

Horne Pit Biophysical and Proposed Development

Submitted to: Little Campbell Watershed Society (LCWS)
and
The Corporation of the Township of Langley

Submitted by: Gordon Smith, Environmental Planning and
Site Design, Aldergrove
and
Strix Environmental Consulting, Fort Langley

March 14, 2001

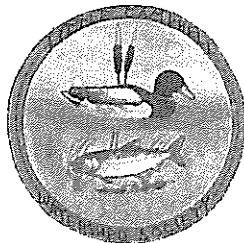


Table of Contents

1.0 Background	1
2.0 Site Overview	1
2.1 General.....	1
2.2 Aggregate Extraction Bylaws.....	2
2.3 Proposed Land Use.....	3
3.0 Biophysical Description	3
3.1 Geology, Hydrogeology and Soils.....	3
3.2 Vegetation.....	4
3.2.1 General.....	4
3.2.2 Disturbed Open Areas.....	5
3.2.3 Forests.....	7
3.2.3.1 Peripheral Forests.....	7
3.2.3.2 Forested Berms.....	7
3.2.3.3 Interior Forests.....	8
3.2.4 The Wetlands.....	9
3.2.4.1 West Pond.....	9
3.2.4.2 Middle Pond.....	9
3.2.4.3 North Pond.....	10
3.2.4.4 East Pond.....	10
3.2.5 Rare and Endangered Plants.....	11
3.3 Animals.....	11
3.3.1 Mammals.....	11
3.3.2 Birds.....	12
3.3.3 Amphibians.....	13
3.3.4 Reptiles.....	13
3.3.5 Fish.....	13
3.3.6 Rare and Endangered Animals.....	13
4.0 Ecological Implications	13
4.1 Management Issues.....	14
5.0 Key Environmental Attributes and Recommendations	14
6.0 Key Planning Objectives and Recommendations	16
7.0 Township and LCWS Involvement	16
8.0 Public Participation	17
9.0 References Cited	17
10.0 Personal Communications	18

List of Tables

Table 1 – Plants of disturbed open areas.....	6
Table 2 – Plants of the interior forests.....	8
Table 3 – Plants of the East Pond.....	10
Table 4 – Birds of fields, forests and edge.....	12
Table 5 – Water-associated birds of Horne Pit.....	12

1.0 BACKGROUND

The Little Campbell Watershed Society (LCWS) commissioned this report through a grant from the Urban Salmon Habitat Program (USHP). The LCWS became a Society on November 30, 1998. Its membership includes landowners who live adjacent to the stream; the Semiahmoo Hatchery; White Rock Surrey Naturalists; GVRD Parks; Langley Environmental Partners Society (LEPS); Semiahmoo First Nations; Ministry of Environment Lands and Parks (MELP); and Department of Fisheries and Oceans (DFO).

The LCWS wishes to see Horne (Gravel) Pit restored and developed as a Municipal park in a manner that respects existing wetland and wildlife values. This report provides a biophysical inventory of the site, and indicates the surrounding land use as well as the proposed development of the gravel pit. The document is intended to provide a basis for detailed site planning, design and rehabilitation of the gravel pit. A number of recommendations are included in Sections 5 and 6 of the report.

2.0 SITE OVERVIEW

2.1 GENERAL

Horne Pit is located between 196th and 200th Streets at 26th Avenue, which is an undeveloped road right-of-way that runs through the middle of the site. (Figure 1. Location Plan). The total area of the site is 27.38 hectares. No exact dates are available as to when gravel extraction occurred, but vegetation growth on the extracted area suggests that the bulk of the gravel was removed 25 to 30 years ago. Minor gravel extraction continued up until 1990 (Clive Roberts, pers. comm.). The Township of Langley introduced a bylaw to regulate gravel extraction in the Township in August 1988.

The site is located on the south fringe of the Brookwood residential area, and is zoned Suburban Residential (SR2). A number of residential properties surround the site. All of these are on wells and septic systems, as there are no water and sewer services in the area. A poultry farm abuts the southwest corner of the site, and 196th Street — the boundary between the Township of Langley and the City of Surrey — forms the western edge of the site. The adjacent property in Surrey is Stokes Pit, a large unrehabilitated gravel pit for which is proposed a future industrial park called Campbell Heights.

The Brookwood/Fernridge Community Plan (1997) indicates an ultimate population forecast for the area of approximately 35,000 people. This will include 30,000 living in single family homes, 3,000 living in townhouses or mobile homes, and 2,000 living in apartments. A commercial core is planned for the 200th Street and 32nd Avenue area. The objective is to provide a focal point for the community which will offer retail, commercial, and personal, services and offices.

Neighbourhood commercial areas providing shopping facilities for common daily requirements are planned at 40th Avenue and 200th Street. The Fernridge commercial area at 24th Avenue and 200th Street will be expanded. A service commercial area is planned for the

area occupied by the poultry farm, for sales of such things as building supplies, motor vehicles, auto parts, farm equipment, and for warehousing. A school and park are proposed within Horne Pit. The Little Campbell River is protected as a Conservation Area.

Gartner Lee Limited completed a study in December 1990, for the Township of Langley, titled "Aggregate Resource Evaluation" (Gartner Lee 1990). Much of the following information is from that report.

The site is relatively flat, with a gentle slope to the south. Three large ponds which resulted from extracting gravel below the water table, and a smaller beaver pond, are present. The ponds are connected and form a large wetland that drains from the south end of the eastern-most pond into the Little Campbell River. There are mounds of topsoil and other piles of debris throughout the site.

The site is becoming well vegetated with black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), red alder (*Alnus rubra*), Himalayan blackberry (*Rubus armeniacus*) and grasses. The wetlands are filling in with common cattail (*Typha latifolia*) and other aquatic species. Erosion does not appear to be a problem. A number of trails and access roads appear to be used for recreation by local residents. The Gartner Lee study (Gartner Lee 1990) states that minor leveling and landscaping of recently placed fill areas, and the provision for public access to the site, would be a benefit to the community.

2.2 AGGREGATE EXTRACTION BYLAWS

The Township of Langley Soil Removal Bylaw Number 2499 has a number of specifications that must be met:

- Final excavation slopes must not be steeper than 2 horizontal to 1 vertical or steeper than the natural angle of repose of the soil mass, whichever is flatter.
 - This criterion seems to have been met on all the perimeter slopes.
- A buffer zone shall be maintained around the perimeter of each soil removal project. No soil or existing trees shall be removed from within 45 metres of a property line adjacent to a public roadway or undeveloped right of way, nor within 15 metres of any other property boundary, except where clearing and grading within the buffer area has been specified on the Reclamation Plan and has been shown to be to the benefit of the future use of the lands.
 - This criterion has been met around the perimeter of the site. A buffer zone has not been left along the undeveloped right-of-way; to do so would not have been beneficial to the future use of the lands.
- No excavation shall be undertaken within 10 metres of any private right-of-way or utility easement.
 - No private right-of-ways for utility easements are existing on the site.
- Aggregate resources shall not be excavated beyond a maximum depth that would result in less than a 1 metre thickness of soil cover above the historical high groundwater elevation in the area.
 - Excavation did proceed beyond the 1 metre soil cover and resulted in the wetlands.

- Temporary excavations below the water table may be permitted for a period not exceeding 6 months, and only if the excavation is to be back-filled with suitable, approved material within the said period of six months, and the proposed temporary excavation and the fill material will not affect the proposed future use.
- This criteria has not been met, and the resulting wetlands are now significant habitat for fish, other animals, and plants. Therefore, it should not be back-filled.

2.3 PROPOSED LAND USE.

There is a lack of active park facilities in the Fernridge / Brookswood area (Al Neufeld, pers. comm.). The Township of Langley Parks and Recreation Department would like to see Horne Pit developed into a community park. "Fernridge Community Park" would be developed in conjunction with a Secondary School for approximately 1,000 students. The school and park development may not be required for 10 to 15 years; however, work could be done in the short term to help facilitate the long term development and to enhance the natural aspects of the site.

The site development plan shows that the northern half of the gravel pit would be developed as soccer and baseball fields, and other park facilities. The southern portion containing the wetlands, which are now fish habitat, would remain largely in a natural state with some trails and viewpoints established.

The following elements are proposed for the park (See Preliminary Concept Plan):

- Entrance off 200th Street
- Parking for park users and students
- One all-weather soccer field
- Six tennis courts
- Four baseball diamonds
- Four soccer fields
- A group picnic area and a family picnic area
- An Interpretive Centre
- Trails with potential to connect to Surrey's trail system
- Retained and enhanced wetlands and forested area
- A service road leading from the parking lot (required to facilitate the operations and maintenance of the sports fields).

The Secondary School with staff parking is proposed to be located north of the proposed park, with access off 28th Avenue. At present this is private land.

3.0 BIOPHYSICAL DESCRIPTION

3.1 GEOLOGY, HYDROGEOLOGY AND SOILS

The remaining gravel resources consist primarily of sand material approximately 1 metre thick in the excavated area. Well records indicate that the gravel horizon was approximately 4 m thick in this area prior to mining, and that the gravel is underlain by 9 m of river sand containing minor amounts of gravel. Most of the sand horizon lies below the water table.

Soils of the site are Columbia soils developed from glaciofluvial deposits¹ (Luttermerding 1980). These soils have a thin layer (< 5 cm) of forest litter underlain by a thin layer (< 2 cm) of sand-loam which, in turn, is underlain by layers comprised predominantly of loose gravel and gravelly sand. Stones and cobbles occur throughout all layers. These soils have a low water holding capacity which results in droughtiness towards the end of the growing season. The soils range from strongly acidic in the surface layer to medium or slightly acidic in the lower soil layers. They are considered moderately productive for forests.

The water table is very close to the surface in the excavated portion of the site. The Gartner Lee study (Gartner Lee 1990) showed that water was encountered in all test pits within 1.5 m of the surface. Three large water bodies occur as a result of gravel extraction below the water table. The site is almost completely extracted above the water table, and most of the remaining resources consist of river sand quality material. Approximately 632,000 cubic metres of sand could be extracted from the site, but most of the sand would be extracted from below the water table. The Gartner Lee report states that further resource development on this property is not recommended.

3.2 VEGETATION

3.2.1 GENERAL

To classify British Columbia ecosystems, the government of British Columbia uses the *Biogeoclimatic Ecosystem Classification (BEC)*, a system that incorporates ecosystem components such as climate, topography, soil and vegetation characteristic of late seral or near climax stages. Using this system, areas with similar ecological attributes and potential are grouped together. The study area, and most of Langley, lies within the CWHxm1, or *Very Dry Coastal Western Hemlock Subzone, Eastern variant* (Green and Klinka 1994; Nuszdorfer and Boettger 1994). In this biogeoclimatic unit, late successional sites are characterized by forests dominated by Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*). Typical shrub species include salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), and red huckleberry (*Vaccinium parvifolium*) (Green and Klinka).

The study area is highly disturbed from gravel extraction and as a result is comprised of numerous vegetation communities reflecting both the time and type of disturbance. The ponds within the south portion of the gravel pit developed from extensive gravel extraction that extended below the water table, and ceased about 25 years ago (Clive Roberts pers. comm.). The ponds are connected by channels which together form an extensive wetland area that comprises the south half of the Township property. This wetland discharges into the Little Campbell River through a small tributary. The ponds recharge from groundwater and precipitation and are therefore influenced by the surrounding landform and landscape features. Thus, an assessment of the environmental features of the area surrounding the wetland is important to assess the wetland which, because it discharges into the Little Campbell River, is the main focus of this study.

Four ponds are present in the southern portion of the Township property. They are joined by small channels and drain to the easternmost wetland (East) which discharges south through a

¹ glaciofluvial – deposits from streams flowing from glaciers

small tributary into the Little Campbell River. Some channels are meandering and complex, with deep pools, shallows, and gravel/rock substrates, while others are straight "ditches" with no pools or muddy substrate. The two large west ponds (West and Middle ponds), which had little open water in October, support a dense cover of emergent vegetation. The largest, East pond has more open water and extensive areas and small islands of emergent vegetation. Water level in this pond appears to be influenced by beaver dams at the south end. A large dam extends almost completely across the wetland just north of the outflow. A small, recent beaver dam was present across the outflow tributary on October 11.

An additional pond is located north of the Middle Pond in a forested area between the north ends of the West and East Ponds. This pond — henceforth referred to as the North Pond — is smaller in area than the others, but appears deeper and supports little emergent vegetation.

Large earthen berms are present along the east and west sides of portions of the West, Middle and East ponds. Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and red alder (*Alnus rubra*) are the most abundant trees on these berms. A high bank, approximately five metres tall, marks the south terminus of gravel extraction south of the West and Middle ponds. The forest atop this bank supports much Douglas-fir and is indicative of the forest that dominated this site before gravel extraction. This narrow forested section separates the Township property from the private properties and the Little Campbell River to the south.

The northern portion of the property is presently used for storing various materials such as rocks, logs, concrete, asphalt, and soils. Dead animals found within the Township are also deposited there. This open area supports stands of small red alder and black cottonwood, particularly in the eastern portion. Many exotic plants grow in the openings. A narrow buffer of native vegetation, including regrowth from recent clearing, separates the north edge of the Township property from adjacent private property. A forested buffer approximately 50 m wide, and comprised predominantly of Douglas-fir, separates the clearing from 196th Street and the City of Surrey to the west.

Most of the forests located within the property are stands of young trees regrowing over recent clearings. Many are strewn with debris such as asphalt and gravel piles that are slowly being obscured by the vegetation. The oldest forests in the extracted area are approximately 25 years old and consist of deciduous trees from 20 to 25 m tall. Younger stands of very dense 6 or 7 year old alders and cottonwoods about 5 to 6 m tall are common, especially around the West and Middle Ponds.

The main focus of this report is the effect of the Horne Pit resources, and future proposed modifications to these resources, on the Little Campbell River. Since the ponds and watercourses discharge into the Little Campbell River, and these ponds and watercourses are influenced by the clearings and forests that surround them, the entire site must be considered to accurately assess present and future environmental conditions.

3.2.2 DISTURBED OPEN AREAS

The north portion of Horne Pit is the most recently disturbed. Service roads provide access to vehicles that dump materials for storage or disposal. Piles of recently deposited soil and turf are present in the northwestern clearing.

The east half of this cleared area supports small stands of regenerating red alder. Plants growing in these openings, around the forest edges, beside roads, and on piles of soil, are

plants typical of highly disturbed sites. Most of these are exotics (non-natives), many of which have the capacity to spread rapidly, thereby hindering growth and establishment of native species. However, this is not problematic until a change is made in the way in which the land is managed; that is, until the land is managed for native environmental characteristics. Some plants, such as *Lobelia*, are commonly cultivated garden plants which have been introduced with imported materials. Common species of this open, disturbed area, are listed in Table 1.

Table 1 – Plants of disturbed open areas.

<i>Alnus rubra</i> – small	red alder
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i> – small	black cottonwood
<i>Cytisus scoparius</i>	Scots broom
<i>Rosa nutkana</i>	Nootka rose
<i>Rubus armeniacus</i>	Himalayan blackberry
<i>Spiraea douglasii</i>	hardhack
<i>Anaphalis margaritacea</i>	pearly everlasting
<i>Chenopodium album</i>	lamb's-quarters
<i>Cirsium arvense</i>	Canada thistle
<i>Cirsium vulgare</i>	bull thistle
<i>Convolvulus arvensis</i>	field bindweed
<i>Digitalis purpurea</i>	common foxglove
<i>Hypochoeris radicata</i>	hairy cat's-ear
<i>Lactuca serriola</i>	prickly lettuce
<i>Lathyrus latifolius</i>	broad-leaved peavine
<i>Leucanthemum vulgare</i>	oxeye daisy
<i>Lotus micranthus</i>	small-flowered birds-foot trefoil
<i>Matricaria discoidea</i>	pineapple weed
<i>Matricaria recutita</i> (probably)	wild chamomile
<i>Plantago lanceolata</i>	ribwort
<i>Plantago major</i>	common plantain
<i>Polygonum aviculare</i>	common knotweed
<i>Polygonum hydropiper</i>	marshpepper smartweed
<i>Ranunculus repens</i>	creeping buttercup
<i>Rorippa palustris</i>	marsh yellow cress
<i>Rumex crispus</i>	curled dock
<i>Sonchus asper</i>	prickly sow-thistle
<i>Tanacetum vulgare</i>	common tansy
<i>Thlaspi arvense</i>	field pennycress
<i>Trifolium pratense</i>	red clover
<i>Trifolium repens</i>	white clover
<i>Urtica dioica</i>	stinging nettle
<i>Vicia cracca</i>	tufted vetch
<i>Vicia</i> sp.	vetch
<i>Equisetum arvense</i>	common horsetail
<i>Phalaris arundinacea</i>	reed canarygrass
Grass	other grasses
<i>Juncus effusus</i>	common rush

3.2.3 FORESTS

3.2.3.1 *Peripheral Forests*

Vegetation composition along the property boundary varies with topography and disturbance history. The oldest, conifer-dominated forests are located on the periphery of the Horne Pit property and form a buffer between the pit and adjacent private property and roads. Other portions of these peripheral forests are much younger, and are comprised primarily of black cottonwood and red alder, such as those growing on the berms that demarcate the property boundary. The greatest concentration of conifers is present in the buffer at the northwest corner of the property. The largest Douglas-firs are located within the north forest buffer approximately 250 m east of 196th.

The strip of forest separating 196th Street from the open pit is approximately 50 m wide and comprised almost entirely of Douglas-fir, with a few scattered paper birch (*Betula papyrifera* var. *commutata*), red alder and western redcedar. Vine maple (*Acer circinatum*) and trailing blackberry (*Rubus ursinus*) are abundant throughout this forest, while dull Oregon-grape, salal (*Gaultheria shallon*) and coastal red elderberry (*Sambucus racemosa* ssp. *pubens* var. *arborescens*) grow in scattered patches. Other shrubs present in small numbers include orange honeysuckle (*Lonicera ciliosa*), red huckleberry (*Vaccinium parvifolium*), false azalea (*Menziesia ferruginea*), cascara (*Rhamnus purshiana*), and three exotic species: European mountain-ash (*Sorbus aucuparia*), English holly (*Ilex aquifolium*) and cherry-laurel (*Prunus laurocerasus*). Sword fern (*Polystichum munitum*) and bracken fern (*Pteridium aquilinum*) are present in the understory. Common mosses include *Dicranum scoparium*, *Eurynchium oregana*, *Rhytidiadelphus loreus* and *Rhytidiadelphus triquetrus*. This forest is the site's closest approximation to the climax community typical of the CWHxm1 biogeoclimatic unit.

The strip of forest that forms the north edge near the east boundary of the property consists of mixed large black cottonwood and Douglas-fir. The remaining border forests are, for the most part, re-generating deciduous forests on recently disturbed land. Other species growing in these mature peripheral forests include black raspberry (*Rubus leucodermis*) and oceanspray (*Holodiscus discolor*).

3.2.3.2 *Forested Berms*

Excavated earth was used to form large berms along the north property boundary, as well as between the interior ponds. These berms are similar in age and structure, and in the species they support. The berm along the east side of the East Pond was examined in detail. It supports a rich assemblage of native plants, although Himalayan blackberry is very abundant at its foot, along the water's edge. Black cottonwood is the most abundant tree; red alder and bigleaf maple (*Acer macrophyllum*) are less abundant. Oceanspray is the most abundant shrub and favours higher portions of the berm. Trailing blackberry is the second most abundant shrub. Coastal red elderberry, common snowberry (*Symphoricarpos albus*), salmonberry, and dull Oregon-grape are also quite common, although salmonberry tends to occur most frequently in the lower portion of berm, next to the adjacent forest in which it is dominant. Beaked hazelnut (*Corylus cornuta*), Indian-plum (*Oemleria cerasiformis*), and red huckleberry are present in small numbers. One introduced evergreen blackberry (*Rubus laciniatus*) was observed. Spiny wood fern (*Dryopteris expansa*), sword fern, youth-on-age, and the introduced Robert geranium (*Geranium robertianum*) are present in the herb-layer.

3.2.3.3 Interior Forests

The regenerating forests of the interior portions of the property are similar in composition but different in age and size. In the forest adjacent to and east of the East Pond, adjoining the berm, red alder and black cottonwood far outnumber the smaller, scattered bigleaf maples and Douglas-firs. Introduced species such as common hawthorn (*Crataegus monogyna*) and black locust (*Robinia pseudo-acacia*) are also present. The common hawthorns occur as lone scattered specimens. The black locusts occur in groups near the north edge of forest by the open gravel pit. Himalayan blackberry occurs most frequently in forest edge. English ivy (*Hedera helix*), another introduced species, is present on some black locusts. Mosses found here include *Rhytidiadelphus loreus*, *Polytrichum juniperinum* and *Dicranum scoparium* on a rotting cedar stump, and *Rhytidiadelphus loreus*, *Rhytidiadelphus triquetrus*, *Eurynchium oregana*, and *Brachythecium asperinum* scattered on the forest floor.

Interior forest understory is characterized by dense growth of salmonberry, trailing blackberry, and Indian-plum, with a few coastal red elderberry and oceanspray.

The process of forest regeneration in Horne Pit is impressive given that the area wasn't prepared for planting; nor was it planted. As well, the forest floor consists of many mounds of earth and gravel, and piles of debris such as asphalt, none of which constitute ideal growing substrate.

Exotic plants are more abundant in the forest edge and surrounding open areas than in the forest interior. Table 2 presents plants observed for forests of all sizes, shapes and locations in the Horne Pit property.

Table 2 – Plants of the interior forests.

<i>Acer macrophyllum</i>	bigleaf maple
<i>Alnus rubra</i>	red alder
<i>Betula papyrifera</i> var. <i>commutata</i>	paper birch
<i>Crataegus monogyna</i>	common hawthorn
<i>Pinus contorta</i> var. <i>latifolia</i>	lodgepole pine
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	black cottonwood
<i>Pseudotsuga menziesii</i>	Douglas-fir
<i>Robinia pseudo-acacia</i>	black locust
<i>Thuja plicata</i>	western redcedar
<i>Acer circinatum</i>	vine maple
<i>Corylus comuta</i>	beaked hazelnut
<i>Gaultheria shallon</i>	salal
<i>Hedera helix</i>	English ivy
<i>Ilex aquifolium</i>	English holly
<i>Lonicera ciliosa</i>	orange honeysuckle
<i>Mahonia nervosa</i>	dull Oregon-grape
<i>Menziesia ferruginea</i>	false azalea
<i>Oemleria cerasiformis</i>	Indian-plum
<i>Prunus laurocerasus</i>	cherry-laurel
<i>Rhamnus purshiana</i>	casacara
<i>Rubus armeniacus</i>	Himalayan blackberry
<i>Rubus laciniatus</i>	evergreen blackberry
<i>Rubus leucodermis</i>	black raspberry
<i>Rubus spectabilis</i>	salmonberry
<i>Rubus ursinus</i>	trailing blackberry
<i>Sambucus racemosa</i> ssp. <i>pubens</i> var. <i>arborescens</i>	coastal red elderberry
<i>Spiraea douglasii</i>	hardhack
<i>Symphoricarpos albus</i>	common snowberry
<i>Vaccinium parvifolium</i>	red huckleberry

Table 2 cont. – Plants of the interior forests.

<i>Chenopodium album</i>	lamb's-quarters
<i>Cirsium arvense</i>	Canada thistle
<i>Digitalis purpurea</i>	common foxglove
<i>Geranium robertianum</i>	Robert geranium
<i>Lactuca muralis</i>	wall lettuce
<i>Plantago major</i>	common plantain
<i>Polygonum aviculare</i>	common knotweed
<i>Tolmiea menziesii</i>	youth-on-age
<i>Urtica dioica</i>	stinging nettle
Grass	grasses
<i>Carex</i> sp.	unidentified sedge
<i>Equisetum arvense</i>	common horsetail
<i>Dryopteris expansa</i>	spiny wood fern
<i>Polystichum munitum</i>	sword fern
<i>Pteridium aquilinum</i>	bracken fern

3.2.4 THE WETLANDS

The south half of Horne Pit consists of a number of ponds connected by channels. Water levels in the ponds fluctuate throughout the year in response to precipitation and beaver activity. The ponds drain eastward to the large East Pond which discharges through a tributary at its south end into the Little Campbell River. The wetlands have a direct impact on the Little Campbell River.

3.2.4.1 West Pond

The long West Pond is aligned north-south, and comprises approximately 0.72 ha in the southwest portion of the property. This pond is shallow with little open water, and an extensive cover of common cattail. In the few small areas where common cattail is absent, spreading rush (*Juncus supiniformis*) forms a thick, low vegetative carpet. The ponded area is dominated by these two species. There is a greater diversity of plants at the edge of the pond. Plants at and near the pond's edge include red alder, black cottonwood, Sitka willow (*Salix sitchensis*), Pacific willow (*Salix lucida* ssp. *lasiandra*), hardhack, Himalayan blackberry, reed canarygrass (*Phalaris arundinacea*), marshpepper smartweed (*Polygonum hydropiper*), large-leaved avens, European bittersweet (*Solanum dulcamara*), small-flowered bulrush (*Scirpus microcarpus*), tapered rush (*Juncus acuminatus*), and possibly slender rush (*Juncus tenuis*). *Calliergonella cuspidata*, a moss that favours wet areas, covers much of the ground along the south edge of the West Pond. A liverwort of the Genus *Riccia* (Adolf Cêska, pers. comm.) is also present, growing upon decaying vegetation.

The West Pond drains into the Middle Pond through two narrow channels located approximately midway along its east side.

3.2.4.2 Middle Pond

The shallow Middle Pond is roughly circular, approximately 1.1 ha. and, like the West Pond, supports extensive growth of common cattail. Common spike-rush (*Eleocharis palustris*) supplants common cattail in and along the edge of a small area of shallow, open water in the

northeast portion of this pond. Plant diversity in the pond itself is low. The pond's edge supports a greater diversity of plants, many of which also occur in the West Pond. Emerged bur-reed (*Sparganium emersum*) is present near the pond edge.

The Middle Pond drains eastward through a large channel that enters the East Pond at approximately midway along its north-south axis. A channel from the north drains into this channel before it reaches the East Pond, carrying water from a deep beaver pond (North Pond) located in a forest block north of the Middle Pond.

3.2.4.3 North Pond

The northernmost pond is small and deep, with no emergent vegetation. It is the smallest pond at approximately 0.08 ha. Water draining from the north part of the property enters the north end of this pond through a small drainage channel. The pond's southeastern outflow is partially blocked by a beaver dam, but the escaping water enters a large drainage channel (3.5 m wide by 0.5 m deep) that connects to the main channel running between the Middle Pond and the East pond. The pond and channel are located in a forest dominated by small red alder and black cottonwood.

3.2.4.4 East Pond

The East Pond is the second largest pond at approximately 0.91 ha. It is long and narrow, and extends from the south edge of the active gravel pit to the south boundary of the property where it discharges into the tributary that drains into the Little Campbell River. In October 2000 it was deeper and had more open water than the Middle and West ponds; however, on January 2, 2001 much of this pond's muddy substrate was exposed, enabling one to walk in areas previously covered with water. The mud consisted of a fine blackish ooze atop a gravelly substrate.

The water level in this pond appears to be controlled by a large beaver dam at its south end that extends across the width of the pond and forces water through an opening along the west side before discharging into the tributary. (A visit on January 22, 2001 revealed that a 4 m wide opening had been created in the middle of this dam by a large, tracked excavator.) In October a second beaver dam had been constructed across this outflow tributary, further raising the water level. The sheltered southeastern portion of the pond behind the dam is regrowing with reed canarygrass (*Phalaris arundinacea*), hardhack and red alder. In the main ponded portion, reed canarygrass, small-flowered bulrush and common rush (*Juncus effusus*) are abundant. Plants associated with the East Pond and its edge are listed in the following table.

Table 3 – Plants of the East Pond.

<i>Salix lucida</i> ssp. <i>lasiandra</i>	Pacific willow
<i>Salix sitchensis</i>	Sitka willow
<i>Salix</i> sp.	willow
<i>Spiraea douglasii</i>	hardhack
<i>Solanum dulcamara</i>	European bittersweet
<i>Geum macrophyllum</i> ssp. <i>macrophyllum</i>	large-leaved avens
<i>Juncus effusus</i>	common rush
<i>Scirpus microcarpus</i>	small-flowered bulrush
<i>Eleocharis palustris</i>	common spike-rush
<i>Typha latifolia</i>	common cattail
<i>Phalaris arundinacea</i>	reed canarygrass

The far north end of the East Pond adjoins the open gravel pit. It is somewhat isolated from the southern portion of the pond by a constriction in pond width approximate 25 m south of the north end. Although there is a ditch connected to this area at the extreme northeast, this portion of the pond appears somewhat stagnant and of poorer quality than the major pond area located south of the constriction. Based on this observation and on its proximity to the open gravel pit, it is felt that filling in this portion would not significantly reduce the ecological value of the East Pond, or of the site. Filling in this portion — and creating a vegetation buffer — should increase water filtering capacity and reduce potential sedimentation and contamination from the adjacent open pit. The role of the ditch entering this pond should be determined before the area is filled. The ditch may no longer serve the same function for which it was created. The ditch was dry during field work for this study, but in the past it seemed to flow from a spring originating in the northeast portion of the property (Bob Oswald, pers. comm.). If it was determined that it is still important to site drainage, there may be opportunities to re-route, re-contour, and “naturalize” this ditch.

Any filling would have to be conducted with the approval of the Ministry of Environment, Lands and Parks (MoELP) and the Department of Fisheries and Oceans (DFO). It would be prudent to conduct a more detailed assessment of this portion of the pond and the inflowing ditch before filling them. This assessment should involve water quality sampling, surveys for fish and other wildlife potential, and a comparison of these values to values from other portions of the East Pond and the site.

3.2.5 RARE AND ENDANGERED PLANTS

No rare or endangered plants were found during site visits on September 12, October 10 and 11, and January 2 and 22. The BC Conservation Data Centre provided three records for Red- and Blue-listed plants found nearby. One of the two records for false-pimpernel (*Lindernia dubia* var. *anagallidea*), a Red-listed water-associated plant, confirms its presence in 1978 in an old gravel pit in Langley at the end of 197A Street. This would appear to coincide with Horne Pit although the UTM coordinates put it in the site of the present trailer park south of 24th Avenue. In either case, this record suggests this species may occur at Horne Pit. Preservation of the wetlands will provide potential habitat for this species, as it favours “wet, sandy or muddy sites” (Douglas *et. al.* 1998).

3.3 ANIMALS

No specific animal surveys were conducted at Horne Pit for this study. Notes were taken on all species observed, and LEPS provided information on fish.

3.3.1 MAMMALS

Beaver (*Castor canadensis*) are active in the East Pond where they continue to build dams across the outflow at the south end. A beaver skeleton, almost completely stripped of flesh, was found January 2, 2001 alongside the channel approximately 15 m south of the North Pond. On the same day, the skinless carcass of a mink (*Mustela vison*) was found at the forest edge along the derelict roadway northeast of the Middle Pond, and the headless carcass of a recently killed unidentified rodent — probably a deer mouse (*Peromyscus maniculatus*)² —

² dark grey pelage with white hairs on flank and belly. Tail approximately 90 cm; body (excluding tail) approximately 80 cm (most of the head was removed). Possibly a juvenile.

was found in the forest just south of the North Pond. Raccoon tracks were present along the north edge of the West Pond. A coyote (*Canis latrans*) den is present on the east face of the berm along the east side of the East Pond. Another possible den site is located on the berm on the west side of the East Pond near a beaver run. Mule deer³ (*Odocoileus hemionus columbianus*) have been reported in Horne Pit (Clive Roberts, pers. comm.), and observed during this study. Many scat piles are present in the open area of tall reed canarygrass along the edge of the north forest strip.

3.3.2 BIRDS

The birds presented in Table 4 were observed within the forests, forest edges, or openings in Horne Pit on September 12⁴, October 10, 11, 2000 and January 2, 2001.

Table 4 – Birds of fields, forests and edge

Cooper's hawk	<i>Accipiter cooperii</i>
northern flicker	<i>Colaptes auratus</i>
Steller's jay	<i>Cyanocitta stelleri</i>
northwestern crow	<i>Corvus caurinus</i>
black-capped chickadee	<i>Poecile atricapillus</i>
Bewick's wren	<i>Thryomanes bewickii</i>
winter wren	<i>Troglodytes troglodytes</i>
golden-crowned kinglet	<i>Regulus satrapa</i>
ruby-crowned kinglet	<i>Regulus calendula</i>
Swainson's thrush	<i>Catharus ustulatus</i>
American robin	<i>Turdus migratorius</i>
spotted towhee	<i>Pipilo maculatus</i>
song sparrow	<i>Melospiza melodia</i>
house finch	<i>Carpodacus mexicanus</i>
pine siskin	<i>Carduelis pinus</i>

Birds associated with the wetlands are listed in Table 5. The greater yellowlegs (*Tringa melanoleuca*), belted kingfisher (*Ceryle alcyon*), and great blue heron (*Ardea herodias*) were present in the East Pond. Four species of ducks — green-winged teal (*Anas crecca*), mallard (*Anas platyrhynchos*), American wigeon (*Anas americana*) and wood duck (*Aix sponsa*) — were seen in the small North Pond. Mallards were also present in the small patch of shallow open water at the north end of the West Pond.

Table 5 – Water-associated birds of Horne Pit

great blue heron	<i>Ardea herodias</i>
wood duck	<i>Aix sponsa</i>
American wigeon	<i>Anas americana</i>
mallard	<i>Anas platyrhynchos</i>
green-winged teal	<i>Anas crecca</i>
greater yellowlegs	<i>Tringa melanoleuca</i>
belted kingfisher	<i>Ceryle alcyon</i>
marsh wren	<i>Cistothorus palustris</i>
red-winged blackbird	<i>Agelaius phoeniceus</i>

A bald eagle (*Haliaeetus leucocephalus*) was seen soaring above Horne Pit.

³ mule deer – There are three subspecies of mule deer (*Odocoileus hemionus*) in BC. The Columbian black-tailed deer (*Odocoileus hemionus columbianus*) is the subspecies that occurs in the Lower Mainland. “Mule deer” is used in this report after Nagorsen (2000), the taxonomic standard sanctioned by the Government of BC.

⁴ site visit by study team prior to submission of proposal

3.3.3 AMPHIBIANS

The extensive wetlands contribute to a great potential abundance and diversity of amphibians. In October, juvenile red-legged frogs (*Rana aurora*) and western toads (*Bufo boreas*) were seen in various locations near the ponds edges, and tree frogs (*Hyla regilla*) were heard at the north end of the West Pond.

Other amphibians that may occur include northwestern salamander (*Ambystoma gracile*), long-toed salamander (*Ambystoma macrodactylum*), roughskin newt (*Taricha granulosa*), ensatina (*Ensatina eschscholtzii*), and western redback salamander (*Plethodon vehiculum*).

3.3.4 REPTILES

No reptiles were observed, but the following snakes probably occur within the property: western garter snake (*Thamnophis elegans*), northwestern garter snake (*Thamnophis ordinoides*), and common garter snake (*Thamnophis sirtalis*).

3.3.5 FISH

The study team observed numerous fish in a pool at the outflow at the south end of the East Pond on September 12. These were probably coho salmon (*Oncorhynchus kisutch*) (Marina Stjepovic, pers. comm.). Langley Environmental Partners Society (LEPS) caught the following fish in gee traps set at the south end of the East Pond, and in the outflow tributary, in October of 1999: coho salmon, rainbow trout (*Salmo gairdneri*), chinook salmon (*Oncorhynchus tshawytscha*), brassy minnow (*Hybognathus hankinsoni*) and threespine stickleback (*Gasterosteus aculeatus*) (LEPS 1999).

3.3.6 RARE AND ENDANGERED ANIMALS

The great blue heron is Blue-listed. No nests of this species were observed in Horne Pit, but an individual was observed feeding in the East Pond in October. The brassy minnow is also Blue-listed. The wetlands and channels of Horne Pit would appear to provide appropriate habitat for this species: "small sluggish, weedy creeks or streams with sand, gravel, or mud bottoms overlain with organic sediment. Common in overflow ponds near rivers. Spawns among vegetation in shallows and on bottom." (Cannings and Ptolemy 1998).

4.0 ECOLOGICAL IMPLICATIONS

The entire site can be viewed as an extremely degraded ecosystem which is in the early stages of recovery. "Recovery" is meant to imply the gradual naturalization of resources, not the complete recovery of the site's former ecology. The magnitude of physical alteration of site and the deposition of debris prevents complete ecological restoration. The new forests will not support the same assemblage of organisms present in the past because of the removal of top soil, changes to topography, and the deposition of waste materials. Native plants dominate in the recovering forests. The formation of ponds from gravel extraction below the water table has completely altered the south half of the site, and has created new resources for a new assemblage of organisms. The wetland has become a valuable ecological attribute.

Portions of the buffer strip on the periphery of the property are degraded and narrow. These portions are also vulnerable to further degradation that may result from development on

adjacent property. The forests within Horne Pit are crucial to the ecology of the site. The forests play an important role in temperature regulation, nutrient loading and cycling, filtration of sediment and pollutants, restriction of access by humans, exotic plants and animals, and the provision of habitat crucial to wetland organisms.

Surrey's large gravel pit to the west, across 196th Street, known as Stokes Pit or Campbell Heights, possesses attributes similar to those of Horne Pit, including the surrounding forested buffer, and a complex array of vegetation communities, ponds, and watercourses. Larger forested areas exist southwest of Campbell Heights, and southeast of Horne Pit at Campbell Valley Regional Park. The Little Campbell River provides a forested corridor that connects some of these undisturbed forests.⁵

The quality of water in the wetland directly affects the quality of water in the Little Campbell River. The Little Campbell River will be affected by water temperatures in the wetland, and by levels of nutrients, sediments, and pollutants that may originate in adjacent upland areas.

4.1 MANAGEMENT ISSUES

The water levels in the ponds are influenced by the beaver dams at the outflow at the south end of the East Pond. They increase water levels which create excellent opportunities for wetland plants and a broad range of animals requiring open water and emergent vegetation: water associated mammals, waterfowl, waders, shorebirds, kingfishers and water-associated passerines,⁶ amphibians and invertebrates.

The dams may also impede or block access by fish, notably salmonids which may overwinter in the ponds. It would be useful to know to what degree salmonids use the wetlands. They are present in the tributary and outflow at the south end of the East wetland, but are they present in the main East Pond area, the other ponds, and the connecting channels? Do the wetlands meet their requirements?

Wetland management will be dictated by management objectives, and these objectives must result from careful consideration of all organisms. It is important to maintain opportunities for a broad range of organisms, while allowing natural environmental changes (flooding, succession) to occur. The activities of beaver, which are often seen as destructive, provide opportunities for many organisms.

5.0 KEY ENVIRONMENTAL ATTRIBUTES AND RECOMMENDATIONS

The key environmental attributes that need to be managed are forests, clearings, and wetlands. The development concept must consider these on the basis of past, present and future resources. Many biological features present before gravel extraction have been lost and cannot be recovered. New biological features have replaced them. Currently, much of the area is regrowing with native vegetation; forests are thriving despite neglect. Site management should focus on the retention of valuable natural attributes and the encouragement of natural restorative processes. The following points outline potential means to maintain, restore and create a complex, natural ecosystem.

⁵ These forests are not truly undisturbed; most have been harvested 50 to 100 years ago.

⁶ passerines – perching birds

Recommendations

- retain productive wetland habitat
- encourage wetland diversity: open water, emergent vegetation, shallow water, deep water
- limit access to ponds – provide viewing opportunities to discourage wanton habitat destruction from visitors
- retain undeveloped forested buffer around wetlands
- retain forests – all conifer forest should be protected and retained. Minimize forest fragmentation by retaining large circular or square forest blocks where possible.
- encourage forest succession – plant coniferous specimens (western redcedar, western hemlock, Douglas-fir, shore pine and Sitka spruce (*Picea sitchensis*)) in the stands dominated by red alder and black cottonwood
- retain course woody debris (fallen logs) and snags (standing dead trees) within forests, clearings, and wetlands
- retain openings – these provide opportunities for different organisms, and increase the ecological complexity of the entire site
- manage openings for native organisms – may include establishing old field habitat for voles (and raptors), and removing Himalayan blackberry to encourage native species. (Himalayan blackberry is valuable for shelter and food for birds and need not be removed from all areas.) Use trees cleared from some areas to increase the complexity and add organic material to openings, water channels and ponds; that is, leave this plant material to decompose on site.
- ignore beaver or manage them intermittently (such as by opening the outflow tributary for fish passage at crucial times of the year — for example, during the fisheries window August 15 to September 15 — or installing a device that allows fish passage without having a major effect on the dam and water levels). Damage caused by beaver may be exacerbated by repeated attempts to discourage them. The “damage” they cause creates opportunities for a variety of other organisms (plants, vertebrate and invertebrate animals), and all of these organisms should be considered. Many of the species that benefit from the wetland may not be readily apparent because of their small numbers, small size, or their secretive natures. Because the area is isolated from surrounding properties, it is unlikely that the effects of beaver will adversely affect human interests on surrounding land.
 - water levels and flows will fluctuate to various degrees in various areas of the wetland depending on the season, and the location and persistence of beaver activity.
- conduct a raptor and heron nest survey prior to clearing trees
- restrict the placement of active park facilities (playing fields, etc.) to the highly disturbed northern portion of the site
- work within or adjacent to water-bodies and water-courses must not proceed without approval from MoELP and DFO.

6.0 KEY PLANNING OBJECTIVES AND RECOMMENDATIONS

The following key planning objectives consider the interests of the Township, the LCWS, and the environment within a park planning framework. Because of the necessary focus on the site's environmental attributes, some environmental points from section 5.0 are reiterated within a planning-oriented perspective.

Objectives and Recommendations

- Horne Pit be officially designated by the Township of Langley Council as a Community Park
- Township staff confirm with the Langley School District that, in the future, a Secondary School is required at this location, in conjunction with the Community Park.
- the LCWS coordinate with Langley Parks and Recreation on a number of volunteer initiatives, such as enhancing the existing forest by planting native conifers, removing invasive species and the installing and monitoring nest boxes
- the LCWS monitor water quality and beaver activity. If beaver dams are to be removed, the Township should remove them but only during the fisheries construction "window" of August 15 to September 15.
- Township Engineering removes stored or deleterious material from the site and coordinates any filling or topsoil stockpiling with the Parks and Recreation Department
- Township Engineering remove the asphalt road in the northeast part of the site and start filling the north-centre corner to accommodate future parking 1.5 m (5 feet) above the existing level
- in the long term the site be developed in accordance with the Preliminary Concept Plan and that the fish-bearing wetlands be fully protected
- public involvement is required to develop the final Park Master Plan.

7.0 TOWNSHIP AND LCWS INVOLVEMENT

It is important that Horne Pit be officially designated as a Community Park. Township Parks and Recreation staff, and LCWS members need to make a presentation to the Parks and Recreation Commission to gain their support for the plan, and request a staff report to the Municipal Council that approves Horne Pit be designated a Community Park.

A secondary school in conjunction with the Community Park is required to make the best use of the park. Township staff need to confirm with the School District that a secondary school is required in this location in the future.

As the biophysical inventory indicated, the forested area and a number of cleared areas could be enhanced with plantings of native trees and shrubs. The LCWS could apply for grant funding for native plant material, especially coniferous trees to enhance the existing forest and disturbed areas that will not be developed in the future.

The biophysical inventory emphasized the significance of the wetlands for fish habitat and biodiversity. The LCWS should monitor the wetlands and fish habitat for water quality to sustain fish and invertebrates, and to ensuring beaver dams are not impeding fish passage. The Township should be ready and willing to react to any beaver problems. However, beaver dams should only be removed during the fisheries construction "window" of August 15 to September 15, and it must be considered that beaver dams create habitat important to other wildlife species (plants and animals).

Wildlife habitat on the site — especially for waterfowl, and possibly shorebirds — could be enhanced. Grants are available to obtain and install nest boxes. Installation of wood duck nest boxes would be beneficial in attracting wood duck to the wetlands, but these must be monitored and cleaned out on a yearly basis, usually in February, prior to each nesting season.

The biophysical inventory indicated a number of non native vegetation species, some quite invasive, on the site. A program to remove non native vegetation in areas not to be developed should be coordinated by the Township with the LCWS encouraging volunteer work parties

The Township is dumping various material and storing culvert pipe and other materials in Home Pit. The Township should not dump any deleterious material (concrete, asphalt, etc.) in the gravel pit. Existing concrete and asphalt deposits should be recycled. (The nearest recycling facility is Columbia Bitulithic (recently purchased by Lafarge) located on 8th Avenue about 0.5 km east of Lefeuer Road in Abbotsford.) The Operations Department needs to coordinate with Parks and Recreation on the dumping of topsoil in the area. Stored material should be removed from the site.

Upon approval in principle of the Preliminary Concept Plan, the parking lot should be brought up 1.5 m (5 feet) above the existing grade. The Township should start filling the north east corner of the site to accommodate the future parking lot at street level. Side slopes into the gravel pit should be at 3 horizontal to 1 vertical. The asphalt road winding down from the north east corner should be removed.

8.0 PUBLIC PARTICIPATION

There are no immediate plans to develop the site, therefore public involvement at this time is not required. Designating the area as a community park requires Council approval with the public being informed, but no formal public process, such as Open House, is required. However, public input is required to develop the final Park Master Plan.

9.0 REFERENCES CITED

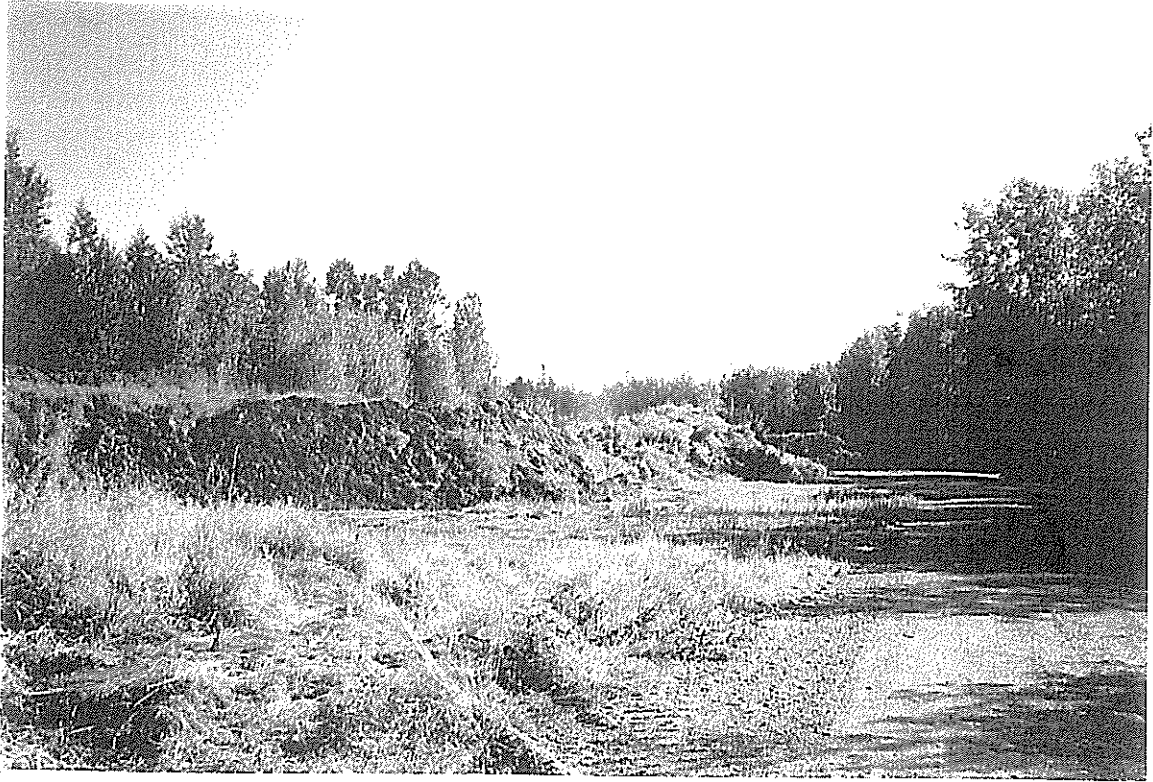
- Brookwood/Fernridge Community Plan. 1997. Township of Langley.
- Cannings, S.G. and J. Ptolemy. 1998. Rare freshwater fish of British Columbia. British Columbia Ministry of Environment, Lands and Parks.
- Douglas, G.W., G.B. Straley, and D.V. Meidinger. 1998. Rare native vascular plants of British Columbia. Government of British Columbia.

- Gartner Lee Limited. 1990. Aggregate Resource Evaluation. GLL 90-729. Prepared for the Corporation of the Township of Langley.
- Green, R.N. and K. Klinka. 1994. A field guide to site identification and interpretation for the Vancouver Forest Region. Land Management Handbook No. 28. Research Branch. Ministry of Forests. Victoria, B.C. 285 pp.
- Luttmerding, H.A. 1980. Soils of the Langley-Vancouver map area. Volume 1 – 6. Kelowna: Province of British Columbia, Ministry of Environment, Assessment and Planning Division.
- Nagorsen, D.W. 2000. Mammals. *In* The vertebrates of British Columbia: scientific and English Names. Standards for components of British Columbia's biodiversity No. 2. Version 2.1, pp. 59-71. Ministry of Environment, Lands and Parks Resource Inventory Branch for the Terrestrial Ecosystems Task Force, Resources Inventory Committee.
- Nuszdorfer, F.C. and R. Boettger. 1994 (Revised). Biogeoclimatic units of the Vancouver Forest Region. Map Sheet 6 of 6. Fraser Valley - Lillooet River. Province of B.C. British Columbia Ministry of Forests. Research Branch. Scale 1:250,000.

10.0 PERSONAL COMMUNICATIONS

- Adolf Cêska, Ecologist, British Columbia Conservation Data Centre, Victoria.
- Terry Lyster, Director of Planning and Development, Township of Langley Planning,
- Al Neufeld, Manager of Park Design and Development, Township of Langley Parks and Recreation.
- Bob Oswald, Little Campbell Watershed Society.
- Clive Roberts, Manager of Design and Construction, Township of Langley Engineering.
- Marina Stjepovic, Environmental Coordinator, Township of Langley.

Horne Pit – Township of Langley



1. Material stored in gravel pit – Some of it is topsoil



2. Some contains concrete and asphalt – which should be recycled