

APPENDIX A

ENVIRONMENTAL REVIEW



envirowest consultants inc.

Suite 101 - 1515 Broadway Street
Port Coquitlam, British Columbia
Canada V3C 6M2
604-944-0502

October 31, 2017

R.F. Binnie & Associates Ltd.

Suite 205 – 4946 Canada Way
Burnaby, BC
V5G 4H7

Attention: Ms. Catherine Eiswerth, AScT
Division Manager - Landscape Architecture, Sports & Recreation

Dear Ms. Eiswerth,

**RE: DISTRICT OF NORTH VANCOUVER
INTER RIVER PARK SOUTH
ENVIRONMENTAL REVIEW**

Envirowest Consultants Inc. (Envirowest) was retained to complete an environmental assessment of Inter River Park South, North Vancouver, British Columbia (the Property). The District of North Vancouver (District) has proposed the conversion of the existing playing field (Field No. 1) and the construction of a second field (Field No. 2) to increase usage of the south portion of the park.

Site assessments were performed by Envirowest on August 16, 2016, April 12, 2017 and May 9, 2017 to assess the current environmental conditions of the Property.

The 9.5 hectare (ha) Property is owned by the District and is zoned as parkland. The Property is bounded on the northwest by Lynn Creek, on the south by a fire training centre, on the southeast and east by residential developments and on the northeast by the remainder of Inter River Park. The section of the Property proposed for field development is approximately 4.0 ha located in the south-central portion of the Property (the Proposed Work Area). The area of environmental impact for the proposed redevelopment of the existing field, parking areas and drive aisles is largely contained within the footprint of the existing grass field and other previously disturbed areas. The proposed second field (Field No. 2) would be developed within a wooded area located to the south of the existing field and would involve the clearing of approximately 1.3 ha, including about 7 metres beyond the boundaries of the new field. The proposed second field (Field No. 2) will require the removal of 130 of the 360 trees inventoried within the wooded area (see arborist report for further details).

The project location is depicted by Figure 1 in Attachment A. The areas of assessment at the Proposed Work Area are depicted by Figure 2 in Attachment A. Representative site photographs are included in Attachment B.

DISTRICT OF NORTH VANCOUVER DEVELOPMENT GUIDELINES

The District of North Vancouver requires a development permit for all development and subdivision within a designated development permit area (DPA).¹

The Property is designated within the Protection of the Natural Environment DPA, Streamside Protection DPA, Wildfire Hazard (Wildfire Interface Area) DPA and Creek Hazard (Potential Flood Hazard Area) DPA.

ENVIRONMENTAL CONDITIONS

Site History

Logging has occurred on the Property, likely in the early 1900s. Large stumps with springboard notches are apparent in the southern sections of the Property. The Property was used as a municipal landfill between 1956 and 1988, and was subsequently used as a soil disposal site commencing in 1990. Some of the fill imported to the site was used to cap the landfill to prevent rainwater infiltration and reduce leachate flow. Park facilities were developed and first opened in 1988. Park development has been relatively continuous since then.

Previous Environmental Studies

The most significant ecological work has been an inventory prepared by Robertson Environmental Services². The inventory was relatively extensive, involving wildlife assessments over four seasons. The report also provides recommendations for habitat preservation and protection. General findings included the following:

- proximity to Lynn Creek, and Lynn Canyon Park, are considered important factors affecting the ecological functions and values of Inter River Park;
- the park was considered to be recovering from past land uses at that time;

¹ **District of North Vancouver. 2011.** Official Community Plan. Bylaw 7900. Schedule B Development Permit Areas. Available: <https://www.dnv.org/sites/default/files/edocs/OCP-schedule-B-development-permit-areas.pdf>.

² **Robertson, I., Page, N., Child, M. and G. Ryder. 1998.** Inter River Park Environmental Inventory Study. Prepared by: Robertson Environmental Services Ltd. and Coast River Environmental Services Ltd. Prepared for: District of North Vancouver Parks Department.

- five habitat types were identified – forested, shrub/scrub, immature riparian forest, grassed areas and un-vegetated/developed;
- 86 species of birds were identified, including 59 passerines. Several observed species of conservation interest, included possible nesters, such as western screech-owl (*Megascops kennicottii kennicotti*), Hutton’s vireo (*Vireo huttoni*), and lazuli bunting (*Passerina amoena*). Raptor use of the park was considered “significant”. Most notable observations were in the northern forested area (saw-whet owl (*Aegolius acadicus*) and western screech owl). Species of Special Concern – observed or possible occurrence of tailed frog (*Ascaphus truei*), great blue heron (*Ardea herodias fannini*), bald eagle (*Haliaeetus leucocephalus*), and Hutton’s vireo. Only Hutton’s vireo is considered to have the potential to breed on site (but is neither federally nor provincially listed at this time);
- mammal use is considerable and includes mink, black bear and black-tailed deer. Proximity of forests is a factor supporting wildlife use;
- recommendations included preservation of the southern woodlot, and ongoing monitoring of the leachate control system and water quality monitoring in Lynn Creek;
- Lynn Creek supports coho salmon (*Oncorhynchus kisutch*), chum salmon (*Oncorhynchus keta*), and steelhead trout (*Oncorhynchus mykiss*). Pink salmon (*Oncorhynchus gorbuscha*) and chinook salmon (*Oncorhynchus tshawytscha*) have also been recorded; and
- amphibians/reptiles – most abundant is Pacific chorus frog (*Pseudacris regilla*). Two salamander species. Suspected red-legged frog (*Rana aurora*) and possible tailed frog. Two species of garter snake. Permanently/seasonally inundated areas north and east of the landfill should be preserved for amphibians.

Current Assessment

The Property was divided into six (6) areas of similar vegetation for this assessment. Trees were identified and assessed in terms of ecological function. Tree health/condition, and their viability to be retained adjacent to potential development was assessed independently by BC Plant Health Care Inc. (see arborist report for further details). The six areas are described as:

- Area 1: existing sports field, Field No. 1;
- Area 2: planted area west of the nursery;
- Area 3: area north of Field No.1 and south of Inter River Bike Park;

- Area 4: existing disturbed portion of riparian setback west of Field No.1 and east of trail along Lynn Creek (outside proposed project footprint);
- Area 5: lower treed area (with small constructed wetland) south of Field No.1 and northwest of the park service road; and,
- Area 6: forested area southeast of the park service road to the south boundary of the Property.

Vegetation

Area 1: Existing Field No. 1

The existing playing field (Field No.1) was comprised of manicured grass. This area is maintained for use as a baseball diamond and soccer field.

Area 2: Area West of Nursery

Vegetation in this small area was likely planted and appears to receive regular maintenance. The canopy was comprised of ten (10) lodgepole pine trees (*Pinus contorta* var. *latifolia*). The shrub layer was comprised of two (2) rhododendrons (*Rhododendron* sp.), approximately twelve (12) leatherleaf viburnum (*Viburnum rhytidophyllum*) and Himalayan blackberry (*Rubus armeniacus*). Ground cover was comprised of grasses, red clover (*Trifolium pratense*), ornamental vetch (*Lathyrus* sp.) and common dandelion (*Taraxacum officinale*).

Area 3: North of Field No. 1

The canopy of Area 3 was characterized by Norway spruce (*Picea abies*) with black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) at the west end. There was one (1) Sitka spruce (*Picea sitchensis*) at the east end adjacent to the access road. The shrub layer was a thick Himalayan blackberry thicket with sporadic mountain ash (*Sorbus sitchensis*). Ornamental vetch and English ivy (*Hedera helix*) occurred throughout the area. To the south a row of willow (*Salix* sp.) was separated from the main stand by manicured grass.

Area 4: West of Field No. 1

The area west of Field No.1 and east of the trail along Lynn Creek occurs within an existing 30 metre riparian setback from Lynn Creek. This area has been highly disturbed and as a result the vegetation was largely invasive species. The canopy of Area 4 was characterized by red alder (*Alnus rubra*) with pole sapling black cottonwood. The shrub layer was characterized by

Himalayan blackberry and Japanese knotweed (*Fallopia japonica*). Ground cover was characterized by herb-Robert (*Geranium robertianum*), red clover and grasses. English ivy, morning glory (*Convolvulus* sp.) and bird's-foot trefoil (*Lotus corniculatus*) were present throughout the area.

Area 5: Lower Treed Area

The canopy of the lower treed area was characterized by bigleaf maple (*Acer macrophyllum*), red alder, black cottonwood and western redcedar (*Thuja plicata*). Snags were also present within Area 5. The shrub layer was characterized by Himalayan blackberry, vine maple (*Acer circinatum*), snowberry (*Symphoricarpos albus*) and policeman's helmet (*Impatiens glandulifera*). Indian plum (*Oemleria cerasiformis*) observed were in poor health. Ground cover was characterized by ornamental vetch, horsetails (*Equisetum arvense*), herb-Robert and sword fern (*Polystichum munitum*). Bird's-foot trefoil and morning glory were also present throughout the area. Leaf litter was shallow and interspersed with patches of exposed ground.

A constructed wetland occurs in the southwest portion of this area, adjacent to the trail along Lynn Creek. Vegetation of this area was typical of the rest of Area 5 as described above.

Area 6: Forested Area

Inter River Park is located in the dry maritime subzone of the Coastal Western Hemlock biogeoclimatic zone (CWHdm). The CWH Biogeoclimatic zone occurs from sea level to 1050 m elevation and is found along the entire BC coast (Meidinger and Pojar 1991³). The canopy of CWH forests is dominated by western hemlock (*Tsuga heterophylla*). Tree species in late successional forests of the dry maritime subzone also include Douglas-fir (*Pseudotsuga menziesii*) and western redcedar (*Thuja plicata*). Dominant understory species in the CWHdm include salal (*Gaultheria shallon*), sword fern (*Polystichum munitum*), vine maple (*Acer circinatum*) and bracken fern (*Pteridium aquilinum*).

Area 6 consists of second-growth mixed-wood forest that has not yet reached a climax state. As such, the canopy also includes bigleaf maple (*Acer macrophyllum*) with minor amounts of black cottonwood (*Populus trichocarpa*) in addition to western hemlock and western redcedar. The understory is dominated by Indian-plum (*Oemleria cerasiformis*), salmonberry (*Rubus spectabilis*), vine maple (*Acer circinatum*), swordfern (*Polystichum munitum*), Himalayan blackberry, Pacific ninebark, red elderberry and common snowberry (*Symphoricarpos albus*). English holly (*Ilex aquifolium*) and Japanese maple (*Acer palmatum*) were also observed in the area. Ground cover was characterized by herb-Robert, false Solomon's seal, policeman's helmet, spiny wood fern (*Dryopteris expansa*), dead nettle (*Lamium galeobdolon*) and English ivy.

³ Meidinger, D. and J. Pojar. 1991. Ecosystems of British Columbia. B.C. Ministry of Forests., Victoria, BC. Special Report Series 6.

Morning glory and laurel were also present. Evidence of past logging includes large stumps with springboard notches, many of which are acting as nurse logs for second-growth trees. The area of the proposed second field (Field No. 2) is predominated by bigleaf maple with lesser amount of western hemlock and western redcedar.

Wildlife

During the assessments wildlife observations included grey squirrel (*Sciurus carolinensis*), mallard, (*Anas platyrhyncho*), hummingbird species, spotted towhee (*Pipilo maculatus*), American robin (*Turdus migratorius*), song sparrow (*Melospiza melodia*) and brown creeper (*Certhia americana*). The generally low number of wildlife sightings are likely a reflection of the heavy presence of pedestrians and dogs in the area. The relatively large numbers of species noted in the 1998 Robertson study are a function of significantly higher level of assessment (over four seasons) and a lower level of human activity at that time. Invasive European fire ants (*Myrmica rubra*) have been previously identified within Area 3, immediately north of the existing field.

SPECIES AT RISK

Definition

Species at risk are identified in the context of the provincial and national ranking systems. The provincial ranking system applies to species that have been assessed by the British Columbia Conservation Data Centre (CDC). The national ranking system applies to species that have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The CDC and COSEWIC publish lists of species at risk in order to prioritize species for conservation.

Conservation Data Centre

In British Columbia, the BC Ministry of Environment supports the CDC. The CDC maintains dynamic tracking lists of rare plant and animal species and rare ecological communities that occur within British Columbia. The CDC utilizes three ranked criteria for species and communities at risk and presents them as lists, specifically the Red, Blue, and Yellow lists. The definitions of these designations are as follows⁴:

Red List: List of ecological communities, and indigenous species and subspecies that are extirpated, endangered or threatened in BC; threatened species are likely to become endangered if limiting factors are not reversed; endangered species face imminent extirpation or extinction.

⁴ British Columbia Ministry of Environment. 2011. Ministry of Environment Glossary. Available: <http://www.env.gov.bc.ca/atrisk/glossary.html>.

- Blue List: List of ecological communities, and indigenous species and subspecies of special concern in BC; species of special concern are those species that are particularly sensitive to human activities or natural events but not endangered or threatened.
- Yellow List: List of ecological communities and indigenous species that are not at risk in BC.

The listings serve two purposes; first, they provide a list of species for consideration for formal designation as Endangered or Threatened, either provincially under the British Columbia Wildlife Act, or nationally by COSEWIC. Second, the listings assist in the setting of conservation priorities for species and ecological communities considered at risk in British Columbia.

Committee on the Status of Endangered Wildlife in Canada

The Canada Species at Risk Act (SARA) was proclaimed with the specific intent of protecting wildlife species at risk in Canada. Within SARA, COSEWIC was established as an independent body of experts responsible for identifying and assessing species considered to be at risk. COSEWIC currently addresses all indigenous mammals, birds, reptiles, amphibians, fish, arthropods, molluscs, vascular plants, mosses and lichens.⁵

The identification and assessment of species considered to be at risk is the first step towards protecting species-at-risk. Species that have been designated by COSEWIC may qualify for legal protection and recovery under SARA. It is the responsibility of the Canadian Minister of Environment (the Minister responsible for SARA) to assign legal protection of species designated by COSEWIC. This involves listing the species in Schedule 1 of SARA. SARA only applies to species listed on Schedule 1. A wildlife species is considered by COSEWIC to be:

a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.⁶

Wildlife status categories utilized by COSEWIC consist of:

- Extinct: A species that no longer exists.

⁵ COSEWIC. 2009. About COSEWIC. Updated February 2009. Available: http://www.cosewic.gc.ca/eng/sct6/sct6_1_e.cfm.

⁶ COSEWIC. 2016. COSEWIC's Assessment Process and Criteria. Updated March 2016. Available: http://www.cosewic.gc.ca/eng/sct0/assessment_process_e.cfm.

Extirpated:	A species that no longer exists in the wild in Canada, but occurs elsewhere (for example, in captivity or in the wild in the United States).
Endangered:	A species facing imminent extirpation or extinction.
Threatened:	A species likely to become endangered if limiting factors are not reversed.
Special Concern:	A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
Not at Risk:	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient:	A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

Schedule 1 of SARA classifies listed species as being Extirpated, Endangered, Threatened, or of Special Concern. Schedule 2 and Schedule 3 include species that have been tracked by COSEWIC prior to the proclamation of SARA, yet require reassessment using the latest assessment criteria before being listed on Schedule 1.

Methods

An assessment was made of which species-at-risk may be found on and within 100 metres (m) of the Property by reviewing species at risk documented⁷ to occur within the Chilliwack Forest District. Species-at-risk are defined here as species found on the provincial Blue or Red lists, or federally listed as Endangered, Threatened or Special Concern by COSEWIC or Schedule 1 of SARA. The list was further refined to include only species found within the Coastal Western Hemlock biogeoclimatic zone.

The initial list of species was refined to include only those species whose habitat requirements for critical life stages (e.g. breeding, nesting/denning, or hibernating, for animals; or germination, flowering, and seed dispersal for plants) matched site conditions on the Property. For species mapped by the CDC⁸, whose distributions are well-known due to systematic provincial or federal

⁷ BC Conservation Data Centre. 2016. Species and Ecosystems Explorer. Available: <http://a100.gov.bc.ca/pub/eswp>.

⁸ Province of British Columbia. 2016. iMapBC. Available: <http://maps.gov.bc.ca/ess/sv/imapbc>.

survey efforts or citizen science initiatives, the list was further refined using documented sightings near the Property.

Results

SARA Recovery Strategies have been developed for a number of species listed under SARA.⁹ Recovery Strategies for each species identify areas of critical habitat. Based on the published Recovery Strategies, the Property is not located within Critical Habitat of any species with a Recovery Strategy. The closest Critical Habitat (marbled murrelet, *Brachyramphus marmoratus*) to the Property is greater than 4 kilometers (km) away. There are no documented sightings of species-at-risk within 2 km of the Property.⁸

Species-at-risk with potential to occur on or near the Property are listed in Table 1. The presence of none of these species was confirmed on the Property.

Table 1. Species of management concern whose habitat requirements are met by current environmental conditions on or near the Property. Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or Species at Risk Act (SARA) status is abbreviated SC (Special Concern), T (Threatened), E (Endangered), or DD (Data Deficient).

Scientific Name	Common Name	COSEWIC Status	Provincial Status	SARA Schedule 1 Status
Amphibians				
<i>Anaxyrus boreas</i>	Western toad	SC (2012)	Blue	SC (2005)
<i>Rana aurora</i>	Northern red-legged frog	SC (2015)	Blue	SC (2005)
Birds				
<i>Ardea herodias fannini</i>	Great blue heron, <i>fannini</i> subspecies	SC (2008)	Blue	SC (2010)
<i>Asio flammeus</i>	Short-eared owl	SC (2008)	Blue	SC (2012)
<i>Chordeiles minor</i>	Common nighthawk	T (2007)	Yellow	T (2010)
<i>Hirundo rustica</i>	Barn swallow	T (2011)	Blue	-
<i>Megascops kennicottii</i>	Western screech-owl, <i>kennicottii</i> subspecies	T (2012)	Blue	SC (2005)
<i>Tyto alba</i>	Barn owl	T (2010)	Red	SC (2003)
Plants				
<i>Rupertia physodes</i>	California-tea	-	Blue	-

⁹ Government of Canada. 2016. Species at Risk Public Registry Recovery Strategies. Available: http://www.registrelep-sararegistry.gc.ca/sar/recovery/recovery_e.cfm.

IMPACTS AND ENHANCEMENT OPPORTUNITIES

The conversion of Field No.1 and most of the existing related facilities (parking areas and drive aisles) will not result in significant habitat losses or other impacts. Drainage mitigation measures such as bio-filtration swales can be implemented to offset historic and anticipated changes to the quality and quantity of site runoff. There are opportunities to conduct invasive plant removal and landscape restoration/enhancement such that these works have a neutral environmental impact. Specific mitigation strategies are detailed below.

Development of the new Field No. 2 will cause a loss of habitat, primarily within Area 6. While this area has the potential to support species-at-risk, the area has been degraded by intense use by pedestrians, cyclists and dogs. Invasive plants are found throughout the area. The impacts of construction of Field No. 2 can be partially offset by drainage mitigation and by habitat restoration and enhancement in other areas of the park. Specific mitigation strategies are detailed below. Conceptual plans of impact mitigation and habitat enhancement works within the park are included as Attachment C. Figure 4.4 shows potential enhancements within the Proposed Work Area, while figures 4.2 and 4.3 identify additional habitat enhancement opportunities in the park, outside of the Proposed Work Area.

Habitat Restoration/Enhancement

Invasive plant removal and re-landscaping

A variety of non-native plants were identified on the Property. These include ornamental species and native species not natural to the site (i.e. they have been planted on the Property) such as rhododendron, European mountain ash, Norway spruce and Japanese maple. Lodgepole pine were also noted; while native to British Columbia these trees have been planted on the Property.

Invasive non-native species observed on the Property include Himalayan blackberry, English ivy, Japanese knotweed, morning glory, English holly, laurel and lamium. These plant species spread aggressively and displace native vegetation to the detriment of native plants, adversely affecting habitat and the wildlife they support. Invasive plants should be removed anywhere they occur on the Property, employing species-specific methodologies. Re-establishment of native plant communities must follow the removal of the invasive species, and utilize plants suited to the site/soil conditions. Species best suited include the native plants identified on the Property, and should generally include trees, shrubs and groundcover species. Long-term (minimum 5 years) monitoring and maintenance is important to prevent re-establishment of the invasive plants, and to ensure establishment of the native plants. Specific areas identified for invasive species removal include the area around the picnic shelter near the large off-leash dog area on the west side of Lynn Creek (Photograph 11 on Figure 4.2), a large gravel bar within the Lynn

Creek channel that has Japanese knotweed throughout (Photograph 13 on Figure 4.3), and the area just beneath the powerline right-of-way (Photograph 21 on Figure 4.3).

Landscaping of areas lacking vegetation

There are areas within the Property that are lacking native vegetation (exposed soil or maintained grasses) that can be enhanced by planting assemblages of native tree, shrub and groundcover species. These include areas on the west side of Lynn Creek, just north of Highway 1 (Photograph 19 on Figure 4.3), near the powerline right-of-way (Photograph 21 on Figure 4.3), along the informal trail through the forested area on the western edge of the park (Photograph 22 on Figure 4.3), and in areas along the river bank that have had heavy foot traffic (Photograph 12 on Figure 4.2).

Infill landscaping and reforestation

The eastern creek bank has been reinforced with rip rap and there are several areas with opportunities to conduct infill planting among the rip rap, utilizing engineered “eco-pockets” (Figure 4.2 and Figure 4.3). Tree species used for areas of reforestation will include species typical of the CWHdm forest, and are also found currently on site: western hemlock and western redcedar. These areas will also include planting of shrubs such as salmonberry, salal, vine maple, Indian-plum, sword fern and common snowberry and placement of coarse woody debris. In areas that will require large amounts of invasive removal (such as Area 4), plantings will focus on early seral, fast growing species such as red alder (*Alnus rubra*) and black cottonwood, that will provide a shade canopy as quickly as possible to outcompete the invasives and prevent re-establishment. Mid-shade tolerant species (Douglas-fir and western red cedar) are recommended in forest openings and along edges, and early successional species should be interspersed among those edges. Shade tolerant native species can be planted beneath the early seral, fast growing species, which will result in the fast growing alder and black cottonwood acting as nursery trees. This will result in the more typical late succession longer lived species become established in an ecologically appropriate manner.

The proposed reforestation described by Envirowest should be coordinated with the tree replacement described in the arborist’s report. BC Plant Health Care Inc. proposes to offset the loss of 130 trees with over 1,000 new trees, albeit at a smaller size than typically proposed. These elements of reforestation and tree replacement are specific to the retained portion of the southern woodland (Area 6). All tree replacement and other proposed landscaping is within the park. Area 6 will be reduced in size by the proposed Field No. 2, to approximately 2.7 ha. A minimum of 1.0 ha of this retained forest will be enhanced by infill landscaping and reforestation, to which a 50% credit would be assigned to the enhanced area.

Habitat complexing

An assessment of hazard trees is not presently available. However, when Area 6 is cleared for field development there will be trees located at the edge of the preserved forest that will require treatment (removal or modification) to eliminate threats such as blowdown. Trees to be removed should be converted to wildlife snags (cut to an appropriate height based on the certified arborist's recommendation). Cut wood should be retained for on-site use in debris piles (small branches) and artificial snags (large stems). Nesting platforms can be constructed/installed for raptors, with nesting boxes installed for smaller birds and bats.

Pond reconstruction

The existing pond at the southwest corner of Area 5 provides the only aquatic habitat (excluding Lynn Creek) within the portion of the Property where works are proposed. The pond has limited functional value for wildlife given its artificial banks (lined with gravel) and fluctuating water level. The expansion and enhancement of this pond is recommended. The pond side slopes should be flattened and landscaped. The bottom of the pond should provide a diversity of depths and landscape treatments with emergent/submergent plants. Boulder clusters and woody debris (e.g. logs) should be placed in and adjacent to the water surface to provide habitat diversity.

In order to support increased habitat value, the water level of the pond should be controlled to a limited fluctuation of no more than 300 mm. Presently, the pond fills completely and overflows as the existing outlet culvert is not presently connected to the creek (owing to water quality concerns). Pending further assessment of water quality (which would improve with proposed habitat enhancements), the existing outlet culvert should be connected to the creek.

Inflow to the pond can continue to include existing sources such as the ditch that flows southward adjacent to Field No. 1 (further, this ditch could be redeveloped as a bio-swale). Other proposed bio-swales and bio-wetlands (discussed below) could be directed to the pond. All work in the vicinity of the proposed pond must be cognizant of existing services/utilities in this area.

Photographs of constructed wetlands are included in Figure 4.5 (Attachment C).

Instream debris removal

There is a small tributary to Lynn Creek that is traversed by the informal trail in the western portion of the park and an informal bridge has been created to traverse the creek using sticks and woody debris to fill in the channel (Photograph 23 on Figure 4.3). The woody debris should be removed, and if the informal trail is kept open, a formal bridge should be built to prevent park visitors from blocking the channel with woody debris.

Access Control

Fencing and barrier plantings

The intrusion of humans and dogs into the Lynn Creek riparian zone is extensive and has been detrimental. While select points of access should be retained, most of the bank of Lynn Creek should be fenced to limit riparian habitat degradation (see Figure 4.2 and Figure 4.3 for identified access points and recommended fencing locations). Pocket planting should be undertaken to accelerate the recovery of the riparian zone. Barrier landscaping with native thorny species such as rose and hawthorn can be used as an alternate or in combination with physical fencing.

Fencing should be used through the Property to restrict access the higher value habitats. Wetted habitats such as an expanded pond (discussed above) should be fenced as a safety feature. Signage advising of habitat sensitivities and potential hazards should be affixed to fences/barriers.

Hydrological Mitigation

Stormwater quality

The existing leachate problem, associated with the historic use of the Property as a landfill, should continue to be monitored. This issue is independent of the current assessment.

Runoff from all proposed paved surfaces is a source of contaminants, primarily those associated with automobiles such as hydrocarbons, anti-freeze (glycol) and metals. All drainage from the paved surfaces should be routed to either (or both) linear bio-swales or a bio-filtration wetland. The disturbed/cleared portion of Area 5 is of sufficient size to allow a function wetland to be developed to treat the paved surfaces (from which runoff can be conveyed in a storm sewer). The lower sections of paved surfaces further downslope (towards the southwest) could be captured in a bio-swale adjacent to the drive aisle. The treated flow from the bio-swale and/or bio-filtration wetland could be routed through the expanded/enhanced pond before being discharged to Lynn Creek. Monitoring of water quality should be undertaken to assess the efficacy of the systems.

Photographs of green parking lots and bio-swales are included in Figure 4.6 (Attachment C).

Stormwater quantity

Increased rates of runoff during periods of peak rainfall are generally associated with the degradation of downstream channels and habitats. The playing fields, paved surfaces and other park features should have engineered drainage systems that address hydrological change. While the area to be developed is relatively small in contrast to the Lynn Creek catchment area, and the creek channel appears relatively stable (with bank reinforcement), the maintenance (or restoration) of post-development hydrological conditions should be an objective of the project. It is, perhaps, more important to infiltrate water to ground to the benefit of the creek and the enlarged/enhanced pond. Infiltration function can be incorporated into bio-swale designs.

Mitigation of Other Impacts

Light/Noise

Playing fields with lights for night use have the potential to significantly alter the light regime in adjacent natural habitats, to the detriment of the wildlife community. The light system must be designed and operated to avoid/minimize the illumination of the adjacent forest. Noise associated with playing fields can also affect wildlife use in adjacent habitats. Screening should be incorporated into site designs to minimize the effects of both light and noise.

Construction

During site construction, all work should conform to a Construction Environmental Management Plan (CEMP). Key elements of the CEMP should include erosion and sediment control (ESC), emergency spill response measures and contacts, specific habitat protection measures, and timing windows to avoid bird nesting and instream works.

Habitat Balance

The proposed expansion of Field No. 1 is not associated with significant habitat losses, nor for the most part are the upgrades to vehicle parking and drive aisles.

The construction of Field No. 2 will result in the loss of approximately 1.3 ha of woodland habitat. The following habitat creation/enhancement works within the immediate project area are proposed as offsets to this loss (figures in parentheses are additional areas within adjacent parkland, outside of the Proposed Work Area).

- | | |
|--|-----------------|
| 1. Invasive removal and re-landscaping | 0.3 ha (0.4 ha) |
| 2. Landscaping of areas lacking vegetation | 0.1 ha (0.1 ha) |
| 3. Infill landscaping, reforestation and habitat complexing (@ 50% credit) | 0.5 ha (0.3 ha) |
| 4. Pond expansion and enhancement | 0.1 ha |
| 5. Exclusion fencing (protected area) | 0.3 ha (0.5 ha) |

Approximately 1.3 ha of habitat creation/enhancement can be undertaken in the immediate project area, while there is potential to enhance approximately 1.3 ha in adjacent parkland, mostly west of Lynn Creek. Completion of all proposed compensation works achieves a ratio of approximately 2-for-1.

While a balance of habitat losses and gains is achievable from a mathematical perspective, other factors should be considered in determining whether or not the proposed habitat compensation would result in suitable habitat replacement. These factors include:

1. Replacement of woodland habitat with other types of habitat. Where enhancement landscaping is proposed it will be comprised of assemblages of native trees, shrubs and groundcover species suited to the site conditions. The objective will be to re-establish plant communities that will mature as representative climax forests. Some differences in species composition would be proposed for areas adjacent to streams (i.e. riparian zones). The relative values of the different plant communities are not significant if the intention is to enhance general ecological functions and values (as opposed to habitat for certain species). The proposed development of pond habitat as an offset for displaced woodland has merit as ponds are lacking in the general vicinity of the project. In order to ensure project success, long-term monitoring should extend a minimum of five years;
2. Time delay (loss of maturity). The woodland that would be displaced, while second-growth and somewhat disturbed by human encroachment, has ecological value that reflects its level of maturity. The replacement of this displaced habitat with an equivalent amount of newly planted area does not adequately balance the loss of mature habitat. Established woodlands, owing primarily to the size and maturity of trees, supports a greater abundance of habitats (and hence wildlife diversity) than recently landscaped area. As a general rule-of-thumb, replacement habitat should be provided at a minimum ratio of 2-to-1 to account for the time delay in the evolution towards a similarly mature and functional plant community;
3. Efficacy of invasive plant removal. The removal of non-native plants, in particular the more aggressive (invasive) species that tend to displace native species, is of ecological value as it allows the restoration of a native plant community and slows the progression of the non-native plants. Effective removal of invasive plants requires significant effort at the time of restoration and further effort over the long-term to ensure the eradication. The propensity of the invasive plants to re-establish from outside and/or adjacent

untreated areas may remain an issue. In order to ensure project success, long-term monitoring should extend a minimum of five years;

4. Value of exclusion fencing. Fencing to restrict the damage to plants and habitats by human and dogs is a recognized measure that allows degraded habitats to recover. Recognizing that approximately 10 metres of riparian width benefits for each linear metre of fence, and that the Lynn Creek riparian zone is only partially impaired by encroachment, we have accounted for 5 square metres of restored/protected habitat for each linear metre of proposed fence; and
5. Risk and costs. Should the project proceed, the loss of 1.3 ha of woodland habitat is certain. The success of the proposed compensation works is not as certain, but is achievable. The risks of failure can be reduced with long-term monitoring and maintenance, but these are additional costs. The costs of completion of all proposed compensation work is approximately \$940,000. Five years of monitoring and maintenance on landscaping works, based on 40% of initial costs, increases the estimated cost to about \$1.3 million, but is considered critical to achieve project success.

SUMMARY

The conversion of Field No. 1 and construction of a new field (Field No. 2) at Inter River Park in North Vancouver has been proposed. A large portion of the project footprint occurs within the existing grass field. The area surrounding the existing field to the south and east is forested with multiple trails and a service road. North of the existing field is a planted area. The area to the west of the existing field occurs within an existing 30 metre riparian setback from Lynn Creek. Field No. 2 would occur within woodland at the south end of the park.

An environmental inventory prepared in 1998 identified a large and diverse number of species utilizing the park, and provide recommendations that remain valid. In particular, that report recommended that the southern woodland (where the second field is proposed) not be developed. As the currently plan proposes to eliminate a portion (1.3 ha) of the southern woodland, reasonable compensation habitat must be provided as an offset for the loss.


Proposed habitat enhancements include removal of invasive plants, landscaping with native species, complexing of the existing wooded areas, and creation of an expanded pond. Additional work includes a number of habitat restoration sites on the west side of Lynn Creek, and fencing to exclude pedestrians and dogs from much of the creek's riparian zone.

A number of impact mitigation strategies have been proposed and include water quality and quantity protections, light/noise mitigation, and construction period controls.

Sufficient mitigation and enhancement opportunities are available to offset the proposed habitat losses. Long-term (minimum five years) monitoring is required to ensure the success of proposed mitigation/enhancement works.

Should development of Field No. 2 proceed, further assessment of required and should include detailed assessment of species-at-risk and mapping/quantification of invasive species presence. Proposed mitigation and enhancement works would also require detailing.

Yours truly,
ENVIROWEST CONSULTANTS INC.



Tracy Anderson, R.P.Bio.
Biologist



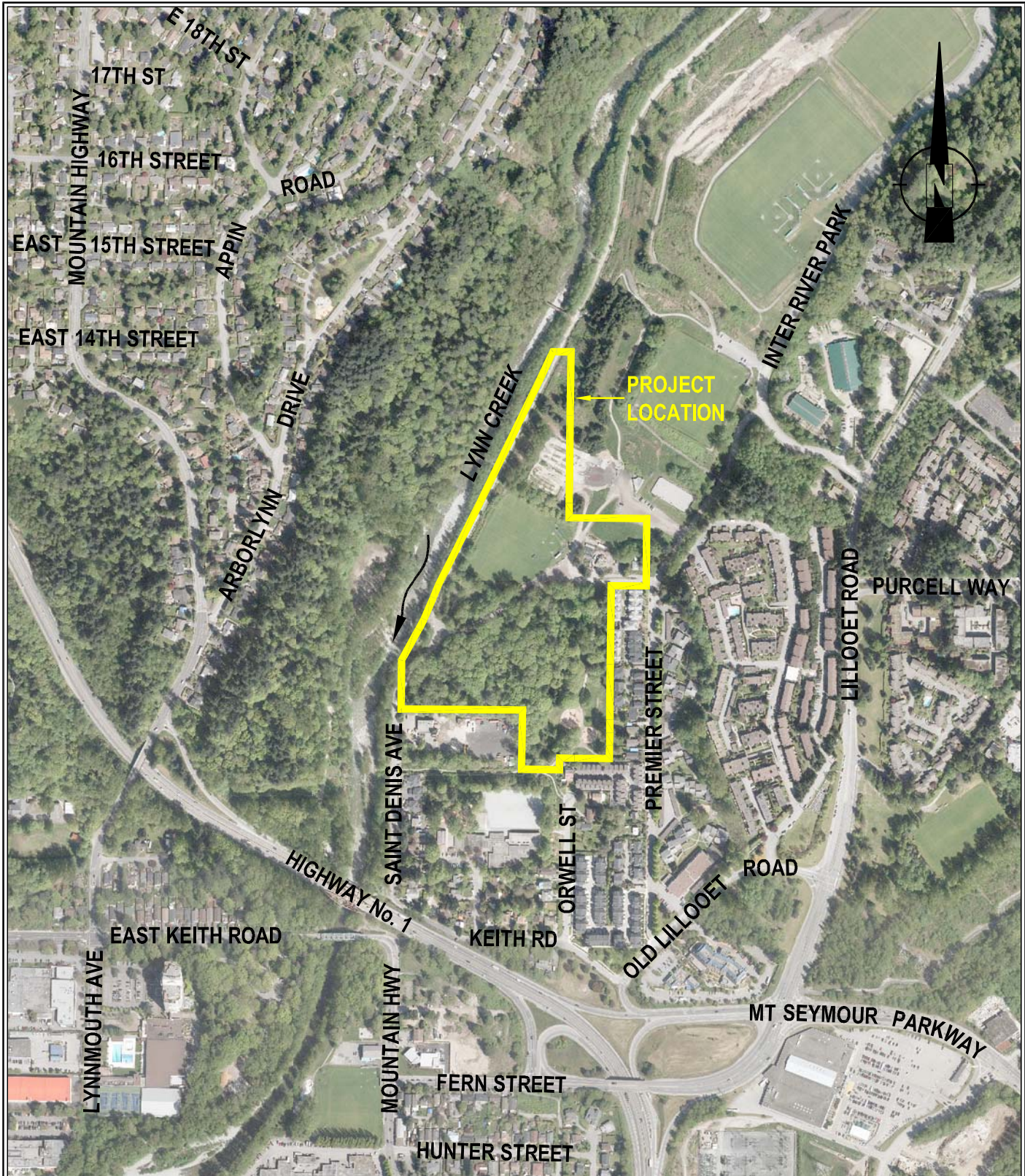
Ian W. Whyte, P.Ag.
Senior Project Manager

TA/IWW

Attachment	A	Figures (Envirowest)
	B	Site Photographs
	C	Figures (RF Binnie)

ATTACHMENT A
FIGURES (ENVIROWEST)

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LAYOUT: FIGURE 1



- REFERENCE DRAWINGS
- 1. 2013 Legal Base From District of North Vancouver.
 - 2. 2013 Ortho Photograph From District of North Vancouver.

R.F. BINNIE & ASSOCIATES LTD.		 <div>Suite 101 - 1515 Broadway Street Port Coquitlam, British Columbia Canada V3C 6M2 office: 604-944-0502 facsimile: 604-944-0507 www.envirowest.ca</div>	PROJECT LOCATION														
DISTRICT OF NORTH VANCOUVER INTER RIVER PARK SOUTH			<table><tr><td>DESIGN:</td><td>DRAWN: SDJ</td><td>CHECKED:</td><td>REVIEWER: 00</td><td>REVISION DATE:</td></tr><tr><td>SCALE:</td><td colspan="3">1:7,500</td><td>DRAWING NUMBER:</td></tr><tr><td>DATE:</td><td colspan="3">October 31, 2016</td><td>FIGURE 1</td></tr></table>	DESIGN:	DRAWN: SDJ	CHECKED:	REVIEWER: 00	REVISION DATE:	SCALE:	1:7,500			DRAWING NUMBER:	DATE:	October 31, 2016		
DESIGN:	DRAWN: SDJ	CHECKED:	REVIEWER: 00	REVISION DATE:													
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LAYOUT: FIGURE 2

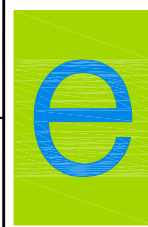


REFERENCE DRAWINGS

1. 2013 Legal Base from District of North Vancouver.
2. 2013 Ortho Photograph From District of North Vancouver.

R.F. BINNIE & ASSOCIATES LTD.

DISTRICT OF NORTH VANCOUVER
INTER RIVER PARK SOUTH



envirowest consultants inc.

Suite 101 - 1515 Broadway Street
Port Coquitlam, British Columbia
Canada V3C 6M2
office: 604-944-0502
facsimile: 604-944-0507
www.envirowest.ca

ENVIRONMENTAL ASSESSMENT AREA

DESIGN: HS/TA	DRAWN: SDJ/CEV	CHECKED: IWW	REVISION: 01	REVISION DATE: April 13, 2017
SCALE: 1:1,500	DRAWING NUMBER: FIGURE 2			
DATE: October 31, 2016				

ATTACHMENT B
SITE PHOTOGRAPHS



Photograph B1. Field #1 (Area 1) looking west from the park service road and parking area (August 16, 2016).



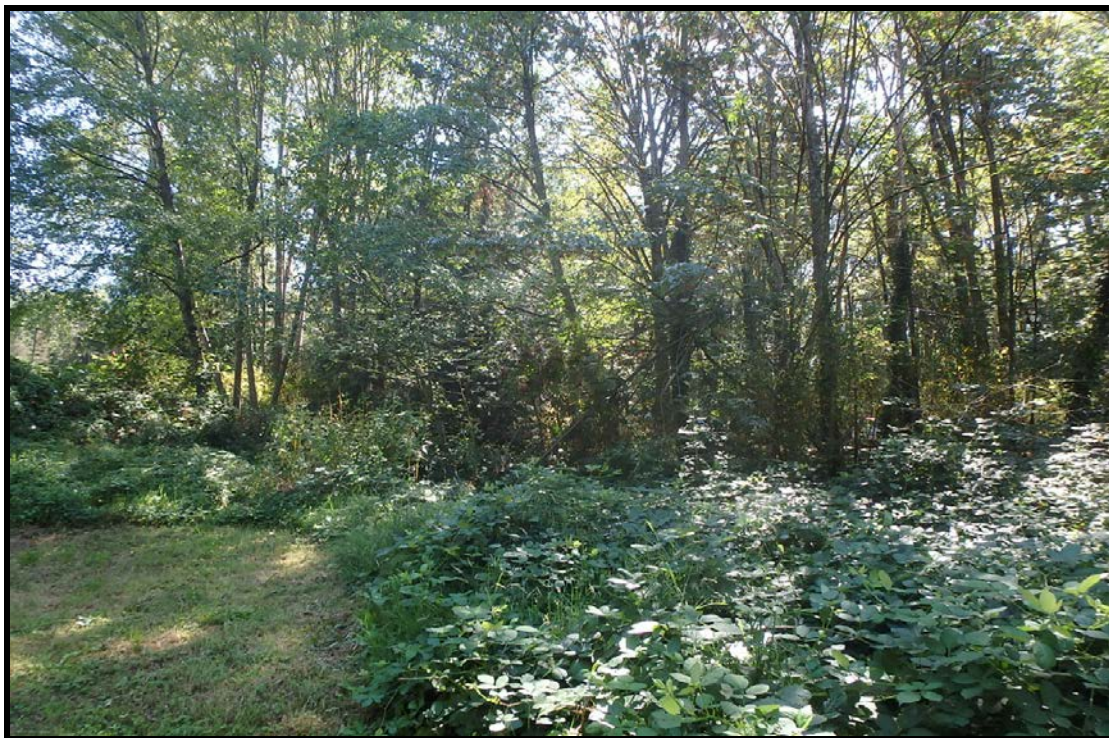
Photograph B2. Planted area west of the nursery (Area 2) looking north (August 16, 2016).



Photograph B3. Area north of Field #1 (Area 3) looking west (August 16, 2016).



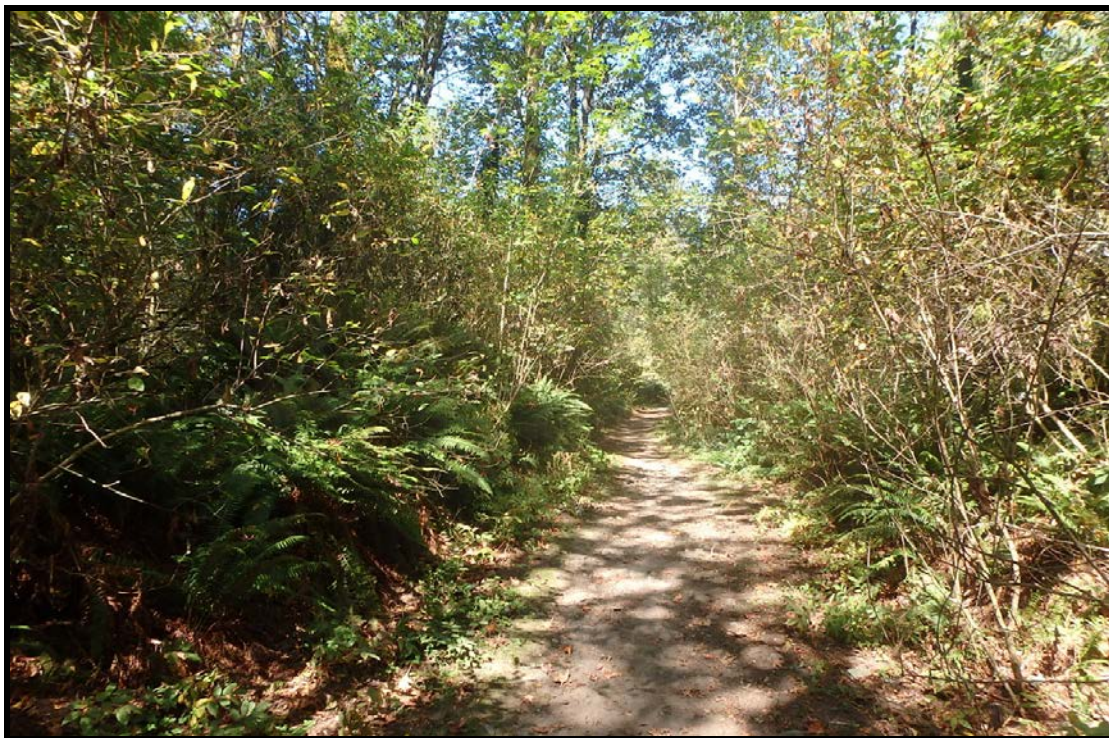
Photograph B4. Disturbed area within riparian setback west of Field #1 (Area 4) looking west (August 16, 2016).



Photograph B5. Lower treed area south of Field #1 (Area 5) looking east (August 16, 2016).



Photograph B6. Lower treed area south of Field #1 (Area 5) looking northwest from the park service road (August 16, 2016).



Photograph B7. One of multiple trails within the forested area southeast of the park service road (Area 6) (August 16, 2016).

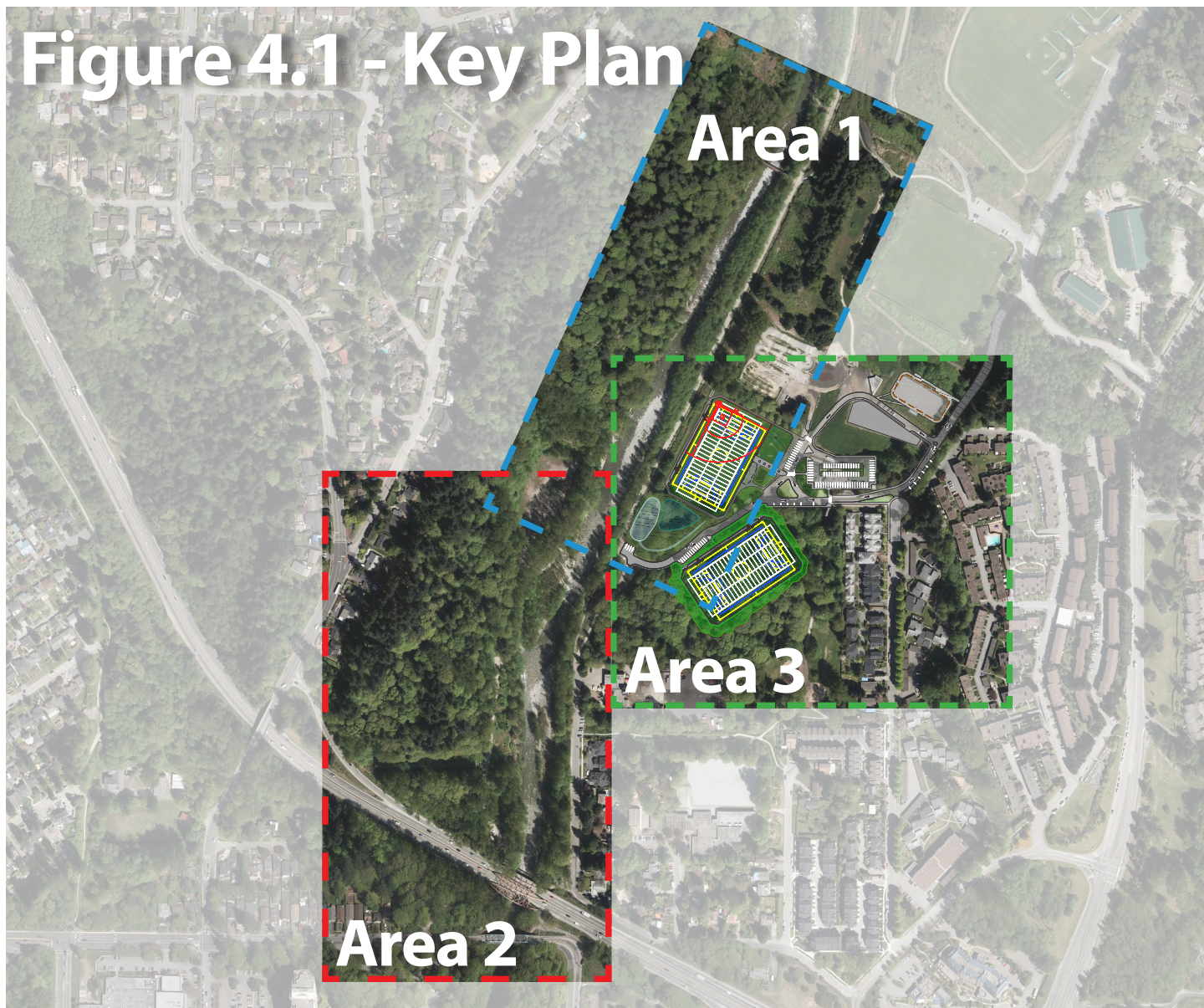


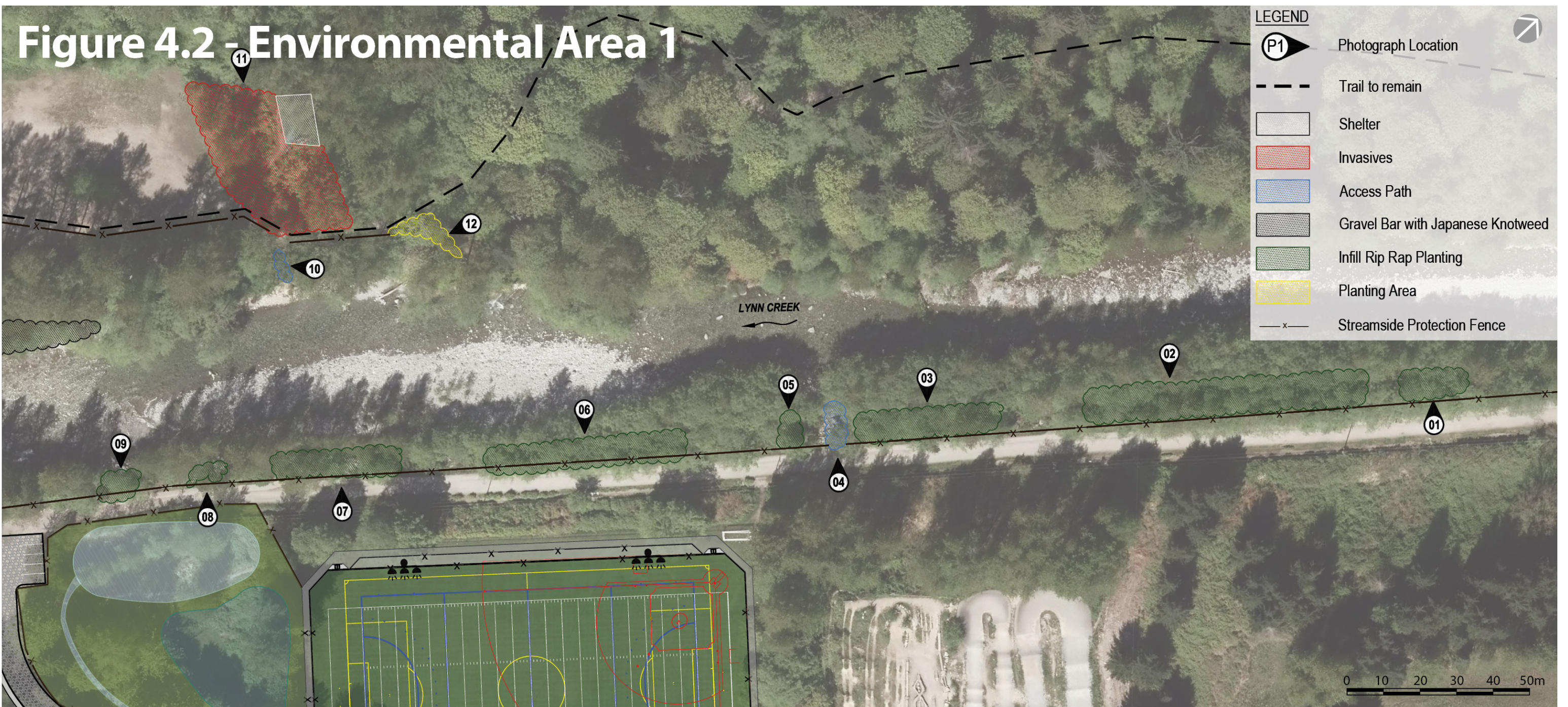
Photograph B8. Forested area southeast of the park service road (Area 6) (August 16, 2016).

ATTACHMENT C

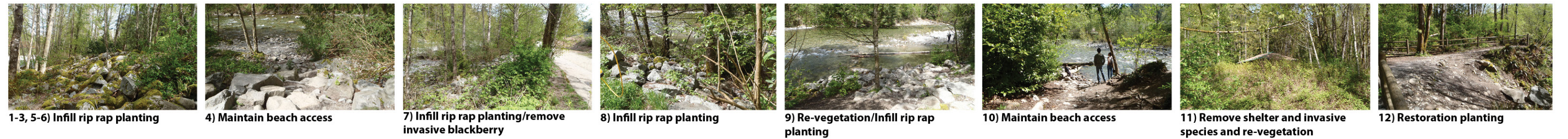
FIGURES (RF BINNIE)

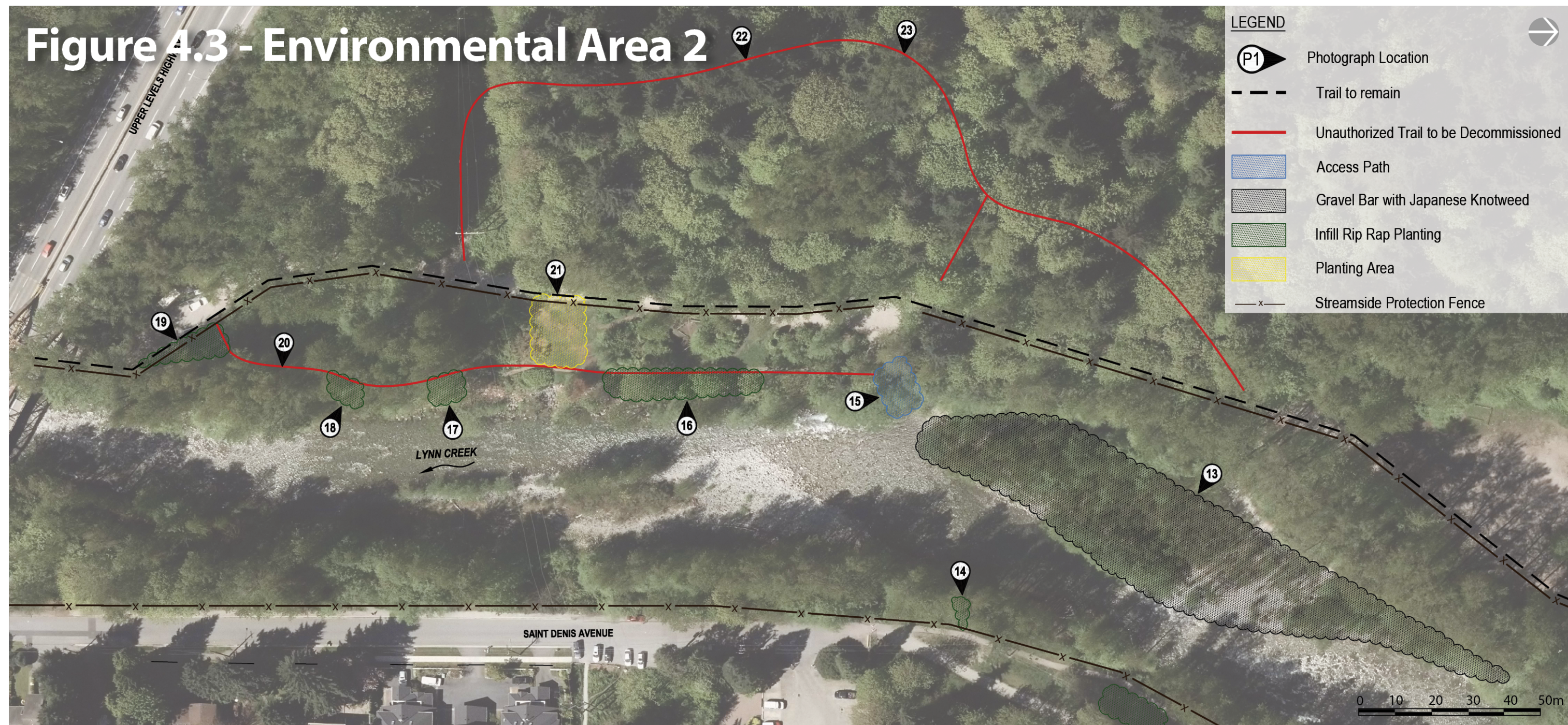
Figure 4.1 - Key Plan





Note: Photos 1-12 reflect current conditions and were taken on May 2, 2017





Note: Photos 13-23 reflect current conditions and were taken on May 2, 2017



13) Remove Japanese Knotweed throughout gravel bar



14, 16 - 18) Infill rip rap planting



15) Maintain beach access



19) Restoration planting



20) Decommission trail restoration planting



21) Restoration planting/knotweed removal



22) Restoration planting



23) Remove makeshift bridge



Figure 4.4 - Environmental Area 3

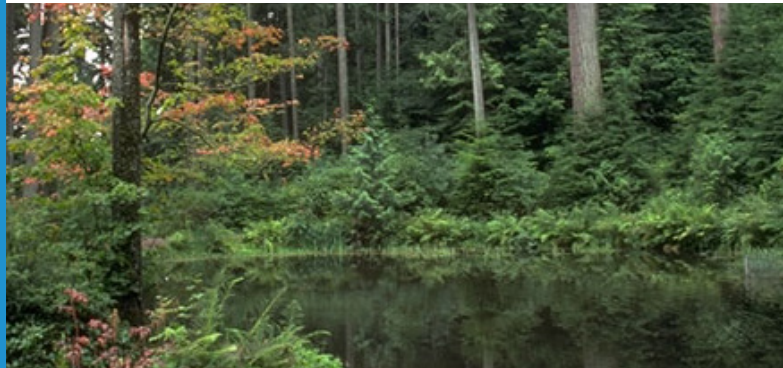


Figure 4.5 - Bio Wetland Examples

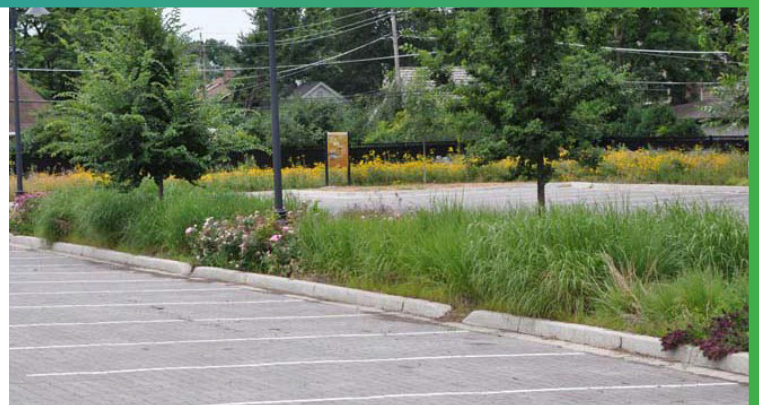
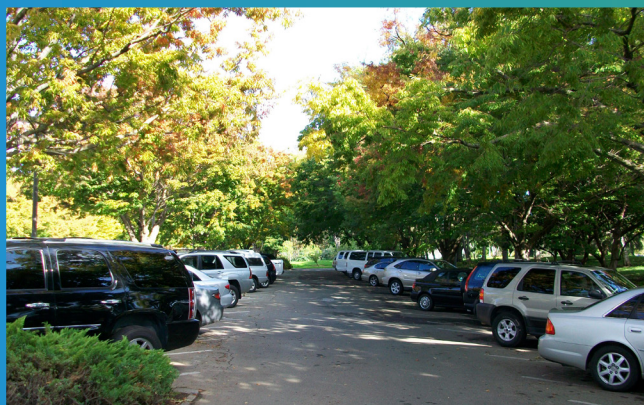


Figure 4.6 - Green Parking Examples