and crumbling material, or danger of flooding.

#### • NATURAL FEATURE

A site or area, generally in a natural condition, which is locally or provincially significant for its ecological, recreational, visual and/or economic values.

#### PROTECTED WETLAND

A designation proposed in this document for specific wetlands that warrant protection. The designation is assigned as the result of a basic or detailed inventory and assessment of a known or potential wetland where the wetland has been determined to have a HIGH or MODERATE Wetland Rating. A protected wetland includes the wetland feature, to its natural boundary, and its buffer zone.

#### WETLAND

Land that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal conditions does support, vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, ponds, bogs and wet meadows. The natural boundary of a wetland is the visible high water mark.



#### WETLAND COMPLEX

An association of individual wetlands in the same drainage basin or along the same watercourse, whose natural ecological function relies on their hydrological and riparian connection to each other.

#### WETLAND RATING

The rating given a wetland based on the result of inventory and assessment work performed by a Registered Professional Biologist, as outlined in Section 2. The rating for a wetland may be expressed as HIGH, MODERATE or LIMITED.

## 4.2 Management Strategy

The management strategy for the protection of wetlands in the City of Kelowna is based on the Strategy Framework (ref: Section 3.1).

#### 1. <u>Priorities for Protection</u>

It is noted that the majority of the 81 inventoried wetland sites and the 63 unconfirmed wetland sites are the remnants of what existed in the area of Kelowna prior to settlement. Some have changed from their pre-settlement classification or function and some have been created, either intentionally or as a by-product of human manipulation of the landscape. However, for the purposes of these guidelines the historical value of the City's wetlands are secondary to their current functional or ecological value. Based on the results of the inventory and assessment work, it is apparent that there is a considerable diversity of wetland type and function. The Assessment (ref: Section 3.2.1) also ascertained that many of the inventoried wetland sites have significant natural or ecological values. Specifically, the sites with a Wetland Rating of HIGH or MODERATE were deemed by the Wetland Habitat Features Committee particularly significant.

## Designate wetlands with a HIGH or MODERATE Wetland Rating as Protected Wetlands.

#### 2. Buffer Zone

Wetlands, as with other natural features, have a core area that is clearly associated with the feature itself. Similarly, wetlands, like streams, typically have a naturally-occurring edge of transition soils and vegetation (e.g. riparian zone) that that is integral to the function of the wetland and help to buffer it from environmental change and disturbance. Such buffer zones also increase the effective area of a wetland. In addition, buffer zones contribute to the biodiversity of the landscape.



The City of Kelowna OCP has provisions for the protection of stream corridors and definition of leave strip areas. This offers an effective opportunity to define and protect wetlands and their riparian areas. The OCP currently includes the term "swamp" in its definition of a stream. It is recommended that the term "wetland" be added to the definition of stream in the OCP, as well as a definition of "wetland", as outlined in Section 4.1.3.

#### *Refine the definition for <u>stream</u> in the Official Community Plan,* Section 2.5, to include the term "wetland" and add the definition of <u>wetland</u>.

Implementation of this recommendation will require an amendment of the *Official Community Plan.* 

#### 3. <u>Natural Feature Designation</u>

The *Natural Features Inventory* identified 58 features in the City of Kelowna that had significant natural values (i.e. biological, visual, recreational or heritage), and designated them as natural features. Of the 81 inventoried wetland sites, 24 have already been designated in the Natural Features Inventory as natural features.

The Assessment (ref: Section 3.2.1) recognized 74 of the 81 inventoried wetlands as having significant biophysical values. Based on the basic inventory and assessment work, these sites of significant natural value were categorized as having a HIGH or MODERATE Wetland Rating. As per recommendation 4.2.1, above, they were also designated as *Protected Wetlands*.

## Designate Protected Wetlands, including their respective buffer zones, as Natural Features.

Implementation of this recommendation will require updating of the *Natural Features Inventory*.

#### 4. Development Permit Designation

The *Official Community Plan* (OCP) identifies properties within the city containing Natural Environment / Hazardous Condition (NE/HC) areas and designates them as Development Permit Areas. Many of these properties are so designated because of the presence of all or a portion of a Natural Feature on them.



The Assessment (ref: Section 3.3.7) identifies that the majority (61 of 74, or 80%) of Protected Wetlands are located in existing Natural Environment / Hazardous Condition Development Permit Areas. Though it is not known if these DP Area designations are based on the presence of a wetland, it is apparent that this DP Area policy framework provides a convenient and effective means of protecting wetlands.

Designate properties containing all or a portion of Protected Wetlands, and/or their buffer zones, as Natural Environment / Hazardous Condition Development Permit Areas.

Implementation of this recommendation will require updating the OCP with respect to the section(s) on *Natural Environment / Hazardous Condition Development Permit Areas*.

#### 5. Enhanced Development Permit Guidelines

The Province passed Bill 26 – The Local Government Statutes Amendment Act in 1997. This Bill amended the Municipal Act to allow municipalities to designate development permit areas for the "protection of the natural environment, its ecosystems and biological diversity". The new wording expands on the previous wording, which only referred to "protection of the natural environment". The broader wording gives the City the ability to be more specific about the ecosystems and biological diversity that is being protected in the development permit area.

Review the text for the Natural Environment / Hazardous Condition Development Permit Areas, and enhance the text and guidelines to address the protection of ecosystems and biological diversity.

Implementation of this recommendation will require an amendment to the *Natural Environment / Hazardous Condition Development Permit Area* section(s) of the Official Community Plan.

#### 6. Powers Under Bill 26

As previously mentioned, Bill 26 amends the Municipal Act to give municipalities a range of new powers to preserve, protect, restore and enhance the natural environment. Under the legislation the City can do the following:

• Establish a system for municipal tax exemptions in relation to riparian property similar to that established for heritage property.



- Allow official community plans to include policies respecting the preservation, protection, restoration and enhancement of the natural environment, its ecosystems and biological diversity.
- Allow official community plans to designate development permit areas for the purpose of protecting the natural environment, its ecosystems and biological diversity.
- Allow official community plans to establish areas and circumstances in which development approval information may be required.
- Prevent a development variance permit from being issued if it would result in an adverse impact on the environment.
- Add authority allowing local government to:
  - require management of runoff disposal.
  - establish maximum percentages for areas that can be paved or otherwise covered with an impermeable surface.
- Allow local government to require landscaping for environmental purposes.
- Allow local governments to require development approval information (e.g. studies on the environment) in relation to circumstances and areas that have been established in an official community plan.
- Allow security deposits in relation to a development or other permit to be applied towards repairing damage to the natural environment that has occurred contrary to the permit.

Some of the new powers under Bill 26 have been discussed in this strategy. However, the City may wish to review the legislation in more detail to identify how it could be used most effectively to implement some of the recommendations in this report.

Review Bill 26 – Local Government Statutes Amendment Act legislation in detail to determine which of the new tools should be used by the City, how they should be used, and how they could fit into the City's current regulatory framework.



#### 6. Wetland Guidelines

A Development Permit Area designation has limited effectiveness on its own. Guidelines are required to enable the DP Area designation to properly and consistently regulate the human use and development in the DP Area. In addition, guidelines provide a known standard that can be consistently applied to all development or use in a DP Area. The City has guidelines for NE/HC DP Areas, however they are limited in their applicability to wetlands because they were only intended to provide broad guidance to development in Environmentally Sensitive Areas (ESAs).

Adopt Wetland Development Permit Guidelines that can be used by landowners, developers and City staff to direct and regulate uses and development on NE/HC DP Areas that have Protected Wetlands.

The Wetland Guidelines are provided in Section 5.0 of this strategy.

#### 7. <u>Conservation Covenant</u>

A conservation covenant is a means of securing the protection or conservation of a wetland, or any other natural feature, in perpetuity by appending the covenant to the land title of the parcel of land upon which the wetland is located. The City currently requests covenants from landowners in association with developments on or adjacent to designated Stream Protection Corridors (OCP Section 2.5). It is an effective and flexible method of protection where a wetland cannot be protected by acquisition or gifting.

Request a Section 219 covenant for the Protected Wetland and buffer zone at the time of development application. The terms of the covenant should put limitations on access and activities and encourage protective measures similar to the Wetland Guidelines.

#### 8. Balancing Wetland Protection and Development Opportunity

For wetlands located on private land, the issue of wetland protection is best considered as a responsibility shared between the City and the landowner. In some instances the measures recommended for protecting wetlands might impact the type or form of use proposed by a landowner considering development of their land. In these instances the interests of wetland protection and land development may jointly benefit from variations from existing policies and bylaws.



#### Consider proposals for variances from existing bylaws and policies that will retain the development feasibility of a site and protect wetlands from impacts of development.

This recommendation may cover variances that affect the following:

- Re-zoning (i.e. to permit land uses more compatible with wetland protection; to permit land uses with higher densities)
- Down-zoning (i.e. to protect wetlands by minimizing development opportunity)
- Density (i.e. to calculate site density on the lot area less the wetland and buffer zone; to provide density bonusing for wetland protection measures that are in addition to those required in this document)
- Building setbacks (i.e. adjust setbacks to avoid a protected wetland or make more room available for development so that the wetland can be protected elsewhere on site)
- Building height (i.e. relax maximum height requirement)
- Site coverage (i.e. increase site coverage)
- Parking requirements (i.e. reduce the parking requirement)
- Habitat banking / mitigation banking (i.e. the restoration and/or creation of large wetland areas to be used as "credits" which may be subsequently withdrawn to offset "debits" incurred at a project development site)

As a rule of thumb, the Protected Wetland and its buffer zone should occupy more than 25% of a site's area before variations in bylaws or policies are considered. Additional or more significant variations may be considered as the proportion of the site covered by the protected wetland and buffer zone increases.

#### 9. Soil Deposit and Removal Bylaw

The existing Soil Removal Bylaw (*Bylaw 6933*) applies primarily to soil removal in excess of 18m<sup>3</sup> that is related to gravel extraction activities. As mentioned in the Assessment (ref: Section 3.3.5), the majority (58%) of the inventoried wetlands are located in whole or in part on land that is within the Agricultural Land Reserve. Soil on land designated as ALR is protected under the *Soil Conservation Act*, and requires a permit from the City and permission from the Agricultural Land Commission before any soil removal or deposition can take place. Fill dumping is an activity which can occur quickly and with little control. Under the existing bylaw, gravel extraction, fill dumping and some agricultural activities may result in damage or loss to wetlands that cannot be anticipated or controlled through the development review process.



#### Review the Soil Removal Bylaw No. 6933 and update or replace it to address the issue of wetland protection by controlling soil deposit and removal.

It is recommended that this updated or new bylaw:

- expand the scope of soil deposit and removal to address gravel extraction, fill dumping, filling of wetlands for agriculture and other activities which may threaten wetlands;
- prohibit soil deposit and removal within the protected wetland and its buffer zone;
- prohibit alteration or damage to a wetland's tributary watercourses and groundwater sources;
- prohibit alteration or damage to surface and subsurface drainage conditions that would impact the wetland;
- consider permitting soil deposit and removal within protected wetlands and their buffer zones under special circumstances, provided the requirements of this wetland strategy regarding compensation (ref: Section 4.2.8) can be met; and
- append or make reference to the *Wetland Habitat Management Strategy Map* (ref: Appendix A) or add properties containing all or a portion of protected wetlands to *Schedule A, of Bylaw 6933*.

#### 10. <u>Wetland Protection Bylaw</u>

A wetland protection bylaw has the potential to provide a wide range of protection powers for wetlands. With the implementation of the above recommendations the need for wide-ranging protection powers is not necessary. However there are some uses or abuses, conducted deliberately or accidentally, that cannot be controlled as part of the development process, including:

- applying herbicides/pesticides;
- dumping grass clippings, leaves or compost;
- cutting or removing shrubs, herbaceous vegetation and aquatic vegetation;
- draining swimming pools;
- dumping fill or construction debris;
- trespassing by off-road vehicles (e.g. 4x4's, ATV's, motorcycles, mountain bicycles, etc.);
- introduction or abandonment of non-indigenous animals (e.g. fish; mammals; birds; amphibians; etc.); and
- introduction of non-indigenous vegetation, except as set out in a plan approved by the City for revegetation or restoration.



It is recognized that the above activities may sometimes be difficult to police or enforce, but a wetland protection bylaw would represent the importance that the City of Kelowna places on protection of the remaining wetlands within its boundaries.

#### Create and implement a Wetland Protection Bylaw that defines damaging activities as bylaw infractions and imposes a financial penalty for commission of infractions.

The Bylaw would cover Protected Wetlands (i.e. those with a HIGH or MODERATE Wetland Rating). Offenses would be dealt with under Municipal Ticketing and the severity of the penalty would reflect the severity of the offence. For example, the dumping of grass clippings into a buffer zone by a local resident would have a minimal penalty whereas the deliberate or negligent practice of a developer or contractor that permanently alters a wetland would have an extreme penalty.

Mere enactment of a bylaw is not expected to reduce the occurrence of damaging activities. The full effectiveness a bylaw's deterrence value will only be realized when potential violators have knowledge of the bylaw and the consequences of violating it and when people appreciate the inherent value of wetlands and then willfully avoid actions that damage wetlands.

#### Develop and implement a public education/stewardship program that informs people of the wetland protection bylaw and involves them positively in wetland protection.

The public education associated with a wetland protection bylaw should include:

- identifying potential violators (e.g. landowners; tenants; neighbours; recreationists; contractors; developers; etc.) and informing them of the value and importance of wetlands and of the scope and penalties of the bylaw;
- enlisting local residents and users in observation and proper reporting/recording of potential bylaw infractions; and
- requiring bylaw violators to perform wetland construction or restoration work in lieu of the financial penalty where compassion or educational value warrants.

#### 11. <u>Proactive Initiatives</u>

Implementation of the above recommendations (e.g. Natural Feature designations, NE/HC DP Area designation, Soil Deposit & Removal Bylaw, etc.) may not necessarily provide adequate measures for the protection of all wetlands identified for protection.



These recommendations are generally most effective if and when a land owner or agent makes inquires or application to the City of Kelowna regarding re-zoning, subdivision, land development, ALR exclusion or soil deposition/removal. If these inquiries are not made the City may not have the opportunity to protect protected wetlands from possible impacts. Examples of situations where this could occur include:

- Draining a wetland to improve agricultural capability;
- Filling in part of a wetland to maximize a residential yard area;
- Incremental filling in part of a wetland to increase an outdoor storage area or work space; or
- Surface water run-off from an over-irrigated golf course or residential landscape.

To reduce the possibility or frequency of this type of situation occurring, it is necessary for the City to take proactive measures.

#### Undertake proactive initiatives to protect unconfirmed and protected wetlands from possible impacts outside of the scope of the development review process.

These initiatives may include, but not be limited to, any one of the following examples:

#### • SECTION 219 COVENANT

Section 219 of the Land Title Act allows a landowner to grant a local government a covenant on a property containing provisions "that land or a specified amenity in relation to it be protected, preserved, conserved or kept in its natural state in accordance with the covenant and to the extent provided by the covenant." A conservation covenant can provide protection of certain lands and features (e.g. wetlands) at significantly less expense than acquisition of the land. The City can require covenants on wetlands at the time of subdivision.

#### • MUNICIPAL TAX EXEMPTION

Provincial legislation provides exemptions on a property owner's municipal taxes for dedication (i.e. as a *Section 219 Covenant*) of riparian property for a term ranging from one to ten years.

#### PRIVATE LAND STEWARDSHIP

Through private land stewardship, land owners are encouraged to recognize and protect important values of their land. Private land stewardship can be accomplished through a wide range of methods, resulting in a cooperative approach between the City and land owner to protect wetlands or other special features. Private land stewardship is generally initiated by proactive relationship building with and education of the land owner by the City. The City of Kelowna currently encourages Stream Stewardship for a number of important watercourses in the city.



#### MEMORANDUM OF UNDERSTANDING

The City can enter into a memorandum of understanding (MOU) with private land owners. The MOU is a voluntary agreement for use of the land or for protection of certain characteristics (e.g. wetland feature). An MOU is flexible in that it can specifically describe the conditions of wetland protection and it can run for a specified period of time.

#### PROFITS A PENDRE

"Profits a Pendre" is a term for the right granted by a land owner to another person or party to enter land and remove something from the land. A profits a pendre can be granted in respect of many aspects of land (e.g. trees; soil; animals; the right to hunt or fish; etc.). A land owner could be encouraged to donate profits a pendre of vegetation and habitat associated with a wetland feature, to the City or a conservation group. The profits a pendre would then prevent future owners from removing or altering this vegetation or habitat because the right to do so has already been donated to the City.

#### LAND TRUST

•

Land trusts are established by private organizations to protect areas of land. The private organization (e.g. Central Okanagan Parks and Wildlife Trust) can hold land and other property rights for the benefit of the public and often undertakes educational, recreational and scientific activities. As private organizations, land trusts have considerable flexibility in the manner they acquire property, and can sometimes act quickly to preserve land before it is developed. Strategic partnerships between the City and land trusts to identify wetlands for acquisition and the contribution of funds and fund-raising efforts towards this can be a cost effective way for the City to protect wetlands.

#### 12. <u>Rights-of-way, Dedications and Easements</u>

In addition to the land title-related tools described above, in Section 4.2.11, there are a number of additional tools that provide opportunity to protect wetlands, riparian areas and stream corridors. These initiatives may include, but not be limited to, any one of the following effective examples:

#### • STATUTORY RIGHT-OF-WAY

*Section 214* of the *Land Title Act* allows local governments to obtain statutory rights-of-way. The rights-of-way can be used to create roads, access points, trails or wildlife corridors across private land. Conservation organizations can also be designated as recipients of statutory rights-of-way.

#### • EASEMENT

Local governments can acquire easements over property. They can be acquired to allow trail, road, utility and other forms of access across private land. A statutory right-of-way, above, is one form of right-of-way.



#### • PUBLIC ROUTE OF ACCESS DEDICATION

The OCP specifies that Public Route of Access to be dedicated on each side of specific creeks or streams. This route is in addition to leave strips required by the Ministry of Environment. If wetlands are included in a revised OCP definition of *stream*, then specific wetlands and riparian areas can be identified for public route of access dedication.

#### 13. Unconfirmed Wetlands

As mentioned (ref: Section 3.2), of the 145 potential wetlands identified in the city at the start of this assignment, 63 of them could not be inventoried within the scope of this assignment and have been designated as "unconfirmed" wetlands. The 82 that were inventoried were prioritized for inventory because of their designation as Natural Features or in accordance with the direction of the Wetlands Habitat Features Committee. In order to satisfactorily complete the work begun in this assignment and fulfill OCP *Policy 2.4.6*, the remaining unconfirmed wetlands, and any additional ones that may be identified, should be inventoried at a basic level.

The City will conduct a basic inventory and assessment on the remaining unconfirmed wetlands in the city. Update the wetland inventory database, perform assessment work and append results to this strategy. Make additional recommendations as required to satisfactorily protect the wetlands and address inter-related issues (e.g. urban development, stormwater management, open space, etc.).

The inventory and assessment work should be undertaken by a Registered Professional Biologist and shall follow the methodology, scope and intensity used in the inventory work undertaken as a requirement of preparing this strategy document (ref: Section 2.0).

It is anticipated that development applications may be made for parcels of land containing potential wetlands before the above-mentioned basic inventory and assessment can be conducted by the City.

In the event that application is made for development (e.g. rezoning, development permit, development variance permit, subdivision or exclusion from the ALR) of a parcel of land containing all or a portion of an undesignated wetland, a detailed inventory, assessment and recommendations shall be required as a condition of application review. The cost of this work will be borne by the proponent.

#### 14. Wetland Review Process

In order to protect wetlands from damaging effects of development it is first necessary to have opportunity to assess potential impacts to wetlands. This is best accomplished by making provision for a wetland-specific review process within the framework of the development review process.

Incorporate a Wetland Review Process into the development review and approval process in order to ascertain the functions and rating of the wetland and ensure development occurs in a manner that protects or enhances the wetland. The process shall apply to both protected wetlands and potential wetlands that have not been inventoried and assessed at a basic level.



# Section 5 Wetland Guidelines

These guidelines are intended for use by landowners, developers, consultants, contractors utility companies and the City in the following instances:

- Development Permit application (i.e. as Development Permit Guidelines)
- Subdivision application
- Planning, design and construction of trails and greenways
- Planning, design and construction of infrastructure (e.g. roads, water, sewer, utilities, communications, etc.)

These wetland guidelines apply to Protected Wetlands.

#### 1. <u>No-Build Zone</u>

- Establish a no-build zone, comprised of the protected wetland feature and its buffer zone. Prohibit the development of buildings, structures, retaining walls, parking areas, driveways, courts and fencing within or over the no-build zone.
- *Exemptions may include:* 
  - wetland and buffer zone restoration;
  - existing structures, facilities and uses within the no-build zone;
  - development and construction of City-mandated stormwater management facilities;
  - maintenance, repair and sedimentation removal of constructed wetlands or their structures that have stormwater management functions;
  - development and maintenance work related to open space use or recreation (e.g. boardwalk, trail, bird-watching blind, bridge, signage, etc.); or
  - emergency procedures by City staff or City contractors only to prevent, control or reduce flooding, erosion or other immediate threats to life or property. However, if it is reasonably likely that such procedures may be required in the future then making provision for these procedures outside the no-build zone ahead of time is encouraged.

In all cases of exemptions, alteration and development work within the no-build zone shall respect the natural biophysical function of the wetland and shall restore disturbed areas to a condition compatible with the natural function of a wetland and the natural surroundings.



□ Prior to construction install temporary fencing and signage around the no-build zone and advise all contractors and site workers not to trespass, encroach, dump or store materials within the zone. Maintain fencing and signage until completion of all construction.

#### 2. Vegetation Retention

The presence of vegetation is crucial to the ecology of a wetland.

- □ *Retain the existing vegetation (i.e. trees; shrubs; herbaceous vegetation; aquatic vegetation; etc.) of the protected wetland and its buffer zone.*
- □ Exemptions to this include standing trees that represent a potential risk to human safety and property (e.g. falling or breaking trees and limbs) or flooding (e.g. fallen trees blocking a watercourse).

#### 3. Wetlands as Water Source

In the past it has been the common practice of some to draw water from wetlands for various uses (e.g. irrigation; livestock watering; washing equipment; filling tanker trucks; etc.). Such activities, particularly if conducted frequently or drawing a large proportion of a wetlands water, may damage or alter the function of a wetland.

□ Do not pump, draw, divert or siphon water from wetlands or wetland tributaries. Prevent others (e.g. contracted road-building crews, landscapers, etc.) from doing the same.

#### 4. <u>Site Planning and Design</u>

Some standards of site planning and design (e.g. rectilinear shapes; straight lines; uncompromising regularity; maximization of yield without consideration for site context; etc.) are generally incompatible with wetland sites.

- □ Layout lot lines, roads, parking lots and building envelopes in a pattern that respects the wetland and its buffer zone. Respect the topographic and vegetation features of the site.
- Use building and site improvement setbacks in a flexible manner in order to protect wetland habitat from development encroachments.



□ *Retain open space linkages and corridors between wetlands or along tributaries and wetland complexes to provide continuous habitat linkages.* 

#### 5. <u>Septic Tanks and Fields</u>

In some instances septic tanks leak and effluent/drainage fields become saturated and effluent travels downhill above or below the surface. This nutrient rich fluid can load a wetland or pond and cause gradual eutrophication, impacting the function of the wetland.

□ Locate septic tanks and effluent/drainage fields no less than 30 metres from the natural boundary of a protected wetland. This guideline shall not supersede requirements of the Ministry of Health or Ministry of Environment except where those requirements have a setback of less than 30 metres.

#### 6. Excavation and Drilling

The water of some wetlands is retained by deposits of clay and silt that form an impermeable layer in a depression and are responsible for the retention of water. Disturbance of this impermeable layer, however slight, may create an irreparable puncture in the layer that permits water from the wetland to leak out and resulting in a permanent loss of habitat.

- □ Do not excavate (e.g. test pit; utility trench; footing for boardwalk or sign) or drill (e.g. water well; bore hole) the earth within the buffer zone. Exemptions to his include stormwater management facilities approved by the City.
- □ For exemptions require evaluation and recommendations by a hydrogeological engineer prior to undertaking excavation or drilling.

#### 7. <u>Site Drainage</u>

Surface drainage from some surfaces and uses can enter wetlands and cause damage (e.g. irrigated or fertilized landscapes; manure stockpiles; dump sites; etc.).

- □ Locate such uses or features away from the tributary basin of the wetland or collect surface drainage from such uses or features and detain it or divert it away from the protected wetland.
- □ Direct surface drainage from such uses and drainage from disturbed terrain, exposed soils and impermeable surfaces (e.g. parking lots; driveways; patios; roof drainage; etc.) away from the protected wetland.



#### 8. Erosion/Sediment Control

In undisturbed environments erosion is a natural process that is part of the ecological and geological succession of a wetland. In developed areas the amount and rate of erosion can be so magnified above that of the natural process that it damages or alters the hydrologic and biologic function of a wetland.

- □ Install silt fencing or construct diversion channels as necessary to prevent silt-laden runoff from reaching the no-build zone during construction.
- □ *Revegetate disturbed, bare and erodable soils as soon as practical after disturbance.*
- □ Schedule development and construction work to minimize risk of potential erosion (e.g. in the dry months of the year; not during periods of heavy rainfall; snowmelt; to allow for vegetation to green-up; phase construction; etc.).

#### 9. <u>Restoration and Enhancement</u>

Landscape disturbances within, and sometimes adjacent to the wetland buffer zone, can have negative impacts on wetland habitat (e.g. siltation; weed encroachment; tree fall; habitat loss; etc.) if untreated or improperly treated.

- □ *Restore disturbed areas of the buffer zone, and any natural areas outside the buffer zone that may impact the buffer zone, to a natural condition as soon as possible after disturbance.*
- □ *Employ restoration practices specifically tailored to address the type and degree of disturbance and the specific conditions of the site.*
- □ Utilize plant material for site restoration that is indigenous to the region. Where this is not possible or desirable, select plant material that is similar in appearance, growth habit, colour and texture to native plants and that will not act as a "weed" in the natural environment (i.e. it will not out-compete native plants, provide habitat for undesirable wildlife or act as a host for insect pests).
- □ For restoration or development of wetland habitat use plant species that have value as food or cover.
- □ Plant shrubs and trees in masses and patterns characteristic of a natural setting and with the intent of encouraging biodiversity.



- □ *Require submission of plan and specifications that describe the extent, degree and details of restoration work.*
- □ *Provide bonding to ensure that implementation is appropriate and successful.*

#### 10. Fertilizers, Herbicides and Pesticides

The use of fertilizers, herbicides and pesticides in or near wetlands and riparian areas can have deleterious impacts on the health and biodiversity of a wetland.

- □ Prohibit the application (e.g. by spraying or spreading) of fertilizers, herbicides and pesticides in wetlands and riparian areas.
- Encourage manual and cultural controls on weeds and pests.
- □ Permit the temporary and controlled use of species-specific pest traps or biological agents for chronic and extreme pest outbreaks that have a negative impact on the wetland ecosystem.



Please refer to the Wetland Habitat Management Strategy Map at the back of this document.





## Appendix B Inventory Data Forms



Appendix C Wetland Rating



#### **APPENDIX C – Wetland Rating**

Wetland Name	Site #	Wetland Rating	Wetland Name	Site #	Wetland Rating
McKinley Reservoir	006	Limited	Unknown (original as Site 17)	002	High
Fraser Lake	050	Limited	Ellison Lake (Duck Lake)	003	High
Valley Glen Wetlands	108	Limited	Bubna Slough	005	High
Unknown	111	Limited	Lightblue Lake	007a	High
Redlich Pond	114	Limited	Unknown	007b	High
Unknown	129a	Limited	Unknown	008a	High
Unknown	129b	Limited	Unknown	008b	High
			Unknown	008c	High
Ponds DL 119 Sec. 26 TWP. 23	004	Moderate	Unknown	008d	High
Walroy Lake	009	Moderate	Unknown	010a	High
Robert Lake	011	Moderate	Unknown	010b	High
Chichester Bird Sanctuary	018	Moderate	Unknown	010c	High
Belgo Pond	025	Moderate	Carney Pond	012	High
Garner Pond	026	Moderate	Rio Terrace Pond	015	High
Munson Pond	029	Moderate	Kathleen Lake	017	High
Unknown	101a	Moderate	Maude Roxby Bird Sanctuary	027	High
Unknown	101d	Moderate	Oasis Marsh	031	High
Unknown	102a	Moderate	Wilson Creek Slough	035	High
Unknown	102b	Moderate	Pandosy Marsh	036	High
Simpson's Pond	105a	Moderate	Casorso Marsh	037	High
Unknown	105b	Moderate	Unknown	101b	High
Sexsmith Wetlands	106	Moderate	Unknown	101c	High
Unknown	107	Moderate	Unknown	103	High
Unknown	109	Moderate	Unknown	104a	High
Unknown	110	Moderate	Unknown	104b	High
Bauer Brook	112	Moderate	Unknown	117a	High
Unknown	113	Moderate	Unknown	117b	High
Unknown	115a	Moderate	Unknown	117c	High
Unknown	115b	Moderate	Unknown	117d	High
Unknown	116	Moderate	Gopher Creek	120	High
Unknown	117e	Moderate	Hall Road Ponds	121b	High
Unknown	118	Moderate	Picco Pond and Riparian Zone	122	High
Unknown	119	Moderate	Unknown	123	High
Hall Road Ponds	121a	Moderate	Unknown	125	High
Unknown	124a	Moderate	Unknown	127	High
Unknown	124b	Moderate	Michaelbrook Marsh	128a	High
Casorso Slough	126	Moderate	Michaelbrook Marsh	128b	High
Unknown	130a	Moderate	Summerhill Winery/Mallam's Spring	131a	High
Unknown	130b	Moderate	Summerhill Winery/Mallam's Spring	131b	High
Hill's Spring	132	Moderate	Unknown	134	High
Unknown	133	Moderate	la als Oraith Lalsa	054	N1/A
LOOK KOAD	135	ivioderate	Jack Smith Lake	051	IN/A



## Appendix D Wetland Class, Form & Type



Wetland Name	Site	Wetland Class	Wetland Form	Wetland Type
Unknown (original as Site 17)	002	Shallow Open Water	shallow basin water	non-vegetated
Ellison Lake (Duck Lake)	003	Swamp / Marsh / Wet Meadow	shore swamp / shore marsh	hardwood tree / grass
Ponds DL 119 Sec. 26 TWP. 23	004	Shallow Open Water	shallow basin water	n/a
Bubna Slough	005	Shallow Open Water / Marsh / Wet Meadow	shallow basin water / shallow basin marsh	submerged aquatic / tall rush / grass
McKinley Reservoir	006	Shallow Open Water	shallow basin water	non-vegetated
Lightblue Lake	007a	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	007b	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	008a	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	008b	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	008c	Shallow Open Water / Wet Meadow	shallow basin water	submerged aquatic
Unknown	008d	Marsh	shallow basin marsh	tall rush
Walroy Lake	009	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	010a	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	010b	Shallow Open Water	shallow basin water	tall rush
Unknown	010c	Marsh	shallow basin marsh	tall rush
Robert Lake	011	Shallow Open Water / Wet Meadow	shallow basin water	n/a
Carney Pond	012	Marsh / Shallow Open Water	shallow basin marsh / shallow basin water	tall rush / floating aquatic
Rio Terrace Pond	015	Shallow Open Water	shallow basin water	submerged aquatic
Kathleen Lake	017	Shallow Open Water / Marsh	shallow basin water / shallow basin marsh	non-vegetated
Chichester Bird Sanctuary	018	Shallow Open Water / Marsh	stream water / stream marsh	tall rush
Belgo Pond	025	Shallow Open Water	kettle water	submerged aquatic
Garner Pond	026	Shallow Open Water / Marsh	shallow basin water / shallow basin marsh	tall rush
Maude Roxby Bird Sanctuary	027	Marsh	shore marsh	tall rush
Munson Pond	029	Shallow Open Water	shallow basin water	submerged aquatic
Oasis Marsh	031	Shallow Open Water	oxbow water / stream water	submerged aquatic / floating aquatic
Wilson Creek Slough	035	Shallow Open Water / Wet Meadow	stream water	non-vegetated / grass
Pandosy Marsh	036	Marsh	n/a	n/a
Casorso Marsh	037	Marsh	n/a	n/a
Fraser Lake	050	Shallow Open Water	kettle water	n/a
Jack Smith Lake	051	n/a	n/a	n/a
Unknown	101a	Marsh	shallow basin marsh	grass / tall rush
Unknown	101b	Wet Meadow	n/a	grass
Unknown	101c	Shallow Open Water	shallow basin water	submerged aquatic

### APPENDIX D – Wetland Class, Form and Type



Wetland Name	Site	Wetland Class	Wetland Form	Wetland Type
	•			•
Unknown	101d	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	102a	Marsh	shallow basin marsh	tall rush
Unknown	102b	Marsh / Shrub Carr	shallow basin mash	tall rush / mixed shrub
Unknown	103	Marsh	shallow basin marsh	tall rush
Unknown	104a	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	104b	Shallow Open Water	shallow basin water	submerged aquatic
Simpson's Pond	105a	Shallow Open Water / Wet Meadow	shallow basin water	non-vegetated / grass
Unknown	105b	Marsh	shallow basin marsh	tall rush
Sexsmith Wetlands	106	Marsh / Wet Meadow	shallow basin marsh	tall rush / grass
Unknown	107	Marsh	shallow basin marsh	tall rush
Valley Glen Wetlands	108	Shallow Open Water	stream water	non-vegetated
Unknown	109	Marsh	shallow basin marsh	tall rush
Unknown	110	Marsh	shallow basin marsh	low rush / sedge
Unknown	111	Marsh	shallow basin marsh	tall rush
Bauer Brook	112	Marsh / Wet Meadow	seepage track marsh	tall rush / grass
Unknown	113	Marsh	kettle marsh	tall rush
Redlich Pond	114	Shallow Open Water	stream water	non-vegetated
Unknown	115a	Marsh	seepage track marsh	tall rush
Unknown	115b	Marsh	stream marsh	tall rush
Unknown	116	Marsh	kettle marsh	grass
Unknown	117a	Marsh / Swamp	shallow basin marsh/basin swamp	tall rush / moss
Unknown	117b	Marsh / Swamp	shallow basin marsh/basin swamp	submerged aquatic / tall rush
Unknown	117c	Marsh / Wet Meadow	shallow basin marsh	tall rush / grass
Unknown	117d	Marsh	shallow basin marsh	tall rush
Unknown	117e	Shrub Carr	n/a	mixed shrub
Unknown	118	Wet Meadow / Shrub Carr	n/a	grass/shrub
Unknown	119	Marsh / Wet Meadow	kettle marsh	tall rush / grass
Gopher Creek	120	Marsh / Wet Meadow	floodplain marsh	tall rush / grass
Hall Road Ponds	121a	Shallow Open Water	shallow basin water	submerged aquatic
Hall Road Ponds	121b	Shallow Open Water	shallow basin water	n/a
Picco Pond and Riparian Zone	122	Swamp / Shallow Open Water / Marsh	stream swamp / oxbow water / channel marsh	hardwood treed / floating aquatic
Unknown	123	Marsh	channel marsh	tall rush
Unknown	124a	Marsh	shallow basin marsh	tall rush
Unknown	124b	Swamp	flat swamp	hardwood treed
Unknown	125	Swamp	flat swamp	hardwood treed
Casorso Slough	126	Marsh	shallow basin marsh	tall rush
Unknown	127	Shallow Open Water / Marsh / Wet Meadow	oxbow water / shallow basin marsh	floating aquatic / tall rush / grass



Wetland Name	Site	Wetland Class	Wetland Form	Wetland Type
Michaelbrook Marsh	128a	Shallow Open Water	oxbow water	submerged aquatic
Michaelbrook Marsh	128b	Shallow Open Water	oxbow water	submerged aquatic
Unknown	129a	Marsh	shallow basin marsh	grass
Unknown	129b	Wet Meadow	n/a	grass
Unknown	130a	Marsh / Shrub Carr	seepage track marsh	tall rush / mixed shrub
Unknown	130b	Marsh / Wet Meadow	shallow basin marsh	tall rush / grass
Summerhill Winery / Mallam's Spring	131a	Marsh	stream marsh	forb
Summerhill Winery / Mallam's Spring	131b	Marsh	stream marsh	tall rush
Hill's Spring	132	Shallow Open Water	shallow basin water	submerged aquatic
Unknown	133	Shallow Open Water / Swamp	stream water	floating aquatic
Unknown	134	Wet Meadow / Marsh	seepage track marsh	grass / tall rush
Cook Road	135	Marsh	shallow basin marsh	n/a



## Appendix E Unconfirmed Wetlands



SITE No.	FLIGHT LINE	PHOTO No.	MATRIX LOCATION	GEOGRAPHIC LOCATION	SIZE (ha)	ADJACENT LAND STATUS	APPEARANCE ON PHOTO
						-	
201	BCC96035	138	10a,4d	E of Glenmore Road	1	forest	shallow dark water visible
202	BCC96035	138	9a,5d	E of Glenmore Road	0.5	forest	open water visible
203	BCC96035	136	2a,5d	W of Ellison Lake	0.05,0.1	forest	open water visible, 2 depressions
204	BCC96035	138	8a, 5/6d	W of Glenmore Road	0.2,0.2,0.05	forest	open water visible
205	BCC96035	138	6a,7d	W of Glenmore Road	0.1	grassland, forest	open water visible
206	BCC96035	138	8a,7/8d	NW of Bubna Slough	0.4	forest	open water visible
207	BCC96035	138	8a,7/8d	NW of Bubna Slough	0.3	forest	shallow dark water visible
208	BCC96035	138	10a,8d	NE of Bubna Slough	0.3	forest	open water visible
209	BCC96035	136	2a,8d	E of Bubna Slough	0.5,0.5	forest	vegetation (no water visible), linear
210	BCC96035	136	2-3a,8-9d	E of Bubna Slough	0.7	forest, grassland	vegetation (no water visible)
211	BCC96036	32	5a,3-4d	SE of Bubna Slough	1.2	forest	vegetation (no water visible)
212	BCC96036	32	2a,3d	N of McKinley Reservoir	0.1	agriculture	saline (water dried up)
213	BCC96036	32	1-2a,5d	W of McKinley Reservoir	0.2	agriculture	open water visible
214	BCC96036	32	2a,5d	S of McKinley Reservoir	0.5	grassland	vegetation (no water visible)
215	BCC96036	34	9a,5-6d	SW of McKinley Reservoir	1	forest	vegetation (no water visible)
216	BCC96036	34	8a,7d	SW of McKinley Reservoir	0.25	grassland, forest	saline (water dried up)
217	BCC96036	202	6a,3d	E of Lightblue Lake	0.6,0.3	grassland, forest	open water visible, 2 depressions
218	BCC96036	202	3a,3d	W of Lightblue Lake	0.5	forest	open water visible
219	BCC96036	34	8a,8/9d	SW of Lightblue Lake	0.15	forest	open water visible
220	BCC96036	201	7a,4d	SW of Lightblue Lake	0.2	forest	vegetation (no water visible)
221	BCC96036	201	8a,4d	S of Lightblue Lake	0.2	forest	vegetation (no water visible)
222	BCC96036	201	8a,4-5d	S of Lightblue Lake	0.3	forest	vegetation (no water visible)
223	BCC96036	202	7-8a.3-4d	N of Robert Lake	20	agriculture, forest	sewage lagoon
224	BCC96036	202	8-9a,6d	N of Robert Lake	1.7	agriculture	open water visible
225	BCC96036	205	2-3a,2-5d	E of airstrip	7	agriculture	vegetation (no water visible), linear
226	BCC96037	31	2a,2d	N of Carney Pond	0.15	industrial, agriculture	open water visible
227	BCC96037	200	7a,3d	N of Kathleen Lake	0.3	forest	vegetation (no water visible)
228	BCC96037	203	5-6a,3-4d	Kelowna Ck. S of Sexsmith Rd.	5	agriculture, industrial	vegetation (no water visible)
229	BCC96037	203	3-4a,5-7d	Kelowna Ck. S of Sexsmith Rd.	1.5	agriculture	vegetation (no water visible)

SITE No.	FLIGHT LINE	PHOTO No.	MATRIX LOCATION	GEOGRAPHIC LOCATION	SIZE (ha)	ADJACENT LAND STATUS	APPEARANCE ON PHOTO
230	BCC96037	205	3a,5d	S of Bauer Brook	0.1	agriculture	vegetation (no water visible)
231	BCC96037	205	7-8a,2-4d	SW of Tower Ranch	2	grassland	vegetation (no water visible)
232	BCC96037	205	4a,8d	S of Swainson Road	0.4	agriculture	open water visible
233	BCC96037	205	6-7a,8-9d	W of Swainson Road	0.4	grassland	vegetation (no water visible)
234	BCC96037	205	7-8a,6-7d	W of McKenzie Road	1	grassland	vegetation (no water visible)
235	BCC96038	35	10a,9d	NE of Munson Pond	0.3	agriculture	open water visible ("Little Munson")
236	BCC96038	30	5-6a,6d	W of Black Knight Mountain	0.6	grassland	open water visible
237	BCC96038	30	7-8a,5d	W of Black Knight Mountain	0.15,0.1,0.3	grassland	vegetation (no water visible)
238	BCC96038	30	9a,8d	W of Black Knight Mountain	0.3	grassland	saline (water dried up)
239	BCC96038	203	5a,4d	SW of Belgo Pond, Mission Ck.	0.5	agriculture	vegetation (no water visible)
240	BCC96038	240	6a,8d	S of Belgo Pond, Mission Ck.	0.1	forest	open water visible (oxbow)
241	BCC96038	203	7a,7d	S of Belgo Pond, Mission Ck.	0.1	forest, grassland	vegetation (no water visible)
242	BCC96038	205	6-7a,4d	S side of Highway 33	0.4	grassland	vegetation (no water visible)
243	BCC96035	71	9a,6d	W of Swamp Road	0.3,0.8	agriculture	vegetation (no water visible), 2 areas
244	BCC96035	72	7-8a,3-4d	N of Casorso Rd., Mission Ck.	1.2	agriculture, forest	vegetation (no water visible)
245	BCC96035	74	7a,7d	N of Matthews Road	0.1,0.1	agriculture	vegetation (no water visible)
246	BCC96034	138	4a,4d	E of Balldock Road	0.3	agriculture	vegetation (no water visible)
247	BCC96034	141	6a,5d	W of Gordon Dr. & Raymer Rd.	< 0.1	residential	vegetation (no water visible)
248	BCC96034	140	5-6a,8d	W of Westridge Drive	0.3	forest, residential	vegetation (no water visible)
249	BCC96035	138	9a,8d	N of Bubna Sough	0.2	forest, grassland	vegetation (no water visible)
250	BCC96036	32	8a,6d	S of Ellison Lk, E of golf course	0.2	golf course, forest	open water visible
251	BCC96035	71	7a,5d	W of Gordon Dr, N of Mission Ck.	0.1	residential	open water visible
252	BCC96038	201	6/7a,2/3d	Hall Road Ponds	2.5	forest, residential	open water visible
253	BCC96035	72	6a,6d	E of Swamp Rd, N of Hughes Rd	0.25	agriculture	vegetation (no water visible)
254	BCC96038	30	6a,9d	S of Hwy 33 at Begley Road	0.2	agriculture	vegetation (no water visible)
255	BCC96034	138	8a,3d	E of June Springs Rd, S of Miller	0.05	agriculture	open water visible
256	BCC96034	138	4a,2d	S of Wallace Hill Rd	0.07	agriculture, forest	open water visible
257	BCC96037	31	3a,9d	N of Fitzpatrick Rd. W of Rutland Rd. N	0.15	agriculture	open water visible

Note: An additional six (6) unconfirmed wetlands were identified and added, after receiving feedback from the Wetland Habitat Features Committee and the general public at an Open House on September 30, 1998.