



# Part C:

## Seniors Resource and Recreation Centre





## 1.0 Introduction

The Seniors Recreation & Resource Centre Pond (Seniors Centre Pond) is part of the Nicomekl River Floodplain Park. While the park stretches through several City neighbourhoods, the pond is located in the Blacklock Neighbourhood at approximately 51 B Avenue and 207 Street. The pond is primarily shallow, considered Class A habitat according to the City's classification mapping and is heavily utilized by waterfowl and other wildlife.

The local context of the Seniors Centre Pond is shown on Figure 9 on the following page.







Seniors Recreation  
and Resource Centre

Nicomekl River



**CITY OF LANGLEY**  
Pond Management Strategies

**Seniors Recreation and Resource Centre Pond Location Plan**

Figure 9

- Major Roads
- Arterial Roads
- Collector Roads
- Local Roads
- Pond



Map Drawing Information  
Data from City of Langley. Some data partially modified by Dillon Consulting.  
Pond size and location based on Seniors Centre Topographic Survey.

Map Created by: Eric Hertzman  
Map Checked by: Jim Walker  
Map Projection: NAD83 UTM Zone 10N



PROJECT: 12-6077  
STATUS: FINAL  
DATE: (3/11/2013)





## 2.0 Where are we now? Current Pond Status

Section 2.0 includes the summary of the functional evaluation that was completed for the Seniors Centre Pond. It was done by considering three main components:

1. Engineering,
2. The Natural Environment, and
3. The Human Environment.

### 2.1 Engineering Assessment

A comprehensive assessment of the Seniors Centre Pond was undertaken that consisted of a thorough examination of available background information, together with field reconnaissance to confirm the physical characteristics and current function of the ponds as well as the surrounding site features (*i.e.*, trails, bridges, creek, etc.). The results of the assessment were compiled and evaluated to identify existing issues, constraints and improvement opportunities.

Sources of background information reviewed as part of the assessment include the following:

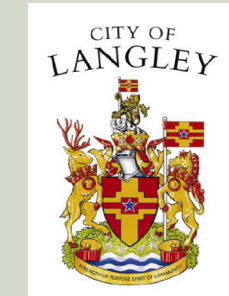
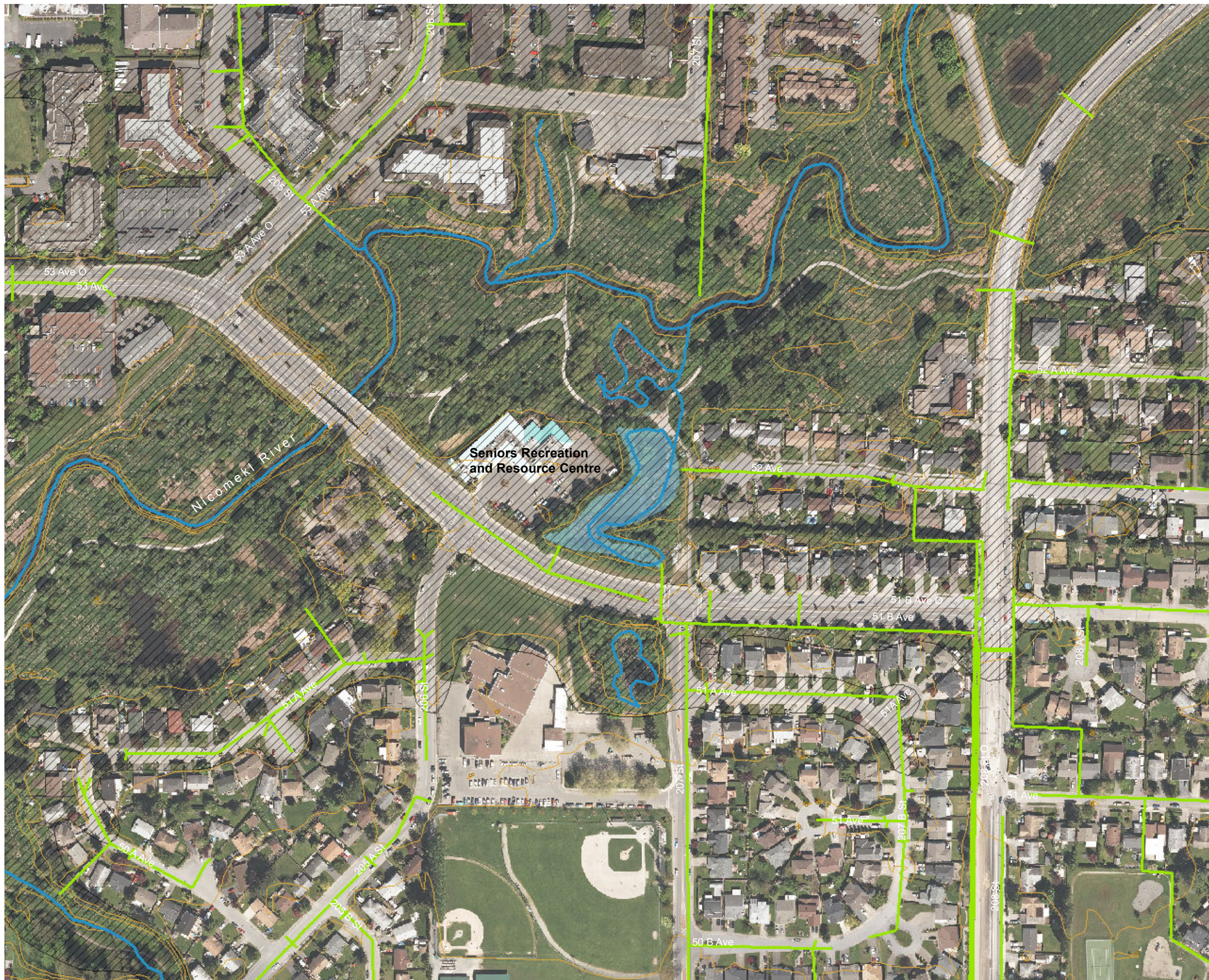
- i) Topographic survey of pond perimeter, trails, and other surface features (source unknown);
- ii) City of Langley GIS database, including topographic/digital elevation mapping, storm sewer system details, watercourse classifications, and land use data;
- iii) 2010 ortho-imagery provided the City of Langley;
- iv) Draft Stormwater Drainage System Assessment, UMA Engineering Ltd. (2005); and
- v) Soil Map of the Lower Fraser Valley, Soil Survey Branch, BC Department of Agriculture (1938).

Information regarding the facility layout, purpose/function, physical characteristics, watershed hydrology and hydraulic characteristics of the pond is summarized below. In addition, a description of the maintenance activities undertaken by Park Operations staff is also provided.

Some results of the Engineering Assessment can be seen on Figure 10 on the following page.







**CITY OF LANGLEY**  
Pond Management Strategies

**Seniors Recreation and Resource Centre Pond Existing Drainage Features**  
Figure 10

- Storm Sewer System
- Watercourses
- Contour (1m)
- Nicomekl Floodplain
- Ponds

0 12.5 25 50 Meters  
SCALE 1:2,500



Map Drawing Information  
Data from City of Langley, Some data partially modified by Dillon Consulting. Pond size and location based on Seniors Centre Topographic Survey. Floodplains from BC Provincial Government GeoBC.

Map Created by: Eric Hertzman  
Map Checked by: Jim Walker  
Map Projection: NAD83 UTM Zone 10N



PROJECT: 12-6077  
STATUS: FINAL  
DATE: (3/11/2013)

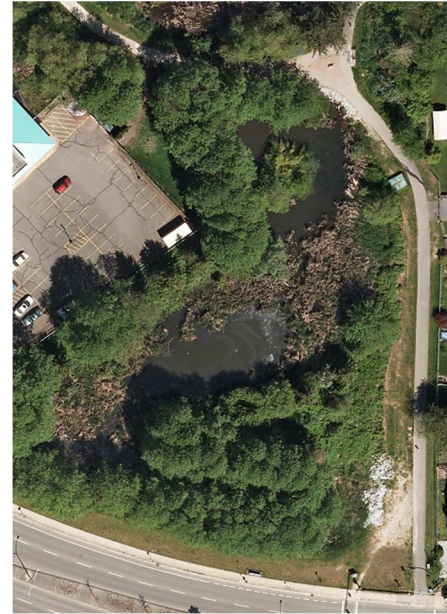




### 2.1.1 Facility Layout

The pond is an irregular shaped stormwater management facility located in the Nicomekl floodplain east of the Seniors Resource Centre (refer to Figure 10). It is surrounded by vegetation on all sides and bound to the north and east by an asphalt pathway that forms a portion of the Nicomekl trail system, to the south by 51B Avenue, and to the west by the Seniors Resource Centre parking lot.

Based on the City's storm sewer system mapping, there are three outfalls that discharge flows into the pond, which are located along its southern and eastern banks. The pond has a single outlet pipe located along its northern perimeter that conveys outflows beneath an asphalt pathway that discharges into a short segment of drainage channel that directs flows to a second culvert under a separate section of the Nicomekl trail network, which discharges into a channel that flows into the Nicomekl River.



As shown on the adjacent aerial photograph of the site, much of the pond is overgrown with cattails, reeds, and other vegetation.

### 2.1.2 Purpose and Function

Although background documentation for the Seniors Centre Pond is very limited, City of Langley staff have indicated that the original intent of the facility was for stormwater management purposes. The results of the background review and subsequent field investigations led to the following conclusions regarding the function of the pond:

- The pond serves as a water quality enhancement facility for the purpose of suspended sediment removal as well as capturing other typical urban runoff contaminants (e.g., metals, nutrients, organics).
- A permanent pool depth of approximately 0.5 m is maintained below the outlet culvert invert.
- A minimal level of quantity/flood control is provided by the pond, due to a limited active storage volume and the absence of a suitable outlet control structure.

The results of field reconnaissance indicate that the pond does not appear to have undergone any significant modifications from its original configuration, aside from the placement of riprap along its northern edge to address erosion and protect the adjacent asphalt pathway.

### 2.1.3 Physical Characteristics

A summary of the dimensional attributes of the ponds is presented in Table 7, which are based on available survey information and field observations.

Table 7: Seniors Centre Pond – Dimensional Attributes

Attribute	Value
Length (m)	100
Average Width (m)	30
Average Depth (m)	1.0-1.5
Area (m <sup>2</sup> )	3,500

*Note: All dimensions are approximate.*

Further to the above, the physical characteristics of the Seniors Centre Pond include:

- The pond has an S-shape configuration with a large peninsula extending from the eastern bank and a small island in the northern portion of facility, as shown on Figure 10.
- Side slopes around the perimeter of the pond vary considerably, from approximately 1H:2V along its northern, eastern and southern edges to as gradual as 1H:4V for the western edge.
- Based on an assumed average depth of 1.25 m and side slopes of 1H:3V within the wetted portion of the pond, the available storage volume is estimated to be approximately 3,500 m<sup>3</sup>.
- The volume of accumulated sediment within the pond is estimated to be 1,200 m<sup>3</sup>.
- The City's storm sewer system mapping indicates that there are three outfalls that discharge flows into the pond, which consist of:
  - a) a 1200 mm diameter concrete sewer that extends in a northerly direction from the intersection of 51B Avenue and 207 Street and discharges into the southeast corner of the pond;
  - b) a 750 mm diameter concrete sewer that flows in a westerly direction along 52 Avenue and discharges into the northern portion of the pond along its eastern edge; and
  - c) a 375 mm diameter concrete sewer that conveys runoff from a short segment of 51B Avenue to the southwest corner of the pond.
- Pond outflows are discharged via a 750 mm diameter HDPE culvert (approximately 8 m in length and typically submerged) beneath the adjacent asphalt pathway to a short length of drainage channel that conveys flows to a 900 mm diameter CSP culvert under a separate segment of asphalt pathway, which discharges into a channel that flows into the Nicomekl River.



### 2.1.4 Watershed Hydrology

The Seniors Centre Pond is located within the Newlands Brook watershed, which has an area of approximately 65 ha. The watershed is generally bounded to the north by the Nicomekl River, to the east by the Newlands Golf & Country Club, to the south by 45 Avenue, and to the west by 206/207 Streets.

Current hydrologic characteristics for the contributing watershed area are summarized below.

- Topographic relief is moderate/steep with highest elevation at approximately 45 mASL and the elevation of the pond perimeter at 5 mASL. Slopes are significantly steeper in the southern portion of the watershed south of 48 Street (up to 20%), and more gradual within the lower elevations (approximately 2%).
- Land use is predominately residential area with some recreational, institutional and open space (parkland, schools, riparian corridor, etc.).
- Available mapping indicates that native surficial soils in the watershed consist of a combination of loamy sand with some gravel in the southern portion of the watershed and clay loam over dense clay in the northern portion.
- The drainage system servicing the watershed area consists predominately of a storm sewer network, together with ditches and swales within the open areas, which convey surface runoff to the pond via three storm sewer outfalls.

### 2.1.5 Hydraulic Performance

In addition to direct precipitation and sheet flow from adjacent areas, the majority of inflows to the pond are discharged through the storm sewer outfalls described above. Outflows are controlled by the outlet culvert that conveys flows to a drainage channel and downstream culvert to the Nicomekl River. The detention time provided by the pond is unknown, however, it is not anticipated to be significant based on the size of the pond relative to the characteristics of the contributing watershed and

Water levels in the pond fluctuate depending on the magnitude of inflows, together with available storage volume and the associated outlet conditions (*i.e.*, blockages, tailwater conditions, etc.). During wet weather conditions, the pond level increases as inflows exceed the capacity of the outlet culvert. When the available storage volume is exceeded, water levels have been observed to overtop the pathway along the north edge of the pond and flow overland into the Nicomekl River.

### 2.1.6 Maintenance Activities

Based on correspondence with City Parks Operations staff, the following maintenance activities are conducted at the Seniors Centre Pond:

- Vegetation control of pathways around pond – trimming of brush in spring and fall, or on an as-needed basis, and
- Riprap is added along the northern edge of pond to prevent erosion/deterioration of asphalt pathway.

## 2.2 Natural Environment Assessment

The study area is located within the Nicomekl River floodplain. The study area is surrounded by mostly residential areas and bounded by the Nicomekl Trail, which surrounds most of the perimeter of the pond area and connects with 51B Avenue. The Seniors Resource Centre is located to the west of the pond. Access to the pond is from the north end of the parking lot. The pond is also accessible from the Nicomekl Trail, to the north of the pond. The study area is approximately 1 acre in area and includes marsh, tree stand and open habitats. The south side of the Study Area is bounded by 51B Avenue.

The pond is shallow, and is heavily utilized by waterfowl and other wildlife. It discharges to the Nicomekl River via two culverts under the trail system and by an open channel located to the north of the pond. The Nicomekl River itself is a low-gradient system that originates in the Township of Langley and flows down a shallow plateau to the lowland areas and then out to Mud Bay, which is part of the larger Boundary Bay ecosystem. This 33 km long river drains an area of 175.2 km<sup>2</sup> and has a mean annual flow of 3.47m<sup>3</sup>/s (Fisheries and Oceans Canada, 1999). The area surrounding the pond provides walking and nature viewing opportunities. The perimeter of the pond is vegetated with a mixture of deciduous and coniferous tree species, which provide habitat for a range of birds, small mammals and amphibian species.

The pond was initially a storm water retention pond that is now an important part of the park system and wildlife habitat, supporting a variety of waterfowl. Over the years, the pond has experienced sediment buildup and invasive species encroachment, which has reduced the quality of habitat for wildlife.

### 2.2.1 Ecological Assessment Parameters

Dillon's ecological field team conducted a biophysical baseline assessment of the Seniors Centre Pond ecology and the surrounding area that may be influenced by future maintenance, operation and redevelopment of the ponds. The following parameters were assessed:

- Terrestrial environment (vegetation and wildlife);
- Aquatic environment and fish habitat (including water/sediment quality);
- Invasive species;
- Potential presence of species at risk; and
- Riparian area management/improvement.

## 2.2.2 Terrestrial Environment

### Vegetation

The study area is situated within the Coastal Western Hemlock zone, which occurs at low to middle elevations west of the Coast Mountains. The vegetation within the study area has been previously disturbed from farming and other human-related activities, and is best described as a river floodplain consisting primarily of red alder (*Alnus rubra*) with conifer species present which includes western red cedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*). Understory vegetation consists primarily of salmonberry (*Rubus spectabilis*) and Himalayan blackberry (*Rubus discolor*). The vegetation surrounding the Seniors Centre Pond is composed primarily of native riparian vegetation. Vegetation presence is limited along the north edge of the pond, with a high complexity along the west, east and south. The field assessment identified eight native species and three non-native species.

Vegetation observed during an initial site assessment includes the species listed in Table 8, below.

Table 8: Seniors Centre Pond – Observed Vegetation in the Vicinity

Category	Species	Native/Invasive
Tree	Western redcedar ( <i>Thuja plicata</i> )	Native
	Red alder ( <i>Alnus rubra</i> )	Native
	Douglas-fir ( <i>Pseudotsuga menziesii</i> )	Native
Shrub	Willow ( <i>Salix</i> spp.)	Native
	Himalayan blackberry ( <i>Rubus discolor</i> )	Invasive
	Indian plum ( <i>Osmaronia cerasiformis</i> )	Native
	Salmonberry ( <i>Rubus spectabilis</i> )	Native
	English holly ( <i>Ilex aquifolium</i> )	Invasive
	Snowberry ( <i>Symphoricarpos albus</i> )	Native
Herb	Cattail ( <i>Typha latifolia</i> )	Native
	Reed canary grass ( <i>Phalaris arundinacea</i> )	Invasive

### *Wildlife*

The pond and surrounding area provide valuable wildlife habitat for a variety of species including, coyote, raccoon, deer, marten, weasel, mink and a variety of small mammals including voles and shrews. Many waterfowl have been observed within the study area, including green-winged teal, American widgeon, geese, mallards and American coots. In addition, the surrounding wetland habitats of the Nicomekl floodplain are known to support a variety of amphibian species. The pond and the area surround the site have been modified by human activities such that the overall habitat value has been reduced.

Based on a background literature review for the Nicomekl River floodplain, the Ministry of Environment considers this area to be a major flyway for migratory waterfowl moving between Boundary Bay and the agricultural lands of the Serpentine and Nicomekl River floodplains. The Langley Field Naturalists indicated the presence of many species of waterfowl, such as mallard, American widgeon, green-winged teal, American coot, and geese which are common within this area. The area surrounding the pond could also provide habitat for red-tailed hawks, northern harriers, and other raptors including bald eagle, osprey, and peregrine falcon. The general area surrounding the project site could also potentially provide habitat for a number of mammals including beaver, muskrat, coyote, raccoon, river otter, mink, short-tailed weasel, and Townsend's vole.

### 2.2.3 Aquatic Environment and Fish Habitat

The Seniors Centre Pond discharges from the north side of the pond into the Nicomekl River floodplain. The river supports several runs of anadromous and resident fish including: coho, chum, chinook, redbreast shiner, cutthroat trout, steelhead, brassy minnow, rainbow trout, Dolly Varden char, and yellow perch. Minnow trapping data from September 28, 2012, indicated the presence of three spine stickleback and one coho within the lagoon. The presence of coho indicates that there is a connection between the Nicomekl River and the Seniors Centre Pond, allowing for some movement of salmonid fish species. The coho also indicates that the water quality in the pond is sufficiently good to support salmonids, which are generally more sensitive to pollution and poor water quality than other fish species.

### *Water and Sediment Quality*

The aquatic habitat of the pond is described as a shallow pool habitat with sections of wetland, which is mostly dominated by cattail. The sediment substrate has a decomposed organic veneer, primarily derived from decomposing emergent marsh vegetation. It should be noted that the cattail can take up pollutants and improve water quality through biofiltration prior to its discharge to the Nicomekl River.

### *Water Quality Results*

Water samples were collected at two (2) sites during May 9, 2012. The sampling was done for the following sites:

- Site 1 – Northeast end of pond ;and
- Site 2 – Northwest end of pond.

All sites were sampled for total metals, dissolved metals, BTEX/VOC, biological oxygen demand (BOD), and total suspended solids (TSS). The results of the surface water sampling were compared to the BC Water Quality Guidelines (BC WQG). The reported results indicate there are some slight exceedances of metals for both chronic and acute standards as discussed below. Toluene also exceeded standards at both sites.

Results and analytical methods can be seen in Tables B-7 to B-9 in Appendix B.

#### *Total Metals*

Both sites exceeded the BC WQG for iron, calcium and copper, with copper exceeding the chronic standards for both sites. Cadmium exceeded the BC WQG for Site 2.

Standards exceeded for specific total metals are indicated in Table B-10 in Appendix B.

#### *Dissolved Metals*

Calcium exceeded the acute standard for both sites. Iron that exceeded the BC WQG at Site 2.

Standards exceeded for specific dissolved metals are indicated in Table B-11 in Appendix B.

#### *BTEX/VPH (Benzene, Toluene, Ethylbenzene, and Xylenes/Volatile Petroleum Hydrocarbons)*

Toluene exceeded the minimal standard for freshwater aquatic life at both sample locations. Toluene is a constituent of a number of industrial compounds and the observed exceedances in the pond could be a result of a point source or non-point source input. The levels of the other compounds were below reportable detection limits.

#### *Biochemical Oxygen Demand (BOD)*

The BOD is a measure of the oxygen that is used by microorganisms to decompose organic wastes. If there is a large amount of organic wastes in the pond, organisms will use more oxygen and therefore the value of the BOD will be high. BOD levels were below reportable detection limits for both sites.

#### *Total Suspended Solids (TSS)*

Total suspended solids are solids in the water column that are able to be trapped in a filter. Elevated concentrations of suspended solids cause a reduction in water clarity and therefore decreased light availability for photosynthesis. Although there is no standard for TSS in the BC WQG, levels were observed to be low.

### In Situ Parameters

In-situ (field) parameters measured for both sites were temperature, turbidity, pH, dissolved oxygen and conductivity. None of the in-situ parameters measured were outside of the normal range for both sites.

### Sediment Quality Results

Sediment samples were collected from the same sites as for water quality during May 9, 2012. All of the sediment samples were taken from a depth of 0 to 0.5 m below the sediment surface. The water depth of these sample locations was approximately 0.6 to 1 m deep. All sites were sampled for metals and hydrocarbons. Results and analytical methods can be found in Table B-12 in Appendix B.

The results of the sediment sampling indicate that there were no reported exceedances of the Contaminated Sites Regulation Schedule 9 Sediment Standards for metals concentrations.

### Metals

Total metals were within normal range and did not exceed any of the standards for both sites.

### Hydrocarbons

There were no exceedances of hydrocarbons for either of the sites.

## 2.2.4 Invasive Species

The vegetation within the project area composes a plant community of limited complexity, with relatively low species diversity and dominance of only a few species. The area has a high preponderance of Himalayan blackberry, an aggressive species that is able to spread quickly, resulting in its establishment and a related reduction in the growth of other species. Aquatic vegetation observed included reed canary grass. The other invasive plant species was English holly.

## 2.2.5 Rare and Endangered Species

The CDC website indicated no reported observations of rare plant or animal species within the area.

The potential presence or absence of plant and animal species listed in Schedule 1 and 2 of the *Species at Risk Act* (SARA) registry was queried. A review of the documents and data from field assessments indicated the potential presence or absence of rare or endangered species within the study area and/or in close proximity, as highlighted in Table 9 on the following page.

Table 9: Seniors Centre Pond – Species at Risk and Potential for Occurrence in Area

Class	Common Name	Scientific Name	Likelihood of Occurring in Project Area	SARA 1 & 2
Mammals	Mountain beaver	<i>Aplodontia rufa</i>	Unlikely	Special concern (Schedule 1)
	Pacific water shrew	<i>Sorex bendirii</i>	Low	Endangered (Schedule 1)
Amphibians	Northern redlegged frog	<i>Rana aurora</i>	Possible	Special concern (Schedule 1)
	Western toad	<i>Anaxyrus boreas</i>	Likely	Special concern (Schedule 1)
	Oregon spotted frog	<i>Rana pretiosa</i>	Unlikely	Endangered (Schedule 1)
Birds	Great blue heron	<i>Ardea Herodias spp.fannini</i>	Likely	Special concern (Schedule 1)
	Short eared owl	<i>Asio flammeus</i>	Possible	Threatened (Schedule 1)
	Barn owl	<i>Tyto alba</i>	Possible	Threatened (Schedule 1)
	Olive-sided flycatcher	<i>Contopus cooperi</i>	Unlikely	Threatened (Schedule 1)
	Western screechowl	<i>Megascops kennicotti</i>	Unlikely	Special concern (Schedule 1)
	Peregrine falcon	<i>Falco peregrinus spp.anatum</i>	Unlikely	Special concern (Schedule 1)
Reptiles	Northern rubber boa	<i>Charina bottae</i>	Unlikely	Special concern (Schedule 1)
	Western painted turtle	<i>Chrysemys picta pop. 1</i>	Possible	Endangered (Schedule 1)
Insects	Monarch	<i>Danaus plexippus</i>	Unlikely	Special concern (Schedule 1)

Discussion of species with the greatest potential (*i.e.*, species indicated in the table as low, possible or likely) to occur in the study area is provided below:



*Pacific water shrews* prefer moderate to high canopy closure, which usually border marshes with skunk cabbage or streams. They require an abundance of shrubs and coarse woody debris, which are limited at the Seniors Centre Pond. There were no observations during the Dillon site assessment and past anecdotal data does not indicate their presence onsite. Therefore, the Seniors Centre Pond does not appear to provide the preferred habitat and, is thus considered poor habitat for this species. Regardless, they are sometimes found on more marginal habitat and, as such, they could be present.

*Northern red-legged frogs* prefer cool temperature and wetlands with trees. They require a habitat with well-shaded areas and logs/other debris to stray cool and damp. These frogs have not been observed within the Seniors Centre Pond; however, with increased presence of shaded areas and woody debris, these frogs could potentially use the pond as a habitat in the future, since they have been observed in other parts of the Nicomekl River floodplain.

*Western toads* are usually found in a wide variety of habitats (wet and dry forest types, meadows and fields, clear-cuts and aquatic). Therefore, it is likely that suitable habitat exists for this species, though it has not yet been documented in the area.

*Great blue herons* inhabit eel grass beds, mudflats, agricultural fields, and old-fields (mainly short-grass or mowed), wharves, beaches, irrigation ditches and urban lakes, streams, drainage ditches and backyard ponds, where they forage for fish and a range of amphibian species. These species could potentially be found within the area. There is some suitable nesting habitat in the general vicinity of the pond.

*Short-eared owls* breed in open country with short vegetation (rangelands, near dry marshes, farmlands and rangelands), and forage over open fields. Since there are some open fields close to the Seniors Centre Pond, there is a possibility of this species occasionally roosting or flying over the area.

*Barn owls* prefer foraging in dense grass fields, marshes and hayfields and require very specific nesting sites (barns, attics and other man-made structures). They prefer Townsend's voles, but also exploit other rodent prey items (mice, rats, etc.). The area is not considered to be ideal habitat for these owls, due to the lack of proper nest sites; however, they could potentially forage within this area.

*Western painted turtles* are found along the margins and shallows of lakes, ponds, ditches and slow-moving streams. They require a lot of aquatic vegetation with muddy sediment and upland areas with no vegetation for breeding. The general lack of suitable upland areas likely precludes the presence of western painted turtle.



### 2.2.6 Riparian Area Management and Improvement

The riparian area around the Seniors Centre pond varies in composition and species, with relatively high vegetation density at the west, east and south pond edges, and low complexity in the northern section. The riparian area is composed largely of deciduous tree stands with a Himalayan blackberry understory. Based on aerial photographs and the site assessment visit, the riparian buffer varies between 0 and 15 m, with the shortest buffers occurring at the north end. This vegetation would provide significant shading of the pond to the benefit water quality.

Riparian area management could involve removal of Himalayan blackberry and limbing of trees to increase light penetration and improve sightlines to the pond (and reduce the potential of the site to be used by homeless people).

## 2.3 Human Environment Assessment

When completing the human environment assessment and proposing goals, objectives and potential actions for the Seniors Centre Pond, a number of planning and landscape architecture aspects were considered, including:

- Relevant land use policy and the Official Community Plan;
- Community use, issues, sensitivities and safety;
- Landscape architecture considerations including grading, trails and seating / viewing opportunities; and
- Connectivity to the City's overall Parks System.

### 2.3.1 Relevant Land Use Policy and the Official Community Plan

The Seniors Centre Pond is located on City parkland that is zoned P1 Public Institutional/Recreation Zone. It is surrounded to the north by additional City parkland, to the east by a City Right-of-Way (laneway) then land zoned as RS1 Single Family Residential, to the south by a City Right-of-Way (51 B Avenue) then additional City parkland, and to the west by the Seniors Resource and Recreation Centre, which is zoned P2 Private Institutional/Recreation Zone.

The land use context for the Seniors Centre Pond is shown in Figure 11 on the next page.

As with all City parkland, the City of Langley Official Community Plan (OCP) recognizes that "parks and recreation play a crucial role in creating quality of life for city residents." City Council adopted a Parks, Recreation and Culture Master Plan Update in 2005 in order "to identify current and future requirements related to the provision of leisure services in the City". The OCP embraces the major recommendations of the PRC Master Plan Update; however, that plan does not include any specific recommendations for the parkland to the east of the Seniors Resource and Recreation Centre, including the pond.



OCP policies that specifically apply to the Seniors Centre Pond and its surrounding parkland include:

- Policy 8.2.1: Maintain, enhance and expand the open space system shown in the Parks and Open Space Map (Schedule “C”).
- Policy 8.2.2: Support and implement the recommendations of the 2005 Parks, Recreation and Culture Master Plan Update, including: (b) Parks & Open Space
  - Acquire parkland in the underserved Nicomekl and Douglas neighbourhoods;
  - Upgrade individual parks and their facilities in accordance with recommendations;
  - Develop CPTED strategies and bylaw enforcement policies to address crime and safety issues in the park system.
- Policy 8.2.3: Develop and maintain a Nature Trail Network in accordance with the 2005 Nature Trail Network Plan and the Parks and Open Space Map (Schedule “C”).
- Policy 8.2.4: Cooperate with GVRD on the development of regional greenways for recreation and wildlife including the Nicomekl River corridor.

Specific to Seniors Centre Pond, the OCP Policies for Environmental Protection should also be considered; these include:

- Section 9.1: The Nicomekl Floodplain and the riparian areas associated with its tributary creeks comprise the City's most significant ecological assets.
- Policy 9.2.1: Protect and enhance environmentally sensitive areas and watercourses identified in the Environmentally Sensitive Areas Map (Schedule "D").
- Policy 9.2.5: Encourage storm water management practices both within and outside of the City to mitigate flooding and destruction of habitat and farmland.
- Policy 9.2.6: Storm water management shall be consistent with the GVRD Liquid Waste Management Plan and Integrated Storm Water Management Planning.
- Policy 9.2.7: Pursue habitat enhancement projects in partnership with conservation groups and other government agencies.

The Seniors Centre Pond is located in the floodplain and wetland component of the City's Environmentally Sensitive Areas (See Figure 12 on following page).

### 2.3.2 Community Use, Issues, Sensitivities and Safety

The Seniors Centre Pond and surrounding trails are used widely by a number of user groups, including residents and particular users of the adjacent Seniors Resource and Recreation Centre. The site is also popular for wildlife viewing and feeding (grain to ducks). The pond is only fenced on the west side, where there is no trail. Along the northeast the trail is very close to the edge, causing a safety issue.

### 2.3.3 Landscape Architecture Considerations

There are gravel and paved trails that run along the north and east sides of the pond. Human access to the water is becoming limited by the growth of cattails in northern area of pond. The pond serves many functions including nature viewing opportunities, duck feeding, and pathway connectivity. All of these functions are a benefit to the surrounding community.

### 2.3.4 Connectivity to the City's Overall Parks System

This area is well connected to the surrounding trail system, with trails going to the northeast, northwest and the southeast, which form a component of the City's Nicomekl trail system. Figure 13 shows the pond in the context of the City's Park System.

Figure 12: Seniors Centre Pond – Environmentally Sensitive Areas Context

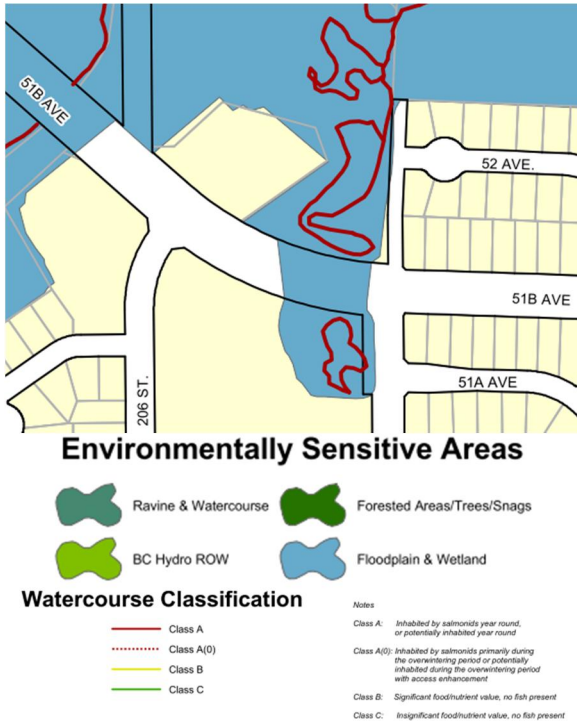
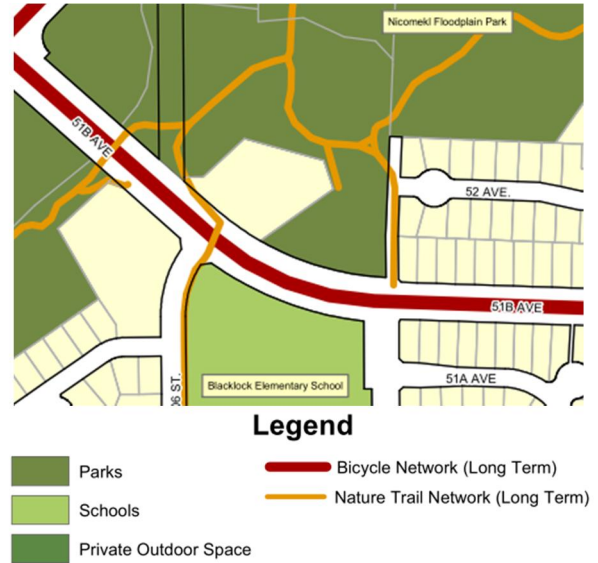


Figure 13: Seniors Centre Pond – Parks Context



## 2.4 Key Issues

During the Functional Evaluation a number of key issues were identified, which are summarized in this section. Issues that can be represented spatially are shown on Figure 14 on the following page, with corresponding photographs.

### 2.4.1 Engineering

A description of the issues identified as part of the functional evaluation is provided below, which are based on the results of the background review and subsequent field investigations.

- A significant volume of sediment has accumulated within the pond – based on field investigations and assumptions regarding pond configuration, the volume of sediment is estimated to be approximately 1,200 m<sup>3</sup>.
- The pond is located within the Nicomekl River floodplain, which affects its hydraulic performance during high flow periods in the Nicomekl River, causing outflows to overtop the asphalt pathways and nuisance flooding to occur.



1 Overgrown Aquatic Vegetation



3 Pond Outlet Culvert to Nicomekl River



5 Invasive Vegetation Around Pond Perimeter



2 Erosion and Asphalt Eroding Along Pathway



4 High Water Level in Pond



6 Pond Inlet



**CITY OF LANGLEY**  
Pond Management Strategies

**Seniors Centre Pond**  
**Key Issues**  
Figure 14

Picture Location, Direction, and Id Number

0 5 10 20 Meters  
SCALE 1:800



Map Drawing Information  
Data from City of Langley, Seniors Centre  
Topography Survey provided by City of  
Langley, Dillon Created.

Map Created by: Eric Hertzman  
Map Checked by: Jim Walker  
Map Projection: NAD83 UTM Zone 10N



PROJECT: 12-6077  
STATUS: FINAL  
DATE: (3/11/2013)





- iii) Portions of the pond are overgrown with vegetation (*i.e.*, cattails, reeds, etc.), which impacts the hydraulic performance and reduces the available volume within the pond through accumulation at the base and fringes of the facility.
- iv) Fluctuating water levels have resulted in considerable deterioration of paved pathway along northern limits of pond – efforts to remediate through the placement of rip-rap have been moderately successful, however, a long-term solution to address this issue is required.
- v) The existing culvert is typically submerged and clogged with vegetation, sediment, and other debris. Furthermore, the configuration and condition of the culvert does not facilitate the passage of fish in and out of the pond with ease.

## 2.4.2 Natural Environment

### *Riparian Vegetation*

- Riparian vegetation allows for diverse mixture of uses by wildlife.
- Vegetation is well-established and functioning well.

### *Instream Vegetation*

- Vegetation provides good biofiltration but may compromise fish habitat in the long run (*i.e.*, eventual pond infill).

### *Fish Habitat*

- Access from the Nicomekl River is compromised.
- Depth may be limiting factor for fish habitat value.

### *Terrestrial Habitat*

- Good waterfowl habitat but access limited in sections due to riparian vegetation (primarily south portion of pond).
- Likely provides habitat for amphibians.

### *Water & Sediment Quality*

- Contaminated with toluene.
- Some erosion discharge to pond from people accessing perimeter.
- Warm temperatures in summer would restrict salmonid presence.

### 2.4.3 Human Environment

Based on the assessment of the human environment, concerns include:

- The entrance to the park from the Seniors Centre is not good.
- Accessibility could be a challenge (e.g., wheelchairs, assisted walkers, etc.)
- The horseshoe area near the entrance to the Seniors Centre is overgrown.
- Erosion along edge of asphalt noted during the site assessment. Evidence of flooding.
- The trail is constructed as a “saddle” at the outlet. As it is unlikely that it was designed as an overflow, the trail should be raised or a small pedestrian bridge could be installed to reduce flooding potential.
- There may be a need for safety education.



## 3.0 Where do we want to be? Future Vision

### 3.1 Pond Goals and Objectives

Based on the results of the functional evaluation and the visioning workshop held with City staff, the following goals were created for the Seniors Centre Pond:

GOAL 1: Maintain the current stormwater management functions of the pond.

GOAL 2: Improve the human environment of the site, and

GOAL 3: Improve the natural environment aspects of the site.

With respect to the three “buckets” that had been identified through the functional evaluation, their relative priority for Seniors Centre Pond was determined to be as follows:

Discussion Area	Priority Level
<b>1. Engineering / Stormwater Management</b>	HIGH
<b>2. Natural Environment / Ecology</b>	MEDIUM
<b>3. Human Environment</b>	HIGH

#### 3.1.1 Water Resources Engineering Objectives

Four objectives relating to the water resources engineering functions of the pond were determined:

1. Improve water quality enhancement capabilities.
2. Increase storage volume.
3. Improve hydraulic performance.
4. Reduce future maintenance requirements.

### 3.1.2 Natural Environment Objectives

Five objectives relating to the natural environment functions of the pond were determined:

1. Enhance riparian area.
2. Maintenance of instream vegetation.
3. Improve access and habitat value for aquatic and terrestrial species.
4. Improve water quality.
5. Reduce potential for erosion.

### 3.1.3 Human Environment Objectives

Lastly, seven objectives relating to the human environment functions of the pond were determined:

1. Improve Trails.
2. Improve popularity and potential for use.
3. Provide visual interest.
4. Increase public ownership of the park/pond.
5. Improve safety.
6. Improve public treatment of site.
7. Reduce wear and tear on the park.

## 3.2 Actions and Evaluation

For the Seniors Centre Pond, a list of potential actions was created during the visioning session. Those potential actions were evaluated according to the objectives for each bucket, and their relative priority, to create a refined list of options. This evaluation can be seen in Table 10 on the following page.

Table 10: Seniors Centre Pond - Evaluation Matrix

Action:	Buckets:						Subtotal:	Relative Score	Cost:	Total:	Timing					
	Engineering		Natural Environment		Human Environment						Low = \$0-\$20k (200) Medium = \$25k - \$75k (100) High = \$75k + (0)	Timing	1-3 Years	3-5 years	5 - 10 years	
	High Priority	3	Medium Priority	2	High Priority	3										
	Meet objectives? - Improve water quality enhancement capabilities - Increase storage volume - Improve hydraulic performance - Reduce future maintenance requirements	Score	Meet objectives? - Enhance riparian area - Maintenance of instream vegetation - Improve access and habitat value for aquatic and terrestrial species - Improve water quality - Reduce potential for erosion	Score	Meet objectives? - Improve safety, trails, popularity and education - Reduce wear and tear on the park around pond - Increase community ownership of the park/pond	Score										
1 New gated access to Seniors centre	N/A	0	N/a	0	Yes - would increase accessibility	2	6	Medium	50	Low (\$5k)	200	256	Mid-term			
2 Limb up vegetation to create sightlines	N/A	0	Pros and cons	0	Yes - would increase safety	2	6	Medium	50	Low (\$15k)	200	256	Short-term			
3 Develop interpretive signage and wayfinding	N/A	0	N/A	0	Yes - Environmental education	2	6	Medium	50	Low (\$5k)	200	256	Mid-term			
4 Incorporate CPTED design elements	N/A	0	N/A	0	Yes - improve safety	2	6	Medium	50	Low (\$20k)	200	256	Mid-term			
5 Control discharge from adjacent parking lot	Yes - would meet objectives	1	Yes - improvement of water quality	1	N/A	0	5	Medium	50	Low (\$20k)	200	255	Mid-term			
6 Selectively remove portions of cattail to improve fish habitat	N/A	0	Yes - improves complexity	2	N/A	0	4	Medium	50	Low (\$15k)	200	254	Mid-term			
7 Provide fishing opportunities	N/A	0	No - loss of fish	-1	Yes - increase user experience	2	4	Medium	50	Low (\$5k)	200	254	Mid-term			
8 Modify / replace outlet to Nicomekl	Yes - to gain better functionality	2	Improves fish access	2	N/A	0	10	High	100	Medium (\$30k)	100	210	Mid-term			
9 Install footbridge/pathway to improve outlet configuration, provide fish access, etc.	N/A	0	Improves fish access	2	Yes - would improve user experience	2	10	High	100	Medium (\$35k)	100	210	Mid-term			
10 Raise elevation of pathway near outlet to increase storage volume	Yes - needs to be done - reduce erosion & maintenance	2	N/A	0	Yes - could help reduce erosion on trails	1	9	High	100	Medium (\$30k)	100	209	Mid-term			
11 Install more vegetation for shading	Yes - improves water quality	1	Yes - improves water quality and habitat function	1	Yes - would likely be a positive benefit	1	8	High	100	Medium (\$25k)	100	208	Mid-term			
12 Introduce instream complexing features for amphibians	N/A	0	Yes - meets objectives	1	N/A	0	2	Low	0	Low (\$10k)	200	202	Mid-term			
13 Dredge/deepen - Remove accumulated Sediment	Yes - would restore functionality	2	Yes - improves water quality and habitat complexity	2	N/A	0	10	High	100	High (\$250k)	0	110	Mid-term			
14 Create forebay / sediment sump at inlet to promote settlement & facilitate future maintenance	Yes - needed for sediment deposition	2	Yes - improves water quality	1	N/A	0	8	High	100	High (\$100k)	0	108	Mid-term			
15 Replace invasive with native species	N/A	0	Yes - meets objectives	1	N/A	0	2	Low	0	Medium (\$25k)	100	102	Mid-term			
16 Make a looped trail around the pond, with bridges, boardwalks and platforms	No - would limit access for maintenance	-1	No - anticipate loss of habitat	-1	Yes - increase user experience	2	1	Low	0	High (\$125k)	0	1	Mid-term			
17 Concentrate / limit human access to north end	N/A	0	Yes - reduces potential for habitat impacts	1	Could slightly reduce experience	-1	-1			Low (\$10k)						
18 Limit access for people and dogs	N/A	0	Yes - less potential for habitat disturbance	1	No - would be detrimental to user experience	-2	-4			Low (\$10k)						
19 Partially infill pond	No - would not meet objectives	-2	No - loss of habitat	-1	Neutral - pond would be lost but could be a new use...	0	-8			Medium (\$50k)						
20 Completely infill pond	No - would not meet objectives	-2	No - total loss of habitat	-2	Neutral - pond would be lost but could be a new use...	0	-10			High (\$300k)						
							6.06	Average								



## 4.0 Implementation Plan

The key to implementation of a strategy such as this is prioritization of actions, in such a way that roles, responsibilities and funding are clear. This section provides the Action Plan for the Seniors Centre Pond; suggests further studies and detailed plans that are required in the future; implementation considerations; and a recommended design and construction schedule.

### 4.1 Action Plan

The Action Plan presented in Table 11 provides a summary of the various projects that are recommended to address the pond goals and objectives outlined in Section 3.1. The plans include a combination of undertakings along with the associated timeframe, responsible City department, level of importance (requirement vs. enhancement), required studies/next steps, and an estimate of capital and operations and maintenance costs.

The elements of the Action Plan were developed based on the following understanding and assumptions:

- i) The summary of work included in the status quo section (*i.e.*, no capital improvements) is based on information provided by Parks Operations staff;
- ii) Where possible, construction activities will be carried out by Engineering and/or Parks Operations staff, with labour rates estimated at \$50/hour per;
- iii) Sediment excavated from the pond base or otherwise will be managed on-site or other City lands, as transportation and landfill disposal is prohibitively costly (approximately \$600/m<sup>3</sup> for sediment) – preliminary investigations indicate that the sediment is considered non-hazardous, however, confirmatory sampling during sediment removal may be required;
- iv) Annual operations and maintenance (O&M) activities will be carried out by Engineering/Parks operations staff; and
- v) Estimated costs are based on 2013 dollar values and include a 20% engineering allowance as well as a 15% contingency.





Table 11. Action Plan and Cost Breakdown for Seniors Resource Centre Pond

Project Objective	Implementation Details					Estimate of Costs <sup>1</sup>							
	Summary of Work	Timeframe <sup>2</sup>	Responsibility	Importance	Required Studies/ Next Steps	Units	Quantity	Unit Rate	Capital Cost (A)	Engineering & Contingency <sup>3</sup> (B)	Total (A+B)	Annual O&M <sup>4</sup>	Notes
Status Quo (i.e., No Capital Improvements)	- Vegetation control along pathways.	Ongoing	Parks	Requirement	N/A	-	-	-	-	-	\$0	\$2,000	Vegetation pruning and brush removal - O&M costs estimated at 10 hrs x \$200/hr for 4 person Parks crew.
Sub-total									\$0		\$0	\$2,000	Estimated costs to maintain 'Status Quo'.
1. Improve Public Safety & Security	- Install additional signage, fencing, lighting, etc. to improve safety and prevent vandalism.	Short-term	Parks	Enhancement	N/A	LS	1	\$3,000	\$3,000	\$1,050	\$4,050	\$500	City could consider limiting public use to daytime hours. O&M costs for routine maintenance.
2. Improve Hydraulic Performance	- Replace existing HDPE pond outlet culvert.	Short-term	Engineering	Requirement	Functional engineering design	LS	1	\$25,000	\$25,000	\$8,750	\$33,750	\$250	Based on 900 mm diameter CSP (similar to downstream culvert replacement). O&M costs for annual inspection, debris removal and flushing.
	- Excavate material from pond base by mechanical excavation (long-reach excavator or vacuum truck).	Short-term	Engineering	Requirement	Confirmatory sediment sampling & excavation plan	m <sup>3</sup>	1,250	\$60	\$75,000	\$26,250	\$101,250	\$1,000	Quantity of material based on average 1.0 m depth over 1,250 m <sup>2</sup> pond area (refer to Part C - Section 4.2), assumed to be non-contaminated as per applicable standards for <i>Contaminated Sites Regulation</i> . Annual O&M cost assumes 25 year clean-out frequency for 0.25 m depth over 1,500 m <sup>2</sup> (non-forebay) pond area.
	- Remove and dispose of overgrowth vegetation within pond.	Short-term	Parks	Enhancement	N/A	LS	1	\$2,500	\$2,500	\$875	\$3,375	\$500	To be repeated on 5 year frequency.
3. Improve Water Quality / Reduce Future Maintenance	- Construct forebay berms to promote sediment settlement.	Short-term	Engineering	Enhancement	Functional engineering design	m <sup>3</sup>	300	\$75	\$22,500	\$7,875	\$30,375	\$1,250	Quantity based on berms with 1.5m height and top width of 1m, consisting of a soil/clay core overlain with riprap. O&M costs for sediment removal by mechanical excavation - annualized for 10 year removal frequency of 250 m <sup>3</sup> volume (0.25 m depth).
4. Enhance Pathway Network	- Stabilize pond bank along edge of path where eroding through regrading and protect with bio-engineering techniques and rip-rap.	Short-term	Parks	Requirement	Functional engineering design	m <sup>3</sup>	40	\$60	\$2,400	\$840	\$3,240	-	Potential approaches to stabilize the bank could include landscaping or bio-engineering techniques, such as the planting of deep-rooted, water tolerant vegetation, live stakes (i.e., willow), and/or the installation of fiber rolls. Further protection could be provided by the placement of large stones.
	- Upgraded duck feeding area.	Long-term	Parks	Enhancement	Functional engineering design	LS	1	\$15,000	\$15,000	\$5,250	\$20,250	\$500	To consist of new seating area, surface treatment, interactive signage.
Sub-total									\$145,400	\$50,890	\$196,290	\$4,000	Total costs for proposed improvement works.
TOTAL									\$145,400	\$50,890	\$196,290	\$6,000	ESTIMATED TOTAL COSTS

**Notes:**

1. Estimated costs are based on 2012 dollars and are exclusive of applicable taxes.
2. Engineering and contingency allowances are 20% and 15%, respectively.
3. Average labour rates assumed to be \$50/hr for Parks Operations staff.
4. Timeframe defined as: short-term (0-5 years) and long-term (>5 years).







## 4.2 Description of Proposed Improvement Works

A description of each of the proposed improvement works that comprise the Action Plan for the Seniors Centre Pond is provided below.

### 1. Improve Public Safety & Security

It is proposed that additional signage and lighting are installed to improve safety, reduce vandalism, and offer educational information related to the function and ecologic features of the pond and surrounding areas. It is expected that the locations and other details would be determined through discussions between the Parks and Engineering departments and in consultation with the public (e.g., Seniors Resource & Recreation Centre representatives).

### 2. Improve Hydraulic Performance

It is recommended that accumulated sediment and some of the existing aquatic vegetation (i.e., cattails, reeds, etc.) are removed from the pond to improve its hydraulic performance. Based on the results of field investigations, the clean-out efforts should focus on the following portions of the pond:

- An area of approximately 500 m<sup>2</sup> within the southern portion of the pond near the 1,200 mm diameter storm sewer outfall excavated to an average depth of 1 m (total volume of approximately 500 m<sup>3</sup>);
- An area of approximately 700 m<sup>2</sup> along the eastern bank of the pond where a considerable amount of vegetation currently exists – the estimated volume of material for removal is approximately 700 m<sup>3</sup> at an average depth of 1 m; and
- The area around the upstream end of the pond outflow culvert and the downstream ditch segment (approximately 20 m in length) – the estimated volume of material for removal at this location is approximately 50 m<sup>3</sup>.

The most effective and practical method of removing the accumulated materials would likely involve the use of a long-reach excavator, which could access the pond by using mud mats or a suitable alternative to provide a sufficient working area. It is recommended that the handling, storage, and transportation of the excavated material should be undertaken in accordance with best practices for sediment control to minimize potential impacts to receiving watercourses. The estimated costs included in Table 11 are based on the understanding that the accumulated materials are not contaminated, in accordance with applicable standards prescribed by the *Contaminated Sites Regulation (BC Reg. 97/2011)*.

Further to the above, the existing HDPE culvert structure that conveys pond outflows to the receiving drainage system is undersized and currently clogged with a considerable amount of sediment and debris. It is proposed that the structure is replaced with a new culvert complete with headwalls at the inlet/outlet. Although the size and configuration will depend largely on the existing physical constraints (i.e., pathway elevation, grading, etc.), it is recommended that the new culvert is at least a 900 mm diameter structure – similar to the recently replaced culvert at the downstream crossing of the Nicomekl River trail.

Consideration could also be given to moving the outlet structure closer to the northwest corner of the pond, which would provide a direct hydraulic connection to the north side of the Nicomekl trail and reduce flows contributing to the downstream culvert noted above.

### 3. Improve Water Quality/Reduce Future Maintenance

It is proposed that the pond is retrofitted to include a forebay at the existing 1,200 mm diameter inlet along the southern edge of the facility. Construction of the forebay would involve the placement of a berm between the southern bank to the peninsula along the eastern edge of the pond. The berm could consist of earthen material overlain with rip-rap stone. It is recommended that a sediment sump is also established by excavating material from the base of the pond within the forebay area.

Required maintenance will involve the periodic removal of accumulated sediment at a frequency of approximately 3-5 years. Depending on the size and configuration of the proposed forebay, sediment clean-out can be conducted using an excavator or vacuum truck.

### 4. Enhance Pathway Network

The existing asphalt pathway along the northern edge of the pond has experienced considerable deterioration as a result of fluctuations in the water level of the pond as well as periodic overtopping during significant flow events. Previous efforts to address this issue through the placement of rip-rap stone along the pond edge have not resolved the problem.

It is proposed that the southern bank of the pond is stabilized through a combination of bio-engineering techniques and armouring. This could include the addition of suitable materials that would create a physical separation/barrier between the pond edge and the pathway, such as a vegetated buffer that is reinforced with large stones. In addition to remediating the ongoing asphalt deterioration, these efforts would also provide an increased level of safety for pathway users.

In addition, a portion of the bank along the northwestern edge of the pond has experienced erosion due to a lack of vegetation that appears to be, at least in part, the result of birds entering and exiting the water. To address this issue, it is proposed that the slope is stabilized through measures that will protect the area from continued erosion. Potential approaches to stabilize the bank could include landscaping or bio-engineering techniques, such as the planting of deep-rooted, water tolerant vegetation, live stakes (i.e., willow), and/or the installation of fiber rolls. Additional protection could be provided by the placement of large stones.

### 4.3 Further Studies or Detailed Plans

This section highlights additional studies or detailed plans that may be required but are outside of the scope of the Management Strategy.

Additional Studies/Plans	Responsibility	Cost Estimate
Integrated Stormwater/Watershed Management Plan for the Upper Nicomekl River watershed.	City of Langley/ Township of Langley/ City of Surrey	\$400,000
Integrated Stormwater/Watershed Management Plan for the Newlands Brook watershed	City of Langley	\$100,000
Water Quality Monitoring Program	City of Langley	\$10,000

### 4.4 Implementation Considerations

#### 4.4.1 Funding and Funding Options

Stormwater management levy or utility – a specific levy or utility could be established to fund proposed SWM infrastructure within the Study Area. These funds could be collected in the form of a levy added to municipal property taxes, based on the contributing imperviousness and land use of individual properties, or could consist of a separate utility applied to property taxes.

Provincial or Federal Infrastructure Funding – the provincial and federal governments currently provide infrastructure funding that could be applicable to the proposed pond improvements. These include, but may not be limited to the Infrastructure Canada Program, the Canadian Strategic Infrastructure Program, the Canada/BC Infrastructure Program, the Canada-BC Municipal Infrastructure Fund, the Community Recreation Program, the Infrastructure Planning Grant Program, and others that provide funding for projects for urban and sustainable development initiatives.

#### 4.4.2 Approval Process

Any redevelopment of the Seniors Centre Pond or change in its configuration will require review by the environmental regulatory agencies. Fisheries and Oceans Canada will review any proposed alteration under Section 35 of the *Fisheries Act* (as the law is currently applied). The provincial Ministry of Forests, Lands and Natural Resource Operations will review under Section 9 of the *Water Act* and/or Section 7 of the *Water Regulation*. The expected review process and the specific requirements of any approval documents will depend on the nature and extent of the proposed alterations.

In addition, it may be possible to obtain a Water license under the terms and conditions of the *Water Act* which will allow the City to conduct maintenance/cleaning of the proposed sediment basin without the requirement to apply for instream work every time it is required.





# Part D: Sendal I Gardens



## 1.0 INTRODUCTION

Sendall Gardens is a community park located within the Simonds Neighbourhood at 201 A Street & 50<sup>th</sup> Avenue. The park features over five hectares of botanical gardens, including a nature trail, two small online ponds and public washrooms.

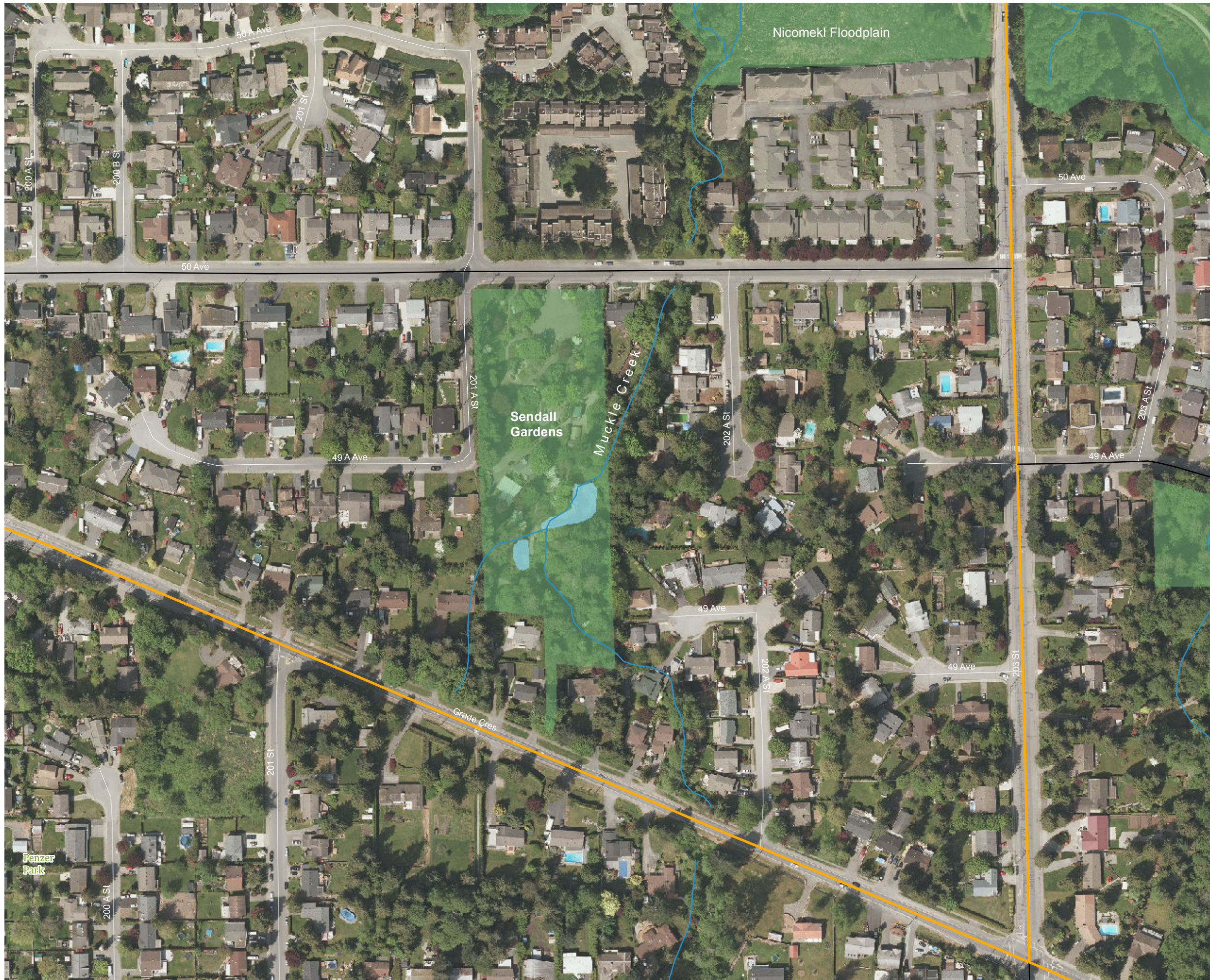
The lower pond is presumed to have been constructed as a water feature by the Sendall's (original property owners). The pond is online with Muckle Creek and is very shallow due to the accumulation of sediment received from the upper Simonds catchment. The Muckle Creek thalweg has generally formed a preferential flow path along the right bank (adjacent to the pedestrian trail). Muckle Creek is classified as fish-bearing (*i.e.*, Class A habitat) according to the City's mapping.

The ponds support several waterfowl species (*i.e.*, geese and ducks), amphibians, and other wildlife. The upper pond is considered "offline" (receives diverted flow from Muckle Creek and one of its tributaries) and appears to have been constructed to function specifically as a duck pond.

The location of Sendall Gardens can be seen on Figure 15 on the next page.













**CITY OF LANGLEY**  
Pond Management Strategies

**Sendall Gardens  
Location Plan**

Figure 15

-  Major Roads
-  Arterial Roads
-  Collector Roads
-  Local Roads
-  Ponds
-  Parks

0 12.5 25 50 Meters  
SCALE 1:2,200



Map Drawing Information  
Data from City of Langley. Some data partially modified by Dillon Consulting. Pond size and location based on Sendall Gardens Topographic Survey.

Map Created by: Eric Hertzman  
Map Checked by: Jim Walker  
Map Projection: NAD83 UTM Zone 10N



PROJECT: 12-6077  
STATUS: FINAL  
DATE: (3/11/2013)





## 2.0 Where are we now? Current Pond Status

Section 2.0 includes the summary of the functional evaluation that was completed for the Sendall Gardens Ponds. It was done by considering three main components:

1. Engineering,
2. The Natural Environment, and
3. The Human Environment.

### 2.1 Engineering Assessment

A comprehensive assessment of the Sendall Gardens ponds was undertaken that consisted of a thorough examination of available background information, together with field reconnaissance to confirm the physical characteristics and current function of the ponds as well as the surrounding site features (*i.e.*, trails, bridges, creek, etc.). The results of the assessment were compiled and evaluated to identify existing issues, constraints and improvement opportunities.

Sources of background information reviewed as part of the assessment include the following:

- i) Legal/topographic survey of Sendall Gardens by Isaak Osman & Associates (1997);
- ii) Soil Map of the Lower Fraser Valley, Soil Survey Branch, BC Department of Agriculture (1938);
- iii) 2010 ortho-imagery provided the City of Langley;
- iv) City of Langley GIS database, including topographic/digital elevation mapping, storm sewer system details, watercourse classifications, and land use data;
- v) Township of Langley GeoSource mapping, including topographic mapping (1 m contours), storm sewer system details, and land use data; and
- vi) Draft Stormwater Drainage System Assessment, UMA Engineering Ltd. (2005).

Information regarding the facility layout, purpose/function, physical characteristics, watershed hydrology and hydraulic characteristics of the ponds is summarized below. In addition, a description of the maintenance activities undertaken by Park Operations staff is also provided.

Some results of the Engineering Assessment can be seen on Figure 16 on the following page.







**CITY OF LANGLEY**  
Pond Management Strategies

**Sendall Gardens**  
**Existing Drainage Features**

Figure 16

- Storm Sewer System
- Watercourses
- Contour (1m)
- Ponds
- Parks

0 12.5 25 50 Meters  
SCALE 1:2,500



Map Drawing Information  
Data from City of Langley. Some data partially modified by Dillon Consulting. Pond size and location based on Sendall Gardens Topographic Survey.

Map Created by: Eric Hertzman  
Map Checked by: Jim Walker  
Map Projection: NAD83 UTM Zone 10N



PROJECT: 12-6077  
STATUS: FINAL  
DATE: (3/11/2013)





### 2.1.1 Facility Layout

Sendall Gardens includes two small ponds, which are located within the southern portion of the park near the confluence of Muckle Creek and one of its tributaries. The ponds are situated in close proximity to each other (approximately 10 m apart) and are separated by a narrow gravel pathway. The larger (lower) pond is an on-line facility along Muckle Creek, while the smaller (upper) pond is an off-line feature that is hydraulically connected to the creek and tributary by a series of culverts.



The adjacent photograph (taken facing northeast from the southeast corner of the site), shows the upper and lower ponds in the foreground and background, respectively. Refer to

Figure 16 for additional details with respect to the layout of the Sendall Gardens ponds.

### 2.1.2 Purpose and Function

The lower (on-line) pond was constructed by the Sendall family, who were the original owners of the property that comprises the park. Although background documentation related to the purpose and design of the ponds is very limited (*i.e.*, no 'as-built' drawings, design documents, maintenance records, etc.), it is understood based on discussions with City staff that the lower pond was constructed as a water feature primarily for aesthetic purposes.

Subsequent to the City assuming ownership of the property, the upper (off-line) pond was created to provide habitat for ducks, geese and other migratory birds. No design information for the upper pond was available at the time of the assessment.

Aside from a considerable accumulation of sediment, the results of field reconnaissance indicate that the lower pond does not appear to have undergone any significant modifications from its original configuration. Notwithstanding the pond's apparent ability to trap suspended sediment contained within the incoming flows from Muckle Creek, it is not expected to provide significant stormwater management benefits. The two ponds currently serve as a central component of the Sendall Gardens by offering natural viewing opportunities and ecologic habitat.



### 2.1.3 Physical Characteristics

A summary of the dimensional attributes of the ponds is presented in Table 12 below, which are based on available survey information and field observations.

Table 12: Sendall Gardens – Dimensional Attributes

Attribute	Lower (On-Line)	Upper (Off-line)
Length (m)	40	20
Width (m)	15	10
Average Depth (m)	0.75	0.50
Area (m <sup>2</sup> )	420	150

*Note: All dimensions are approximate.*

Further to the above, the physical characteristics of the upper pond include:

- The off-line pond was constructed through the excavation of a surface depression to create the permanent water feature for waterfowl habitat, which includes large stones around its perimeter.
- Side slopes around the pond perimeter are gradual on all sides, with the exception of the embankment leading up to the pathway along the southern edge – for the purpose of pond volume calculations, the side slopes for the wetted area were assumed to be 3H:1V.
- The pond is fenced on all sides for safety purposes as well as to provide a barrier between the pathway and resident waterfowl.
- Water levels in the off-line pond are maintained at approximately 9 mASL (based on topographic survey) by flows from Muckle Creek and tributary via two 400 mm diameter PVC culverts as well as a series of buried plastic pipes along the western slope.
- The estimated volume of the pond at an average depth of 0.5 m is approximately 60 m<sup>3</sup>.
- Outflows are discharged to Muckle Creek through a grated drain and 400 mm CSP culvert beneath a wooden footbridge on the pathway.

The physical characteristics of the lower pond are as follows:

- The pond appears to have been constructed through excavation and widening of the Muckle Creek channel, followed by the placement of large rocks around its perimeter.
- Side slopes at the perimeter of the pond vary considerably, from approximately 4H:1V along the southern banks to 2H:1V for portions along the northern and eastern banks leading up the embankment to the elevated pathway (due to the accumulation of sediment within the pond, side slopes within the lower elevations were not discernible at the time of field investigations).

- The outlet to the downstream reach of Muckle Creek consists of a rock weir beneath the wooden bridge along the northern edge of the pond, which is made up of angular stone of varying size (approximately 100 – 300 mm diameter).
- Based on the dimensions noted in the table above, the estimated pond volume for an assumed average depth of 0.75 m is approximately 200 m<sup>3</sup>.
- The volume of accumulated sediment at the time of the field investigations was estimated to be approximately 75 m<sup>3</sup> at an average depth up to 0.5 m (the composition of the sediment is a mixture of sandy/silty material with some small gravels).

#### 2.1.4 Watershed Hydrology

Sendall Gardens is located within the Muckle Creek watershed, which is a tributary of the Nicomekl River. Based on available topographic mapping and existing drainage system information, the Muckle Creek watershed area is approximately 55 ha, and is generally bounded to the north by 49 A Avenue, to the east by 203 Street, to the south by 42 Avenue and to the west by 200 A Street. Hydrologic characteristics for the contributing watershed area are summarized below.

- Topographic relief is low/moderate with highest elevation at approximately 45 mASL and the elevation of the ponds at 10 mASL.
- Land use is predominately residential area with some institutional and open space (parkland, BC Hydro ROW, riparian corridor, etc.).
- Available mapping indicates that native surficial soils in the watershed predominately consist of loamy sand over coarse sand.
- The drainage system consists of a combination of storm sewers to service the residential areas along with sheet flow, ditches and culverts within the open spaces.
- Groundwater seepage through embankments and steep slopes contributes flows to the ponds, which was observed at multiple locations during site investigations.
- As a result of a higher level of imperviousness within the watershed through urbanization, it is expected that wet weather peak flows and runoff volumes in Muckle Creek and its tributaries have increased considerably from pre-development levels, together with a reduction in overall baseflow contributions.

#### 2.1.5 Hydraulic Characteristics of Ponds

As noted, surface water inputs to the Sendall Gardens ponds are conveyed from the headwaters of the watershed via Muckle Creek and one of its tributaries. A summary of the hydraulic characteristics and performance of the upper and lower ponds is provided below.

### *Upper Pond*

Inflows to the off-line pond include the total flows from the tributary, which are conveyed to the pond by a 400 mm PVC culvert, together with a portion of the flows from the main tributary of Muckle Creek via a second 400 mm PVC culvert. The magnitude of flows contributed from the main tributary depends on the water level in the channel, where the inlet of the culvert to the upper pond was presumably sized and positioned such that a minimum depth could be maintained for waterfowl habitat.

Outflows from the upper pond are conveyed to Muckle Creek through a 400 mm diameter CSP culvert that is equipped with a drain grate at its inlet. The culvert discharges flows to the main channel approximately 10 m upstream of the lower pond.

### *Lower Pond*

The lower pond functions as an on-line facility along Muckle Creek. Inflows are conveyed to the pond by the upstream reaches Muckle Creek and its tributaries, while outflows discharge into the receiving lower reach of the creek.

At the time that field investigations were carried out, a significant volume of accumulated sediment was observed within the central portion of the pond, causing flows to travel along the perimeter towards the outlet location. The resulting flow depths were generally shallow, and the storage volume within the pond was minimal.

As noted, the pond outlet is comprised of a rock weir under a wooden trail bridge that consists of a range of stone sizes. Due to the irregular shape of the rock weir and the accumulation of sediment and debris (*i.e.*, leaves, sticks, branches), the hydraulic performance of the outlet is no longer functioning as designed.

## 2.1.6 Maintenance Activities

Based on correspondence with City Parks Operations staff, maintenance activities conducted at the Sendall Gardens ponds are limited and generally involve vegetation control (pruning, cutting, removal) as well as periodic improvements to the gravel pathways through the addition of granular materials.

## 2.2 Natural Environment Assessment

### 2.2.1 Ecological Assessment Parameters

Dillon's ecological field team conducted a biophysical baseline assessment of the Sendall Gardens ecology and the surrounding area that may be influenced by future maintenance, redevelopments and operation of the two ponds. The following parameters were assessed:

- Terrestrial environment (vegetation and wildlife);
- Aquatic environment and fish habitat (including water/sediment quality);
- Invasive species;
- Potential presence of species at risk; and
- Riparian area management/improvement.

## 2.2.2 Terrestrial Environment

### Vegetation

The study area is situated within the Coastal Western Hemlock zone, which occurs at low to middle elevations west of the Coast Mountains. The vegetation within the study area has been previously disturbed from human related activities. Vegetation consists primarily of mature and young conifers (western redcedar, western hemlock [*Tsuga heterophylla*]) surrounding the pond areas, along with several native and non-native shrub species. The riparian vegetation is limited along the west edge of the lower pond, but is more complex along the north, east and south sides. Vegetation is largely lacking around the upper pond. There is no significant vegetation which grows in the ponds; however, the creek connecting the two ponds is heavily overgrown with shrubs in some areas.

Understory vegetation includes Himalayan blackberry (*Rubus discolor*), rose species, English ivy (*Hedera helix*), sword fern (*Polystichum munitum*), and rhododendron species, with some areas of skunk cabbage (*Lysichiton americanus*) present in the creek upstream of the lower pond. The field assessment identified seven native species and three non-native species as indicated in Table 13 below.

Table 13: Sendall Gardens – Observed Vegetation in the Vicinity

Category	Species	Native/Invasive
Tree	Western redcedar ( <i>Thuja plicata</i> )	Native
	Red alder ( <i>Alnus rubra</i> )	Native
	Western hemlock ( <i>Tsuga heterophylla</i> )	Native
Shrub	Pacific rhododendron ( <i>Rhododendron macrophyllum</i> )	Native
	Himalayan blackberry ( <i>Rubus discolor</i> )	Invasive
	Rose ( <i>Rosa</i> sp.)	Native
	English holly ( <i>Ilex aquifolium</i> )	Invasive
Herb	Sword fern ( <i>Polystichum munitum</i> )	Native
	Skunk cabbage ( <i>Lysichiton americanus</i> )	Native
	English ivy ( <i>Hedera helix</i> )	Invasive

### *Wildlife*

Waterfowl utilized the upper pond, which consisted mostly of mallards and some geese. The Langley Field Naturalists have installed bird boxes (5 total, of which 3 remain) that have been utilized by black-capped chickadees. Other wildlife expected to utilize the pond, include mammals such as raccoons, coyotes and a variety of small mammals, including ground squirrels and mice.

The wildlife utilization for the lower pond is fairly low, due to the lack of depth and deficiency of any instream cover. The ponds and the areas surrounding the project site have been greatly modified by human activities, so that the overall habitat value is low and does not provide adequate habitat for many wildlife species.

It is unlikely that there will be a high utilization by amphibians given the lack of cover and depth. No egg masses or individuals were observed in the pond areas during the assessment.

### **2.2.3 Aquatic Environment and Fish Habitat**

Muckle Creek is classified by the City of Langley as blue (watercourses for which no detailed information exists). However, existing data indicates that fish have accessed the reaches upstream of the ponds and, as such, the channel should be reclassified as "Class A – Red".

The creek connects the lower and upper ponds, and flows through a culvert under 50<sup>th</sup> Avenue further downstream, and continues into the Nicomekl River floodplain before joining with the Nicomekl River. The Nicomekl River supports runs of anadromous species including coho, chum, chinook, cutthroat trout, steelhead, rainbow trout and Dolly Varden char. Resident fish species include yellow perch, redbreast shiner, and brassy minnow.

Access for fish is compromised at a weir downstream of the lower pond. However, as referenced, fish have been historically reported upstream. Therefore, if there is adequate access, fish could potentially exist within the stream.

The value of the Sendall Gardens area in terms of fish habitat would be considered low. There were no fish seen or expected within either of the two ponds.

### *Water and Sediment Quality*

The aquatic habitat of the study area consists of small shallow ponds. The upper pond has been highly utilized by waterfowl, which can potentially cause contamination risks and increased nutrients in the water, leading to a decrease in overall water quality. Generally, small and shallow waterbodies, with low dilution rates and high/persistent residency of waterfowl increases the risk of contamination and nutrient input. Therefore, it is likely that water quality is fairly poor considering the amount of waterfowl that have existed within the project area.



### 2.2.4 Invasive Species

Based on the initial field assessment, the project team confirmed areas of invasive species vegetation particularly along the stream connecting the lower and upper ponds, where these areas are heavily inundated with invasive species. Invasive species include English ivy and Himalayan blackberry which are present in patches beside the ponds.

### 2.2.5 Rare and Endangered Species

The CDC database did not reveal any species at risk observations within the area; however, the potential presence or absence of plant and animal species listed in Schedule 1 and 2 of the Species-at-Risk Act (SARA) registry was queried. A review of the documents revealed a lengthy list of species which could potentially inhabit the Langley area. This list has been reduced to account for species that could potentially utilize Sendall Gardens. Based on the field assessment and our local knowledge of the area, rare or endangered species that could potentially be within the study area and in close proximity are highlighted in Table 14.

Table 14: Sendall Gardens – Species at Risk and Potential for Occurrence in the Area

Class	Common Name	Scientific Name	Likelihood of Occurring in Project Area	SARA 1 & 2
Mammals	Mountain beaver	<i>Aplodontia rufa</i>	Unlikely	Special concern (Schedule 1)
	Pacific water shrew	<i>Sorex bendirii</i>	Unlikely	Endangered (Schedule 1)
Amphibians	Northern redlegged frog	<i>Rana aurora</i>	Unlikely	Special concern (Schedule 1)
	Western toad	<i>Anaxyrus boreas</i>	Likely	Special concern (Schedule 1)
	Oregon spotted frog	<i>Rana pretiosa</i>	Unlikely	Endangered (Schedule 1)
Birds	Great blue heron	<i>Ardea Herodias fannini</i>	Unlikely	Special concern (Schedule 1)
	Short eared owl	<i>Asio flammeus</i>	Unlikely	Threatened (Schedule 1)
	Barn owl	<i>Tyto alba</i>	Unlikely	Threatened (Schedule 1)
	Olive-sided flycatcher	<i>Contopus cooperi</i>	Unlikely	Threatened (Schedule 1)
	Western screech owl	<i>Megascops kennicotti</i>	Unlikely	Special concern (Schedule 1)
	Peregrine falcon	<i>Falco peregrinus anatum</i>	Unlikely	Special concern (Schedule 1)
Reptiles	Northern rubber boa	<i>Charina bottae</i>	Unlikely	Special concern (Schedule 1)
	Western painted turtle	<i>Chrysemys picta pop. 1</i>	Unlikely	Endangered (Schedule 1)
Insects	Monarch	<i>Danaus plexippus</i>	Unlikely	Special concern (Schedule 1)

The only species at risk that could potentially inhabit Sendall Gardens is the Western Toad, which can be found in a wide variety of habitats (wet and dry forest types, meadows and fields, clear-cuts and aquatic habitats). Therefore, there is a possibility that some pockets of suitable habitat exist for this species, though it has not yet been documented in the area.

### 2.2.6 Riparian Area Management and Improvement

Limited riparian vegetation is present around either the lower and upper ponds. Both ponds are lined with rip rap around the perimeter. The habitat directly adjacent to the pond area is mostly composed of exposed earth and patches of grass and shrubs. Currently, the riparian area is considered poor habitat due to the lack of vegetation and general low habitat complexity; therefore, riparian improvement for this area would involve planting vegetation and creating a perimeter around the ponds that are less prone to erosion.

## 2.3 Human Environment Assessment

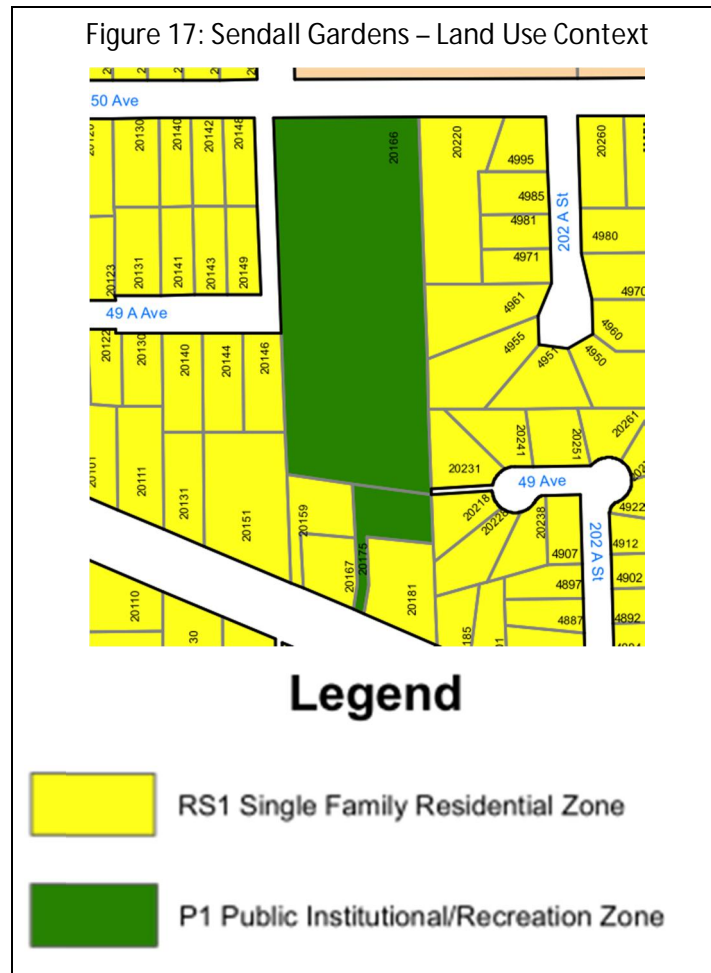
When completing the human environment assessment and proposing goals, objectives and potential actions for the Sendall Gardens ponds, a number of planning and landscape architecture aspects were considered, including

- Relevant land use policy and the Official Community Plan;
- Community use, issues, sensitivities and safety;
- Landscape architecture considerations including grading, trails and seating / viewing opportunities; and
- Connectivity to the City's overall Parks System.

### 2.3.1 Relevant Land Use Policy and the Official Community Plan

The Sendall Gardens ponds are located on City parkland that is zoned P1 Public Institutional/Recreation Zone. The park is surrounded to the east, west and south by residential land use – zoned as RS1 Single Family Residential, and to the north by a City Right-of-Way (50<sup>th</sup> Avenue). The land use context for Sendall gardens is shown in Figure 17 on the next page.

As with all City parkland, the City of Langley Official Community Plan (OCP) recognizes that “parks and recreation play a crucial role in creating quality of life for city residents.” City Council adopted a Parks, Recreation and Culture Master Plan Update in 2005 in order “to identify current and future requirements related to the provision of leisure services in the City”. The OCP embraces the major recommendations of the PRC Master Plan Update, however, that plan does not include any specific recommendations for Sendall Gardens, with the exception of “reconsidering the role of Sendall Gardens in the parks system”. To date there has not been a dialogue with respect to the future of Sendall Gardens, although the City is completing an update to the Parks, Recreation and Culture Master Plan in 2013.



OCP policies that specifically apply to Sendall Gardens include:

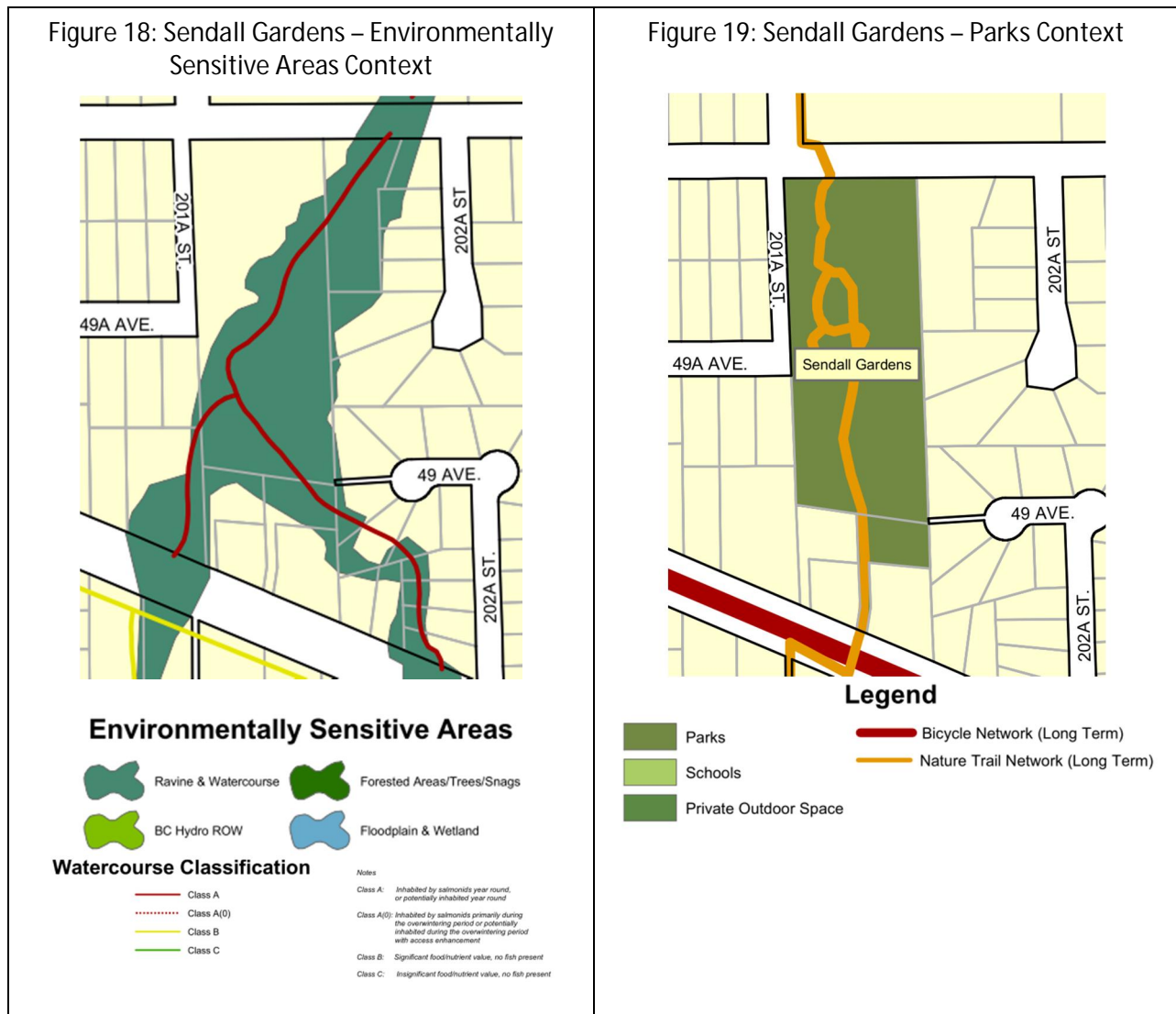
- Policy 8.2.1: Maintain, enhance and expand the open space system shown in the Parks and Open Space Map (Schedule “C”).
- Policy 8.2.2: Support and implement the recommendations of the 2005 Parks, Recreation and Culture Master Plan Update, including: (b) Parks & Open Space
  - Upgrade individual parks and their facilities in accordance with recommendations;
  - Develop CPTED strategies and bylaw enforcement policies to address crime and safety issues in the park system.
- Policy 8.2.3: Develop and maintain a Nature Trail Network in accordance with the 2005 Nature Trail Network Plan and the Parks and Open Space Map (Schedule “C”).

Specific to Sendall Gardens, the OCP Policies for Environmental Protection should also be considered, which include:

- Section 9.1: The Nicomekl Floodplain and the riparian areas associated with its tributary creeks comprise the City’s most significant ecological assets.

- Policy 9.2.1: Protect and enhance environmentally sensitive areas and watercourses identified in the Environmentally Sensitive Areas Map (Schedule “D”).
- Policy 9.2.5: Encourage storm water management practices both within and outside of the City to mitigate flooding and destruction of habitat and farmland.
- Policy 9.2.6: Storm water management shall be consistent with the GVRD Liquid Waste Management Plan and Integrated Storm Water Management Planning.
- Policy 9.2.7: Pursue habitat enhancement projects in partnership with conservation groups and other government agencies.

Sendall Gardens is located in the ravine and watercourse component of the City's Environmentally Sensitive Areas (See Figure 18).





### 2.3.2 Community Use, Issues, Sensitivities and Safety

Sendall Gardens is widely used by a variety of user groups. There is moderate to high utilization of the upper pond for wildlife viewing and feeding (grain to ducks). The park's trails are well-used by local residents and forms a component of the City's overall trail system. In terms of safety, the lower pond is not fenced; trails are close to the pond edge. The lower pond is full of sediment which if accessed by the public is a hazard.

### 2.3.3 Landscape Architecture Considerations

Sendall Gardens is home to a number of gravel trails that circle the ponds. From a landscape architecture perspective, the issues with the Sendall Garden ponds included excess sedimentation at the bottom end of the lower pond, water quality concerns in the upper pond, steep slopes and erosion in the upper pond. Other design considerations include slope seepage onto some of the pathways, poor pedestrian circulation, unsightly chain link fencing, lack of a proper entry sequence, and under-appreciated overlook opportunities. The overall pedestrian circulation of this area needs to be updated. In addition, the relationship of the pond area with the northern part of the park should be studied in further detail.

### 2.3.4 Connectivity to the City's overall Parks System

The site is well connected to the surrounding trail system, with trails going to the east, south and north. Figure 19 shows Sendall Gardens in the context of the City's Park System.

## 2.4 Key Issues

During the Functional Evaluation a number of key issues were identified, which are summarized in this section. Issues that can be represented spatially are shown on Figure 20, with corresponding photographs.

### 2.4.1 Engineering

A description of the issues identified as part of the functional evaluation is provided below, which are based on the results of the background review and subsequent field investigations.

- i) A significant volume of sediment has accumulated within the lower pond (estimated at approximately 75 m<sup>3</sup>), which has affected its hydraulic performance and aesthetic value, and is considered to be a safety hazard following an incident where park users got stuck in the pond adjacent to the pathway. Further, accumulation of sand and sediment was observed in the Muckle Creek channel upstream of the lower pond for most of its length within the Sendall Gardens property.
- ii) The condition of many of the gravel pathways in the southern portion of the Sendall Gardens Park have deteriorated and require considerable maintenance to address poor drainage and safety concerns. Standing water and saturated ground conditions resulting from groundwater seepage through steep slopes and embankments were observed at multiple locations during field investigations, including much of the

pathway around the perimeter of the lower pond as well as portions of the main path between the upper pond and the southern park boundary. In addition, a short segment of the path adjacent to Muckle Creek is eroding due to the direction of flow, together with a lack of adequate protection.

- iii) No safety measures are in place between the lower pond and the adjacent pathway along its southern and eastern perimeter – it is recommended that a barrier (*e.g.*, fencing, landscaping, etc.) should be installed to provide a barrier to prevent park users from accessing the pond area.
- iv) The existing rock weir at the outlet of the lower pond is in poor condition and requires maintenance to remove accumulated debris and reconfigure the rock weir to improve the hydraulic performance of the pond.
- v) Under current conditions, there is a limited circulation of the upper pond, which could result in poor water quality conditions in the water feature, particularly given the anticipated amount of organic materials within the pond (*i.e.*, bird feces, decaying vegetation, etc.).

## 2.4.2 Natural Environment

### *Riparian Vegetation*

- Riparian function around the majority of the site is poor. Could improve around upper pond in particular.

### *Instream Vegetation*

- Lack of nutrient value.
- Lack of biofiltration, due to minimal vegetation, which allows for increased runoff.
- Lack of cover.

### *Fish Habitat*

- Access compromised at weir downstream of lower pond.
- Lower pond has very limited value even if made accessible, although channelization could increase fish accessibility.
- Upper pond likely not accessible.

### *Terrestrial Habitat*

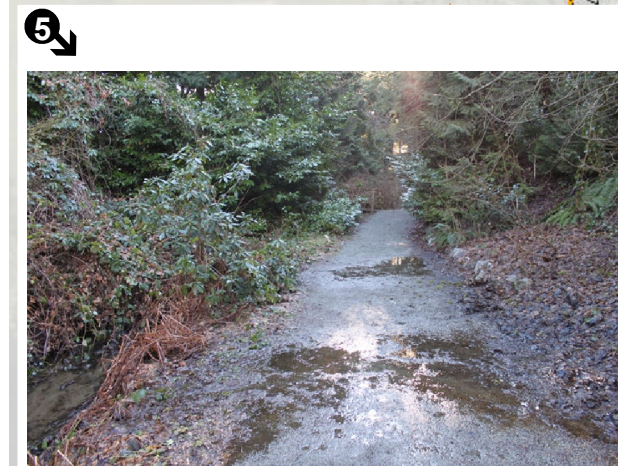
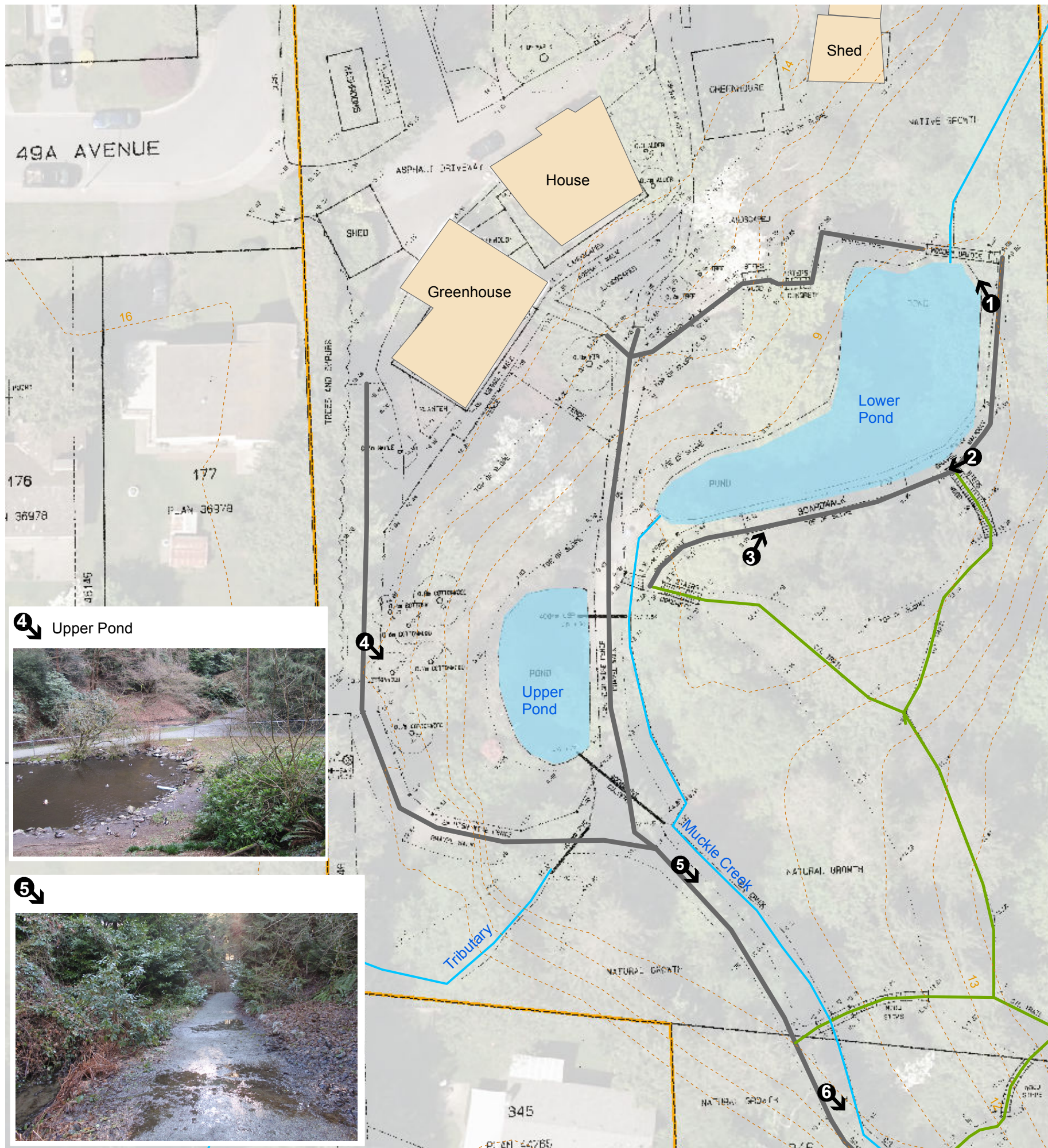
- Mature forested canopy provides good wildlife habitat.
- Some ivy dominance but well away from ponds.

### *Water & Sediment Quality*

- Water quality is likely not an issue.
- No sediment data available.







**CITY OF LANGLEY**  
Pond Management Strategies

**Sendall Gardens**  
Key Issues Summary  
Figure 20

- Picture Location, Direction, and Id Number
- Sendall Gardens
- Contours
- Creek
- Gravel Pathway
- Trails
- Buildings (Existing)
- Ponds



SCALE 1:500  
MAP DRAWING INFORMATION:  
Data from City of Langley, Legal/Topographic Survey by Isaak Osman & Associates . Some data created by Eric Hertzman, GIS Specialist.

MAP CREATED BY: Eric Hertzman  
MAP CHECKED BY: James Walker  
MAP PROJECTION: NAD\_1983\_UTM\_Zone\_10N



PROJECT: 12-6077  
STATUS: FINAL  
DATE: (3/11/2013)





## 2.5 Human Environment

Based on the assessment of the human environment, concerns include:

- There is a section of trail adjacent to the pond that is in disrepair due to groundwater seepage.
- Drainage is an issue at several trail locations.
- The site is not very accessible (*e.g.*, wheelchairs, assisted walkers, etc.).
- There is a need to increase safety along the trail and remove hazards, and potentially for safety education.

## 3.0 Where do we want to be? Future Vision

### 3.1 Pond Goals and Objectives

Based on the results of the functional evaluation and the visioning workshop held with City staff, the following goals were created for the Seniors Resource and Recreation Centre Pond:

GOAL 1: Improve the human environment of the site,

GOAL 2: Improve the natural environment aspects of the site, and

GOAL 3: Maintain the current stormwater management function of the pond.

With respect to the three “buckets” that had been identified through the functional evaluation, their relative priority for Sendall Gardens was determined to be as follows:

Discussion Area	Priority Level
<b>1. Engineering / Stormwater Management</b>	LOW
<b>2. Natural Environment / Ecology</b>	MEDIUM
<b>3. Human Environment</b>	HIGH

#### 3.1.1 Water Resources Engineering Objectives

Three objectives relating to the water resources engineering functions of the ponds were determined:

1. Improve hydraulic performance within online (lower) pond.
2. Reduce future maintenance requirements.
3. Improve drainage along pathways.

### 3.1.2 Natural Environment Objectives

Six objectives relating to the natural environment functions of the ponds were determined:

1. Enhance riparian area around lower and upper ponds.
2. Establish instream vegetation.
3. Improve access and habitat value for aquatic and terrestrial species.
4. Improve water quality.
5. Reduce potential for erosion.
6. Channelize lower pond and create wetland for remainder.

### 3.1.3 Human Environment Objectives

Lastly, seven objectives relating to the human environment functions of the ponds were determined:

1. Improve Trails.
2. Improve popularity and potential for use.
3. Provide visual interest.
4. Increase community ownership of the park/pond.
5. Improve Safety.
6. Improve public treatment of site.
7. Reduce wear and tear on the park around pond.

## 3.2 Actions and Evaluation

For the Sendall Gardens ponds, a list of potential actions was created during the visioning session. Those potential actions were evaluated according to the objectives for each bucket, and their relative priority, to create a refined list of options. This evaluation can be seen in Table 15 on the following page.





Table 15: Sendall Gardens - Evaluation Matrix

Action:	Buckets:						Subtotal:	Relative Score: High = 100 Medium = 50 Low = 0	Cost: Low = \$0-\$20k (200) Medium = \$25k - \$75k (100) High = \$75k + (0)	Total:	Timing	Timing				
	Engineering		Natural Environment		Human Environment							Timing	1-3 Years	3-5 years	5 - 10 years	
	Low Priority	1	Medium Priority	2	High Priority	3										
	Meet objectives? - Improve hydraulic performance within online (lower) pond - Reduce future maintenance requirements - Improve drainage along pathways - Improve hydraulic connection to upper pond - Improve Water Quality	Score	Meet objectives? - Enhance riparian area around lower and upper ponds - Establish instream vegetation - Improve access and habitat value for aquatic and terrestrial species - Improve water quality - Reduce potential for erosion and sedimentation	Score	Meet objectives? - Improve safety, trails, popularity and education - Reduce wear and tear on the park around pond - Increase community ownership of the park/pond	Score										
1 Raise/improve pathway along western edge of online pond	Gives more functionality to the ponds, reduces maintenance requirements	2	N/A	0	Yes - would improve trails	2	8	High	100	Low (\$20k)	200	308	Short-term			
2 Develop Interpretive signage and wayfinding	N/A	0	N/A	0	Yes - improve user experience	2	6	Medium	50	Low (\$10-15K)	200	256	Short-term			
3 Add a boardwalk	Creates a maintenance and access issue	-1	N/A	0	Yes - improve user experience	2	5	Medium	50	Low (\$15k)	200	255	Mid-term			
4 Develop a master plan for the park	May benefit, but possibly not	0	May be positive, assuming improved environmental focus	1	Yes - would provide vision for human use of park	2	8	High	100	Medium (\$50k)	100	208	Short-term			
5 Redevelop trails to mitigate seepage issue	Helps maintenance and access	1	N/A	0	Yes - improve trails	2	7	High	100	Medium (\$25k)	100	207	Short-term			
6 Lower Pond - modify / improve outlet weir	Yes - would need to be done if pond improved - improve pond performance	1	Yes - Improves fish access	1	N/A	0	3	Low	0	Low (\$10k)	200	203	Short-term			
7 Replace invasive (Ivy) with native species	N/A	0	Yes	1	N/A	0	2	Low	0	Low (\$15k)	200	202	Mid-term			
8 Install native vegetation where possible	N/A	0	Yes	1	N/A	0	2	Low	0	Low (\$15k)	200	202	Mid-term			
9 Introduce instream complexing features for amphibians	N/A	0	Yes	1	N/A	0	2	Low	0	Low (\$10k)	200	202	Mid-term			
10 Lower Pond - remove sediment	Yes - improves water quality, improved hydraulic performance	2	Yes - improves water quality and habitat complexity	1	N/A	0	4	Medium	50	Medium (\$25k)	100	154	Short-term			
11 Sedimentation facility up or downstream of ponds, with good access	Yes	2	Yes - improves water Quality	1	N/A	0	4	Medium	50	Medium (\$25k)	100	154	Mid-term			
12 Lower Pond - Create channel to convey flows at suitable rate to reduce sediment deposition	Yes - improve water quality, reduces maintenance	2	Yes - Improves habitat values	2	Yes - channel could improve safety	1	9	High	100	High (\$75k+)	0	109	Mid to long-term			
13 Upper Pond - Remove sediment	Yes - improves water quality	1	Yes - improves water quality	1	N/A	0	3	Low	0	Medium (\$25k)	100	103	Short-term			
14 Upper Pond - Establish defined channel	No - would not meet objectives	-1	Yes - improves water quality and habitat	1	May reduce waterfowl feeding opportunities	-1	-2			High (\$35k)			Mid to long-term			
15 Upper Pond - completely infill pond	No impact	0	No	-2	Neutral - pond lost but potential new use	0	-4			Medium (\$50k)			Mid to long-term			
16 Lower Pond - completely infill pond	Negative impact	-1	No	-2	Neutral - pond lost but potential new use		-5			Medium (\$75k)			Mid to long-term			
							4.85	Average								



## 4.0 Implementation Plan

The key to implementation of a strategy such as this is prioritization of actions, in such a way that roles, responsibilities and funding are clear. This section provides the Action Plan for Sendall Gardens, suggests further studies and detailed plans that are required in the future, implementation considerations, and a recommended design and construction schedule.

### 4.1 Action Plan

The Action Plan presented in Table 16 provides a summary of the various projects that are recommended to address the pond goals and objectives outlined in Section 3.1. The plans include a combination of undertakings along with the associated timeframe, responsible City department, level of importance (requirement vs. enhancement), required studies/next steps, and an estimate of capital and operations and maintenance costs.

The elements of the Action Plan were developed based on the following understanding and assumptions:

- i) The summary of work included in the status quo section (*i.e.*, no capital improvements) is based on information provided by Parks Operations staff;
- ii) Where possible, construction activities will be carried out by Engineering and/or Parks Operations staff, with labour rates estimated at \$50/hour per;
- iii) Surplus sediment excavated from the pond base or otherwise will be managed on-site or other City lands, as transportation and landfill disposal is prohibitively costly (approximately \$600/m<sup>3</sup> for sediment) – preliminary investigations indicate that the sediment is considered non-hazardous, however, confirmatory sampling during sediment removal may be required;
- iv) Annual operations and maintenance (O&M) activities will be carried out by Engineering/Parks operations staff; and
- v) Estimated costs are based on 2013 dollar values and include a 20% engineering allowance as well as a 15% contingency.







Table 16. Action Plan and Cost Breakdown for Sendall Gardens Ponds

Project Objective	Implementation Details					Estimate of Costs <sup>1</sup>							
	Summary of Work	Timeframe <sup>2</sup>	Responsibility	Importance	Required Studies/ Next Steps	Units	Quantity	Unit Rate	Capital Cost (A)	Engineering & Contingency <sup>3</sup> (B)	Total (A+B)	Annual O&M <sup>4</sup>	Notes
Status Quo (i.e., No Capital Improvements)	- Vegetation control along pathways.	Ongoing	Parks	Requirement	N/A	-	-	-	-	-	\$0	\$2,000	Vegetation pruning and brush removal - O&M costs estimated at 10 hrs x \$200/hr for 4 person Parks crew.
Sub-total									\$0	\$0	\$0	\$2,000	Estimated costs to maintain 'Status Quo'.
1. Improve Public Safety & Security	- Install additional signage, lighting, etc. to improve safety and prevent vandalism.	Short-term	Parks	Requirement	N/A	LS	1	\$3,000	\$3,000	\$1,050	\$4,050	\$500	City could consider limiting public use to daytime hours. O&M costs for routine maintenance.
	- Install wooden split rail fence between pathway and lower pond.	Short-term	Parks	Requirement	Functional engineering design	lm	50	\$75	\$3,750	\$1,313	\$5,063	-	Approximately 1.2 m height pine or cedar fencing.
2. Pathway Network Enhancements	- Realign and raise pathways through placement of approx. 150mm of granular material.	Short-term	Parks	Enhancement	Functional engineering design	m <sup>2</sup>	200	\$100	\$20,000	\$7,000	\$27,000	\$1,000	Quantity based on 100m length of pathway at 2m average width. O&M costs for pathway maintenance.
	- Install ditching at toe of slopes along pathways.	Short-term	Parks	Requirement		lm	100	\$50	\$5,000	\$1,750	\$6,750	\$400	Proposed ditch to consist of 0.3m v-bottom vegetated ditch. O&M costs for periodic maintenance (i.e., debris/ sediment removal, etc.) - 2 hrs x \$200/hr for 2 person Parks crew.
	- Install culverts beneath pathway at strategic locations.	Short-term	Parks	Requirement		lm	20	\$150	\$3,000	\$1,050	\$4,050	\$200	Assumed 4 x 150mm diameter PVC culverts (5m length) with jute bag headwalls. O&M costs for periodic maintenance (i.e., debris/ sediment removal, etc.).
	- Place riprap along edge of path where eroding due to proximity to Muckle Creek.	Short-term	Parks	Requirement		m <sup>3</sup>	2	\$100	\$200	\$70	\$270	-	Riprap protection to be underlain with non-woven geotextile.
	- Install rip-rap lining between edge of pond and pathway.	Short-term	Parks	Enhancement		m <sup>3</sup>	10	\$100	\$1,000	\$350	\$1,350	-	To stabilize slope and provide erosion protection.
3. Improve Hydraulics/ Aesthetics & Reduce Future Maintenance	- Construct low-flow channel within lower pond through excavation/re-grading of accumulated sediment.	Short-term	Parks	Enhancement	Functional engineering design	m <sup>3</sup>	250	\$20	\$5,000	\$1,750	\$6,750	\$500	Quantity based on 75m long trapezoidal channel with bottom width of 2m at average depth of 1.5m. O&M costs for removal of debris, sediment, etc. - to be disposed of at City operations yard.
	- Re-grade sediment to form benches between low-flow channel and perimeter of pond.	Short-term	Parks	Enhancement		m <sup>2</sup>	200	\$25	\$5,000	\$1,750	\$6,750	-	To be stabilized through dewatering, addition of suitable fill material, and planting of native wetland vegetation.
	- Reconfigure rock weir outlet system.	Short-term	Parks	Enhancement		LS	1	\$1,000	\$1,000	\$350	\$1,350	-	Proposed outlet to consist of improved rock weir structure.
Sub-total									\$46,950	\$16,433	\$63,383	\$2,600	Total costs for proposed improvement works.
TOTAL									\$46,950	\$16,433	\$63,383	\$4,600	ESTIMATED TOTAL COSTS

**Notes:**

1. Estimated costs are based on 2013 dollars and are exclusive of applicable taxes.
2. Engineering and contingency allowances are 20% and 15%, respectively.
3. Average labour rates assumed to be \$50/hr for Parks Operations staff.
4. Timeframe defined as: short-term (0-5 years) and long-term (>5 years).



## 4.2 Description of Proposed Improvement Works

A description of each of the proposed improvement works that comprise the Action Plan for Sendall Gardens is provided below.

### 1. Improve Public Safety & Security

It is proposed that additional signage and lighting are installed to improve safety, reduce vandalism, and offer educational information related to the function and ecologic features of the pond and surrounding areas. It is expected that the locations and other details would be determined through discussions between the Parks and Engineering departments and in consultation with the public.

In addition to the above, it is recommended that fencing (e.g., split-rail) is installed between the lower pond and the pathway along its eastern bank to improve safety for park users. As an alternative, suitable vegetation and/or boulders could be considered.

### 2. Enhance Pathway Network

Significant portions of the pathway network within the lower portion of Sendall Gardens experience water related issues due to a lack of drainage infrastructure. To convey surface and groundwater flows from up-gradient areas, it is proposed that the following measures are undertaken where issues exist:

- Raise pathways through the placement of additional granular material;
- Create shallow ditches at the toe of slopes to capture and convey runoff; and
- Install cross-culverts to convey flows beneath pathway at various locations.

In addition, erosion of the edge of the gravel pathway is occurring at multiple locations where Muckle Creek flows adjacent to the trail. It is proposed that rip-rap is placed at these locations to divert flows away from the pathway and provide protection against further erosion.

### 3. Improve Hydraulic Performance/Aesthetics & Reduce Future Maintenance

As noted in Section 2.4, a considerable volume of sediment has accumulated within the lower pond, which has affected its appearance and hydraulic performance. To address the current issue and reduce future maintenance efforts, it is proposed that the sediment is re-graded to form a terraced low-flow channel within the central portion of the pond. The resulting channel configuration would lower the potential for sediment accumulation by maintaining a sufficient flow velocity through the pond.

In combination with the above-described works, the proposed concept would involve the stabilization of the sediment material with the addition of topsoil and native, wetland vegetation that provides erosion protection in the event of higher flows and enhances the aesthetic value of the pond.



It is also proposed that the existing rock weir should be reconfigured as part of the proposed concept to improve the hydraulic performance of the lower pond. This would involve moving some of the existing rocks and could potentially include the placement of additional larger stones as well as stabilization measures to prevent future movement of these materials.

### 4.3 Further Studies or Detailed Plans

This section highlights additional studies or detailed plans that may be required but are outside of the scope of the Management Strategy.

Additional Studies/Plans	Responsibility	Cost Estimate
Integrated Stormwater/Watershed Management Plan for the Upper Nicomekl River watershed.	City of Langley/ Township of Langley/ City of Surrey	\$400,000
Integrated Stormwater/Watershed Management Plan for Muckle Creek.	City of Langley	\$100,000
Sendall Gardens Park Master Plan	City of Langley	\$50,000

### 4.4 Implementation Considerations

#### 4.4.1 Funding and Funding Options

Stormwater Management Levy or Utility – a specific levy or utility could be established to fund proposed SWM infrastructure within the Study Area. These funds could be collected in the form of a levy added to municipal property taxes, based on the contributing imperviousness and land use of individual properties, or could consist of a separate utility applied to property taxes.

Provincial or Federal Infrastructure Funding – the provincial and federal governments currently provide infrastructure funding that could be applicable to the proposed pond improvements. These include, but may not be limited to the Infrastructure Canada Program, the Canadian Strategic Infrastructure Program, the Canada/BC Infrastructure Program, the Canada-BC Municipal Infrastructure Fund, the Community Recreation Program, the Infrastructure Planning Grant Program, and others that provide funding for projects for urban and sustainable development initiatives.

#### 4.4.2 Approval Process

Any modifications to the Sendall Gardens ponds or change in their configuration will require review by the environmental regulatory agencies. Fisheries and Oceans Canada will review any proposed alteration under Section 35 of the *Fisheries Act* (as the law is currently applied). The provincial Ministry of Forests, Lands and Natural Resource Operations will review under Section 9 of the *Water Act* and/or Section 7 of the *Water Regulation*. The expected review process and the specific requirements of any approval documents will depend on the nature and extent of the proposed alterations.