CITY OF SHORELINE

Planning & Development Services Dept.

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ADMINISTRATIVE ORDER#000110-081909

SITE SPECIFIC CODE INTERPRETATION TC 16, TC 17 AND TC18

CODE SECTION: 20.80.460 and 20.80.470 Streams

I. ISSUE

The piped and open drainage that runs through Hamlin Park and the Fircrest campus is identified as a stream, Thornton Creek tributary reaches TC16, TC17 and TC18 (Attachment A), in the *City of Shoreline Stream and Wetland Inventory and Assessment, May 2004, Tetra Tech/KCM, Inc.* These tributary reaches are also referred to as Hamlin Creek in other reports. As a stream it would be regulated under Shoreline Municipal Code Chapter 20.80.

Recent critical area reports on the segments through Hamlin Park and Fircrest conclude that this tributary is not a stream because: it is a series of artificially created stormwater conveyances (pipes and ditches) that does not have salmonid fish use or demonstrated salmonid habitat value and does not convey a stream that was naturally occurring prior to construction. If this drainage is not a stream SMC 20.80 would not apply and protection of the drainage would be under the adopted Surface Water Code.

"WAC 220-110-020 (107) defines 'Waters of the state' or 'state waters' as all salt waters and fresh waters waterward of ordinary high water lines and within the territorial boundaries of the state. The State has jurisdiction over waters of the state."

If the City decides this drainage is not a stream, the State may still regulate the drainage as a stream or "water of the state". The State does not have a method of declassifying a stream.

II. FINDINGS:

- SMC 20.20.046 and 20.80.460 define streams as:
  Those areas where surface waters produce a defined channel or bed, not including irrigation ditches, canals, storm or surface water runoff devices or other entirely artificial watercourses, unless they are used by salmonids or are used to convey streams naturally occurring prior to construction. A channel or

bed need not contain water year-round; provided, that there is evidence of at least intermittent flow during years of normal rainfall.

- The ***City of Shoreline Stream and Wetland Inventory and Assessment (May 2004, Tetra Tech/KCM, Inc.)*** describes Thornton Creek tributaries TC16, TC17 and TC18 as predominantly piped with intermittent open water courses. No information is provided for this reach on fish barriers, habitat conditions, or other site conditions.

- The *Fircrest Master Plan: Critical Area Report and Conceptual Restoration Plan for Hamlin Creek, Shoreline, WA (November 2008, The Watershed Company)*(Attachment B) evaluates the portions of this tributary which crosses the Fircrest campus. The report indicates that Hamlin Creek on the Fircrest campus:
  - Does not currently and will not likely support fish populations due to physical characteristics;
  - Flow is ephemeral, not just intermittent which precludes direct use of the stream by fish on the Fircrest campus;
  - All of the drainage channel sections on and upslope of the site can be construed as "entirely artificial watercourses" because they are roadside ditches, other man-made channels, piped sections or carry flow originating from surface water drainage systems; and
  - Refers to a report from April 2002 by Golder Associates (Attachment C Preliminary Geotechnical Assessment for Fircrest School Site, Golder and Assoc. Inc. 2002) that looked at historic topographic maps (dated 1909, 1949, 1968 and 1983) and aerial photos (dated 1936, 1946, 1956, 1960, 1969, 1974, 1980, 1985, 1990, 1995, an 1999) for the area as well as doing two site visits and concluded that there was no evidence of natural stream channels, creeks, ponds, or lakes historically or at the time of the site visits.

- The *Drainage Evaluation, Hamlin Park, City of Shoreline* (December 2008) and two follow-up reports (February 2009 and March 2009) by Touchstone EcoServcies evaluates the portions of this tributary which flow through Hamlin Park upstream of the Fircrest campus. The reports indicate that:
  - The drainages in Hamlin Park function only as a stormwater drainage system and are not streams because there is not a base flow in the tributary. For that reason this tributary was not included in the *State of the Waters 2007* report from Seattle Public Utilities even though it was included in the original *Thornton Creek and West Lake Washington Basins Characterization Report.*
  - Multiple partial and impassable fish barriers exist downstream of this tributary in Thornton Creek. While removal of fish barriers within Thornton Creek is in the long-term goals of the City of Seattle, these projects are not currently adopted in a six-year capital improvement plan.
  - It is unknown whether this drainage had been a natural stream prior to urban development. The report concludes ephemeral flow seen in this drainage system now is probably a direct result of urban development.
  -

III. CONCLUSIONS

The evaluations provided by three independent qualified professional consultants demonstrate that the Hamlin Creek tributaries to Thornton Creek, also known as TC16, TC17 and TC18 or the Hamlin Park drainages, do not meet the definition of a "stream" under the City of Shoreline Municipal Code sections 20.20.046 and 20.80.460 through 20.80.470 because:

- There is no current or potential salmonid fish use or demonstrated habitat values;
- The drainage system through Hamlin Park, Fircrest campus and downstream to the confluence with Thornton creek is comprised of entirely artificial watercourses;
- There is not evidence of at least intermittent flow during years of normal rainfall; and
- There is no historical or present day evidence that this drainage system is used to convey water from streams that were previously naturally occurring.

Based on the examination of more detailed studies prepared for Hamlin Park and Fircrest, the City has concluded that TC16, TC 17 and TC 18 do not meet the City's definition of a stream and will update the City's Basin Characterization Report to reflect this change. In conversation with the Washington State Department of Fish and Wildlife, TC16, TC 17 and TC18 will likely be regulated by the State as streams. The State does not have a process by which a watercourse can be reclassified from a stream to something less than a stream.

IV. DECISION:

Thornton Creek tributary reaches TC16, TC17 and TC18, also known as Hamlin Creek and Hamlin Park drainages are not classified as streams under the Shoreline Municipal Code and are not subject to SMC 20.80.

These drainages may be regulated by the State as "waters of the state". These drainage courses formerly referred to as TC 16, TC 17 and TC 18 will be denoted in the City's GIS as potential "waters of the state". This will alert viewers of the data that an HPA permit may be required to work within these drainage courses.

Director's Signature

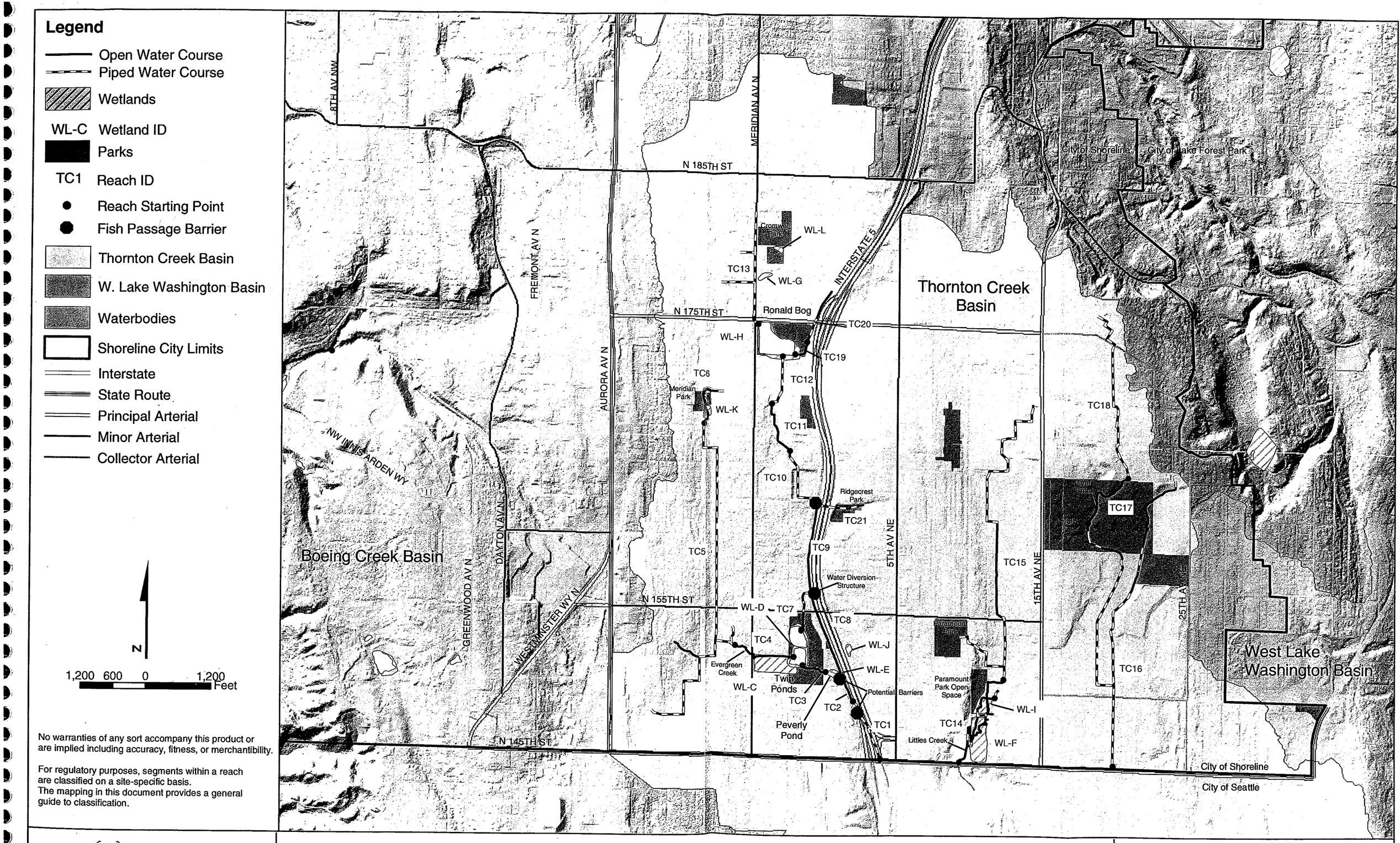
9/1/09
Date

Attachment A — Excerpt map from City of Shoreline Stream and Wetland Inventory and Assessment, May 2004, Tetra Tech/KCM, Inc. of TC 16, 17 & 18

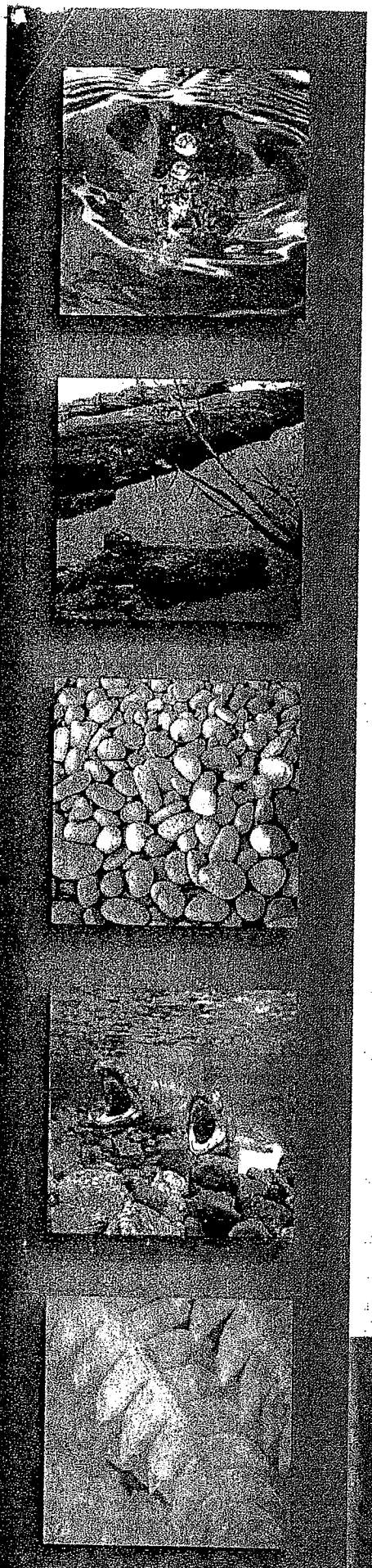
Attachment B — Fircrest Master Plan: Critical Area Report and Conceptual Restoration Plan for Hamlin Creek, Shoreline, WA (November 2008, The Watershed Company)

Attachment C	Preliminary Geotechnical Assessment for Fircrest School Site, Golder and Assoc. Inc. 2002
Attachment D	Drainage Evaluation, Hamlin Park, City of Shoreline (December 2008; February 2009, TED Touchstone Ecoservices)

Attachment A


Legend
Open Water Course
Piped Water Course
Wetlands
WL-C Wetland ID
Parks
TC1 Reach ID
Reach Starting Point
Fish Passage Barrier
Thornton Creek Basin
W. Lake Washington Basin
Waterbodies
Shoreline City Limits
Interstate
State Route
Principal Arterial
Minor Arterial
Collector Arterial
N
1,200 600 0 1,200 Feet
No warranties of any sort accompany this product or are implied including accuracy, fitness, or merchantibility.
For regulatory purposes, segments within a reach are classified on a site-specific basis.
The mapping in this document provides a general guide to classification.
8TH AV NW
N 185TH ST
MERIDIAN AV N
FREMONT AV N
AURORA AV N
INTERSTATE 5
N 175TH ST
NW INNIS ARDEN WY
GREENWOOD AV N
DAYTON AV N
WESTMINSTER WY N
N 155TH ST
N 145TH ST
5TH AV NE
15TH AV NE
25TH A
Boeing Creek Basin
Thornton Creek Basin
West Lake Washington Basin
City of Shoreline
City of Lake Forest Park
Cromwell Park
WL-L
TC13
WL-G
Ronald Bog
TC20
WL-H
TC19
TC6
Meridian Park
WL-K
TC12
TC11
TC10
Ridgecrest Park
TC21
TC9
TC5
Water Diversion Structure
WL-D
TC7
TC8
TC4
WL-J
WL-E
Evergreen Creek
WL-C
Twin Ponds
TC3
TC2
Potential Barriers
Peverly Pond
TC1
Paramount Park
Paramount Park Open Space
WL-I
TC14
Littles Creek
WL-F
TC15
TC16
TC17
TC18
City of Shoreline
City of Seattle

Attachment B



Fircrest Master Plan:
Critical Areas Report and Conceptual Restoration Plan for Hamlin Creek, Shoreline, WA

AHBL, Inc.
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Seattle WA 98101-3117

and

Washington State Department of
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Lands and Buildings Division
1115 Washington Street
PO Box 45848
Olympia, WA 98504-5848

November 24, 2008

THE WATERSHED COMPANY

FIRCREST MASTER PLAN:

Critical Areas Report and Conceptual Restoration Plan for Hamlin Creek, Shoreline, Washington

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November 24, 2008

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Reference Number: 080510

Hamlin Creek Restoration Plan for Fircrest Campus Master Plan
Critical Areas Design Report

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1 BACKGROUND AND INTRODUCTION: THE FIRCREST CAMPUS EXCESS PROPERTY MASTER PLAN

The Washington Department of Social and Health Services (DSHS) has been directed to complete a master plan of the portion of the Fircrest Campus (located in the City of Shoreline) not utilized by the Fircrest School or the Department of Health (DOH). For a Vicinity Map, see the Overall Concept Plan in Appendix A. In consultation with various agencies and stakeholders, several alternatives for future land uses of the excess property were formulated including recommendations for uses such as housing, government office, retail, recreation, and, the application of "smart growth" concepts. Phase I work on the master plan is presented more fully in the report titled *Fircrest Excess Property Report - Land Use Options and Recommendations*, which can be viewed at http://cosweb.ci.shoreline.wa.us/uploads/attachments/pds/fircrest/Finalreport.pdf.

As an element of the DRAFT Conceptual Site Plan for the Fircrest Campus Excess Property Master Plan (see Figure 1), it is proposed, along the east boundary of Area 5, to daylight and/or restore sections of upper Hamlin Creek which are now conveyed mostly in piped systems across the property. Hamlin Creek originates in the watershed areas upstream (north) of the Fircrest Campus including in the City's Hamlin Park and Shorecrest High School. The piped and open-channel sections of the creek on-site are intermittent, flowing only in response to periods of high precipitation, and are therefore non-fish-bearing. Hamlin Creek is a tributary of Thornton Creek, which it joins approximately 20 blocks south of the Fircrest Campus within the City of Seattle. An overview of the stream location on and near the Fircrest Campus as it flows towards Thornton Creek south of the campus is provided by Figure 2. This urban stream has been significantly impacted by past and present land use activities, and the proposed stream daylighting project is intended to largely restore natural stream headwater functions including biofiltration, water infiltration and storage, wetland and wildlife habitats, and, in general, to provide high-quality, less flashy flows to downstream fish and wildlife habitat areas.

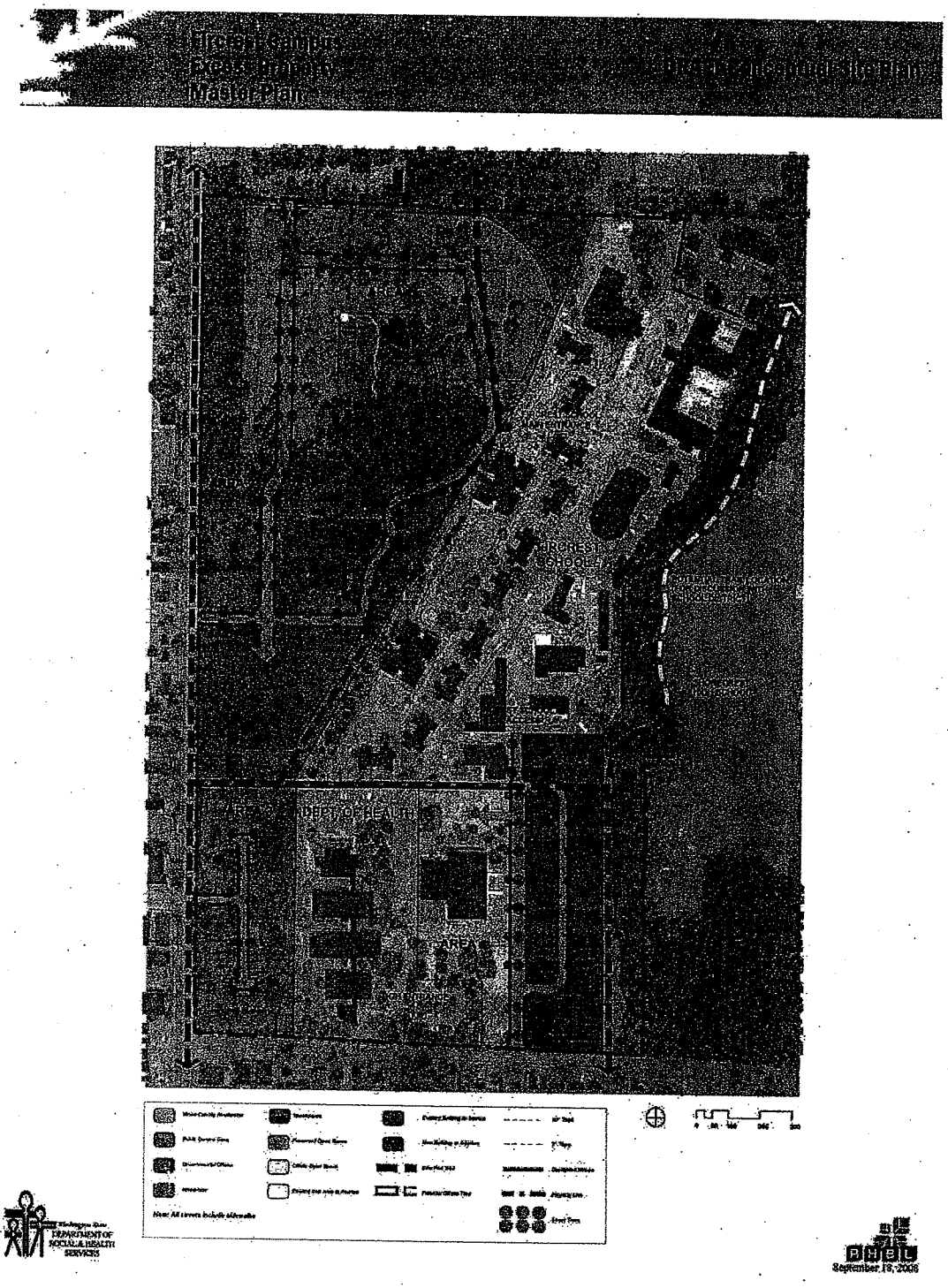


Figure 1. Fircrest Campus Excess Property Master Plan (DRAFT Conceptual Site Plan) provided by AHBL.

Project goals related to and consistent with the proposed daylighting and restoration of sections of Hamlin Creek include:

1. Daylighting piped portions of Hamlin Creek to increase fish and wildlife habitat values, to reduce stormwater surge and flood events, and to achieve other natural drainage benefits such as improved water quality and groundwater supply;
2. Retaining significant stands of trees and vegetation and their ecological benefits. Protect mature specimen trees and to enhance understory functions and species diversity;
3. Reducing the proportion and area of impervious surfaces on the campus; improve site infiltration and enable biofiltration of stream- and stormwater;
4. Integrating green building principles and Low Impact Development (LID) practices into the new development proposal for the Campus to promote environmental stewardship and sustainability; and
5. Providing open space amenities, interpretive and passive recreational opportunities, and site aesthetics for the local community.

2 CRITICAL AREAS REPORT

2.1 Existing Condition of Hamlin Creek on the Fircrest Campus

The Hamlin Creek sub-basin is identified as sub-basin N6 in the *Thornton Creek Watershed Characterization Report* (SPU 2000). This subwatershed is approximately 405 acres in size and includes largely-forested Hamlin Park, the adjacent commercial and educational facilities including the Fircrest Campus, and the surrounding residential neighborhood. Hamlin Park also includes some open-area ball fields (see Figure 3). Hamlin Creek joins the North Branch of Thornton Creek in the City of Seattle near 20th Ave NE just south of NE 130th St. Downstream (south) of 150th Street, between the Fircrest Campus and the confluence with Thornton Creek, Hamlin Creek flows primarily in various open ditches and piped segments along 20th Avenue NE and contains little quality habitat (see Figure 4).

The portion of Hamlin Creek that is located on the Fircrest Campus site consists of two tributaries, the first of which alternates between piped and ditched sections along the eastern property boundary. The other tributary exists as a swale near the north property boundary, and then runs underground in a pipe

southward until it connects with the culverted eastern tributary on the Campus near the southern property line (refer to Appendix A and Figure 2 for the existing locations of these mostly-piped drainage pathways on-site).

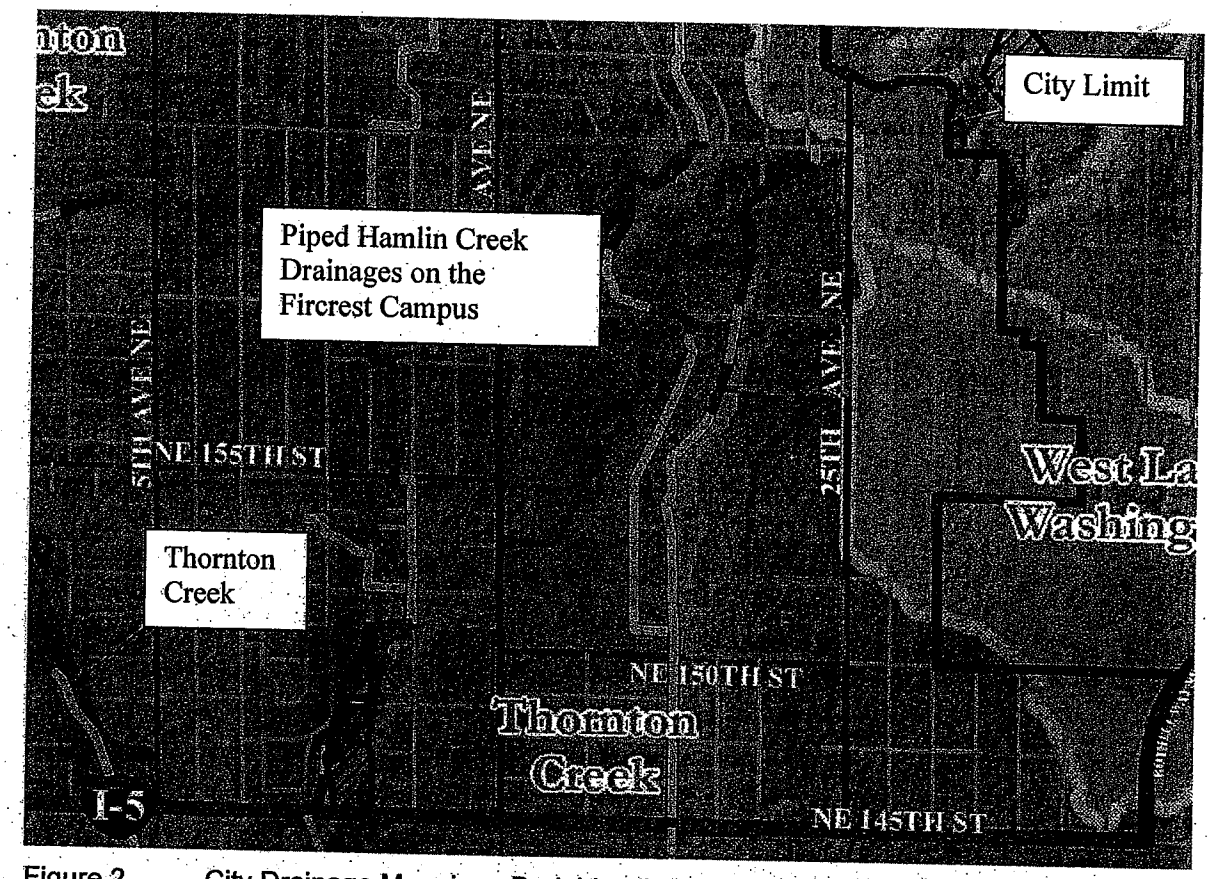


Figure 2. City Drainage Mapping. Dark blue lines indicate open water courses and light blue lines indicate piped watercourses.

Neither tributary currently supports fish populations, and due to their physical characteristics (numerous extended pipe sections, limited exposed channel, intermittent flow), they do not likely have this potential.

Flow in Hamlin Creek on-site is ephemeral, meaning not only that it ceases to flow seasonally, during the normally-drier summer months, but that it also stops flowing in response to periods without precipitation throughout the year, including the normally-wetter winter season. Water has been observed to flow in the on-site, open-channel sections of the stream only during and for periods shortly following significant storm events (4/11/02 Golder Geotechnical report; Golder Associates, Inc. 2002b.). This condition and flow regime clearly precludes any kind of direct, on-site fish use of the stream. In addition, the culvert outfall at the mouth of Hamlin Creek, where it flows into Thornton

Creek, is likely a barrier to upstream fish migration, including anadromous salmon and trout. The gradient is steep and the vertical distance from the culvert outfall to the surface of Thornton Creek is 18-24 inches, depending on flow conditions. The culvert is in poor condition with water flowing out through gaps in its bottom rather than out the end (Golder Fisheries, Streams, and Wildlife Report, Golder Associates, Inc. 2002a). While *seasonal* streams sometimes support fish populations, generally *ephemeral* ones do not. In addition, entirely seasonal stream sections upstream of definitive migration barriers cannot support fish use from year to year (unless artificially planted again each year) because fish are eliminated from such sections each year as flow ceases and natural recolonization is prevented the following wet season by the barrier.

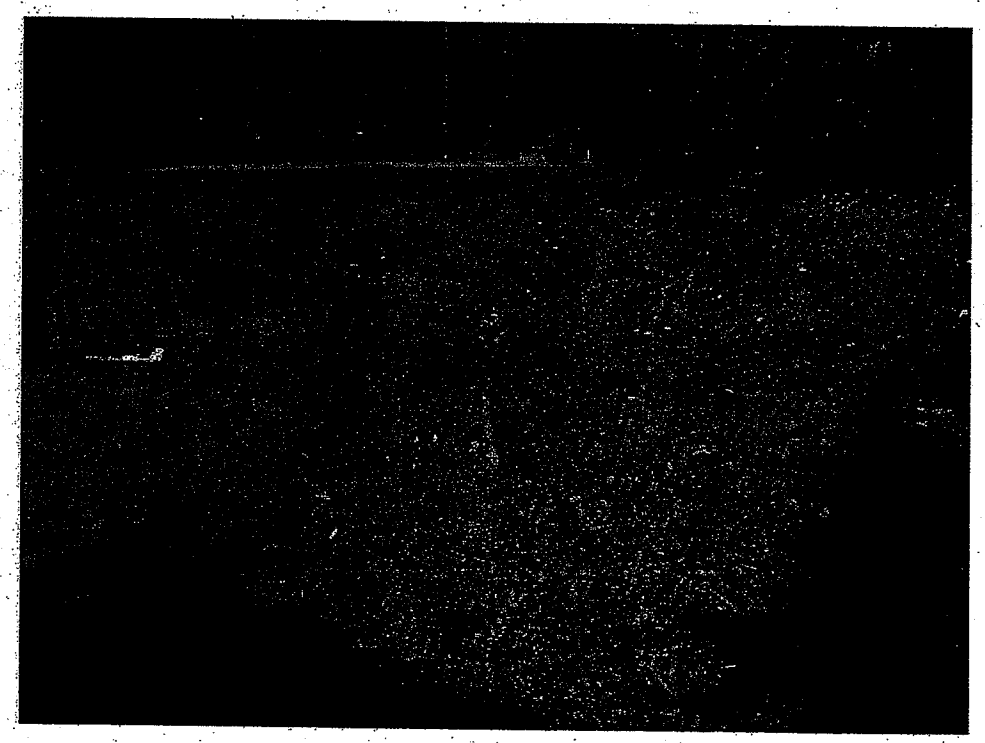


Figure 3. Facing upstream along the east fork of Hamlin Creek in Hamlin Park between the toe of the slope and a baseball field (Taken on 8/4/08).

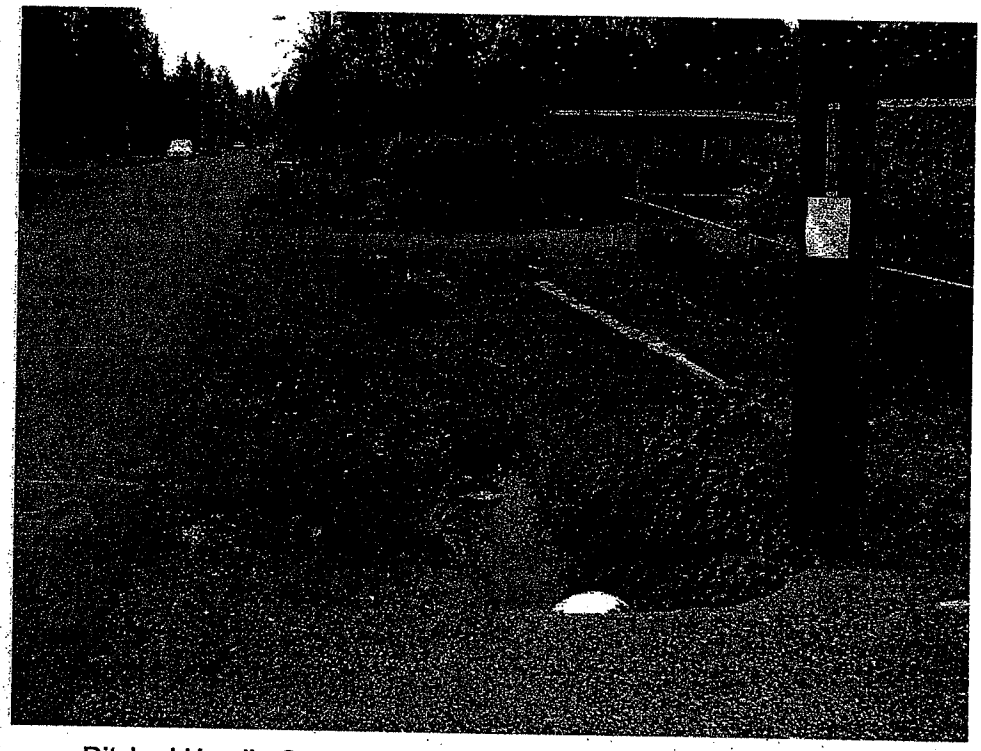


Figure 4. Ditched Hamlin Creek channel along the west side of 20th Avenue NE, downstream of the Fircrest Campus (Taken on 9/17/08).

Geotechnical analyses conducted in 2002 as part of a prior planning process identified that that poor soil infiltration results in standing water in many of the flat areas of the Campus, especially in low-lying areas, during storm events. Habitat problems identified or confirmed for Hamlin Creek in the 2000 Thornton Creek Watershed Characterization Report focus on the high proportion of piped stream length and the poor habitat with little vegetative cover along the ditched and piped sections extending southward from the campus along 20th Ave NE.

2.2 On-site Stream Presence and Type

Background stream mapping and presence information for the Fircrest Campus site reviewed in the preparation of this report includes the City's *Streams and Basins* map (updated 6/6/07, as downloaded from the City's website), King County i-MAP website information for the parcel and vicinity, Washington DNR Forest Practice Water Type Mapping, the 1975 Washington Department of Fisheries' *Catalog of Washington Streams and Salmon Utilization*, and the *King County Water Features* map. Site mapping provided by AHBL in conjunction with the Master Planning Process indicates the presence of the two mostly-piped drainage pathways from north to south across the site as described previously. City mapping (Figure 2, above) also shows these on-site piped drainages. Flow carried by the west drainage originates from a system of roadside ditches and

piped drainages in and upslope of Hamlin Park and, for the east drainage, from the vicinity of Kellogg Middle and Shorecrest High Schools.

However, though these mapped drainages across the site are commonly referred to as some aspect of Hamlin Creek, there remains some question as to whether they rigorously meet the definition of jurisdictional stream sections under City of Shoreline Code and, if so, their classification. According to Shoreline Municipal Code (SMC) Chapter 20, Section 20, *Definitions*, regulated stream features in the City are:

> Those areas where surface waters produce a defined channel or bed, not including irrigation ditches, canals, storm or surface water runoff devices or other entirely artificial watercourses, unless they are used by salmonids or are used to convey streams naturally occurring prior to construction. A channel or bed need not contain water year-round; provided, that there is evidence of at least intermittent flow during years of normal rainfall.

Since all of the drainage channel sections on and upslope of the site are roadside ditches or other man-made channels, piped drainage sections, and/or carry flow originating exclusively from stormwater drainage system discharges, they could all be construed as or considered to be "entirely artificial watercourses." Furthermore, a brief, sub-basin reconnaissance revealed no evidence of a historic stream channel through the area or through the relatively less disturbed areas upslope in Hamlin Park.

The 2002 *Fisheries Stream, and Wildlife Ecological Resources Assessment* for the site and the 2002 *Wetland Delineation Report for Fircrest Campus*, both prepared by Golder Associates, Inc., each imply or presume that the on-site drainages are jurisdictional streams, being portions or segments of "Hamlin Creek." However, according to the *Preliminary Geotechnical Assessment for Fircrest School Site Shoreline, Washington*, also prepared by Golder Associates, Inc., and dated April 11, 2002:

> No natural stream channels or bodies of water were observed on the site, although a man-made drainage ditch was observed along the northern half of the eastern side of the site. This ditch conveys stormwater runoff to a municipal storm drain system. Water was observed to flow in this ditch only during and after significant storm events;

and

> There were no natural stream channels, creeks, ponds or lakes evident on the site in historic topographic maps dating back to 1909...or on aerial photographs dating back to 1936... There was also no evidence that natural stream channels on the site during our two site-reconnaissance visits.

Of the stream mapping and related materials reviewed, only the City's *Streams and Basins* map and the mapping associated with the master planning process indicate any drainage features to be present on or in the immediate vicinity of the Fircrest Campus site. A portion of the City's map showing the location of the Fircrest Campus within the context of the mapped drainages is reproduced above (Figure 2).

However, since the project proponent does not wish to question whether these drainage features are technically streams, they will henceforth throughout this report be presumed to qualify as regulated streams according to City definition and code. Under that presumption, for which there is some precedent, they would most aptly be classified according to SMC 20.80.470(D) as Type III stream segments, which "are those streams which are not Type I or Type II streams with perennial (year-round) or intermittent flow with channel width of two feet or more taken at the ordinary high water mark and are not used by salmonid fish." This is opposed to Type IV streams which would otherwise be the same but would be 2 feet or *less* in width at ordinary high water. Arguably, establishing a channel width at the ordinary high water mark level for these drainages would result in a width moderately in excess of 2 feet; channels generally tend to lose their definition to become non-streams as they narrow to approaching two feet in width or less.

Type III streams in Shoreline are assigned 65-foot standard and 35-foot minimum buffer widths while Type IV steams are assigned 35-foot standard and 25-foot minimum buffer widths. The application of less than the standard and down to the minimum buffer widths normally requires that applicants 1) demonstrate that the proposed, reduced buffer widths are adequate to protect stream functions and 2) that they implement one or more enhancement measures such that net improvements to streams and buffers can be demonstrated. However, as discussed in Section 4, later in this report, required buffers for *daylighted* stream sections, regardless of stream classification but still contingent on an approved restoration plan, shall be a minimum of 10 to 25 feet. Hence a stream buffer width of 25 feet is proposed for the to-be-daylighted sections of Hamlin Creek on-site.

A lack of salmonid fish use is presumed in the drainages on-site due to their small size in an extreme headwater area, extensive piped segments, documented ephemeral (not even seasonal) flow, likely migration barriers downstream, and a general lack of beneficial habitat features including pool/riffle sequences and in-stream wood.

2.3 Fish Use of Thornton and Hamlin Creeks

Thornton Creek has supported coho and sockeye salmon, and steelhead and cutthroat trout (Williams et al., 1975) and, to a lesser extent, chinook salmon (Ken Milton, 1998 *in* Thornton Creek Watershed Characterization Report, 2000).

Cutthroat trout are present in much of the basin, where flow and fish passage conditions allow, and coho fry have been released into Thornton Creek by various schools participating in the Salmon in the Classroom program run by Washington Department of Fish and Wildlife (WDFW). In 1998, participating schools received 3,350 coho eggs and 1,050 chinook eggs. (Thornton Creek Watershed Characterization Report, 2000.) However, due to generally unsuitable habitat conditions primarily associated with its small size, ephemeral flows, and likely downstream fish passage barriers, Thornton Creek tributary Hamlin Creek does not, and is not expected to, support fish populations on-site. The closest documented fish use is in Thornton Creek at its confluence with Hamlin Creek.

2.4 Wildlife Habitat Potential of the Restored Stream Corridor On-Site

The City of Shoreline code (SCC 20.20) provides a definition of *Stream Functions* as:

> Natural processes performed by streams including functions which are important in facilitating food chain production, providing habitat for nesting, rearing and resting sites for aquatic, terrestrial and avian species, maintaining the availability and quality of water, such as purifying water, acting as recharge and discharge areas for ground water aquifers, moderating surface water and stormwater flows and maintaining the free flowing conveyance of water, sediments and other organic matter.

And, according to SCC 20.80.460 (B):

> Stream areas and their associated buffers provide important fish and wildlife habitat and corridors; help to maintain water quality; store and convey stormwater and floodwater; recharge groundwater; and serve as areas for recreation, education and scientific study and aesthetic appreciation.

Clearly, the existing on-site piped stream sections are providing little in the way of stream function other than basic conveyance. Arguably, the piped sections provide shade to keep water temperatures cool, however, given the ephemeral (sporadic) nature of the flows through these headwater stream segments, little or no flow is typically present during the warmer-weather periods. As such, temperature is typically not an issue. Virtually all wildlife habitat function is typically lacking for the piped segments along their alignments (refer to the Photos in Figures 7-9).

In contrast, the proposed daylighted channel sections will provide for most of the wildlife functions as listed and described above, including:

1. native vegetation for food production, cover, refuge and resting areas, and nesting sites;
2. biofiltration for downstream water quality, especially for the downstream fish-bearing sections of North Branch and Mainstem Thornton Creek;
3. in-channel and side-channel storage to increase detention capacity; and
4. opportunities for infiltration to supplement groundwater and dry-season flows and reduce flow volatility.

Direct fish use of the daylighted and enhanced stream channel sections on-site will essentially be precluded by the ephemeral nature of the stream flows they will carry in combination with various barriers to upstream migration. However, the buffer areas, revegetated as they will be with a dense assemblage of native plant species, will provide greatly improved habitat opportunities primarily for various birds and small mammals.

2.5 Water Quality: Benefits to Downstream Fish Habitat

The broad channel as proposed will be vegetated with dense groundcover vegetation suitable and adapted for use in biofiltration swales. As such, it will make a significant contribution to water quality extending downstream. Very little biofiltration occurs in pipes, which is the existing condition. In contrast, water flowing in direct contact with densely-growing, fine-stemmed vegetation, interacting with accumulated detrital matter such as fallen leaves, and interacting with soils and shallow groundwater, as will occur along the proposed channel, will provide a very high degree of biofiltration. The downstream, fish-bearing sections of the North Branch and Mainstem of Thornton Creek will benefit from this expected improvement in water quality.

2.6 Open Space: Aesthetic, Recreational, and Interpretive/Educational Benefits

A recreational trail or pathway, possibly with one or more bridged crossings, would be provided along the daylighted channel section as an amenity. This trail would typically be aligned to be within the outer half of the buffer. It would provide opportunities to nearby residents for passive recreation and exercise such as strolling, jogging, and possibly biking; wildlife viewing; and, potentially, educational enrichment through interpretive signage.

3 CONCEPTUAL HAMLIN CREEK RESTORATION PLAN

3.1 General Plan Elements and Description

A description of the proposed project along with supporting background information is provided below. Preliminary design plans are presented in Appendix A.

The basic approach of the stream restoration is to improve habitat and function by daylighting some presently-piped sections and enhancing some existing, open-channel ditched sections. Biologically diverse, well-vegetated stream buffer areas will be created as space allows, also contributing to improved in-stream habitat, especially where new channel sections are created. The proposed new channel alignment has been chosen to provide improved channel characteristics and sinuosity without excessive grading or clearing. Nearly all of the area proposed for the creation of the new, daylighted channel has been disturbed by previous development, now largely removed. Dense planting of the stream corridor with native species, along with planned maintenance and monitoring efforts, will help prevent encroachment by Himalayan blackberry and other non-native species.

There are three primary areas on-site where this concept plan will be implemented, addressing varying treatments along different sections of Hamlin Creek. As shown on the overall site concept plan in Appendix A, the piped section of Hamlin Creek in Area A will be daylighted and designed to facilitate the combined flows of the two parallel piped sections into a single open channel. It is also intended that the two existing open channel sections on-site farther upstream (to the north) in Areas B and C will also be reconfigured to carry this additional flow and improve stream function. Ideally, flows from the two parallel piped sections would be combined at the upstream end of Area C. If however for some reason the channels in Areas B and/or C, or the to-remain piped systems connecting them, cannot be modified to reliably carry the combined flows, alternatives are shown on the Overall Site Concept Plan in Appendix A whereby flows would be combined farther downstream, such as at the upstream end of either Area B or Area A. In those cases, either Area C or both Areas B and C would continue to carry their existing, east branch flows only. With regard to the intervening piped sections to remain, they could possibly be upgraded to carry the combined flows, however this may not be feasible or it may be just as feasible to daylight additional stream length instead.

Area A

The primary area for the proposed stream daylighting is located in the southeastern corner of the overall campus, parallel to the western toe of South Woods. Buildings and formal structures have already been demolished and removed, except for remnant building foundations, concrete hardscapes, and road infrastructure. All remaining debris would be removed in conjunction with implementation of the stream daylighting plan. Existing conditions are shown in Figures 7 to 10 below.

As shown on the cross sections below, in Figures 5 and 6, this particular daylighted stream channel section is designed to carry the combined east and west branch flows with the following features:

- A fairly wide, meandering, swale-like channel;
- Flood plain benches, backwaters, and embayments;
- A trail roughly paralleling the stream surfaced with pervious materials;
- Specific viewing points with interpretive signage along the trail;
- Potential bridged stream crossings (see Figure 6) for additional access to viewing and passive recreation;
- Channel and buffers vegetated with native vegetation, and
- Supplemental wildlife habitat structures including bird and bat boxes, snags, logs, and root wads.

Native vegetation would emphasize and maximize the new channel's functionality with respect to biofiltration, which will improve water quality in the fish-bearing sections of Thornton Creek farther downstream. Buffer vegetation can also attract and benefit birds and other wildlife species on-site, providing wildlife viewing opportunities for site residents and the nearby schools. Both sides of the daylighted channel (25' minimum stream buffer) would be revegetated with native plants equal to or in excess of the following density:

Trees	0.012 per square foot (9-foot on center)
Shrubs	0.028 per square foot (6-foot on center)
Herbs/groundcover	0.25 per square foot (assumes 4" pot) 2-foot on center

Source: Critical Areas Restoration and Enhancement in King County (King County, 2007)

A list of suggested native plants extracted from the *Critical Areas Restoration and Enhancement in King County* guidelines (King County, 2007) is included in Appendix B as a reference. In addition to providing ecological benefits, the daylighted stream corridor will serve as an open space amenity, contributing to the overall value of and benefits from the proposed site redevelopment as depicted by the Master Plan.

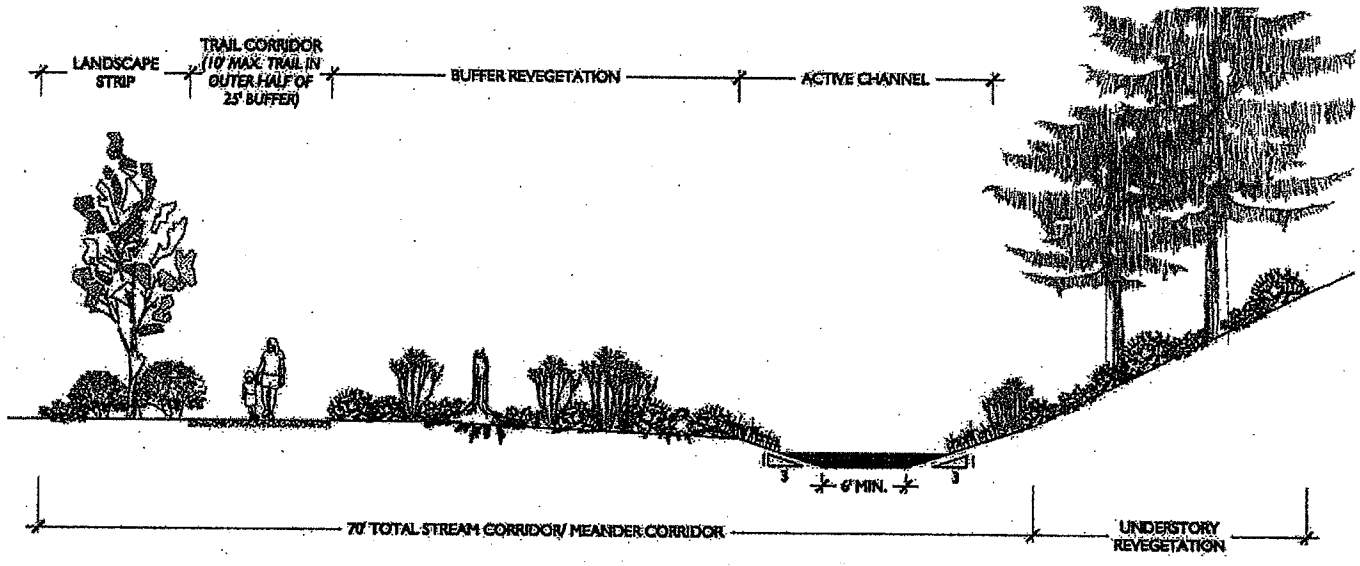


Figure 5. Typical cross-section of daylighted Hamlin Creek in Area A.

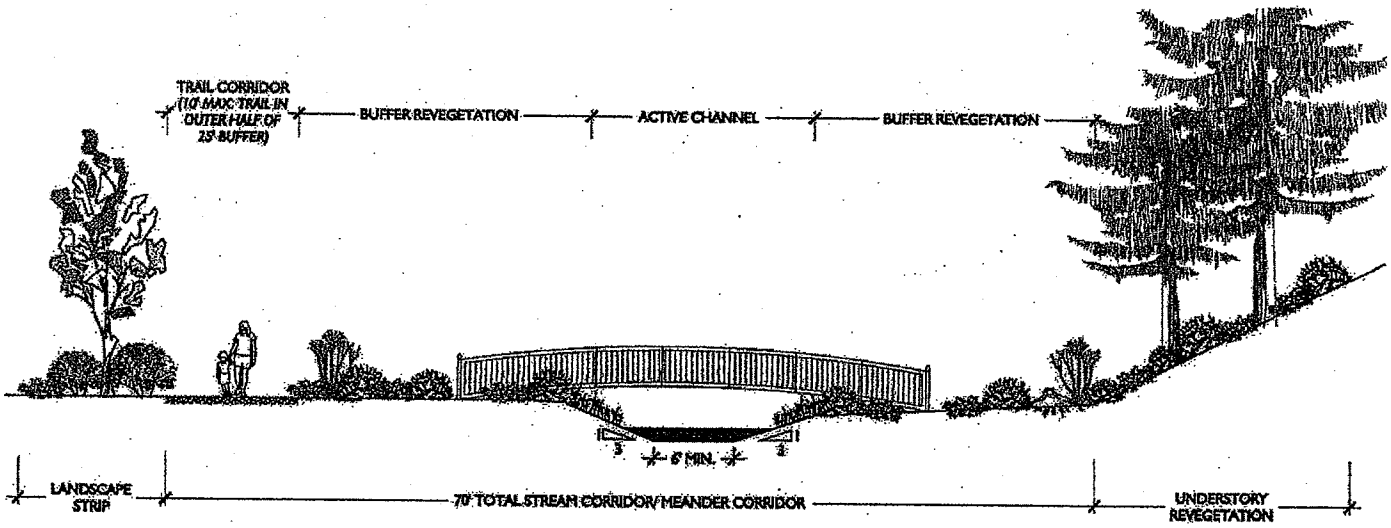


Figure 6. Channel variations in Area A, depicting a potential footbridge crossing and channel meandering away from the toe of the hillslope.

The above cross sections generally conform to the channel dimension requirements for flow-carrying capacity as provided by AHBL. Preliminarily, based on upstream basin analysis and using the Western Washington Hydrology Model (WWHM), the following stream channel cross section dimensions were recommended to maintain flow capacity for up to the 100-yr storm event :

- Bottom Width = 6 feet
- Side slopes = 3(H):1(V)
- Depth = 3.10 feet, including 1 foot of freeboard

These dimensions result in a top width of approximately 25 feet. For purposes of denoting buffer widths and the channel meander corridor, it has been assumed that the ordinary high water line would correspond roughly to 1 foot of flow depth in the 6-foot-toe-width channel. Based on that assumption, the channel width at ordinary high water would be approximately 12 feet at a 3:1 sideslope.

The recommended 1 foot of freeboard has been incorporated into the proposed cross section typically as a gentle, 8:1 or 10:1 slope across the buffer from the trail to the top-of-bank of a more defined, two-foot-deep channel (see Figure 5). Another option for providing the recommended freeboard, without the appearance of a deeper channel, would be to provide it as a low, 1-foot berm along the outer, western edge of the buffer, such as incorporating it into the trail. It would not be needed along the east side due to the presence of the slope extending upward to the east.

The new stream channel, as proposed, largely parallels or aligns with the toe of the South Woods slope extending downward to the east bank (see Figures 8-10, below). Since the slope is presently forested, the proposed channel along this alignment would immediately have the benefits of shade, cooling, and other habitat functions as provided by the already-mature vegetation. In that regard, this proposed alignment is preferable to alternative alignments farther to the west and away from the toe of the slope that would traverse broad, barren, presently-exposed open spaces with little near-term possibility of mature vegetation on either bank (see Figures 7 and 9, below). Supplemental, primarily shrubby vegetation will also be planted along the east bank to enhance understory layers, with a full assemblage of native tree and shrub vegetation to be planted along the west bank and buffer.

Plantings selected for the buffer areas are to be entirely native to western Washington and suited to the climate and conditions that exist at the site. Many of the species to be selected for the site already exist in the vicinity. They will include groundcover species, shrubs, and trees to create a diverse vegetative community, which in turn will foster habitat for a variety of terrestrial fauna. The vegetation will also provide shade and erosion resistance for the stream channel and floodplain, facilitate biofiltration of water entering the stream from the surrounding landscape, and be a source of future woody debris recruitment for stream structure.

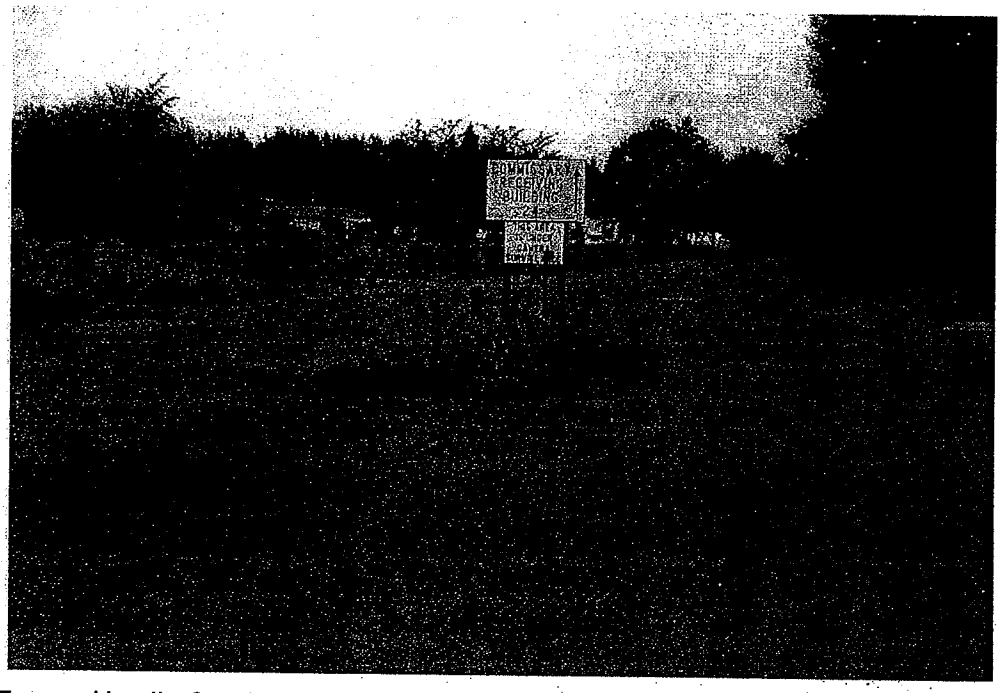


Figure 7. Hamlin Creek Area A stream daylighting area, facing North from near NE 150th Street. Catch basin in foreground locates the confluence of the east and west forks, both of which are currently piped at this location (taken on 9/17/08).

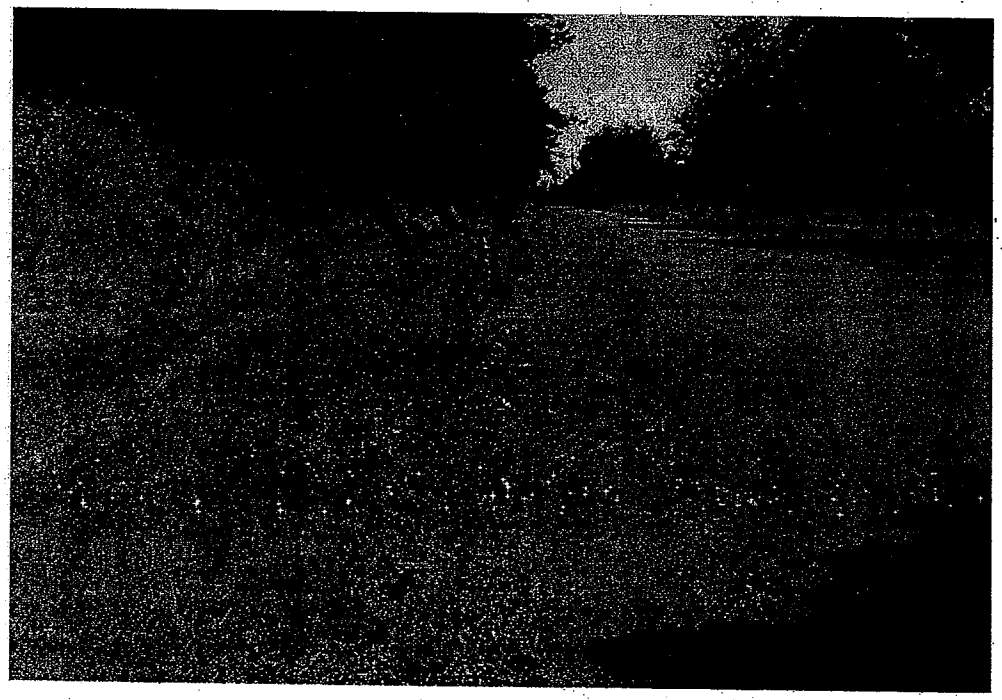


Figure 8. Facing South along the Area A daylighting area, showing toe of forested slope to the left [east] (taken on 8/4/08).

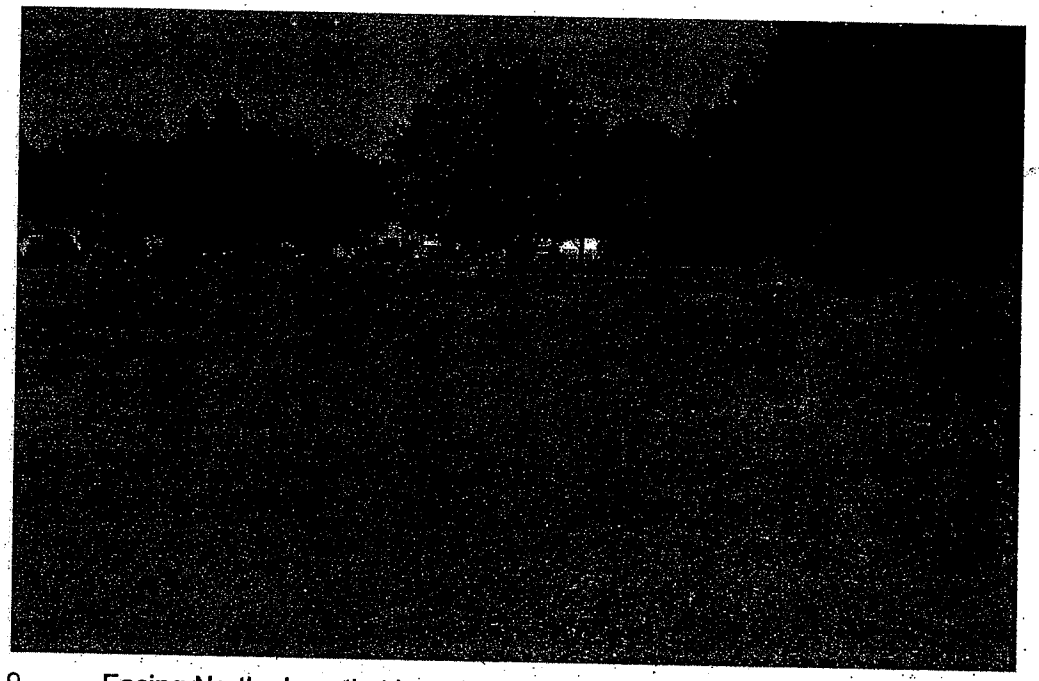


Figure 9. Facing North along the Area A daylighting area (Taken on 8/4/08).

Figure 10. Facing South along the Area A daylighting area from part way up the east slope (Taken on 9/17/08).

Areas B and C

For the two upstream, already-daylighted but ditch-like or channelized sections in Areas B and C (refer to Figures 13-16 and the overall site concept plan), their active stream channels would be widened or otherwise modified as feasible to resemble that depicted in the conceptual cross section in Figures 11 and 12. In general, they would be re-formed to provide an approximate 6-foot-wide channel at the bottom (the same as is proposed for Area A), with sideslopes ranging from their current steepness (over 50%) to approximately 30% depending on topography and setback requirements to nearby structures. It is presumed that the intervening, presently-piped sections between areas A and B and B and C would not be modified as part of this proposal.

Supplemental native buffer vegetation would also be planted along the channel in Areas B and C as space allows. However, the proposed buffer dimensions and site amenities (i.e. trail system, wildlife viewing, and bridge crossing) as shown for Area A would not apply in full to these upper stream sections due primarily to the spatial constraints imposed by existing land uses. The existing buffer widths and configuration would remain until the adjacent areas redeveloped, at which time updated buffers complying with current City of Shoreline code regulations would likely apply.

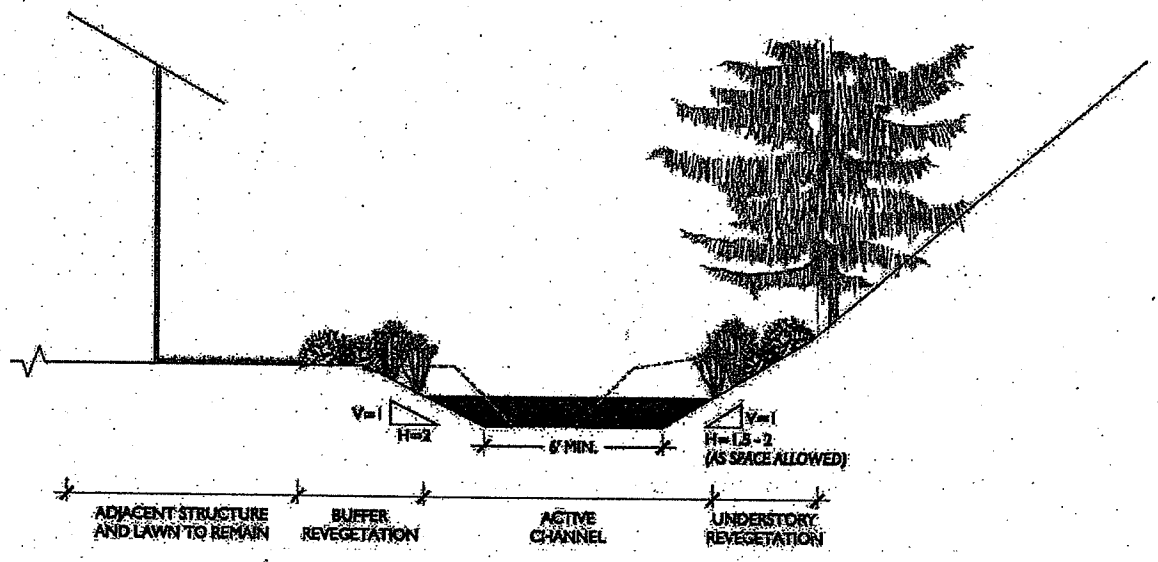


Figure 11. Channel improvements in Area B

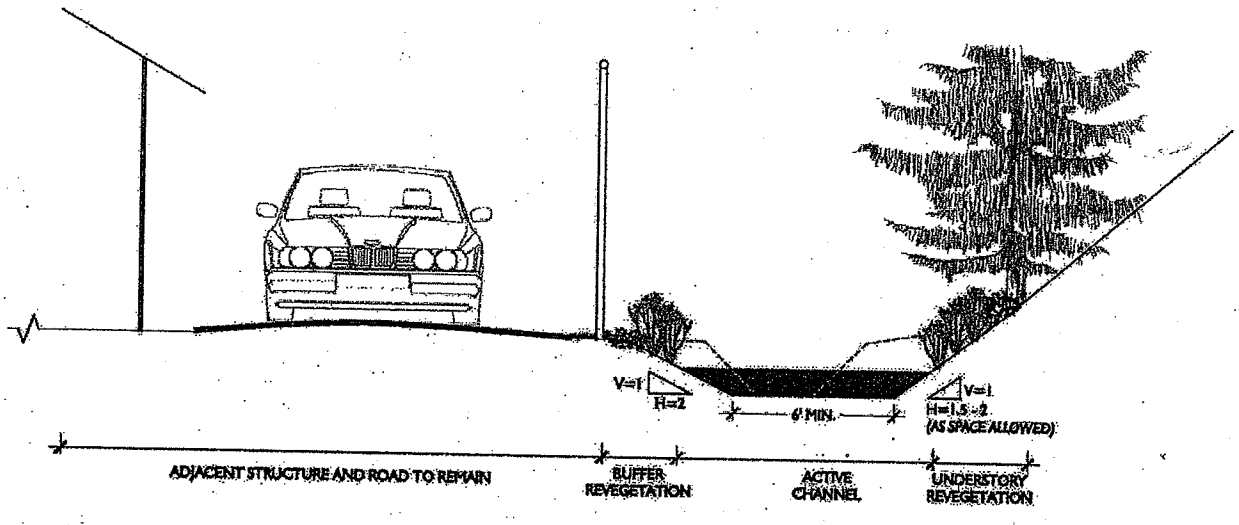


Figure 12. Wider channel and revegetation in Area C

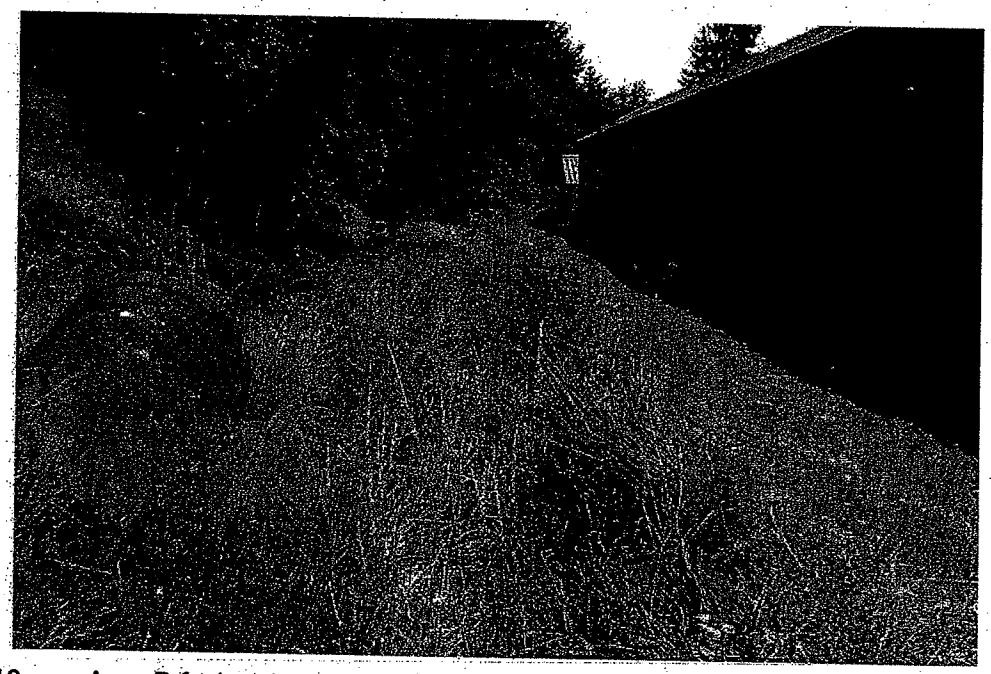


Figure 13. Area B facing downstream. Notice former pipe sections, now removed, and the close proximity of the existing buildings (taken on 8/4/08).

Figure 14. Area B facing upstream. The existing channel is an abrupt, grass-lined ditch. Again, notice the close proximity of the existing buildings (taken on 9/17/08).

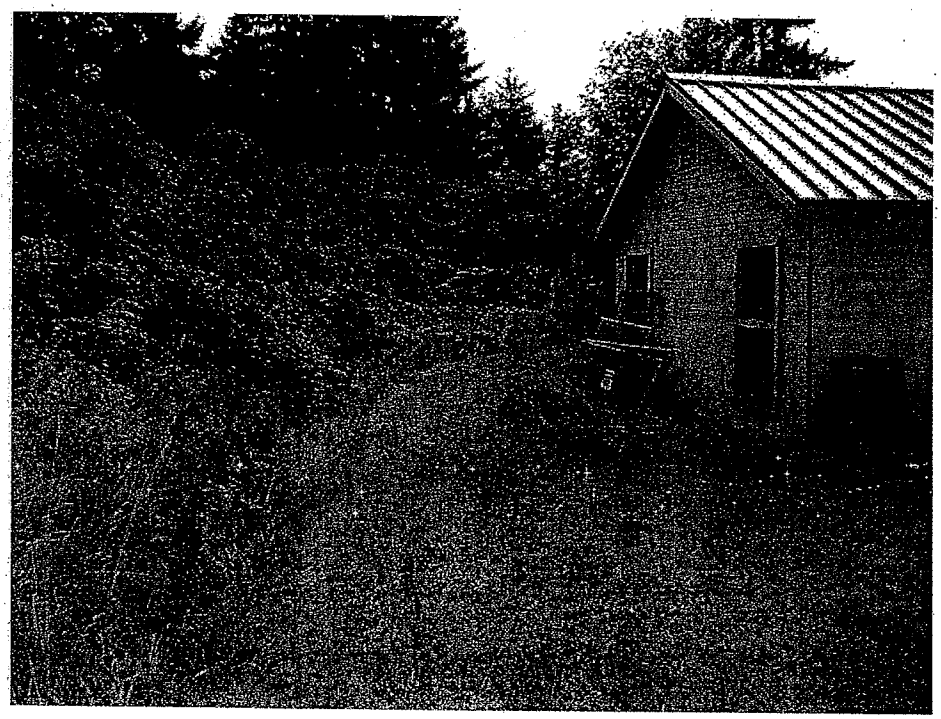


Figure 15. Area B facing downstream near lower end. Note slope vegetated with invasive Himalayan blackberry and morning glory (taken on 9/17/08).

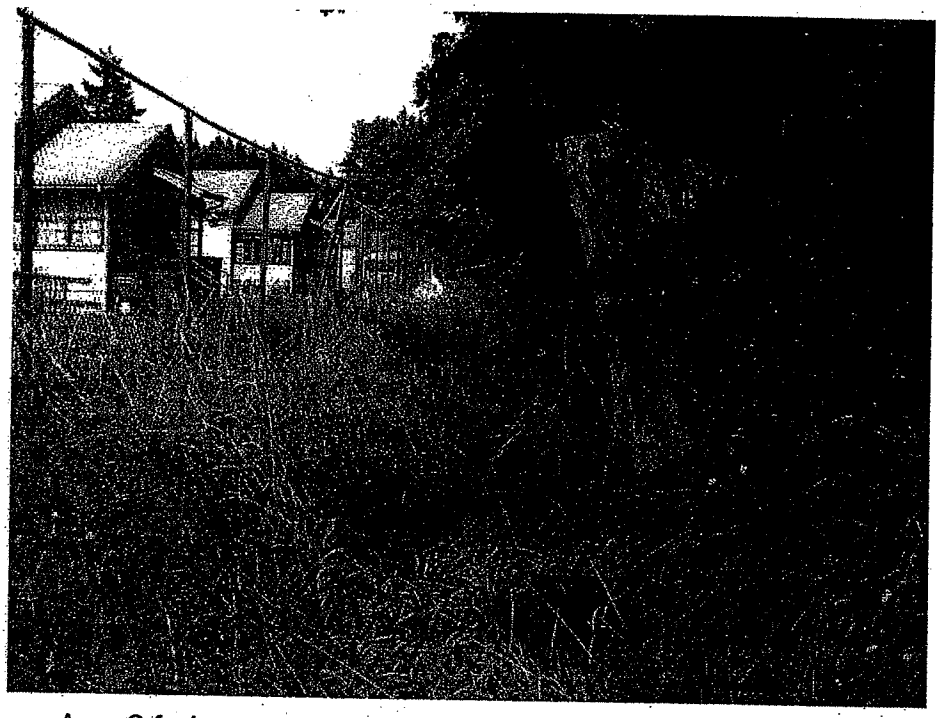


Figure 16. Area C facing upstream from near lower end. Little space is available for enhancement between the forested slope to the east (right) and the road and buildings to the west (taken on 9/17/08).

Channel Characteristics Common to Areas A - C

Substrate Materials

Substrate materials for all of the various channel sections in Areas A-C would be a well-graded mixture of granular materials ranging in size from sand and silt to large cobbles, blended by varying degrees with topsoil and/or compost. The larger granular materials would provide stability and resistance to erosion during periods of high or peak flows, while the finer-grained and organic topsoil materials would retain moisture and provide the nutrients needed to support the groundcover (channel bottom) and shrub (sideslopes) vegetation needed to carry on effective biofiltration function. Once established, this vegetation would also contribute substantially to channel stability.

Pools and Large Woody Debris

Various depressions would also be formed along the channel sections to form broad, usually shallow pools. However, due to lack of fish use, this pool formation will not be overly-emphasized, and the ephemeral nature of the stream flow dictates that they would be dry, or empty, much of the time. It is not envisioned that hard-set, log weir grade controls would be included. Such pools would, however, store water temporarily following freshets to increase

infiltration and to provide moisture for plant growth. Some large woody debris materials, logs and stumps, could be placed along the channel sections of all three areas for wildlife usage, in addition to those placed throughout the buffers, however care must be taken that wood placed directly in the channel sections does not overly impede channel flow-carrying capacity.

3.2 Potential Variations

Possible variations on the theme presented thus far include adjustments to buffer widths, modifications to trail alignment and crossing locations, details of the channel form (wetland side channels, embayments, backwaters, number and location of pools, steepness and variability of sideslopes, etc.), which native species would be included in the planted vegetation, amount and placement of stumps and logs, and other aspects.

3.3 Consistency with Master Plan Goals and Objectives

As stated in the introduction, Hamlin Creek on-site has been significantly impacted by past and present land use activities. Proposed stream daylighting is intended to reverse the trend of past impacts and largely restore natural stream headwater functions. The stream daylighting itself, whereby portions of Hamlin Creek would be restored in a swale-like condition to improve Campus drainage and provide an amenity, is an explicitly-stated goal of the Master Plan. Associated goals include reducing the proportion and area of impervious surfaces on-site, promoting the infiltration and biofiltration of stormwater, and providing clean, attenuated flows for fish and wildlife use downstream. The proposed stream daylighting concept design intrinsically satisfies these goals.

Another stated Master Plan goal is to retain the underlying natural land contours, particularly where they represent the historic landscape and are associated with significant stands of existing trees and vegetation, including mature specimen trees. An associated goal is to provide ecological benefits including directly-useable, on-site wildlife habitat. The proposed stream daylighting concept satisfies these goals as well.

Finally, an adopted goal is to integrate green building principles and Low Impact Development (LID) practices into the proposed development for the campus as depicted by the Master Plan. The proposed daylighting concept design for upper Hamlin Creek, as depicted, comprehensively incorporates the natural drainage system techniques and methodologies adopted by Seattle Public Utilities (SPU).

In addition to the ecological benefits mentioned above, the daylighted channel also serves as an amenity to on-site and nearby off-site communities.

4 REGULATORY COMPLIANCE

4.1 City of Shoreline

Please refer to Figures 5 and 6, which are conceptual cross sections of the to-be-daylighted sections of Hamlin Creek at the Fircrest Campus. The following narrative will describe how this concept design is consistent with all applicable City of Shoreline code sections, including SCC 20.80.480 (H) "Restoring Piped Watercourses."

Under SCC 20.80.480 (H), the City allows and makes provision for the voluntary opening of previously channelized and/or culverted streams, along with their rehabilitation or restoration. This often, but not necessarily, occurs in conjunction with new development. Required protective buffers for such daylighted streams, regardless of stream classification and based on an approved restoration plan "shall be a minimum of 10 to 25 feet, at the discretion of the Director." Such stream and buffer areas are to "include habitat improvements and measures to prevent erosion, landslide and water quality impacts." To gain City approval for daylighting stream segments, it must be demonstrated to the City's satisfaction "that the proposal will result in a new improvement of water quality and ecological functions and will not significantly increase the threat of erosion, flooding, slope stability or other hazards."

Also according to SCC 20.80.480 (D) (3), it is stated that the construction of trails near stream segments is to be consistent with the following criteria:

a. Trails should be constructed of permeable materials;

b. Trails shall be designed in a manner that minimizes impact on the stream system;

c. Trails shall have a maximum trail corridor width of 10 feet; and

d. Trails should be located within the outer half of the buffer, i.e., that portion of the buffer that is farther away from the stream.

In addition, item (D) (4) of that section indicates that the construction of footbridges (presumably as opposed to culverts) is allowed within stream buffer areas to allow for trail crossings of streams, and item (D) (5) of that section indicates that informational signs or educational demonstration facilities are (presumably each) "limited to no more than one square yard surface area and four feet high, provided there is no permanent infringement on stream flow."

The proposed concept design for stream daylighting as described above has been expressly formulated to be consistent with all these City of Shoreline regulations. The proposed buffer widths of 25 feet exceed the minimums for daylighted stream sections, and proposed trails will be constructed of permeable materials

and will not exceed the 10-foot maximum allowable width within stream buffers. The implemented design will result in a demonstrable improvement in water quality, habitat quality, and other measures of ecological function. Neither will the proposed stream daylighting significantly increase erosion, flooding, or slope instability. Trail crossings of the daylighted stream would consist of appropriately-designed bridges, and interpretive signage would meet the size and other requirements as specified in the code.

4.2 State and Federal Agencies

State and federal permits would also be required to complete the daylighting and other enhancements to Hamlin Creek as described above. Because Hamlin Creek is a tributary to Thornton Creek, it is likely to be considered among "waters of the U.S.". The U.S. Army Corps of Engineers (Corps) regulates activities within "waters of the U.S." under Section 404 of the Clean Water Act. Any filling, excavating, or other construction activities within the creek, would require approval from the Corps. Additionally, work within any areas of wetlands located adjacent to Hamlin Creek would also require Corps permits, though no wetlands were found to be present along the creek according to the *Wetland Delineation Report for Fircrest Campus* (Golder Associates, Inc. 2002c.). Any wetlands created in the course of implementing the project would also likely be regulated going forward, as would the daylighted stream. A Corps permit would also trigger the need for compliance with the Endangered Species Act (ESA). However, because Hamlin Creek does not support fish, evaluation under ESA would not likely be necessary. The need for a federal permit from the Corps would necessitate permits from the Washington Department of Ecology (DOE) - Individual 401 Water Quality Certification and Coastal Zone Management Consistency determination. And finally, work within the stream channel would also require the need for Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW).

5 SUMMARY AND CONCLUSION

The proposed Hamlin Creek daylighting and enhancement project as described in this report would restore important aspects of stream function, which are now largely absent due to the piped and ditched nature of the stream as it crosses the Fircrest Campus. As defined in the City's code, these stream functions include facilitating food chain production, providing nesting, rearing and resting sites for aquatic, terrestrial and avian species, maintaining the availability and quality of water (such as purifying water and acting as recharge and discharge areas for ground water aquifers), moderating surface water and stormwater flows, and maintaining the free-flowing conveyance of water, sediments, and organic

matter. Stream areas and their associated buffers also provide important fish and wildlife habitat and migration corridors, connecting habitat units that are spread across the landscape and might otherwise be isolated. They serve people for use as areas for recreation, education, scientific study, and aesthetic appreciation.

As detailed throughout this report, the proposed daylighting and other enhancements proposed for headwater reaches of Hamlin Creek on the Fircrest Campus would provide for an increase in all of these functions, and most to an appreciable or high degree. While improvements in habitat for fish and other types of strictly aquatic wildlife would largely occur in reaches downstream of the Fircrest Campus due to the ephemeral nature of on-site flows, seasonally-wetted habitat for amphibians on-site may be able to be included during the final design process. Downstream improvements would include better water quality and other improvements associated with competent stormwater management, primarily flow attenuation. Vegetated cover would be provided to the creek over time as the planted vegetation matures. Both the area and density of native vegetation would be increased through non-native vegetation removal and native revegetation, and by locating the daylighted stream channel section along the boundary of the existing South Woods to the east. The proportion of impervious surfaces on the Campus, especially near the creek will be reduced.

The proposed concept design for Hamlin Creek daylighting and restoration at Fircrest has been prepared to be consistent with applicable City of Shoreline code sections, including the regulations detailed under SCC 20.80.480 (H) "Restoring Piped Watercourses." The proposed minimum stream buffer width of 25 feet exceeds the required minimum for daylighted stream sections, and the proposal describes a restoration plan at a concept level that will lead to substantial habitat improvements. The completed stream project will result in demonstrable improvements in water quality, habitat quality, and other measures of ecological function, as required by code. Soil stability is addressed through the streambed and bank materials used and the native revegetation plan, and proposed stream daylighting will not significantly increase erosion, flooding, or slope instability. Construction-related soils stability issues will be addressed during the development of the final, construction-level plans for the project. Trails sections in stream buffer areas will be constructed of permeable materials, as required, and will not exceed the allowable 10-foot maximum width. Interpretive signage along the trail and/or bordering the project area would meet the size and other requirements as specified in the code.

REFERENCES

AHBL Inc. 2008. Fircrest Excess Property Report - Land Use Options and Recommendations. Report prepared for Washington State Department of Social & Health Services (DSHS).

City of Seattle. 2007. State of the Waters Report, Volume 1: Seattle Water courses.

Golder Associates, Inc. 2002a. Ecological Resources Assessment; Fisheries, Streams, and Wildlife for Fircrest School Site. Report prepared for DSHS.

Golder Associates, Inc. 2002b. Preliminary Geotechnical Assessment for Fircrest School Site. Report prepared for DSHS.

Golder Associates, Inc. 2002c. Wetland Delineation Report for Fircrest Campus. Report prepared for DSHS.

Kerwin, John. 2001. Washington Conservation Commission. Salmon and Steelhead Habitat Limiting Factors Report for the CEDAR – SAMMAMISH BASIN (Water Resource Inventory Area 8).

King County Department of Development and Environmental Services (DDES). 2007. Critical Areas Restoration and Enhancement in King County.

R. W. Beck, Inc. 2005. City of Shoreline Surface Water Master Plan.

Seattle Public Utilities (SPU). 2000. Thornton Creek Watershed Characterization Report. November 2000. Report prepared by Thornton Creek Watershed Management Committee under the direction of Seattle Public Utilities.

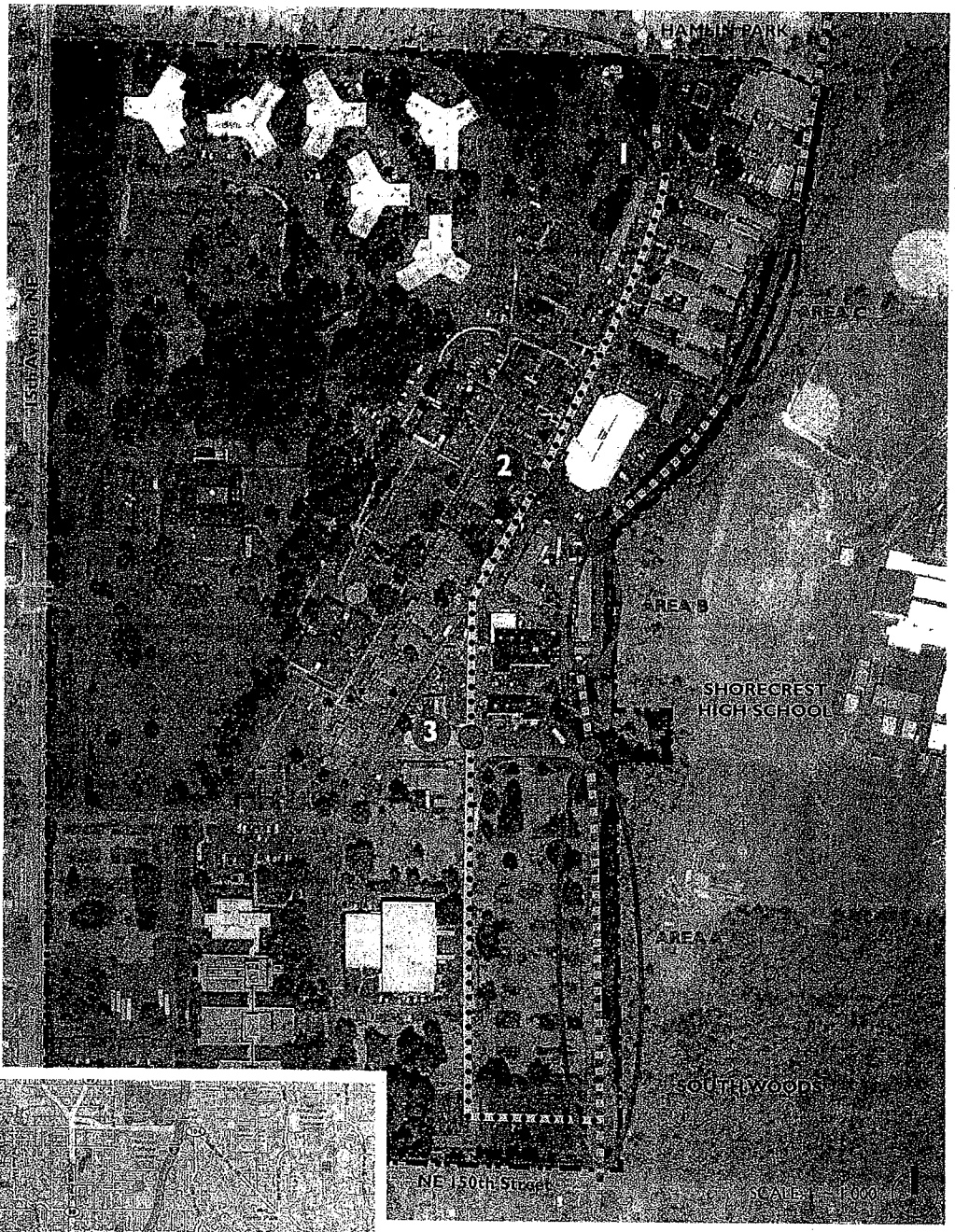
Tetra Tech. 2003. City of Shoreline: Stream and Wetland Inventory and Assessment, Appendices. Prepared for the City of Shoreline, Seattle, Washington.

Tetra Tech/KCM. 2004. Thornton Creek Basin Characterization Report. Prepared for the City of Shoreline, Seattle, Washington.

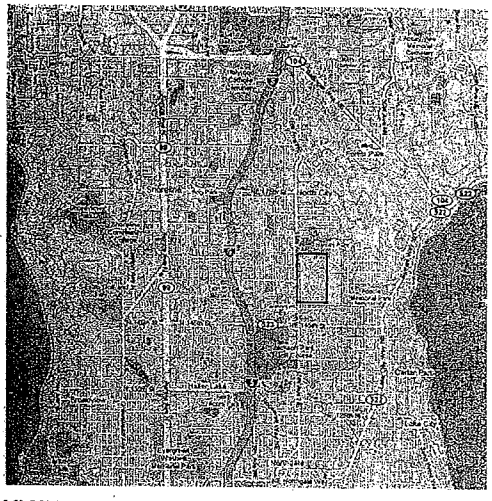
APPENDIX A

Overall Concept Plan

HAMLIN CREEK DAYLIGHTING/RESTORATION PLAN



OVERALL SITE CONCEPT PLAN



VICINITY MAP

EXISTING DAYLIGHTED CHANNEL

EXISTING PIPED CHANNEL

PROPOSED PIPE TO BE REMOVED

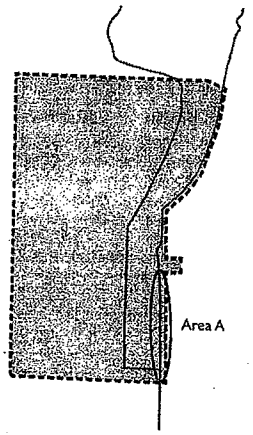
PROPOSED PIPE CONNECTION

1 ALTERNATIVE ONE (PREFERRED)

2 ALTERNATIVE TWO (IF NEEDED FOR PROFILE)

3 ALTERNATIVE THREE (IF AREAS 2, 3 OR PIPED SECTIONS CANNOT CARRY COMBINED FLOW)

HAMLIN CREEK DAYLIGHTING/RESTORATION PLAN



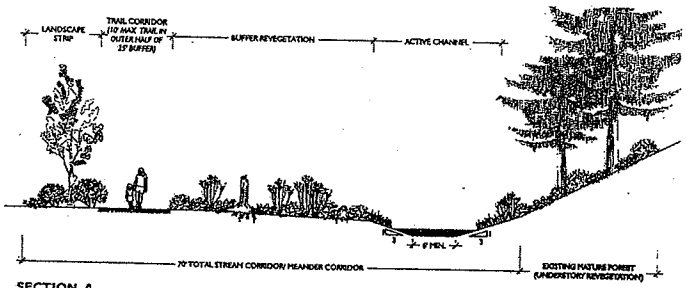
AREA A

As shown on the cross section below, this particular daylighted section is designed to facilitate the passage of the combined flows through a fairly wide, meandering, swale-like channel including flood plain benches, backwaters, and embayments. It would be roughly paralleled by a trail surfaced with pervious materials.

The channel and its buffers would be vegetated with native vegetation to emphasize and maximize its functionality with respect to biofiltration, which will improve water quality in the fish-bearing sections of Thornton Creek farther downstream.

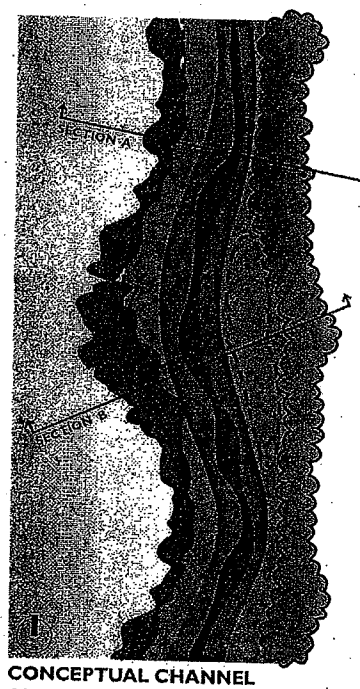
Native vegetation would be planted along the 25' minimum stream buffer to attract and benefit birds and other wildlife species on-site, providing a wildlife viewing opportunity for site residents and the nearby schools. Specific viewing points with interpretive signage could be provided along the trail, with potential bridged stream crossings for additional access to viewing and passive recreation areas.

Supplemental wildlife habitat structures including bird and bat boxes, snags, logs, and root wads might also be included along the corridor as shown. In addition to providing ecological benefits, the daylighted stream corridor will serve as an open space amenity, contributing to the overall value of and benefits from the proposed site redevelopment as depicted by the Master Plan.



SECTION A

SCALE: 1"= 8'-0"



CONCEPTUAL CHANNEL ALIGNMENT IN AREA A

Aquatic Zone

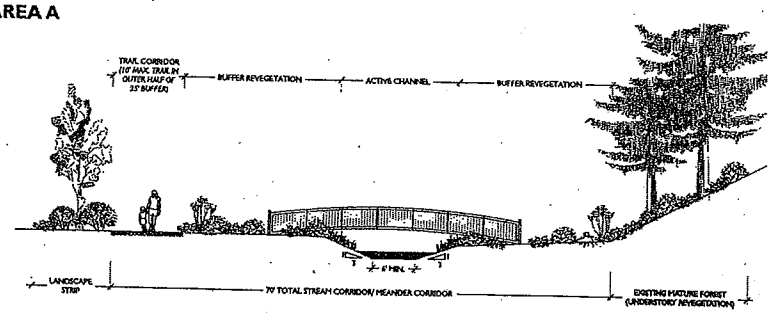
Active stream channel designed to handle the combined surface runoff from the site and existing piped flows of Hamlin Creek. Channel is lined with bioretention soil mix, rock mix, and emergent communities to promote water biofiltration and infiltration. Area will be planted with native species that can tolerate wetter conditions. Channel is designed with 6-foot width in the bottom, meandering laterally within a 30-foot corridor at the top of bank.

Storage Zone

A seasonally wet zone during storm events and high water surge. Similarly to natural floodplain and channel embayments, a series of depression is formed adjacent to the active channel to pond excess water and create a wet-dry riparian zone. A more resilient plant palette, which is exclusively native shrubs and small trees, will be selected to handle occasional standing water. Supplemental habitat features such as woody debris will be placed within this area.

Buffer Zone

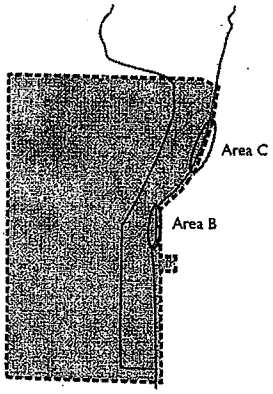
This area functions as an ecological and visual buffer for wildlife and site users. Native trees, shrubs, and groundcovers will be planted here to create terrestial diversities for birds and mammals. Other site features including bat boxes, bird houses, trails, and picnic tables. A bridge or crossings can be placed here to enhance users' experience of a wildlife corridor and a site amenity.



SECTION B

SCALE: 1"= 8'-0"

THE WATERSHED COMPANY



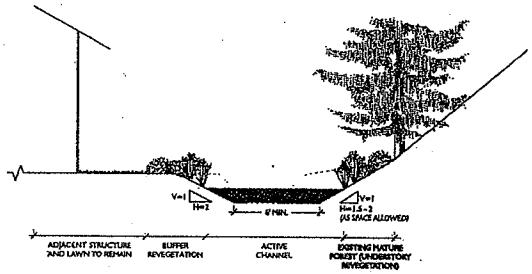
AREAS B & C

For the two already-daylighted sections in Areas B and C, their active stream channels would be widened or modified as feasible to resemble that depicted in the conceptual cross section below.

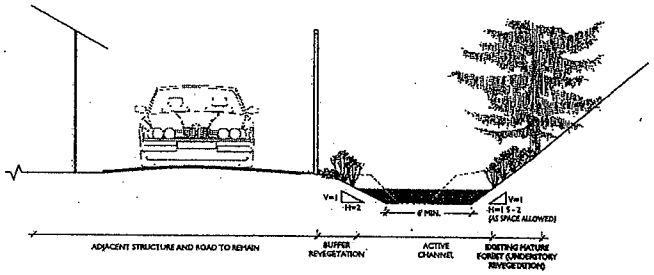
In general, they would be re-formed to provide an approximate 6-foot-wide channel at the bottom (the same as is proposed for Area A), with sideslopes ranging from their current steepness (over 50%) to approximately 30% depending on topography and setback requirements to nearby structures.

Supplemental native buffer vegetation would also be planted along the channel in Areas B and C as space allows. However, the proposed buffer dimensions and site amenities (i.e. trail system, wildlife viewing, and bridge crossing) as shown for Area A would not likely apply in full to these upper stream sections due primarily to the spatial constraints imposed by existing land uses.

The existing buffer widths and configuration would likely remain until or unless the adjacent areas were to be redeveloped, at which time updated buffers complying with current City of Shoreline code regulations would likely apply.



TYPICAL CHANNEL SECTION IN AREA 2 *SCALE: 1"= 8'-0"*



TYPICAL CHANNEL SECTION IN AREA 3 *SCALE: 1"= 8'-0"*

APPENDIX B

List of Native Vegetation in Western Washington

- extracted from Critical Areas Restoration and Enhancement in King County, King County DDES

APPENDIX B

Habitat Worksheet

Project Name: _____

Project Number: _____

Location: _____

Contact Name: _____

LIGHT NEEDS*

SI=Shade Intolerant ST=Shade Tolerant

SD=Shade Dependent HA=Highly Adaptable

SITE PLACEMENT**

DB=Drier Buffer WB=Wetter Buffer

WE=Water's Edge SS=Saturated Soils SW=Shallow Water

Habitat requirements derived from: *Flora of the PNW* (Hitchcock & Cronquist); *Plants of the PNW Coast* (Pojar & MacKinnon); Wetland Plants of Western WA (Cooke); Guidelines for Bank Stabilization Projects and Surface Water Design Manual (King County); Proceedings of the Puget Sound Wetlands and Stormwater Management Research Study (9/26/96); and DDES field observations.

TREES						
Scientific Name	Common Name	Indicator Status	Max Ht	Light Needs	Site Placement	Comments
*Abies grandis**	grand fir	FACU-	125	SI-ST	DB	Best conifer for soil binding roots
Acer macrophyllum	big leaf maple	FACU+ [FAC]	100	SI-ST	WB,DB	Seral/sprouter - shallow rooter
Alnus rubra	Red alder	FAC	80	SI-ST	WB,DB	Seral, sprouter & spreader
Arbutus menziesii	Pacific madrone	UPL	80	SI	DB	Likes drier, coastal: slow-grower
Betula papyrifera	paper birch	FACW	80	SI	WE, SS	Saturated soils
Fraxinus latifolia	Oregon ash	FACW	80	SI-ST	WE,SS	Requires flat, damp soils
*Picea sitchensis**	Sitka spruce	FAC	230	SI	WE,SS	Wettest conifer
*Pinus contorta**	Shore pine	FAC	60	HA	WE,WB,DB	Tolerates poor soil
*Pinus monticola**	Western white pine	FACU- [FACW]	120	SI	WB,DB	NOT within 900' of *Ribes* spp.!
Populus tremuloides	quaking aspen	FAC+	75	SI	DB	Seral in montane
Populus trichocarpa	black cottonwood	FAC	200	HA	WE,SS,WB	Seral; sprouter
Prunus emarginata	bitter cherry	FACU	50	SI	DB	Tree form has heavily pubescent leaves.
*Pseudotsuga menziesii**	Douglas fir	FACU	300	SI	WB,DB	Driest conifer-seral, fast grower
*Taxus brevifolia**	Pacific yew	NI [FAC-]	80	ST-SD	WB	Very slow growing
*Thuja plicata**	western red cedar	FAC	230	SD	SS,WE,WB	Basic to PNW & wetlands
*Tsuga heterophylla**	western hemlock	FACU-	200	SD	DB	Dry conifer

All plant prices from Fourth Corner Nurseries, Sound Native Plants, Storm Lake Growers, and Wabash Natives (containers); and Abundant Life and Frosty Hollow (seeds).

SHRUBS		Indicator	Max	Light	Site	Comments
Scientific Name	Common Name	Status	Ht.	Needs	Placement	
Acer circinatum	vine maple	FAC-	25	SD	WB,DB	Needs canopy shade or lots of moisture.
Amelanchier alnifolia	serviceberry	FACU	20	SI	DB	Edge-loving
Berberis aquifolium	tall Oregon grape	UPL	7	SD	DB	Dry sites
Berberis nervosa	short Oregon grape	UPL	4	ST-SD	DB	Drier sites
Cornus stolonifera	red-osier dogwood	FACW+	20	ST	WE,SS,WB	Takes sun if has lots of moisture
Corylus cornuta ®	hazelnut	FACU	15	ST	DB	Good wildlife habitat
Crataegus douglasii	black hawthorn	FAC	20	SI	WB,DB	Typically on meadow hummocks
Gaultheria shallon	salal	FACU	7	ST-SD	DB	Basic forest groundcover
Holodiscus discolor	ocean spray	NI	10	SI-ST	DB	Drought-tolerant, edge-loving
Lonicera involucrata	black twinberry	FAC+	10	SI-ST	WE,SS,WB	Takes sun if has lots of moisture
Myrica gale	sweetgale	OBL	6	SI	WE,SS	Common in scrub-shrub wetlands
Oemleria cerasiformis	Indian plum	FACU	15	SD	WB,DB	Sub-canopy
Oplopanax horridus	Devil's club	FAC+	7	ST	WE,WB	Needs good drainage, forms thickets
Philadelphus lewisii	mock orange	NI	10	SI-ST	WB,DB	Likes streams, good drainage
Physocarpus capitatus	Pacific ninebark	FACW-	20	SI-ST	WB,DB	Needs good drainage
Prunus virginiana	choke cherry	FACU	20		DB	Native to the whole US
Pyrus fusca	western crabapple	FACW	35	SI-ST	WE,WB	Edges - most of value in streamside control
Rhamnus purshiana	cascara	FAC-	30	ST-SD	WB,DB	Found in most wetlands
Ribes bracteosum	stink currant	FAC	10	ST	WB,DB	Transition
Ribes lacustre	prickly currant	FAC+	7	ST	WB,DB	Can take drought
Ribes sanguineum	red-flowering currant	NI	7	SI	WB,DB	Doesn't form thickets!
Rosa gymnocarpa	Wood rose	FACU	7	ST	DB	Tough, hardy
Rosa nutkana	Nootka rose	FAC [OBL]	10	ST	SS,WB	Rapid volunteer on damp soil
Rosa pisocarpa	clustered rose	FAC [FACW]	7	ST	WE,SS,WB	Will hybridize with nootka rose
Rubus leucodermis	black raspberry	NI	10	ST	DB	Good buffer planting
Rubus parviflorus	thimbleberry	FAC-	10	SI	DB	Seral groundcover in clear-cuts, drought tolerant
Rubus spectabilis	salmonberry	FAC+	15	HA	WE,WB,DB	Takes sun if has lots of moisture
Salix geyeriana	Geyer willow	FACW+	15	SI	SW,WE	Likes inundation, sluggish water, wet meadows
Salix hookeriana	Hooker's willow	FACW-	20	SI	SW,WE,SS	Only found <5 mi. from coast
Salix lasiandra	Pacific willow	FACW+	50	HA	WE,SS,WB	Common, tolerant, prefers riparian
Salix scouleriana	Scouler willow	FAC	35	ST	SS,WB,DB	Upland & wetland
Salix sitchensis	Sitka willow	FACW	25	HA	WE,SS,WB	Common, tolerant
Sambucus racemosa	red elderberry	FACU	20	HA	WB,DB	Rapid grower, tolerates sun, seral on clear-cuts
Sorbus sitchensis	Cascade mountain	FACU	15	SI-ST	WB,DB	Montane, not to be mistaken for *S. aucuparia*
Symphoricarpos albus	snowberry	FACU	7	SI	WB,DB	Common, tolerant
Vaccinium ovatum	evergreen	UPL	5	SD	DB	Prefers mature shade
Vaccinium parvifolium	red huckleberry	NI [FACU]	13	SD	DB	Requires lots of organic matter

Sedges and Rushes						
Scientific Name	Common Name	Indicator Status	Max Ht	Light Needs	Site Placement	Comments
Carex comosa	Bristly sedge	OBL	2'	SI	SW,WE,SS	Rare in King County
Carex lenticularis	Shore sedge	FACW+	3'	SI	WE,SS	From shore to high mountains
Carex lyngbyei	Lyngby sedge	OBL	3'	SI	SW,WE,SS	Coastal only
Carex obnupta	Slough sedge	OBL	4.5'	ST	SW,WE,SS	Extremely common, coast to Cascade crest
Carex rostrata (utriculata)	Beaked sedge	OBL		SI-ST	SW,WE,SS	Common
Carex stipata	Sawbeak sedge	OBL	3'	SI-ST	SW,WE,SS	Lowland to mid-montane
Eleocharis acicularis	Spikerush	OBL	0.5'	SI	SW,WE	Rhizomatous, lowland to mid-montane
Eleocharis palustris	Common Spikerush	OBL	0.5'	SI	SW,WE	Rhizomatous, coastal to mid-montane
Juncus acuminatus	Tapered rush	OBL	2'	SI	SW,WE	Tolerant
Juncus articulatus	Jointed rush	OBL	2'	SI	SW,WE	Tolerant
Juncus effusus(var. *pacificus,*	Soft rush	FACW	3'	SI-ST	SW,WE,SS	Weedy, common, hardy - often invasive
Juncus ensifolius	Dagger leaf rush	FACW	2'	SI	SW,WE,SS	Lowland to mid-montane, lovely flowers & foliage
Juncus oxymeris	Pointed rush	FACW+	3'	SI	SW,WE,SS	Lowland
Scirpus acutus	Hardstem bulrush	OBL	6'	SI	SW,WE	Tolerates up to 3' of water; common, hardy
Scirpus maritimus	Saltmarsh bulrush	OBL	4.5'	SI	SW,WE	Coastal only
Scirpus microcarpus	Small-fruited bulrush	OBL	4.5'	SI-ST	SW,WE,SS	Lowland to mid-montane, very common
Grasses						
Scientific Name	Common Name	Indicator Status	Max Ht	Light Needs	Site Placement	Comments
Alopecurus aequalis	Short-awn foxtail	OBL		SI-ST	SW,WE,SS	Often submerged
Alopecurus geniculatus	Water foxtail	OBL	1.5'	SI-ST	SW,WE,SS	Often submerged, tolerant
Beckmannia syzigachne	American	OBL	2'	SI	WE,SS	Good wildlife forage, lowland to mid-montane
Calamagrostis canadensis	Bluejoint reedgrass	FACW+			WE,SS,WB	Rhizomatous, coastal to mid-montane
Cinna latifolia	Wood reed	FACW	6'	ST	WE,SS,WB	Coastal to sub-alpine
Deschampsia caespitosa	Tufted hairgrass	FACW	2'	SI	WE,SS,WB	Common, keystone species in wet meadows
Elymus glaucus	Blue wildrye	FACU	2'	SI	DB	Very drought-tolerant, good wildlife forage
Festuca idahoensis	Idaho fescue	FACU*	2.5'	SI	DB	Drought-tolerant
Festuca rubra var. rubra	Red fescue	FAC+	2.5'	SI	SS,WB	Common, tolerant
Glyceria borealis (occidentalis)	Northern mannagrass	OBL	4'	ST	WE,SS	Tolerates up to 3' of water
Glyceria elata	Tall mannagrass	FACW+	4.5'	SD	WE,SS,WB	Prefers streamside
Panicum occidentale	Western panic-grass	FACW		SI	WE,SS,WB	Coastal to sub-alpine

Ferns						
Scientific Name	Common Name	Indicator Status	Max Ht	Light Needs	Site Placement	Comments
Athyrium filix-femina	lady fern	FAC	3	ST	SS,WB	Very common, tolerant
Blechnum spicant	deer fern	FAC+	2	SD	WB	Needs shade, moisture
Dryopteris expansa	shield fern	FACW	2	SD	WE,SS,WB	Likes muddy soil
Polystichum munitum	western sword fern	FACU	5	ST	DB	PNW basic; needs shade or moisture
Pteridium aquilinium	bracken	FACU	4	SI	DB	Seral on disturbed areas
Herbs and Groundcovers						
Scientific Name	Common Name	Indicator Status	Max Ht	Light Needs	Site Placement	Comments
Achillea millefolium	Yarrow	NI	1'	SI	DB	Self-seeds, robust, tolerant
Anaphalis margaritacea	Pearly everlasting	NI	1'	SI	DB	Robust, tolerant
Arctostaphylos uva-ursi	Kinnikinnick	FACU-	1'	SI	DB	Slow grower - likes dry stony soil
Aruncus dioicus	Goat's beard	FACU+	2'	ST	WB,DB	Streamside
Caltha palustris	Marsh marigold	OBL	9"	ST	SW,WE	Coastal
Dicentra formosa	Bleeding heart	FACU*	18"	ST-SD	WB,DB	Very common, tolerant
Epilobium angustifolium	Fireweed	NI	4'	SI	DB	Seral on clear-cuts, common, tolerant
Fragaria chiloensis	Coast strawberry	NI	6"	SI	DB	Rapid spreader, evergreen
Geum macrophyllum	Big-leaf avens	FACW-	3'	ST	WE,SS,WB	Common
Heracleum lanatum	Cow parsnip	FAC+	6'	ST	WE,SS,WB	Likes riparian, self-seeds
Hydrophyllum tenuipes	Pacific waterleaf	NI [FAC]	12"	ST-SD	WB,DB	Wet forest groundcover
Linnaea borealis	Twinflower	FACU-	6"	ST	DB	Usually in forests, but seral on clear-cuts
Lupinus polyphyllus	Big-leaf lupine	FAC+	3'	SI	DB	Seral, common, tolerant
Lysichiton americanum	Skunk cabbage	OBL	10"	SD	SW,WE	Totemic plant, like cedar
Maianthemum dilatatum	Wild lily of the valley	FAC	14"	ST	WB,DB	Rapid spreader
Mimulus guttatus	Yellow monkey flower	OBL	3'	SI	WE,SS,WB	Forms sheets near seeps
Myosotis laxa	Small forget-me-not	OBL	15"	ST	WE,SS	Uncommon, pretty
Oenanthe sarmentosa	Water parsley	OBL	3'	ST	SW,WE,SS	Common, hardy, good amphibian habitat
Osmorhiza chiloensis	Sweet cicely	NI	6"	ST-SD	DB	Very common in PNW forest
Oxalis oregana	Wood-sorrel	NI	9"	ST	WB,DB	Very rapid spreader, robust, highly tolerant
Petasites frigidus	Coltsfoot	FACW-	20"	ST	WE,SS,WB	Rhizomatous, good spreader
Polygonum persicaria	Lady's thumb	FACW	3'	SI-ST	SW	Many species in this genus, good amphibian habitat
Potentilla fruticosa	Bush potentilla	FAC-	3'	SI	DB	Montane, pretty
Smilacina stellata	Solomon's Star	FAC-	18"	ST	WB	Forms drifts near streams
Stachys cooleyae	Great betony	FACW	4'	SI-ST	WB	Common
Tellima grandiflora	Fringecup	NI	2'	ST	DB	Common, tolerant
Tiarella trifoliata	Foamflower	FAC-	2'	ST	DB	Common, tolerant
Tolmiea menziesii	Piggy-back plant	FAC	30"	SD	WB	Forms drifts near streams
Viola glabella	Stream violet	FACW+	7"	SI-ST	WB	Common, rapid spreader

Attachment C

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PRELIMINARY GEOTECHNICAL ASSESSMENT

FOR

FIRCREST SCHOOL SITE
SHORELINE, WASHINGTON

Prepared for:

Washington Department of Social and Health Services
Submitted to
Arai/Jackson Architects & Planners

Submitted by:

Golder Associates Inc.
Redmond, Washington

Michael S. Lumpkin
Project Geologist

James G Johnson
Associate Engineering Geologist

April 11, 2002

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APPENDICES

- Areas of artificial fill were identified in a geotechnical report by others at the southern end of the site in the area of the Public Health Lab building. Other localized areas of fill may be present;
- Building rubble and construction debris was reported to have been dumped into the basement of a building that once stood to the south of the Activity Building and Pool at the western side of the site;
- The Fircrest site is within Seismic Zone 3, defined in the Uniform Building Code, 1997 (UBC 1997), an area of reoccurring moderate to strong earthquakes, and
- No known earthquake faults are located on or near the Fircrest site.

2. SCOPE OF SERVICES

The following describes the activities conducted in support of this preliminary geotechnical assessment:

1. We conducted a visual reconnaissance of the property walking around the buildings and along the adjacent properties. The purposes of the reconnaissance was to look for evidence of potential geologic hazards or geotechnical issues such as the following:
    - Slope instability;
    - Ground settlement or subsidence;
    - Uncontrolled surface water drainage;
    - High erosion potential, and
    - General surface geology and soil types.
2. We reviewed published geologic and geotechnical documentation for the subject property.
3. We reviewed one previous geotechnical report for the property, provided by the Fircrest School.
4. We reviewed the most current and historic United States Geologic Survey (USGS) topographic maps of the subject property and surrounding area.
5. We conducted a search of the King County property records, WA Department of Natural Resources reports, King County Sensitive areas portfolio, US Geological Survey reports and map, and consultant's reports.
6. We reviewed federal, state and other government and private online information.

4. METHODS

The following sections explain the methods of data gathering used for this report. The pertinent information contained in the records, observed during the site reconnaissance, and viewed in historic photographs and topographic maps are incorporated in the text.

4.1 Onsite Records Review

A small records archive is located in the Maintenance Building at the Fircrest site. Many of the site records generated over the years of site operation have been stored in the archive. A records search was performed of all documents that would pertain to the Master Plan and EIS for the site. Records that relate to site geology and geotechnical issues were limited to the single document listed below.

- Geotechnical Report, Public Health Laboratories, N-Wing Addition, Shoreline Washington, prepared by HWA Geosciences Inc. for The Miller/Hull Partnership, May 11,1998.

4.2 Site Reconnaissance

Golder's Project Geologist, Michael Lumpkin, visited the subject property on two occasions in November 2001 to observe geologic and geotechnical features on the campus and the surrounding area. Bill Beck, the Golder Project Manager, participated in the reconnaissance during the first site visit. All accessible areas on the site were visited, the site was viewed from all adjacent public thoroughfares and photographs of significant site features were taken. We walked around the exterior of all accessible buildings and recorded significant observations. The weather at the time of the site visits was generally raining, with temperatures in the 40° to 50 °F range.

4.3 Geologic Reports, Maps and Publications Review

We searched for federal, state, and county geologic reports and maps of the Fircrest campus and the City of Shoreline area. The information available from the geologic maps and reports was general in nature. More detailed geologic and geotechnical information was gathered during the site reconnaissance, aerial photographs and topographic map review, and review of the one geotechnical report prepared for the site.

4.4 Historic Topographic Maps

The most current topographic map was obtained from the US Geological Survey. Copies of historic topographic maps were obtained from Environmental Data Resources, Inc. of Southport Connecticut. Topographic maps from 1909, 1949, 1968, and 1983 were available and were reviewed for this study. The maps were reviewed to determine the elevations, topography, landforms and cultural features of the site and changes that may have occurred since the site was developed. Copies of the historic topographic maps and review notes for each photograph are included in Appendix B.

5. GEOLOGICAL CONDITIONS

5.1 Geologic Setting

The Fircrest Campus is located within the North Seattle Drift Upland, a subdivision of the Puget Lowlands geographic province. The North Seattle Drift Upland consists of a series of elongated ridges with intervening valleys that were sculpted by the glacial ice sheets. The advance of several glacial ice sheets into the Seattle area during the ice age is well documented. The latest glacial advance to effect the greater Seattle area was the Vashon Stade of the Frazier Glaciation, which ended approximately 13,500 years ago. During this glacial episode large, thick glaciers covered the region from the north and extended to the Olympia area, approximately 50 miles to the south of Seattle. The incursion of the glacial ice sheet covered the Puget Lowland and left a complex sequence of soil deposits (drift) and landforms. Thick glacial deposits consisting of clay, silt, sand, and gravel underlie the City of Shoreline and the Fircrest School site. The depth to bedrock in the Fircrest area is several hundred feet and no bedrock is exposed at the site. The deposits and topography will be discussed in greater detail below.

The landforms and deposits at the Fircrest site and surrounding area are of glacial origin and have been modified somewhat by erosion and deposition following the melting of the glaciers. Recent post-glacial deposits and surficial (geologic) processes such as slope erosion and depression infilling, are superimposed on the glacial deposits and land forms that are remnants of the last glacial period.

5.2 Site Topography

The topography of the site reflects the parallel north-south ridge and valley characteristic of the post-glacial terrain of the North Seattle Upland. A ridge is located along the western side of the site with a broad valley along the eastern and southern sides. A second ridge is located just outside the eastern boundary, but swings slightly into the site on the north half.

The valley floor slopes down gently to the south and southwest. The elevation of the valley floor ranges from 363 feet mean seal level (MSL) at the northern end to 335 feet MSL at the southwestern corner of the site (Photograph 1).

The western ridge is located west of Buildings 200 and 500 shown in Figure 2. The high point of the ridge is 415 feet MSL at the north and decreases to the south where the ridge meets the valley floor. The eastern side of the ridge drops moderately to steeply, up to about 40%, toward the valley floor (Photograph 2).

The ridge on the eastern side of the valley is just outside the site and forms the site's eastern boundary. The highest elevation on the ridge is 412 feet MSL. The western side of the ridge slopes steeply (up to 40%) downward toward the site (Photograph 3).

Although the site was first developed in the 1940's, only minor land modification (cut and fill) was performed for development. The topography of the site today closely reflects the pre-development topography.

The lodgement till can be difficult to excavate with conventional equipment. Although dense in an undisturbed condition, the lodgement till has a fine-grained matrix that is moisture sensitive. The lodgement till becomes muddy and difficult to work with construction equipment once disturbed and wet.

6.3 Colluvium

Colluvium is the loose to medium dense soil that commonly mantles the sides and toe of the slopes. Colluvium is a surficial deposit derived from weathering of the near surface soils on slopes. On steep slopes it gradually creeps down slope, due to gravity, producing thicker deposits at the toe of the slope. The thickness of colluvium at the site was generally less than 2 feet thick at the toe of natural slopes, and almost absent on graded slopes where it has not had time to develop.

Colluvium soils are not suitable for foundation subgrades. They are normally excavated and the foundation placed on the underlying unweathered soil.

6.4 Depression Infilling

Depression infilling describes the geologic process of post-glacial erosion and filling of shallow depressions. Soils encountered in the in-filled depressions are typically loose and may contain organic material. This minor infilling was evident in the variable thickness of loose soil above the dense soil layer on the valley bottom. The existence of these in-filled depressions was also observed in the historic aerial photographs based on vegetation patterns and topographic relief.

With few exceptions the depth of the in-filled depressions varied from 3-inches to about 18-inches. Dense to very dense soils, most likely lodgement till, underlie the loose infill soils.

These soils are generally treated similarly to colluvium soils during construction. Thick deposits can sometimes be constructed upon by pile supporting structures on dense underlying soils. However, most of the deposits are thin enough that the soil can be removed or excavated down to the dense underlying soils.

6.5 Artificial Fill

Uncontrolled, artificial fill often contains loose debris and soils that are unsuitable for foundation and pavement subgrades. Artificial fill was reported to be located at three areas of the site. These are shown in Figure 3 and included the following:

- Eastern slope of the western ridge, southwest of the 200 Building - The fill was observed to extend from the crest to approximately 12 feet below the crest of the slope. The side slope of the fill was generally at 1.5 H:IV (horizontal to vertical) and was covered with a grass sod. There were no signs of slope instability. The compaction methods and relative density of the fill has not been reported and is unknown.

7. HYDROGEOLOGIC CONDITIONS

7.1 Surface Water

The majority of the Fircrest site lies within the Hamblin Creek drainage basin. A small drainage of the western side of the site lies within the Littles Creek drainage basin. Both drainage basins are tributaries to Thorton Creek which is located approximately one mile south of the site. There were no natural stream channels, creeks, ponds or lakes evident on the site in historic topographic maps dating back to 1909 (Appendix B) or on aerial photographs dating back the 1936 (Appendix C). There was also no evidence that natural stream channels on the site during our two site-reconnaissance visits.

A manmade drainage ditch is located at the toe of the slope on the eastern side of the site (Photograph 5). The primary source of the water in the drainage ditch is from Kellogg Middle School and Shorecrest High School to the northeast and east of the Fircrest Site. The source of the water was traced, on two separate site visits during a heavy rain, and found to be from the initiation of stormwater runoff from the schools. Surface water runoff at the subject property follows the local topography and flows into the storm water system or infiltrate into the soil. The stormwater drainage system eventually drains into Thornton Creek, which flows southeast into Lake Washington.

Standing water was observed during the reconnaissance in many of the flat level areas of the site, especially at the low-lying areas of the valley (Photograph 7 and Figure 4). Yard drains have been installed in several of the lawn areas to drain standing water.

7.2 Groundwater

Groundwater was encountered between six and seven feet below ground surface in test pits excavated during the geotechnical investigation for the Public Health Labs N-Wing Addition. The groundwater typically occurred at the surface of the contact with the dense lodgement till that underlies the site.

The depth to the water table and the direction of groundwater flow may fluctuate in response to seasonal recharge, and groundwater extraction or injection. The actual groundwater gradient was not determined in this study due to the lack of available groundwater elevation information. Subsurface exploration was beyond the scope of this study.

of Seismic Zone 3 and presents design criteria for structures in this seismic zone. Except for soft soils and artificial fill, the Fircrest site is underlain by lodgement till with a soil profile type S_C. These soils are very dense with penetration resistance, *N* value, greater than 50 blows per foot ($N>50$). These values are based on average typical values for Standard Penetration Test (SPT) blow counts in exploratory soil borings.

Seismic hazards that can occur from a major earthquake include: ground shaking, liquefaction and lateral spreading, and secondary effects such as landslides and building collapse. The entire Fircrest site is underlain by dense to very dense lodgement till that is not susceptible to liquefaction, lateral spreading or landslides. There was no reported damage at the Fircrest School following the Nisqually earthquake of February 28, 2001.

Historically there has been no correlation of earthquakes with geologic faults in the Puget Sound region. The study of earthquakes indicates that major earthquakes have occurred in the recent past and should be expected to continue into the future. Well-designed and constructed buildings sited on stable soils can better withstand the effects of earthquakes.

10. STANDARD LIMITATIONS

This Preliminary Geotechnical Assessment has been prepared for the exclusive use of the Washington Department of Social and Health Services, Arai/Jackson Architects & Planners and their subconsultants. We have performed this assessment in substantial conformance with generally acceptable industry standards.

This report includes data and information collected during the site visit by Golder Associates, Inc. and is based solely on the condition of the property at the time of the site visit and supplemented by historical information from data base retrieval techniques. There is always the possibility that unrecognized subsurface geological or geotechnical conditions exist that are not readily obvious from the surface. The information presented in this report is based on visual observations made of the surface of the site and from published information. No subsurface explorations were performed as a part of this study.

In evaluating the property, Golder Associates Inc. has relied in good faith on historical information provided by individuals and sources noted in this report. We accept no responsibility for any deficiency, misstatements, or inaccuracy contained in this report as a consequence of omissions, misrepresentations or fraudulent acts of persons interviewed.

This report is not meant to represent a legal opinion. No other warranty, expressed or implied, is made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Golder Associates Incorporated accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This study is based on information provided by others that is presumed to be true and correct. Golder Associates is not responsible for misrepresentation and misstatements from these sources used to evaluate this property.

http://waterdata.usgs.gov/wa/nwis/inventory?search_criteria=county_cd&search_criteria=station_nm&submitted_form=introduction

- University of Washington, Geophysical Program, Seismology Lab, Earthquake Hazards.
  http://www.hedra-x.com/uofw.htm

- University Of Washington, Department of Earth and Space Sciences, February 28, 2001 Nisqually Earthquake.
  http://spike.geophys.washington.edu/SEIS/EQ_Special/WEBDIR_01022818543p/welcome.html

- US Geological Survey, Earthquake Hazards Program – Pacific Northwest.
  http://geohazards.cr.usgs.gov/pacnw/

- Washington Department of Natural Resources, Division of Geology and Earth Resources, Bibliography of Geology and Mineral Resources of Washington State.
  http://www2.wadnr.gov/dbtw-wpd/washbib.htm

FIGURES

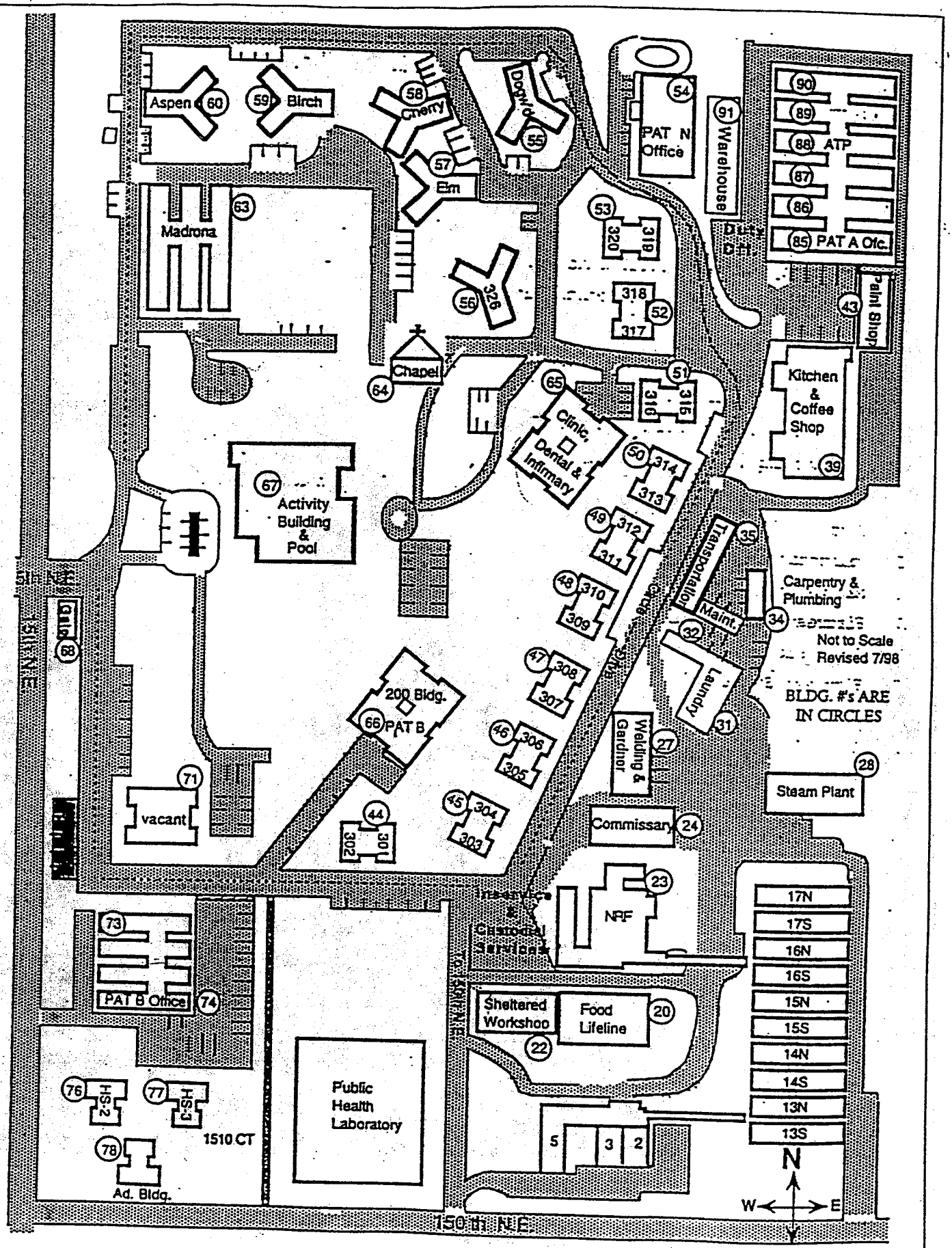


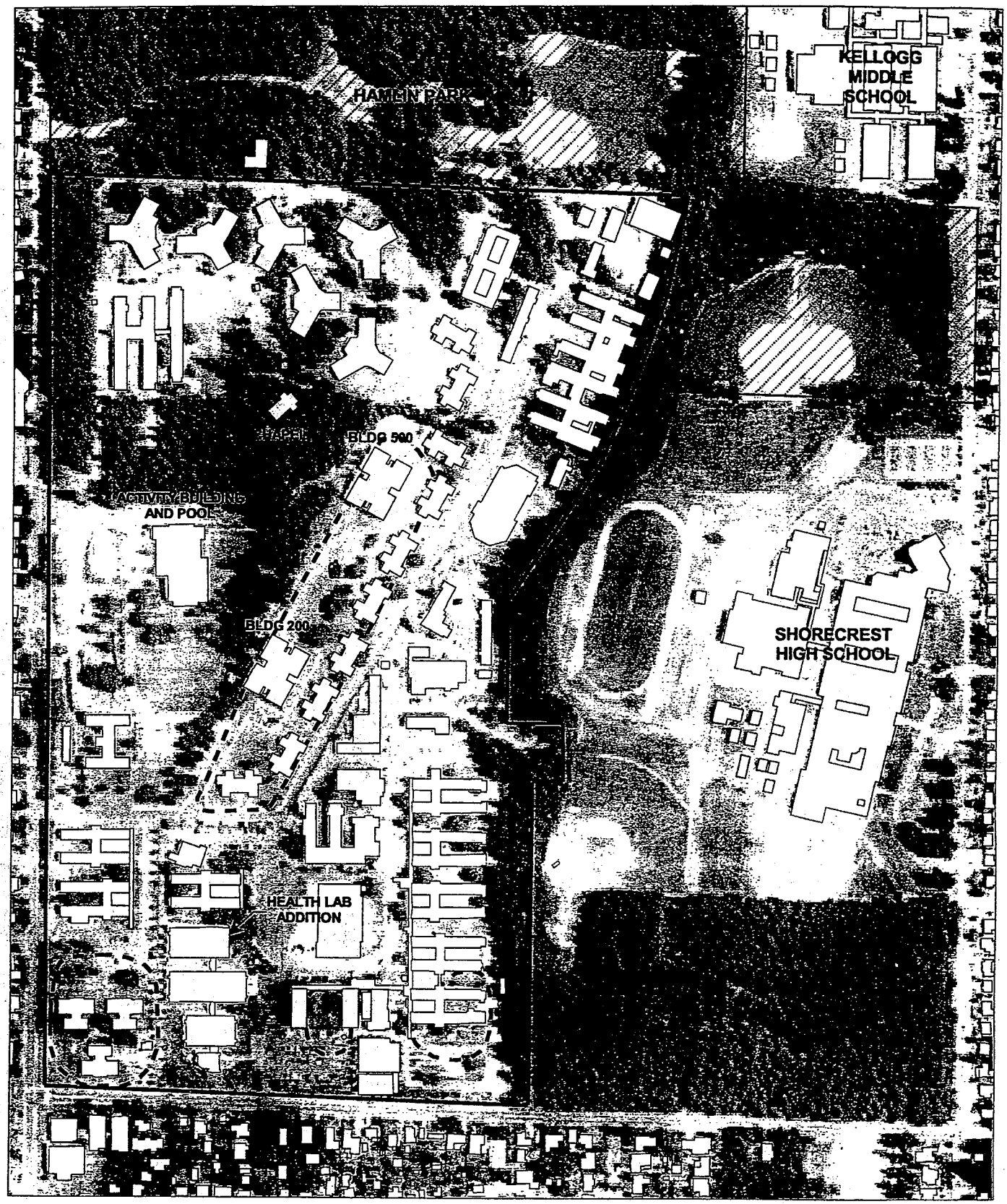
FIGURE **2**

SITE PLAN

ARAI-JACKSON/FIRCREST SCHOOL/WA

DRAWING NO. 01314544000fg01 DATE 04/08/02 DRAWN BY DC

Golder Associates



LEGEND

- Approximate Location of Observed Poor Drainage
- Fircrest School Boundary
- Buildings
- Parks
- Roads

N

0 400

Scale 1" = 400 Feet

Map Projection: Washington State Plane North, NAD83, Feet

Source: Arai-Jackson

Observed Poor Drainage

ARAI-JACKSON/FIRCREST/WA

Drawn: ATB	Revision:	Date: Apr.09, 2002	Figure: 4

01314543000_040802.apr

Golder Associates

Photograph 1. View north up the main street of the site. The site is largely developed with structures, streets, landscaping and lawns. The topography slopes gently south toward the photographer. The majority of the current site development is concentrated in the valley on the site.

Photograph 2. Steep slope along the eastern side of the ridge at the western side of the site. The view is northeast toward Building 200 from the southern end of the ridge. The slope is up to 40 percent and ranges up to 20 feet, north of Building 200 in the mid-ground. The slope was cut during site development.

FIGURE **A-1**
SITE PHOTOGRAPHS
ARAI/JACKSON-FIRCREST SCHOOL SITE/WA

DRAWING NO. 01314543000FG01 DATE 04/10/02 DRAWN BY DC

Golder Associates

HISTORIC TOPOGRAPHIC MAP REVIEW NOTES

Review of the historic topographic maps indicated that no large scale grading or changes to the site topography had occurred during the time of the historic topographic maps. There were no indications of landslide, slope instability or other geologic hazards on the site. There were also no bodies of water or stream channels evident on the site in the maps. The site is well away from any flood planes.

1909

No development or roads are indicated at the Fircrest site. Development in the area is concentrated in the Seattle area to the south of Green Lake.

1949

Initial development of the site is indicated in this map. Buildings are shown at the south, central and eastern portions of the site. There is no development indicated at the northwest corner of the site. Residential development surrounds the site.

1968

Additional development is indicated on the site at the central and eastern sides of the valley. New buildings are indicated at the western side and northwestern corner of the site. The "Y" shaped buildings are indicated at the northwest corner of the site. The original buildings at the southwest corner of the site are shown replaced with smaller buildings.

1983

Several buildings have been removed from along the western side of the central portion of the site. They have been replaced with smaller buildings on a less dense spacing.

Environmental Data Resources, Inc.
Historical Topographic Map Report

Environmental Data Resources, Inc.'s (EDR) Historical Topographic Report is designed to assist professionals in evaluating potential liability on a target property, and its surrounding area, resulting from past activities. ASTM E 1527-00, Section 7.3 on Historical Use Information, identifies the prior use requirements for Phase I environmental site assessment. The ASTM standard requires a review of *reasonably ascertainable standard historical sources. Reasonably ascertainable is defined as information that is publicly available, obtainable from a source with reasonable time and cost constraints, and practically reviewable.*

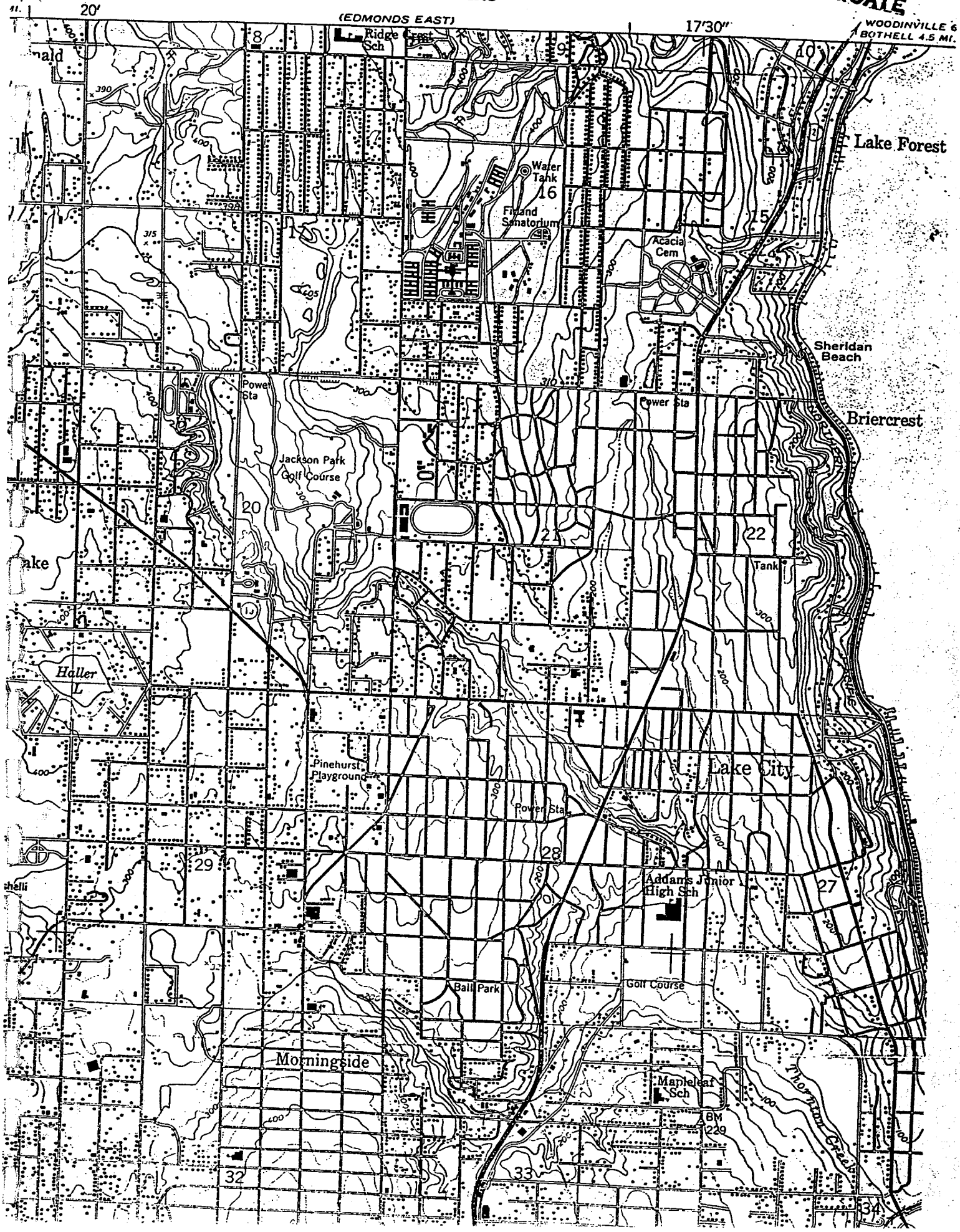
To meet the prior use requirements of ASTM E 1527-00, Section 7.3.2, the following *standard historical sources* may be used: aerial photographs, city directories, fire insurance maps, topographic maps, property tax files, land title records (although these cannot be the sole historical source consulted), building department records, or zoning/and use records. ASTM E 1527-00 requires *"All obvious uses of the property shall be identified from the present, back to the property's obvious first developed use, or back to 1940, whichever is earlier. This task requires reviewing only as many of the standard historical sources as are necessary, and that are reasonably ascertainable and likely to be useful."* ASTM E 1527-00, Section 7.3.2 page 11.)

EDR's Historical Topographic Map Report includes a search of available public and private color historical topographic map collections.

Topographic Maps

A topographic map (topo) is a color coded line-and-symbol representation of natural and selected artificial features plotted to a scale. Topos show the shape, elevation, and development of the terrain in precise detail by using contour lines and color coded symbols. Many features are shown by lines that may be straight, curved, solid, dashed, dotted, or in any combination. The colors of the lines usually indicate similar classes of information. For example, topographic contours (brown); lakes, streams, irrigation ditches, etc. (blue); land grids and important roads (red); secondary roads and trails, railroads, boundaries, etc. (black); and features that have been updated using aerial photography, but not field verified, such as disturbed land areas (e.g., gravel pits) and newly developed water bodies (purple).

For more than a century, the USGS has been creating and revising topographic maps for the entire country at a variety of scales. There are about 60,000 U.S. Geological Survey (USGS) produced topo maps covering the United States. Each map covers a specific quadrangle (quad) defined as a four-sided area bounded by latitude and longitude. Historical topographic maps are a valuable historical resource for documenting the prior use of a property and its surrounding area, and due to their frequent availability can be particularly helpful when other standard historical sources (such as city directories, fire insurance maps, or aerial photographs) are not reasonably ascertainable.



Similar to 1946 photo. Development was complete on the site. Denser vegetation was visible on the western slope of the eastern ridge. The areas of bare ground on noted in the 1946 photos are no longer visible.

No visible streams or creek channels. No evidence of unstable slopes or erosion.

1960 K.C. 60-20-6/7 Black and White Stereo Pair 1"=1000'

Incomplete coverage of the northern side of the site on Photo 7.

The areas of the site were similar to previous photos. Shrubs on the site appeared larger. The top of the eastern ridge had been recently cleared. The ground surface is irregular and undulating.

No visible streams or creek channels. No evidence of unstable slopes or erosion.

1969 K.C. 69-6-4/5 Black and White Stereo Pair 1"=1500'

Incomplete coverage of the northern side of the site on Photo 5

Six Y-shaped buildings have been constructed at the northern end of the western ridge. Two new buildings constructed in place of former H-shaped buildings that had been removed. A school had been developed at the northern end of the east ridge to the east of the site.

No visible streams or creek channels. No evidence of unstable slopes or erosion.

1974 3-20-74 KC-74 1-6-4/5 Black and White Stereo Pair 1"=1500'

Incomplete coverage of the northern side of the site on Photo 5.

H-shaped buildings that were previously in the western side of the valley along the eastern side of the western ridge have been removed and replaced by buildings with smaller footprints. Two multi-story buildings added. The H-shaped buildings at the southern end of the western ridge had been removed other buildings constructed.

No visible streams or creek channels. No evidence of unstable slopes or erosion.

1980 KC 80A5534 7-27-80 10N-6/7 Black and White Stereo Pair 1"=1500'

Incomplete coverage of the eastern side of both images

Similar to above. Site vegetation has apparently become large and more mature. No new construction. No visible streams or creek channels. No evidence of unstable slopes or erosion.

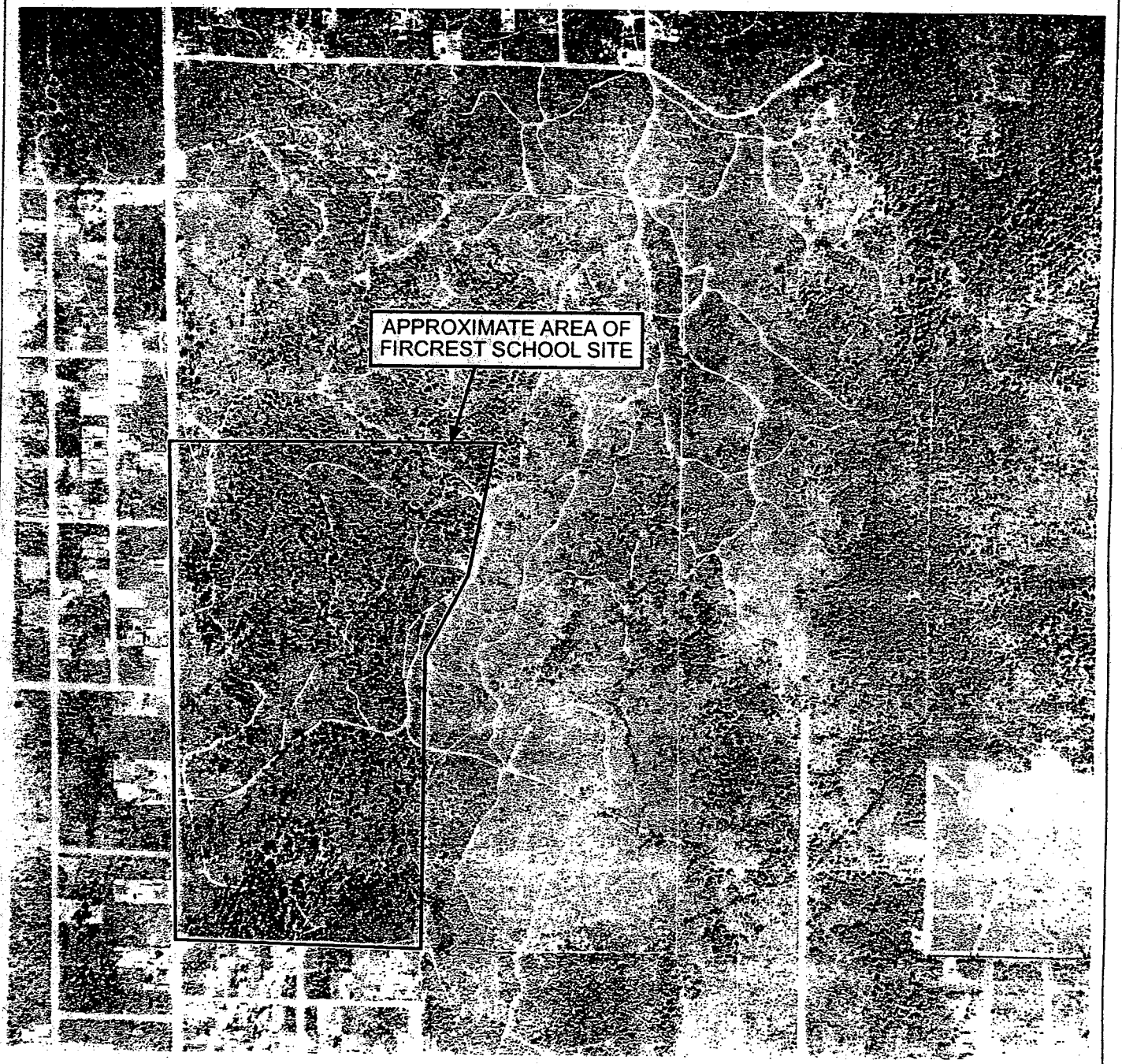


FIGURE **C-1**
1936 AERIAL PHOTOGRAPH
ARAI/JACKSON-FIRCREST SCHOOL SITE/WA

DRAWING NO. 01314543000FG05 DATE 04/10/02 DRAWN BY DC

Golder Associates

Attachment D

TES TOUCHSTONE ECOSERVICES

Susan Black & Associates, Inc
1148 NW Leary Way
Seattle, WA 98107

December 26, 2008

Attn: Charles Warsinske

Transmitted by electronic email to: War@sbassociates.com

RE: Drainage Evaluation
Hamlin Park
City of Shoreline, Washington

Dear Mr. Warsinske:

This letter-report has been prepared at your request to provide an evaluation of the two drainages in Hamlin Park, located at 16006 15th Ave NE in the City of Shoreline, Washington. It is my understanding that the city wants a determination as to whether the drainages are streams or stormwater features. Information in this letter is based on the following sources:

- a site visit at the park conducted on December 4, 2008
- personal communication with Katherine Lynch, Senior Environmental Analyst at Seattle Public Utilities (SPU) on December 23, 2008
- personal communication with Ginger Holser, Habitat Biologist at the Washington State Department of Fish and Wildlife (WDFW) on December 19, 2008
- personal communication with Steve Foley, Fish Biologist at WDFW on December 19, 2008
- *City of Seattle State of the Waters 2007, Volume I: Seattle Water Courses*, prepared by Seattle Public Utilities and Herrera Environmental Consulting
- City of Shoreline GIS Stormwater Maps
- *Thornton Creek and West Lake Washington basins Characterization Report* , 2004, prepared for the City of Shoreline by Tetra Tech/KCM
- City of Seattle Department of Planning and Development GIS imaps (http://web1.seattle.gov/dpd/dpdgisv2/mapviewer.aspx#)
- Digital Coastal Atlas, Washington State Department of Ecology (www.ecy.wa.gov/programs/sea/sma/atlas_home/html)
- Streamnet imap, Pacific States Marine Fisheries Commission (www.streamnet.org)
- *Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California,* 1998, National Marine Fisheries Service.
- *Status Review of Coho Salmon from Washington, Idaho, Oregon, and California,* 1995, National Marine Fisheries Service.

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Both of the drainages at Hamlin Park flow north to south across the park and both are fed primarily from street runoff with minor input from the park itself (see Attachment A). The western drainage, located in approximately the center of the park, begins approximately one mile north of the park near NE Serpentine Place just south of NE 177th Street and enters the park near the 18th Avenue NE/NE 165th Street intersection. The eastern drainage, located along the eastern boundary of the park, begins approximately 1 block north of the park near the 23rd Avenue NE/NE 165th Street intersection. It enters the park via two culverts near the northeast corner of the park. Near the south boundary of the park, water in both drainages enters an approximately 1.7-mile piped system that conveys runoff into Thornton Creek. The watershed for these drainages includes residential, commercial, and school properties, and Hamlin Park.

Initially, from the southern boundary of the park, both drainages enter into separate culverts that carry runoff through two 36-inch concrete pipes that join together just north of NE 150th Street. At that point, the drainage continues south as a single 24-inch concrete pipe under 20th Avenue NE into the City of Seattle, and outfalls into Thornton Creek at 20th Avenue NE just south of NE 130th Street. For the ease in describing this system within this document, this drainage will be referred to as the Hamlin Park drainage.

The elevation within the Hamlin Park drainage drops approximately 60 ft. over most of its length (as measured on the U.S.G.S topographic map accessed on the Washington State Department of Ecology Digital Coastal Atlas); from approximately 125 ft. in elevation at Hamlin Park down to approximately 65 ft. in elevation at the top of bank of the Thornton Creek ravine just south of NE 130th Street. The culvert drops more steeply into the ravine. The Hamlin Park drainage is located in a wide valley that extends from the park to Thornton Creek. It is not known whether this drainage had previously been a naturally occurring stream prior to urban development.

The *Thornton Creek and West Lake Washington Basins Characterization Report* identifies the west drainage as a stream (Hamlin Creek) and the east drainage as the east stem of the creek. However, as part of its *State of the Waters 2007* report, SPU surveyed all of Thornton Creek up to its headwaters at Ronald Bog Park and its two northern tributaries that extend well into the City of Shoreline, but did not include the Hamlin Park drainages (see Attachment B). Katherine Lynch, SPU Senior Environmental Analyst, stated that, as part of the intensive survey of Thornton Creek and its tributaries, SPU and WDFW agreed that the Hamlin Park drainages function only as a stormwater drainage system and were not considered to be a stream because of the lack of a base flow in the drainage due to hydrologic regime alteration from urban development.

During the December 4, 2008 site visit, water observed trickling from the culverts at the north end of the east drainage infiltrated into the ground within several linear feet of the culvert and no surface water was observed in the remainder of the drainage. Also, no surface water was observed in the western drainage during this site visit. Based on flashy hydrologic inputs and the observed infiltration in the drainages, it is assumed that surface flows through the drainages are expected to occur only following large rain events after the ground has become completely saturated. Even then, flows are expected to be intermittent, lasting only as long as it takes for stormwater to flow through the drainages.

Five partial fish barriers and three impassable barriers on Thornton Creek block salmonid passage approximately 1 mile downstream of the Hamlin Park drainage outfall. One of the impassable barriers consists of a set of weirs on private property and two are culverts; one at NE 125th Street near 24th Avenue NE and another at 25th Avenue NE near NE 123rd Street. Weekly fish surveys conducted by Washington Trout from 1999 through 2008 as part of SPU's Thornton Creek watershed study (including

its two northern tributaries Littles Creek and Littlebrook Creek) documents the presence and location of redds and adult and juvenile salmonids. The furthest upstream documentation of salmonids and redds (Chinook and coho) in the north branch of Thornton Creek is near NE 117th Street (See Attachment C). Pacific States Marine Fisheries Commission imaps indicate that only fall-run Chinook occur in Thornton Creek.

The steeper drop in the last 25 feet of the Hamlin Park drainage culvert along with the smooth sides of the concrete culvert may also act as a fish barrier to the Hamlin Park drainage system. In addition, the flashy nature of hydrology within the Hamlin drainage, with high peak flows and rapid recession rates is expected to flush out any fish or benthic organisms in the drainage rather than provide viable habitat.

While the City of Seattle has a long-term goal of replacing the culvert barriers within Thornton Creek, plans to do so have not been formally adopted in the city's capital improvement plans for the creek. The city is communicating with the private property owner regarding removal of the weirs and restoring the creek reach; however there are no plans to carry out this restoration at this time due to the lack of funds. In addition, the city has no plans to reduce the hydraulic drop into the ravine.

Drainage Evaluation

WDFW policy considers even small drainages that have been altered by urban development to be potential fish habitat in the event that downstream barriers to fish are restored at some future date. However, the Shoreline Municipal Code (SMC 20.80.460A) defines streams as perennial and intermittent natural water courses, not including storm or surface water runoff devices or other entirely artificial watercourses, unless they are used by salmonids or are used to convey streams naturally occurring prior to construction.

Because it is not known whether the Hamlin Park drainage was historically a stream, it does not necessarily meet the city's definition of a stream under Shoreline Munipical Code 20.80.460A as it appears to be a constructed stormwater runoff system. No salmonids have been documented within the drainages in the park and the SPU fish study found no salmonids or redds within Thornton Creek 1 mile downstream of the Hamlin Park drainage culvert outfall due to impassable fish barriers.

Even if the barriers were removed, it is doubtful that conditions at the Hamlin park drainages would support the life history of fall-run Chinook and coho because the drainages within Hamlin Park do not provide viable fish habitat during salmonid critical life history periods. The drainages are not expected to have a base flow during the Lake Washington fall-run Chinook migration in the month of August, nor during their spawning period from September into December. In addition, Chinook spawn in the main stem and lower tributaries of rivers where the water is colder than that found in small drainages fed by street runoff. Coho in the Lake Washington basin migrate from September to early November, also when no base flows are expected in the Hamlin Park drainage during years of normal rainfall. Coho spawn from mid-October to early February and the young hatch in the spring and early summer. The fry and smolts stay within freshwater for up to 18 months and require pools, which do not occur in the Hamlin Park drainages.

Two additional investigations could be conducted to assist in determining whether the Hamlin Park drainage is simply a stormwater runoff system or whether it has the capability to provide salmonid habitat:

1. The outfall of the Hamlin Park drainage culvert could be checked to see whether it is perched above Thornton Creek.

2. An investigation into the base flow within the park drainages may also indicate whether the drainages have the potential to provide salmon habitat. January is expected to be the first month that groundwater saturation would be high enough to support surface flows in the drainages. The drainages could be monitored January 2009 to document the duration of surface flow in the drainages following rain events.

If the culvert outfall is perched one foot or more above Thornton Creek then the entire Hamlin Park drainage can function only as a stormwater drainage system. If the drainage is determined to function only as a stormwater system, there is no buffer required under SMC 20.80.480B.

If the outfall would allow fish passage AND if base flow were present in the Hamlin Park drainages during years of normal rainfall, then the drainages could be considered to be a Type III or IV stream depending on their channel width. SMC 20.80.480B requires a minimum 35-ft. buffer for Type III streams and a 25 ft. minimum buffer for Type IV streams.

The conclusions reached in this letter are based on current local critical regulatory requirements, state administrative code definitions for fish habitat, and my understanding of salmonid life history. Existing regulations and requirements are subject to change as jurisdictional agencies periodically update their code. If the proposed park improvements are delayed, another evaluation of permit implications may be necessary to assess any regulatory requirements.

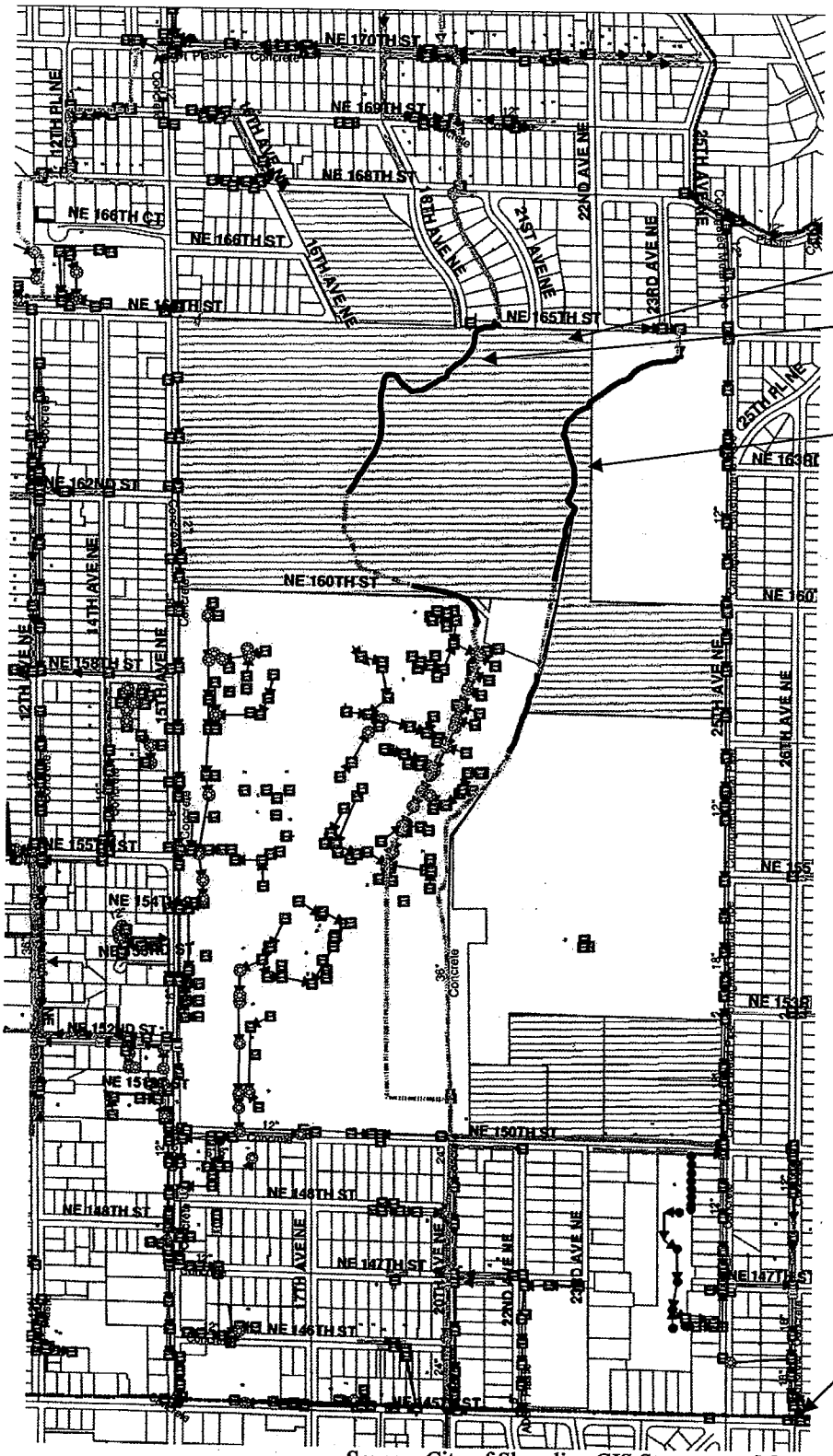
I appreciate the opportunity to assist you with this project. Please call me at (206) 801-7154 if you have any questions regarding this evaluation.

Respectfully,

Diane Brewster

Diane Brewster
Professional Wetland Scientist, Cert. # 1721

ATTACHMENT A
City of Shoreline Stormwater Map of Hamlin Park Drainages



HAMLIN PARK

West Drainage

East Drainage

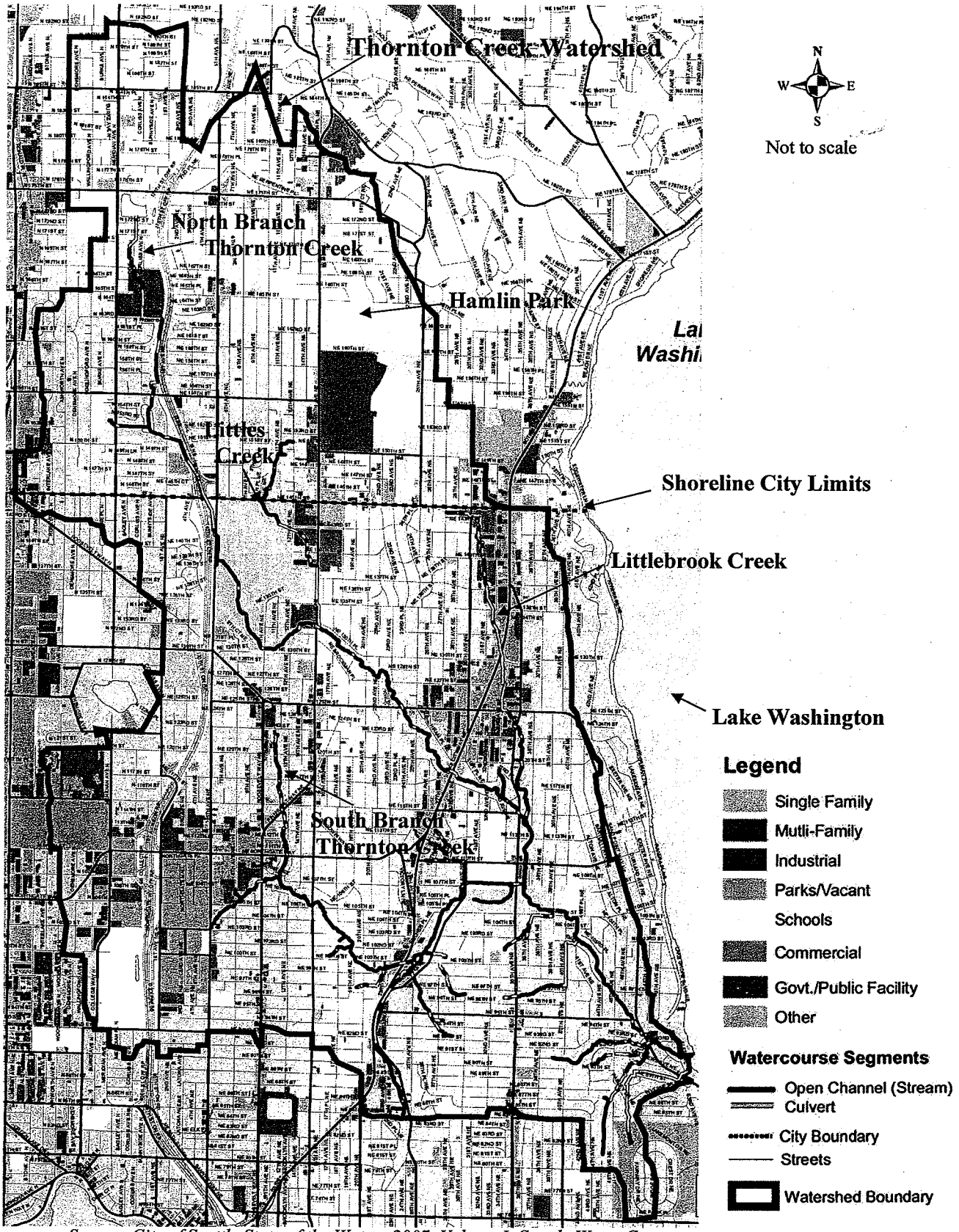
Shoreline City Limits

Source: City of Shoreline GIS Stormwater Map
Provided by Eric Gilmore, 12/16/08

N
W E
S

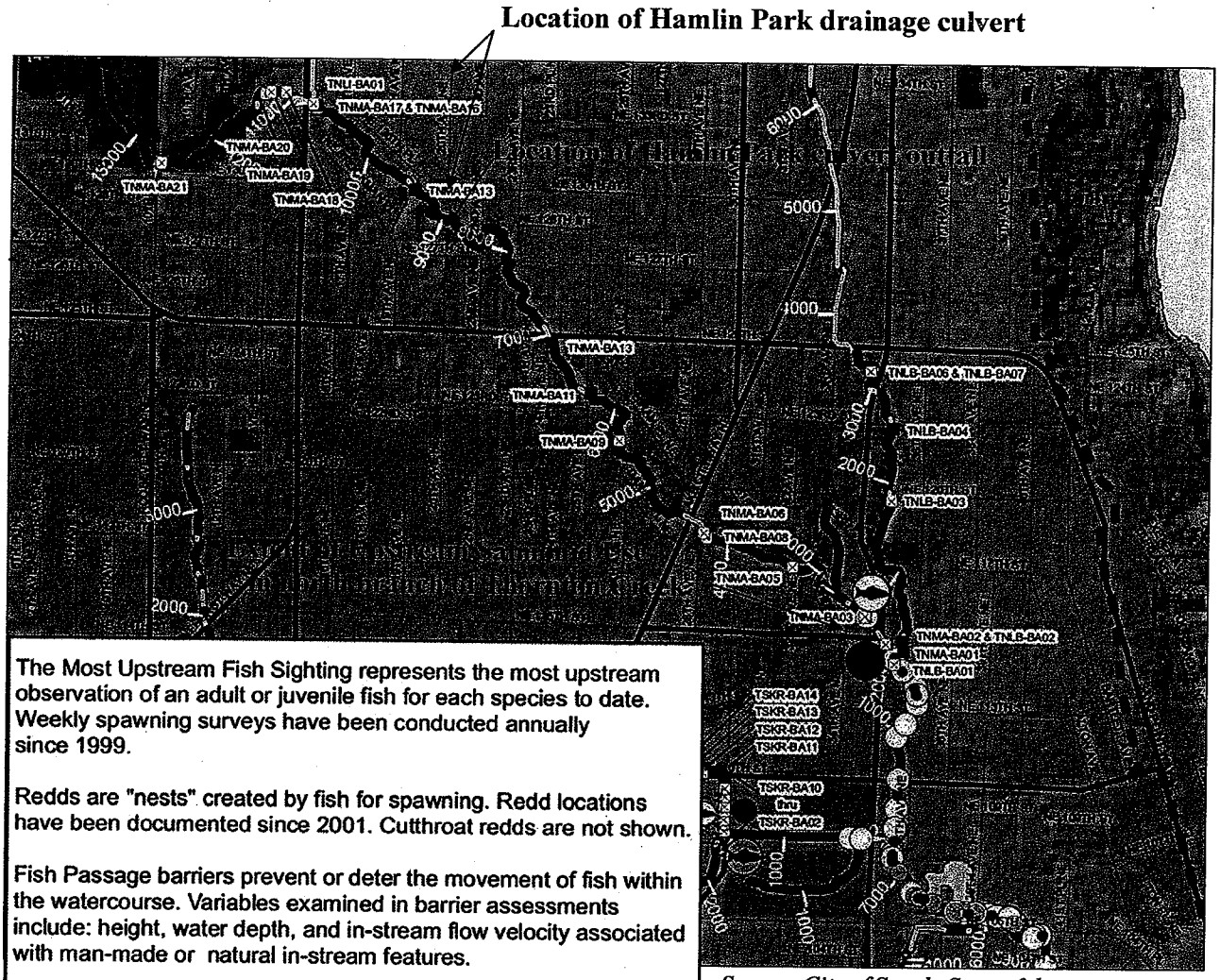
Not to scale

ATTACHMENT B
Thornton Creek Watershed



Source: *City of Seattle State of the Waters 2007, Volume I: Seattle Water Courses*

ATTACHMENT C
Thornton Creek Fish Use and Fish Barriers



The Most Upstream Fish Sighting represents the most upstream observation of an adult or juvenile fish for each species to date. Weekly spawning surveys have been conducted annually since 1999.

Redds are "nests" created by fish for spawning. Redd locations have been documented since 2001. Cutthroat redds are not shown.

Fish Passage barriers prevent or deter the movement of fish within the watercourse. Variables examined in barrier assessments include: height, water depth, and in-stream flow velocity associated with man-made or natural in-stream features.

Data Sources: 1999-2006 Spawning Surveys, 2002 Barrier Assessment, 1999 Stream Typing Survey

Source: *City of Seattle State of the Waters 2007, Volume I: Seattle Water Courses*

N W E S

Not to scale

Legend

Most Upstream Fish Sighting

- Chinook
- Coho
- Chum
- Sockeye
- Steelhead Trout
- Resident Cutthroat Trout
- Rainbow Trout

Salmon Redds

- Chinook
- Sockeye
- Coho

Fish Barriers

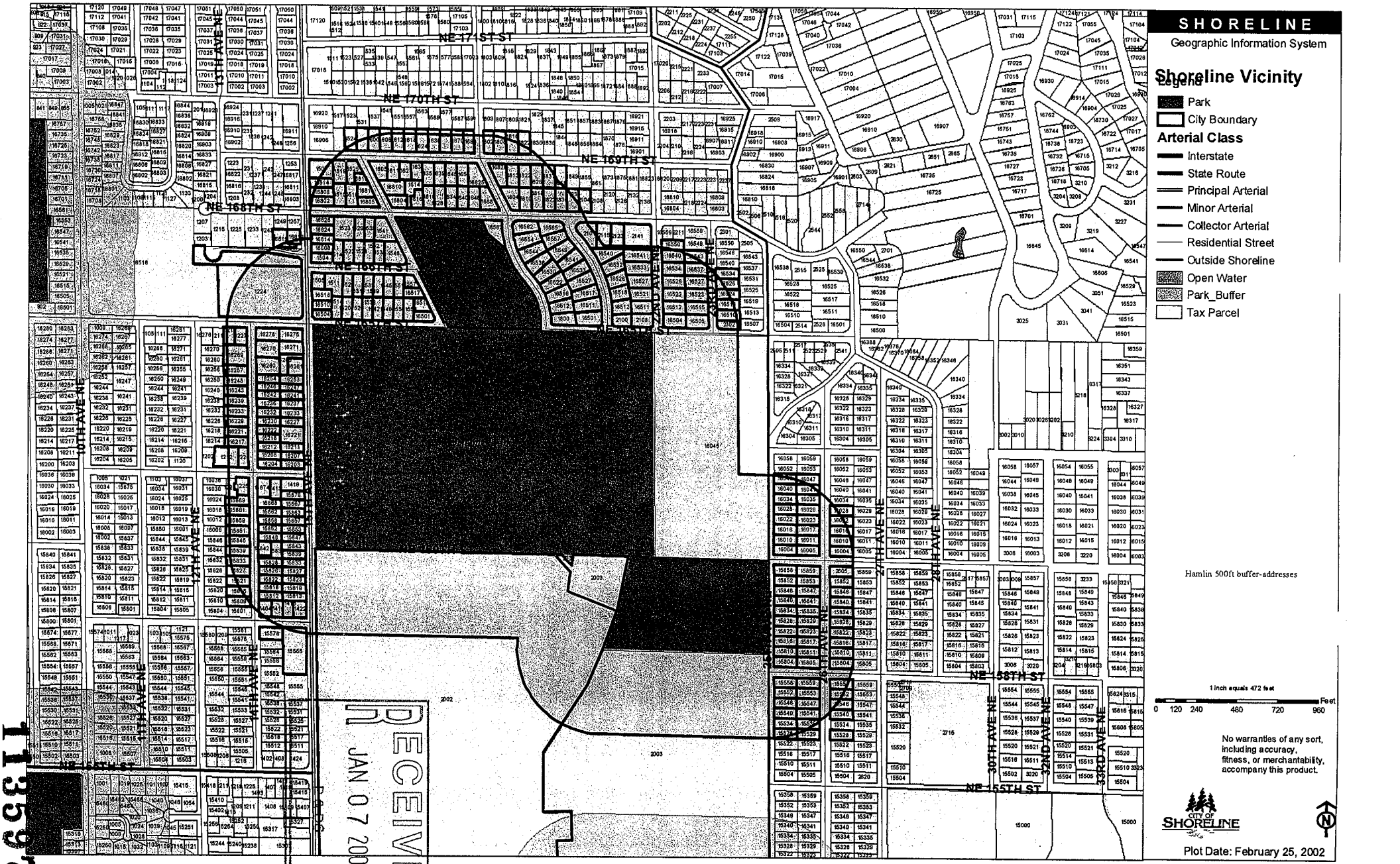
- Barrier
- Partial Barrier
- Unknown Barrier Status

Watercourse Segments

- Open Channel (Stream)
- Culvert

- City Boundary
- Streets
- Watershed Boundary
- Parks

*Upstream sightings on tributaries have smaller symbols


SHORELINE
Geographic Information System
Shoreline Vicinity
Legend
Park
City Boundary
Arterial Class
Interstate
State Route
Principal Arterial
Minor Arterial
Collector Arterial
Residential Street
Outside Shoreline
Open Water
Park_Buffer
Tax Parcel
Hamlin 500ft buffer-addresses
1 inch equals 472 feet
Feet
0 120 240 480 720 960
No warranties of any sort, including accuracy, fitness, or merchantability, accompany this product.
CITY OF SHORELINE
Plot Date: February 25, 2002
NE 171ST ST
NE 170TH ST
NE 169TH ST
NE 168TH ST
NE 160TH ST
NE 158TH ST
NE 155TH ST
10TH AVE NE
12TH AVE NE
14TH AVE NE
15TH AVE NE
25TH AVE NE
27TH AVE NE
28TH AVE NE
30TH AVE NE
32ND AVE NE
33RD AVE NE
RECEIVED
JAN 07 2009
PLANNING & DEVELOPMENT SERVICES

17397

TES TOUCHSTONE ECOSERVICES

Susan Black & Associates, Inc
1148 NW Leary Way
Seattle, WA 98107

February 22, 2009

Attn: Charles Warsinske

Transmitted by electronic email to: War@sbassociates.com

RE: Drainage Evaluation
Hamlin Park
City of Shoreline, Washington

Dear Mr. Warsinske:

This letter-report has been prepared as you requested to respond to the Hamlin Park SEPA Review - #113597 memorandum prepared by the City of Shoreline and dated February 10, 2009. Specifically, the request is for two additional investigations outlined in the Drainage Evaluation letter prepared by Touchstone Ecoservices, dated December 26, 2008, to assist in determining whether the Hamlin Park drainage is simply a stormwater runoff system or whether it has the capability to provide salmonid habitat. These include:

1. Check the outfall of the Hamlin Park drainage culvert at Thornton Creek to see whether it is perched one foot or more above Thornton Creek.
2. Investigate the base flow within the two park drainages to document whether they have base flow during this wetter time of year.

A field investigation on February 15, 2009 to document 1) the condition of the Hamlin Park drainage outfall at Thornton Creek, located just south of NE 130th Street on the east side of 20th Avenue NE, and 2) the presence or lack of surface water in the drainages both within and south of the park. A second field investigation was conducted on February 22, 2009 to document the hydrologic condition of the drainages within the park following a rainfall event. The results of those investigations are described below and photographs of the park drainages are attached.

The February 15, 2009 investigation found that the outfall of the Hamlin Park drainages at Thornton Creek overhangs the creek by 8 inches. This height would allow fish to enter the culvert during high water flows.

The drainages from Thornton Creek up to Hamlin Park consist of a series of open ditches and piped sections along 20th Avenue NE. The open ditches were observed for water flow and are located as follows:

- from the north end of the outfall culvert to NE 130th Street
- from NE 135th Street to NE 145th Street

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- from 147th Street to NE 150th Street
- an approximately 425-ft. ditch along the east side of the Fircrest facility

Flowing water observed during the February 15th investigation was approximately 3 to 4 inches in depth in the open ditches south of NE 145th Street. No flowing water and no saturated soils were observed to the north of NE 145th Street.

Conditions of the open drainages within the park were the same as those observed during the December 4, 2008 site visit and described in the December 26, 2008 Drainage Evaluation letter. On February 15, 2009, water less than 1/2 inch deep was observed trickling from the two 36-inch culverts at the north end of the east drainage. The water infiltrated into the ground within 30 feet of the culverts and no surface water or saturated soils were observed in the remainder of the drainage within the park. Following the light rain event (approximately 0.02 inches) on February 22nd, water flowing from the culverts at the north end of the drainage remained the same as observed the previous week. There were four small areas of pooled water within the drainage that were less than ½ inch deep. No water was flowing into the south culvert that conveys water out of the park. There was also no water in the open ditch along the east boundary of the Fircrest facility during both of these investigations.

On both February 15 and 22, 2009, no water was observed entering the western drainage from the culvert the near the 18th Avenue NE/NE 165th Street intersection. The drainage through the park was completely dry, as was the Fircrest detention pond located just south of the park into which water from this drainage flows.

Due to urban alterations to the upstream hydrologic regime any flows in the park drainages are intermittent and flashy, and are dependant on the size of the storm event. Due to the lack of base flow in these drainages at this time of year and the fact that surface water in the system does not begin until NE 145th Street, approximately 4,300 ft. south of the park, these drainages were determined to function only as a stormwater system and are not a creek.

The conclusions reached in this letter are based on current local critical regulatory requirements. Existing regulations and requirements are subject to change as jurisdictional agencies periodically update their code.

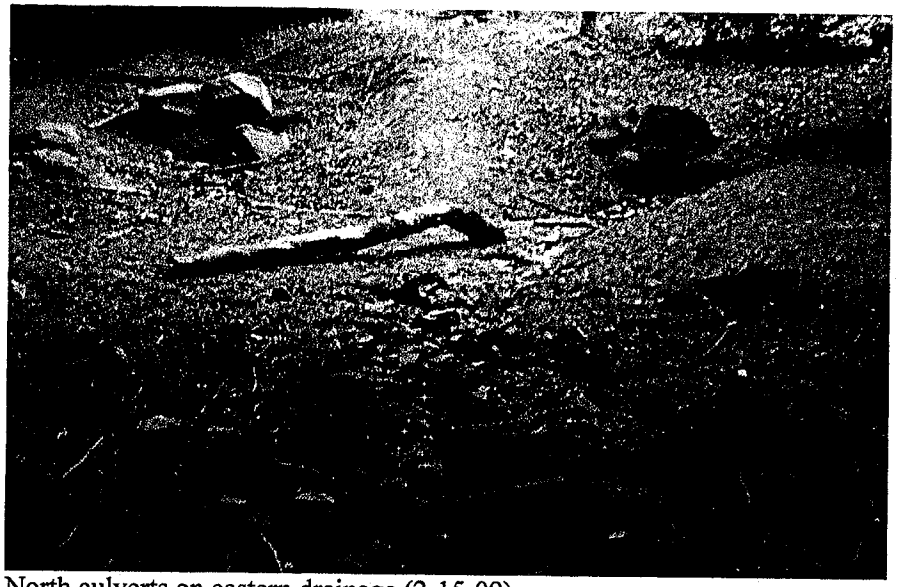
I appreciate the opportunity to assist you with this project. Please call me at (206) 801-7154 if you have any questions regarding this evaluation.

Respectfully,

Diane Brewster

Diane Brewster
Professional Wetland Scientist, Cert. # 1721

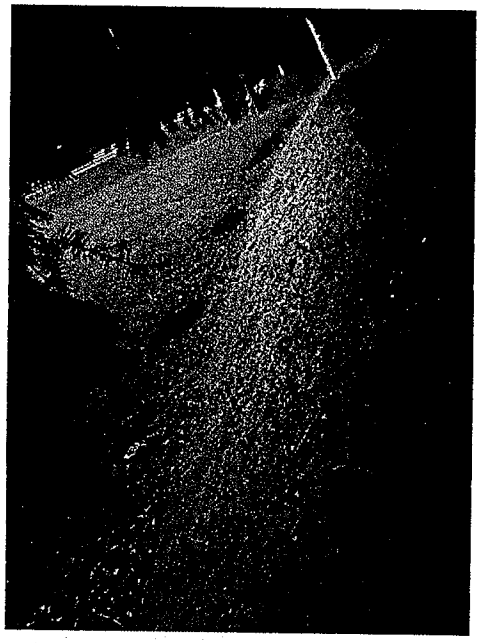
Hamlin Park Drainages Investigation
February 15 and 22, 2009



North culverts on eastern drainage (2-15-09)

South culvert leaving the park on the eastern drainage (2-15-09)

North culverts on eastern drainage (2-22-09)



pools in eastern drainage following rainfall (2-22-09)

Hamlin Park Drainages Investigation
February 15 and 22, 2009

North culvert on western drainage (2-15-09)

Dry west drainage channel (2-15-09)

dry west drainage (2-22-09)

Hamlin Park Drainages Investigation
February 15 and 22, 2009

Hamlin Park drainages outfall into Thornton Creek (2-15-09)

TES TOUCHSTONE ECOSERVICES

Susan Black & Associates, Inc
1148 NW Leary Way
Seattle, WA 98107

March 11, 2009

Attn: Charles Warsinske

Transmitted by electronic email to: War@sbassociates.com

RE: Fircrest Master Plan Restoration Project Comparison
Hamlin Park
City of Shoreline, Washington

Dear Mr. Warsinske:

This letter is in response to the request from the City of Shoreline to review the *Fircrest Master Plan: Critical Areas Report and Conceptual Restoration Plan for Hamlin Creek* prepared by The Watershed Company (dated November 24, 2008). The purpose of this review is to evaluate the ball field improvement plan design at Hamlin Park to make sure that the treatment of the Hamlin Park drainages are comparable and compatible with Fircrest's plan to expose one piped section of the drainage and widen two other sections of the drainage on their property. This letter addresses two items: 1) does the planned work at Fircrest infer that the Hamlin Park drainages are a creek and 2) is the planting plan along the east drainage in Hamlin Park comparable with the planting plans in the Fircrest project.

The Fircrest report states clearly that what is called Hamlin Creek is simply a stormwater drainage system (pp. 6-8 in the report). Their review of historical topographic maps and aerial photographs revealed that there was no stream or creek system in either Hamlin Park or the Fircrest campus. They have collected information showing that the drainages in the park and on the Fircrest Campus do not have even a seasonal flow; instead water flows briefly through the drainages after rain events. The Fircrest report states clearly that no fish occur in the drainages and no fish habitat is available along the length of the drainages.

The Fircrest project proponent has chosen to 'restore' the drainages on their campus. This is being done primarily to improve drainage on the campus and provide an on-campus amenity feature (p. 21 in the report). The proposed 'restoration' will involve exposing the drainage along the east side of the campus just north of 50th Avenue NE and widening two existing exposed drainage channels further north of the newly exposed drainage channel. The report makes it clear that this work will not result in increased water flows in the drainage and it will not provide fish habitat. Instead, it will serve to provide habitat for terrestrial wildlife, increased water quality improvement, stormwater detention and reducing downstream flood flows (p. 10 in the report). The main benefit that the proposed work will provide for fish is within the downstream receiving waters of Thornton Creek by cleaning the water from the Fircrest campus. However, until street runoff along 20th Avenue NE south of the Fircrest campus is

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cleaned prior to entering the drainage, pollution will continue to be picked up along the open ditches on 20th Avenue between Fircrest and Thornton Creek.

The ball park improvement plans in Hamlin Park are consistent with the drainage improvement plans proposed at the Fircrest campus. A 25-foot buffer will be placed along the exposed channel just north of 50th Avenue NE. However, the other two channels at Fircrest to be widened will have a buffer of approximately 10 feet or less between the drainage channel and the existing adjacent roadway and buildings. These narrower buffers may be increased at some future date when the adjacent areas are redeveloped. While the Fircrest plan does not provide a specific planting plan, the buffers will be planted with native species and spacing for trees, shrubs and herbaceous plants as listed by King County DDES for critical area enhancement plans. In comparison, the east drainage in Hamlin Park is already exposed and will be planted with an undulating buffer that varies in width from 15 to 30 feet wide with native species spaced comparably to that proposed by the Fircrest project. Thus, the Hamlin park project will provide a buffer that is comparable in size and composition to the proposed buffer in the southern Fircrest enhancement area. The Hamlin Park buffer will be wider that than provided on the two northern enhancement areas at Fircrest

In conclusion, the Fircrest report supports the Hamlin Park project finding that the two onsite drainages are stormwater features. In addition, the proposed planting plan along the east drainage for the Hamlin Park project is comparable to that for the proposed Fircrest drainage improvements.

I appreciate the opportunity to assist you with this project. Please call me at (206) 801-7154 if you have any questions regarding this evaluation.

Respectfully,

Diane Brewster

Diane Brewster
Professional Wetland Scientist, Cert. # 1721